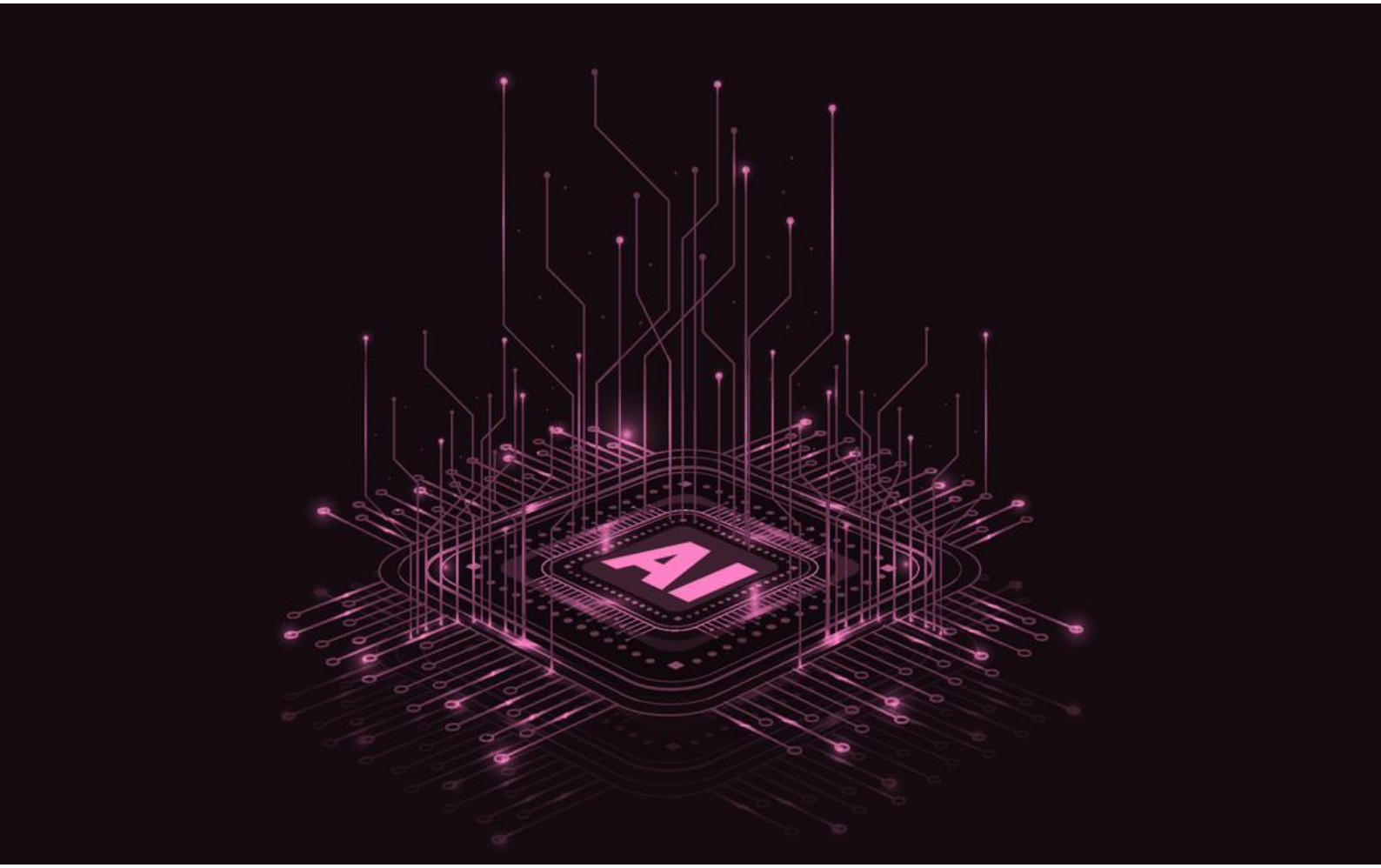
Generative artificial intelligence and its impact on state government IT workforces

McKinsey & Company

NASCIO Representing Chief Information Officers of the States

April 2024



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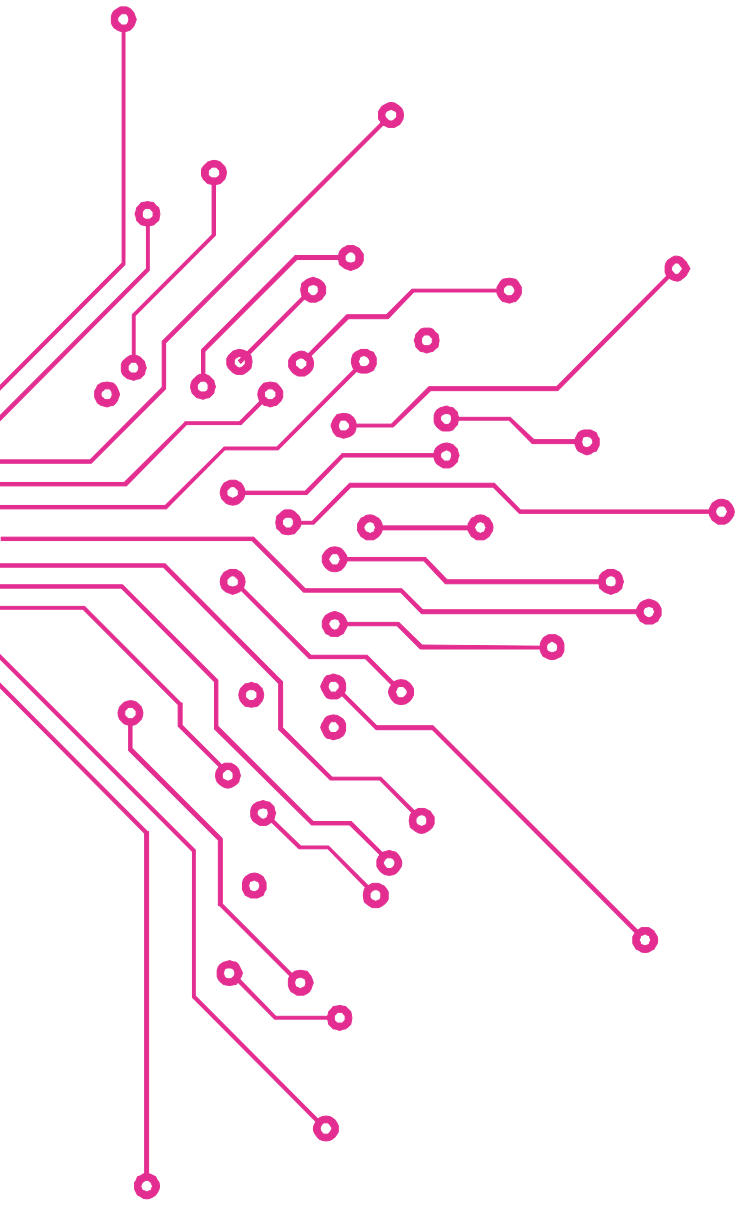


1. Foreword

This research was conducted to better understand the current state and plans for the rollout of generative artificial intelligence (GenAI) in state governments across the US, focusing on workforce implications and challenges. NASCIO would like to thank those whose input has helped inform this report, including its knowledge partner for this report, McKinsey & Company, who provided the analytical fact base.

In February and March 2024, 49 state chief information officers (CIOs) responded to our survey, and we followed up by interviewing many of these CIOs to explore insights arising from the survey. The quotes in this report come directly from the survey and interviews.

2. Executive summary

Key messages

- With policy guardrails in place, and many pilots underway or complete, now is the time for states to move into the scaling phase to realize the benefits of GenAI.
- Scaling up presents real challenges. Chronic skills shortages, for example, will require innovative approaches to helping current staff learn and master new skills and to finding and recruiting fresh talent.
- Additional barriers to full-scale deployment include limitations in data quality, lack of allocated budgets, security, privacy and ethical concerns, and a lack of benefits capture and mechanisms to prioritize at-scale deployments.
- As more use cases are deployed, a wide array of state employees may need to work in new ways and in new teams; technology workforces could be role models in this regard.
- At-scale rollout will also require talent beyond the traditional remit of CIOs, including experts in ethics, responsible AI practices, privacy and various aspects of law and legislation, and deep expertise in topics such as customer service, procurement, workforce development, and specific domains including health, human services, and transport.
- Departments and agencies—procurement, IT, legal, finance, and line agencies, for example—could collaborate more to scale. These collaborations could work in agile multidisciplinary teams at a faster pace than usual.

GenAI is set to have significant impacts on the US workforce

- Automation, particularly through GenAI, could increase US labor productivity by 0.5 to 0.9 percentage points annually through 2030, contributing to significant productivity gains.
- Combining GenAI with other automation technologies could drive annual productivity growth to three to four percent by 2030.
- To realize these benefits, stakeholders across the public and private sectors will need to help workers master new skills and mitigate the risks associated with GenAI.
- Leaders could help workers see GenAI as an aide or “copilot” meant to augment abilities, facilitating smoother transitions and higher-value activities.
- While the McKinsey Global Institute’s (MGI) research shows that automation, including GenAI, could affect up to 30 percent of work hours in the US economy by 2030, MGI

expects it to enhance work in science, technology, engineering, math (STEM), creative, business, and legal professions, rather than displacing a significant number of jobs outright[1].

The research provides a clear picture of the state of GenAI in state government

- Nearly all states have made progress in their GenAI journeys, with the majority having completed research, issued risk guardrails, collaborated with the private sector and invested in training.
- Given that the majority of states have created policies, frameworks and risk guardrails related to GenAI, state CIOs are generally excited and impatient to move into proofs of concept and production implementations to capture benefits. Nearly half have progressed to a proof of concept, pilot or production phase. At the same time, CIOs remain vigilant about open issues such as data privacy and fraud prevention.
- Expected benefits from GenAI include, but are not limited to, productivity boosts, automated content generation, improved analysis and decision-making, and transformations of citizen interactions and service delivery. State CIOs say these benefits may be hard to monetize within business cases.
- There is little observable anxiety about job replacement; according to the interviewed CIOs, most state employees see GenAI as just another tool that will augment human work, not replace it.

  "Most of the folks I'm coming across are technologists or familiar with tech, and staff overwhelmingly seem excited about it. I think it's because they have massive workloads, and they see it as a way to alleviate some of that. There's more excitement than concern."

  "Email was a big moment for IT… it's the same for AI—it's just another tool."
- Leaders in a majority of states therefore believe that GenAI will positively impact their workforces, reducing repetitive tasks, and allow them to absorb excess demand. The biggest productivity improvements are expected in software development, quality testing and data roles, although the full benefits may not be evident for several years.
- While 57 percent of survey respondents felt there would be no change in CIO-related workforce numbers as a result of GenAI, more than a quarter felt they would need to increase headcount to implement and manage GenAI.
- More than half of respondents cited skills shortages as the main barrier to successful GenAI impact, and their inability to match private-sector salaries gave them low confidence that they could attract and retain sufficient talent to build internal GenAI "muscle," meaning that they could rely heavily on vendors for the foreseeable future.

  "GenAI has the potential to fundamentally change how we approach our technology work. Not only will government need to reassess workforce needs, positions, titles and responsibilities, but it will also need to retain and recruit talent who understand how to leverage GenAI as a force multiplier for efficiencies in government."
- Respondents' greatest concern was the lack of necessary skills related to the CIO workforce, and they share concerns about security, privacy and bias.

[1] "The economic potential of generative AI" and "Generative AI and the Future of Work in America," McKinsey & Company, both published in June 2023

- The growth of GenAI will likely trigger a significant wave of reskilling and upskilling. Several state CIOs highlighted the role of higher education in widening the pipeline of talent in the field, but the majority expect that skill-based credentials will be more relevant than college degrees in the CIO-related workforce.
- Most states are creating central hubs for agencies, generally referred to as centers of excellence or innovation hubs, which can include sandbox infrastructure or cybersecurity offerings.
- GenAI has brought the challenges of data accuracy and governance to the fore: solutions cannot be based on inaccurate or biased data. Many data transformation programs may therefore be accelerated, potentially with the assistance of GenAI itself, to cleanse and manage large volumes of data, without replacing business owners' clear responsibility for its veracity.

  "You need good control of your data, and state agencies [struggle with this]. AI can really put a focus on that. If we can get that right, I think we'll have opportunities to make people's lives easier."
- The most common initial use cases include customer service (typically including advanced chatbots), code creation, document generation, testing, and data management.
- The potential path forward for states covers four workforce topics: talent planning, talent attracting and onboarding, talent development and talent management (**Exhibit 1**):

Exhibit 1: Workforce considerations as GenAI scales up (non exhaustive)

3. GenAI and its potential impacts on the US workforce

The McKinsey Global Institute in 2023 studied how to reignite productivity growth in the United States, highlighting the critical roles of automation and reskilling.[2] Automation could help jumpstart productivity, for example, while easing labor shortages.

The research identified GenAI as a key driver, with the potential to increase US labor productivity by 0.5 to 0.9 percentage points annually through 2030, and by three to four percent in combination with other automation technologies. Realizing these gains will require concerted efforts. The public and private sectors can help workers develop new skills, for example, and manage the risks associated with GenAI.

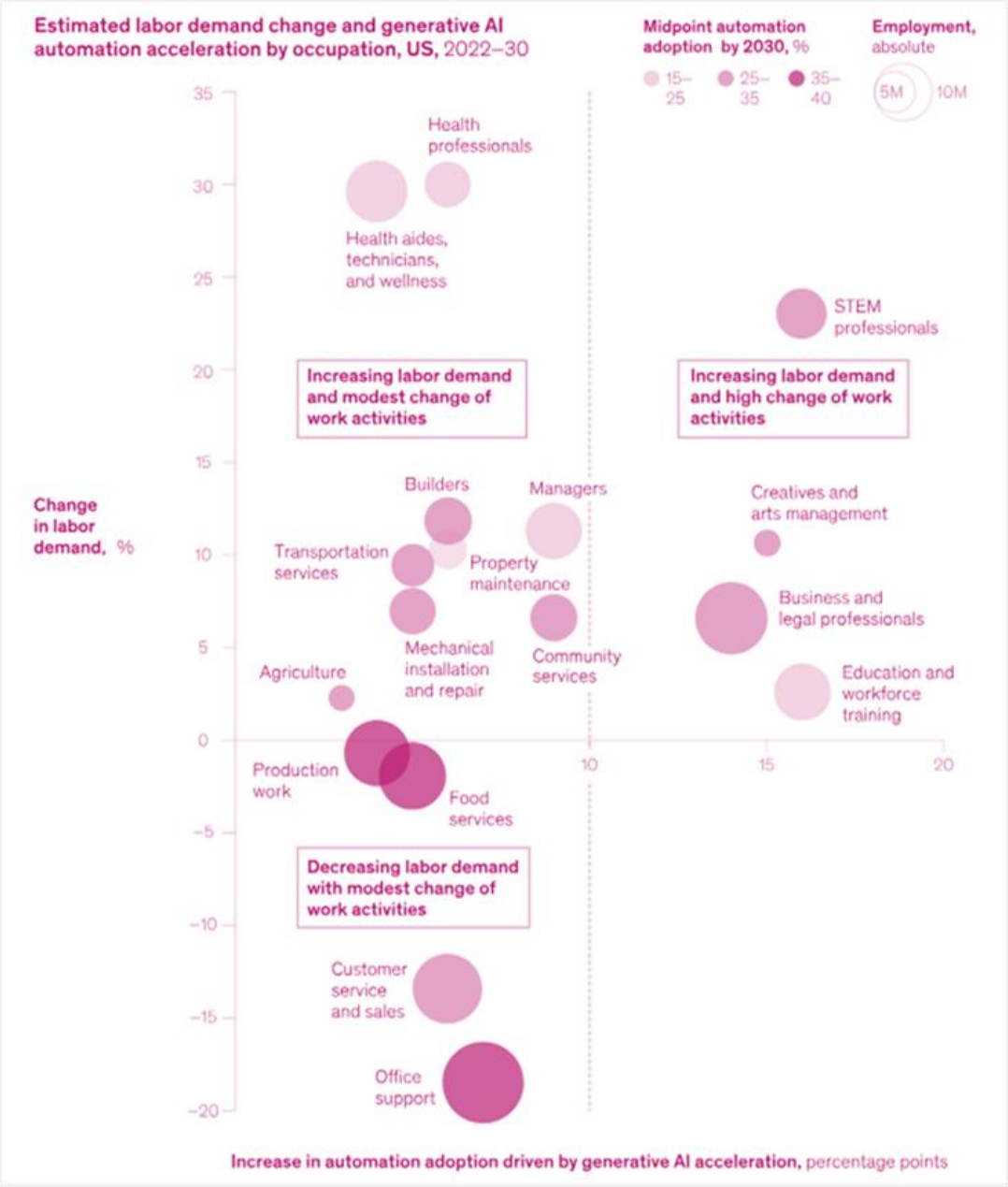
To capture the full productivity benefits of GenAI, employers, policymakers and broader ecosystems can establish clear guidelines and guardrails and both see the new tools, and encourage workers to see them, as aides rather than threats. Indeed, GenAI can handle many administrative duties and other routine, repetitive work, freeing people to pursue more stimulating and higher-value tasks and fostering creativity and collaboration.

The research estimates that automation, especially with the integration of GenAI, could impact up to 30 percent of work hours in the US economy by 2030. Notably, while automation may reshape certain job categories, the research suggests that labor demand will continue to increase in the categories most affected by GenAI, which include in science technology, engineering and math, and among creative and business professionals, rather than displacing a significant number of jobs outright (**Exhibit 2**).

States may need to expand workforce development initiatives and adopt more inclusive hiring practices to support these transitions. Given the high expected number of transitions, the research suggests that employers may need to hire for skills and competencies rather than credentials, recruit from overlooked populations such as rural workers and people with disabilities, and deliver training that keeps pace with workers' evolving needs.

[2] "The economic potential of generative AI" and "Generative AI and the Future of Work in America," McKinsey & Company, both published in June 2023

Exhibit 2: While STEM, healthcare, building trades and other professional fields continue to add jobs, GenAI could significantly change work in many occupations[3]

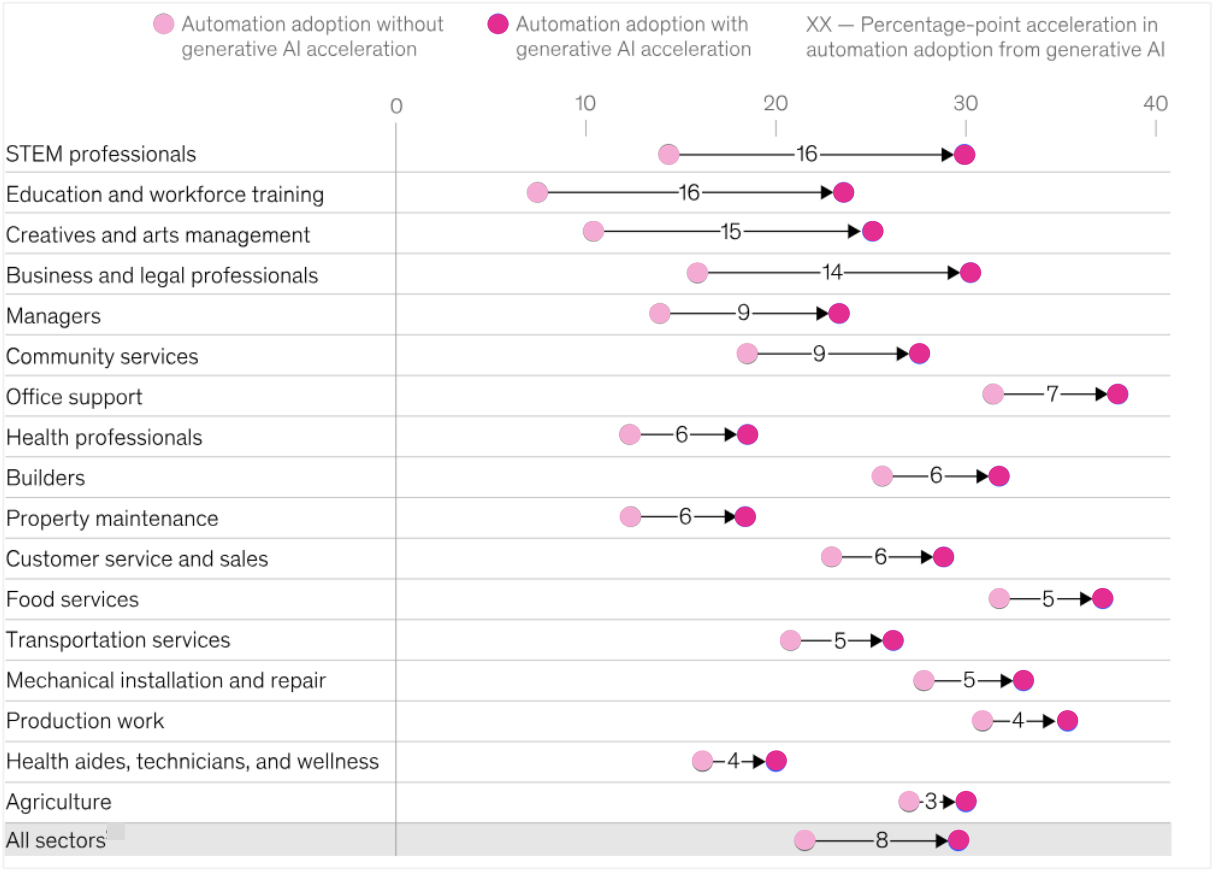


Methodology note: The methodology considered many drivers affecting demand: rising incomes, aging populations, technology and infrastructure investment including the Bipartisan Infrastructure Law, rising education levels, net-zero transitions, the marketization of unpaid work, the creation of new occupations, automation including GenAI, increased remote work and virtual meetings, and e-commerce and other virtual transactions. Sources: US Bureau of Labor Statistics; Current Population Survey, US Census Bureau; and McKinsey Global Institute analysis.

Automation could impact a broader range of work activities than ever before, including those requiring expertise, interaction with people, and creativity. The adoption timeline for automation could accelerate significantly. Without GenAI, automation could account for 21.5 percent of US work hours by 2030; with it, this share could increase to 29.5 percent. (**Exhibit 3**)

[3] Midpoint automation adoption is the average of early and late automation adoption scenarios described in "The economic potential of generative AI: The next productivity frontier," McKinsey, June 2023

Exhibit 3: Midpoint automation adoption by 2030 as a share of time spent on work activities, US, percent[4]



4. The status of GenAI in US state governments

The survey responses and interviews confirmed that most states are taking clear steps to capture the benefits of GenAI within relevant regulatory frameworks. While the speed and nature of adoption vary by state, there are signs of progress. However, no state yet appears to be delivering GenAI at scale (such as a domain transformation).

- 92 percent of states are developing or working on GenAI frameworks and policies, reflecting their commitment to responsible and ethical implementation.
- 80 percent are collaborating with AI industry experts and researchers, showcasing a proactive approach to harnessing GenAI's potential. That said, many could further explore socio-economic implications; only 10 percent are assessing areas such as potential job displacement and recruitment strategies.
- 53 percent are investing in training programs, helping their workforces prepare for the transformative impact of GenAI.
- 34 percent have built proofs of concept (PoCs) and piloted some GenAI models; 10 percent have moved GenAI initiatives into production.

[4] Source: "The economic potential of generative AI: The next productivity frontier," McKinsey, June 2023

Exhibit 4: Most states have taken steps in preparing their workforce for GenAI

Question: What steps is your state taking to address the potential impact of GenAI on your state government's workforce?

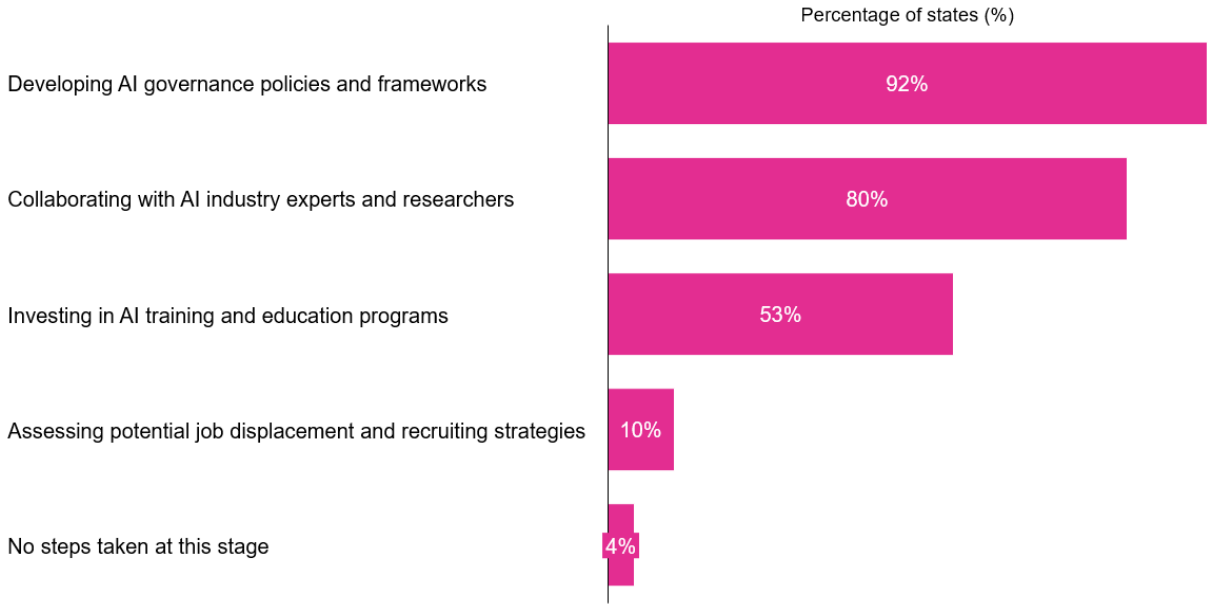
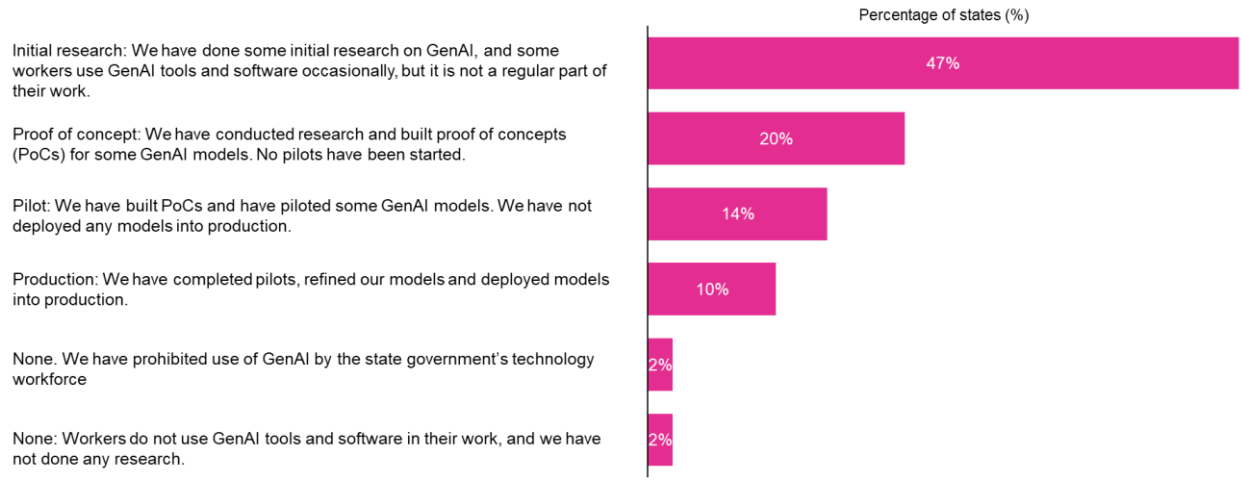


Exhibit 5: States are advancing GenAI implementation—nearly half are in the proof of concept, pilot or production phase

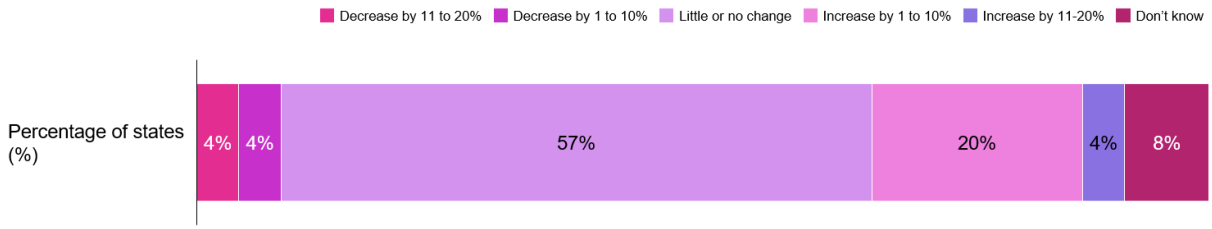
Question: What statement best describes how GenAI is currently used in your state government's technology workforce (including contractors and staff augmentation)?



State CIOs expect GenAI to have significant impacts on their workforces in the near future. Eighty percent agreed or strongly agreed that “GenAI will have a significant impact on the public sector IT workforce (including contractors) in my state.” About 20 percent foresee an increase of one to ten percent in the size of their state government's technology workforce due to the adoption of GenAI, while 57 percent expect little to no change.

Exhibit 6: States embrace GenAI as a tool that can augment human work

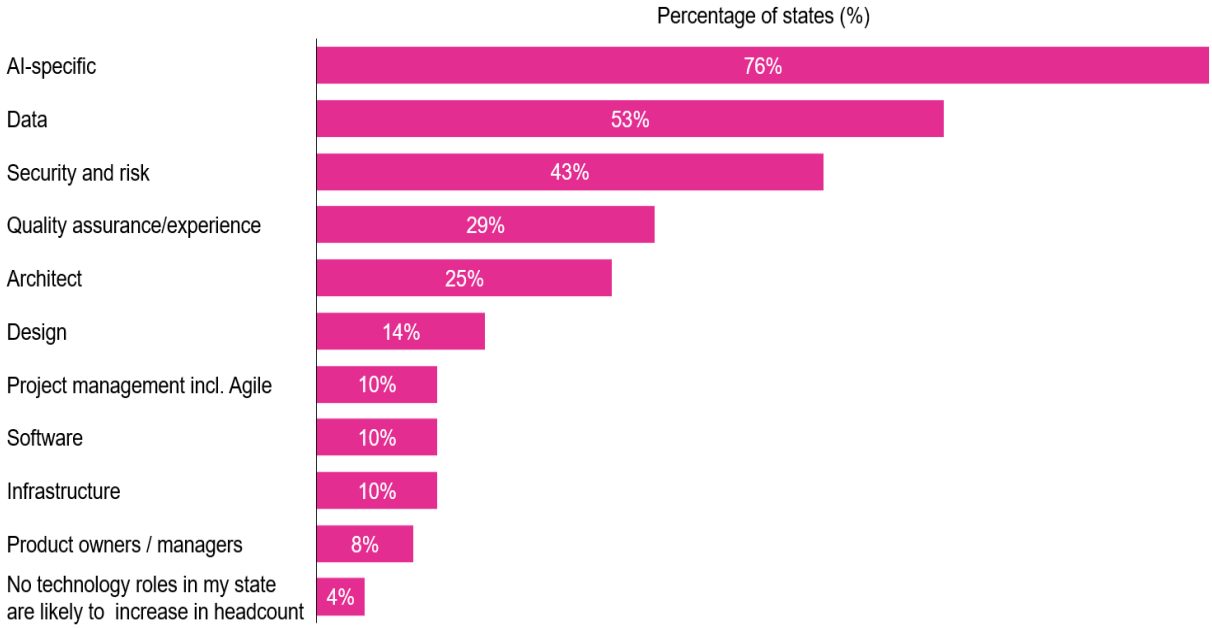
Question: How do you expect the size of your state government’s technology workforce (including contractors and staff augmentation) to change due to adoption of GenAI over the next three years?



The greatest expected need for increased headcount due to GenAI is specifically within AI roles, but respondents also expect the number of data and security and risk roles to grow.

Exhibit 7: States anticipate increasing headcount to implement and manage GenAI in some fields

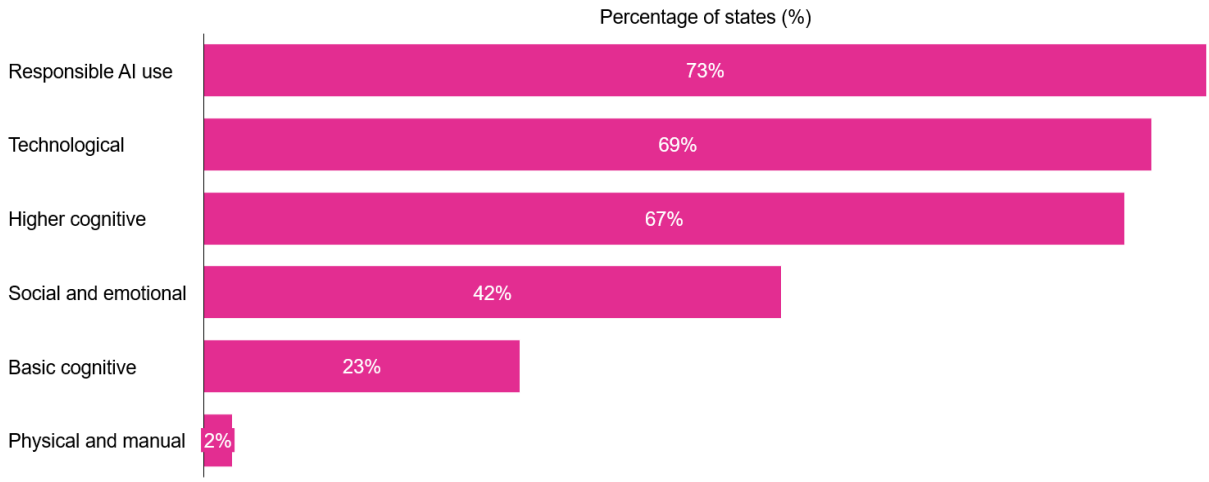
Question: In your opinion, which of the following state government technology roles might see an increased headcount due to the growth of GenAI? (select all that apply)



Given GenAI’s potential to take on repetitive tasks, CIOs expect that the development of skills such as responsible AI use, technological proficiency and advanced cognitive abilities will be important.

Exhibit 8: At least two-thirds of states underscored the significance of skill development, prioritizing responsible AI use, technological proficiency, and advanced cognitive abilities

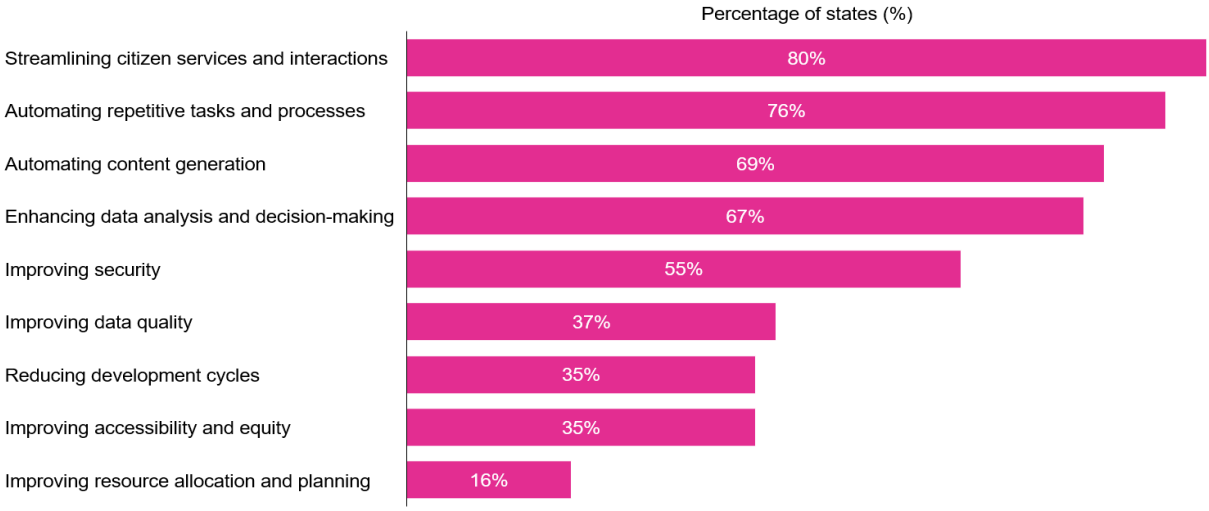
Question: Which skills will be the most important in your state’s future technology workforce (including contractors and staff augmentation) in a GenAI world? [select top three]



State CIOs consistently expect GenAI to increase their teams' productivity, which could help offset some labor shortages, reduce backlogs, and other challenges associated with excess demand. For instance, the throughput of roles increases by automating repetitive tasks, streamlining citizen services, and bolstering data quality. The CIOs expect the greatest gains in core software development roles, where previous research indicated that productivity could increase by around 45 percent due to advances in GenAI.[5]

Exhibit 9: State CIOs anticipate that GenAI could primarily boost productivity by improving citizen services, automating tasks, and enhancing data quality

Question: How do you envision GenAI improving efficiency in your state government's technology workforce (including contractors and staff augmentation) [select all that apply]?

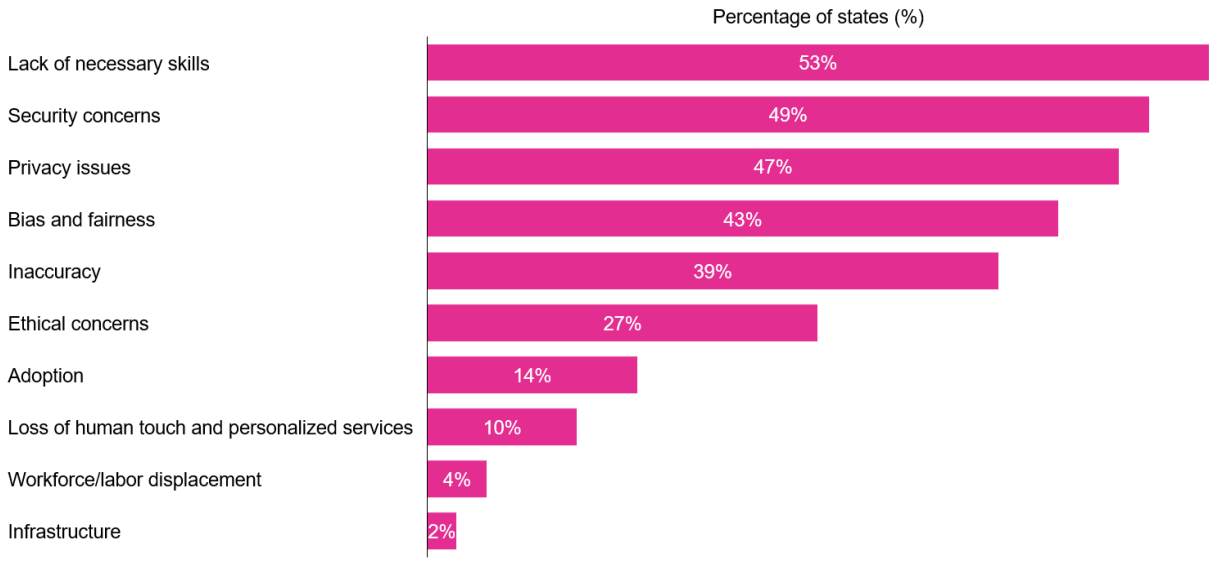


Despite the momentum, CIOs have concerns about GenAI that commonly revolve around the shortage of necessary skills, privacy and security, as well as bias and fairness. For instance, 53 percent of respondents cited a lack of necessary skills as their foremost concern about the impact of GenAI on the technology workforce.

5 "The economic potential of generative AI: The next productivity frontier," McKinsey, June 2023

Exhibit 10: States have apprehensions about GenAI, particularly regarding skill shortages, privacy, security and fairness

Question: What concerns do you have regarding the impact of GenAI on your state government's technology workforce (including contractors and staff augmentation)? [select top 3]



Since the end of the pandemic, job growth has remained strong nationally, contributing to a skills shortage with high vacancies in key AI-related roles such as machine learning engineers, prompt engineers, data engineers and data scientists[6]. The talent challenge in state governments may be exacerbated by the public sector's inability to compete with private sector salaries. As noted, CIOs have low confidence in their capacity to attract and retain the talent they will need. In a 2022 survey, over 20 percent of respondents said it was "very difficult" to hire software engineers, data engineers, AI data scientists, machine learning engineers, etc.[7]

"I do feel like we have a skillset deficit. Right now, we would look toward vendor partners. We have a few enterprising employees who seek out training on their own and on their own time, but their numbers are small compared to all the work we need to be doing."

As a result of this workforce concern, half of states indicated low confidence in their required workforce skillset. This problem is compounded in many states where large portions of the technology workforce are approaching retirement age. This further highlights the importance of ongoing skills development and training initiatives.

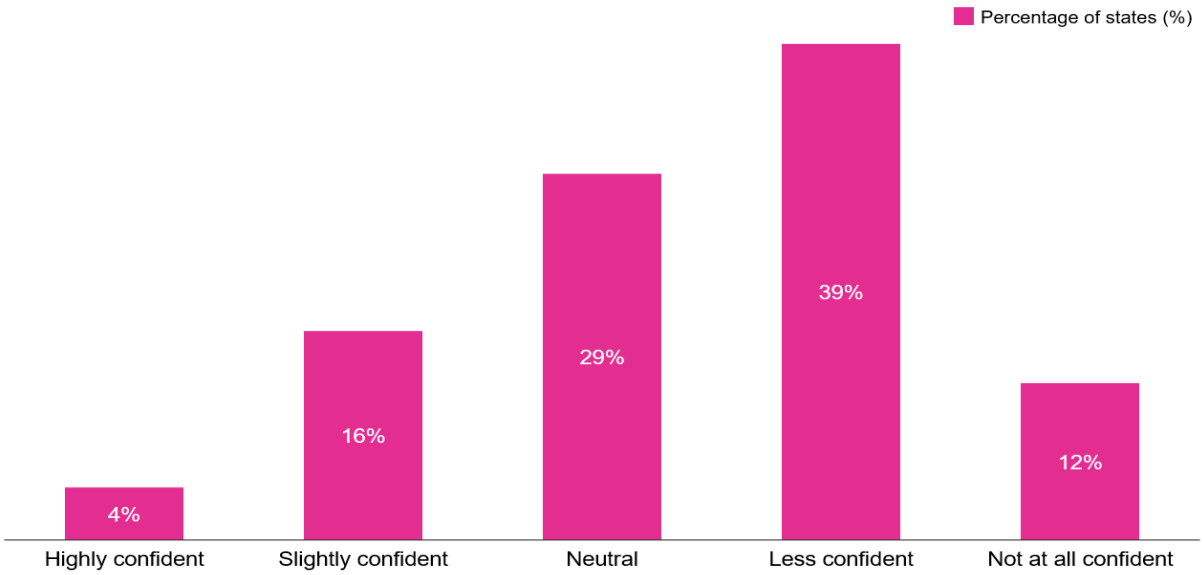
"Our strategy involves educating the entire organization to become conversant in AI, and we're creating a core group of experts to guide business leaders during implementations."

[6] Source: US Bureau of Labor Statistics

[7] "The state of AI in 2022—and a half decade in review," McKinsey & Company, December 2022

Exhibit 11: Half of states express limited confidence in their workforce's readiness for GenAI

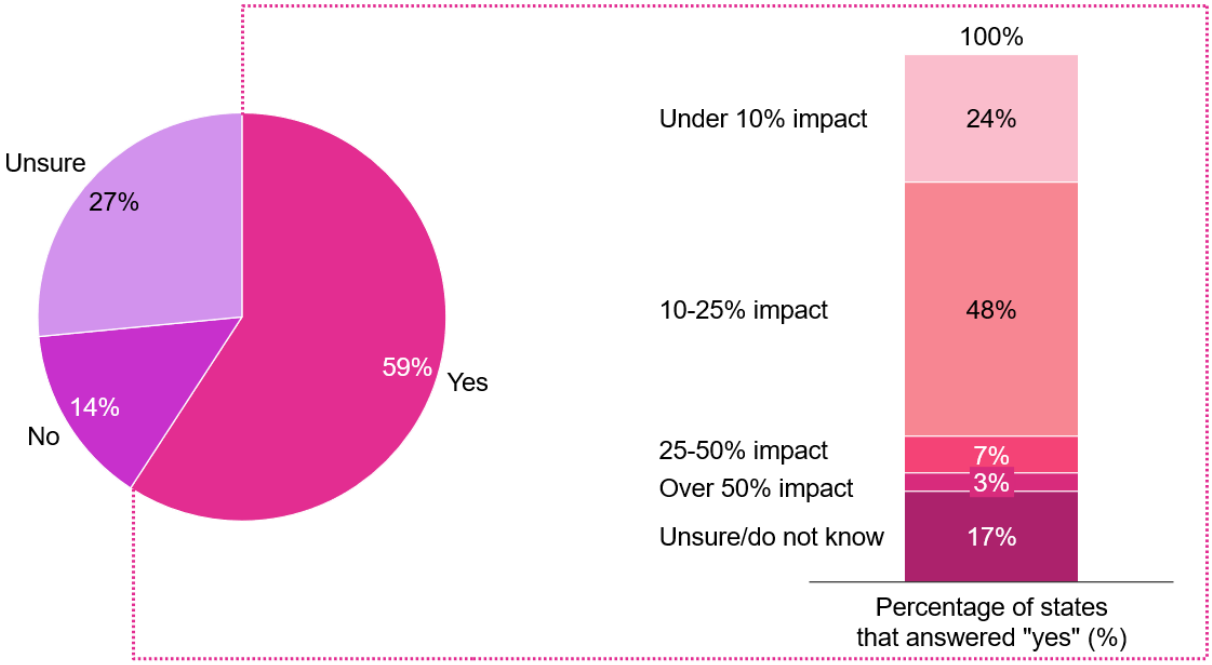
Question: Are you confident that your state government's current technology workforce has the expertise to fill key roles and skillsets with the advent of GenAI?



The need for additional resources—given state governments' challenges in acquiring tech talent today—highlights a need for reskilling and upskilling. Among CIOs, 59 percent acknowledge the necessity of reskilling their workforces and believe that an average of 18 percent of the workforce could require reskilling.

Exhibit 12: Over half of states recognize the pressing need to enhance workforce skills

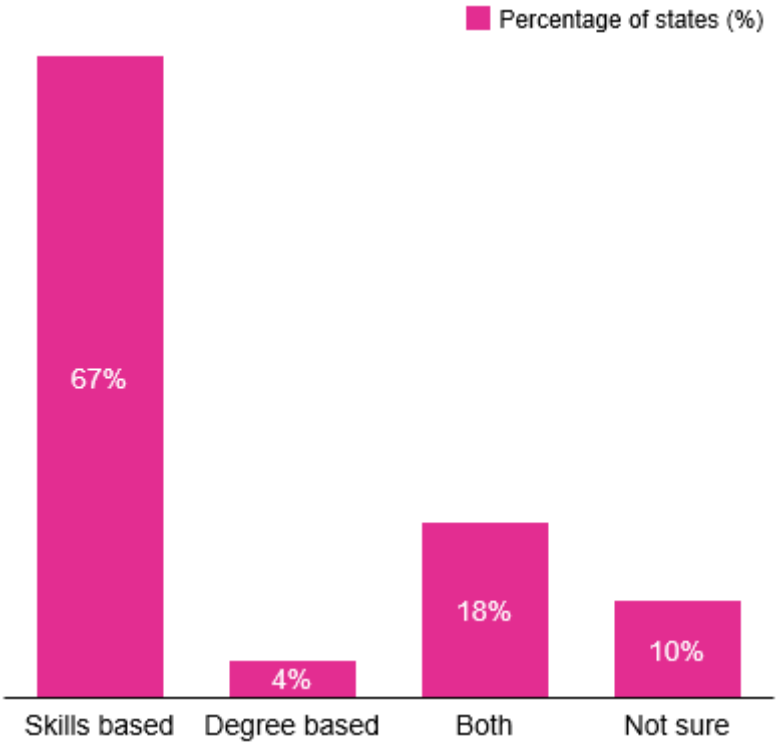
Question: Do you expect GenAI to impact reskilling of technology employees (because of role or FTE reductions) in your state government workforce (including contractors and staff augmentation) over the next three years? (If yes), by what percentage?



GenAI will also shift the skill requirement of the workforce—due partly to the rapidly changing nature of the field—as the requirement for college degrees could diminish while the role of certifications grows.

Exhibit 13: States foresee shifts from degree-centric to skill-based recruitment

Question: In your opinion, are GenAI-related positions best suited for a skills-based hiring approach or a degree-based approach?



GenAI has brought the challenges of data accuracy, data security and data governance to the fore, emphasizing the importance of implementing solutions based on accurate and unbiased data. Many states are accelerating data transformation programs, anticipating GenAI making underlying data limitations more pronounced, while some plan to use GenAI to clean and manage large volumes of data.

"Using ChatGPT in the public domain is the same as going to Starbucks with a folder of sensitive data."

As more use case are deployed, a wide array of state employees may need to master new skills and work in new ways and in new teams; technology workforces could be role models in this regard. At-scale rollout may also require talent beyond the traditional remit of CIOs, including experts in ethics, responsible AI practices, privacy and various aspects of law and legislation, and people with deep expertise customer service, procurement, workforce development, health, human services, transport and more. Scaling may also require talent to collaborate in new ways, such as across procurement, IT, legal, finance and line agencies, all working in agile multi-disciplinary teams at a faster pace than usual.

5. Use cases in state government

According to state CIOs, GenAI has many high-potential applications, and many use cases have already entered production. Those that could be implemented first, include virtual customer service in the form of advanced chatbots (often cross-government, similar to the gov-GPT concept) and query assistants, and within the CIO's responsibility, code creation, automated document generation and testing.

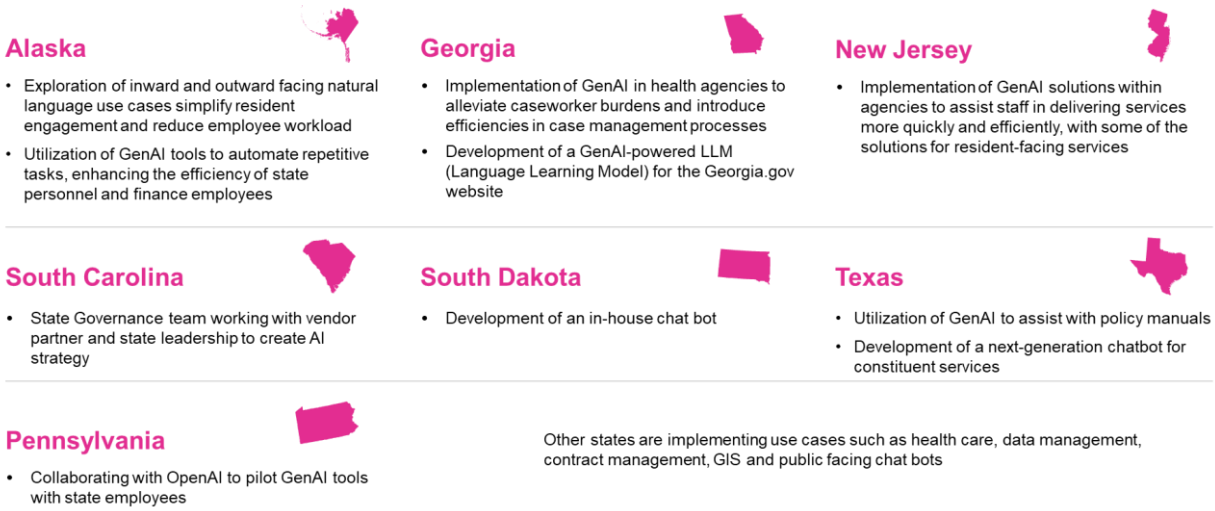
Many large language-based statewide chatbots are already in development or production, with positive early results in their capacity to divert demand from call centers in volumes not experienced with keyword-based and other less advanced versions of chatbots. One state, for instance, reports terrific growth in the use of its chatbot:

"We had a regular chatbot during COVID, and about 2,000 questions a month once the COVID surge died down. Last year, we switched to GenAI, which changed folks' experience. Now the bot uses the state website as its contained private LLM and it starts creating answers. As of the last couple months, we are seeing usage go up to around 30,000-40,000 questions a month! We have learned that this is what people are looking for."

Some CIOs expressed a preference for implementing chatbot-type functionality for internal audiences before launching citizen-facing services:

"Back-office components are the safest place to look right now. The further we are from critical services, the safer it is for us to deploy GenAI and then work our way to the front. If we mess up in the back office, we won't expose client or constituent data."

Exhibit 14: GenAI has been a growing trend in state governments, with several taking proactive measures to use this technology[8]



Many CIOs discussed the attractiveness of the copilot model in call centers. In this use case, large language models provide operators with real-time guidance on appropriate responses to customer questions, including internal help desk customers (referring to large volumes of policies, regulations, procedures and manuals). This reduces the need for operators to place callers on hold while looking up reference documentation. This copilot model can also automate call summary reports that include customer sentiments and root causes for calls.

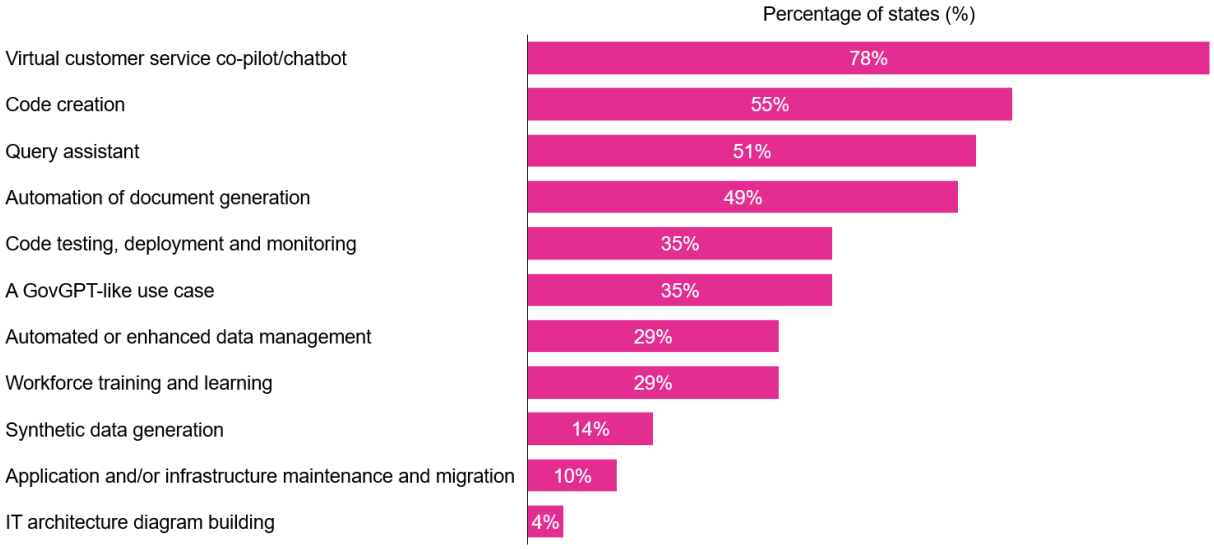
[8] Source: NASCIO CIO interviews

Versions of the copilot can also provide individual operators with hyper-personalized coaching, bolstering existing team leader coaching toolkits.

Many of the CIOs interviewed said data management applications were likely to be among the first to be implemented.

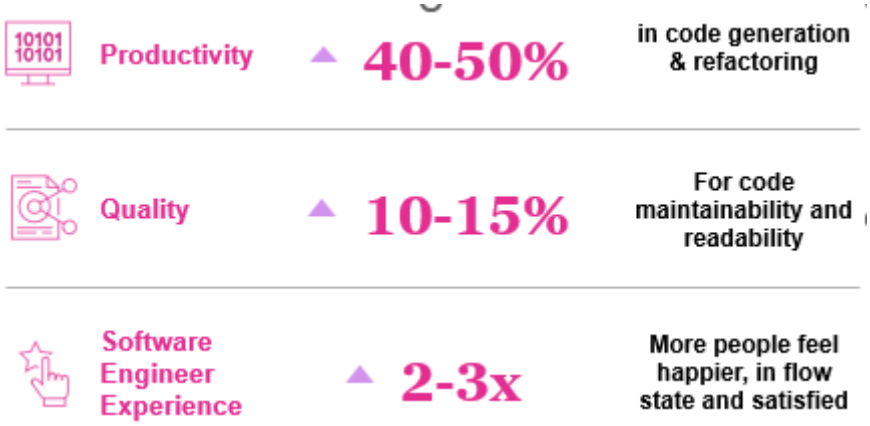
Exhibit 15: States are exploring various GenAI-supported applications

Question: Which of the following applications supported by GenAI is your state most actively considering?



The focus on code creation (such as conversion of legacy languages like COBOL into modern languages in a cloud environment) aligns with research demonstrating significant productivity gains in this field.[9]

Exhibit 16: GenAI coding copilots can improve productivity, quality and developer experience in software development



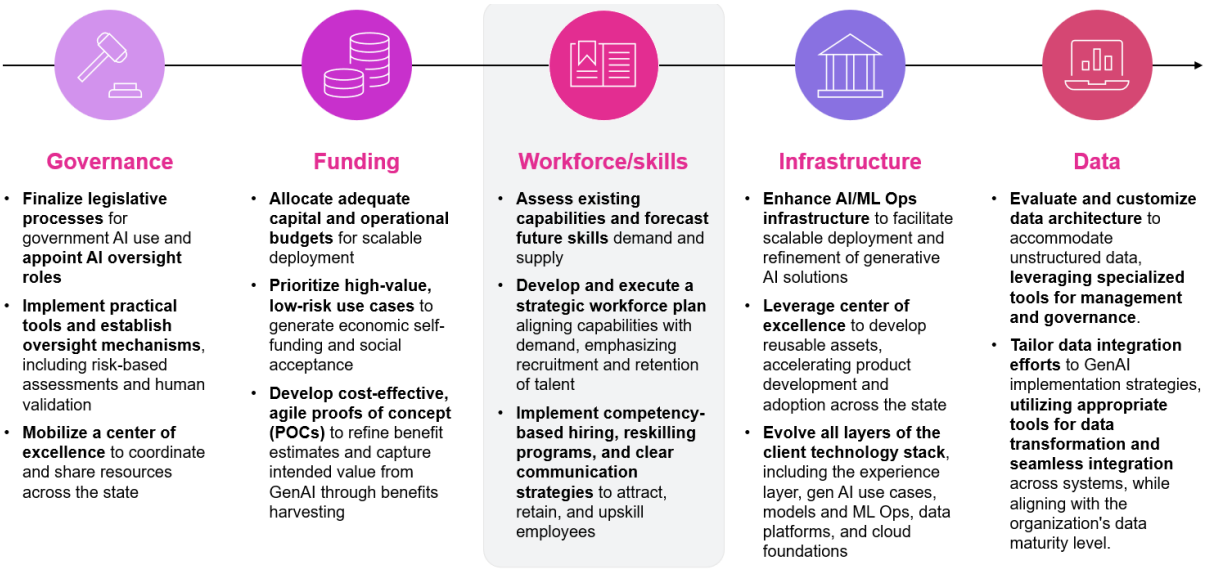
The data indicate that document generation is a popular application type for GenAI. Survey respondents hope it will reduce government workers' repetitive tasks including preparing documents such as briefings, requests for proposal, communications to citizens, and meeting notes. Many such applications are already in widespread use in the private sector.

[9] "Unleashing developer productivity with generative AI," McKinsey, June 2023. Note: productivity increases varied in terms of the underlying skills levels of the developers observed

6. The potential path forward for state CIOs

To improve the effectiveness of GenAI and reduce risk, state governments could consider actions across five dimensions: governance; funding; workforce and skills; and infrastructure and data:

Exhibit 17: Five dimensions for consideration in improving GenAI effectiveness



Here, we focus on next steps in **workforce and skills**. As outlined in Exhibit 1 (above), states could consider implementing some of the following measures:

- **Talent planning**: Steps could include identifying a baseline of existing capabilities and forecasting the demand and supply of skills. Based on these findings, leaders could build robust strategic workforce plans that match demand and supply with capabilities over the next three years or so.
- **Talent attraction and onboarding**: Governments will likely need to attract and onboard fresh talent to deliver on technology and implement a GenAI roadmap, within budgetary and labor market constraints. They could use competency-based hiring to widen the applicant pool, especially as many technology workers begin to retire. Skills tests could help determine the potential for AI proficiency through transferable skills such as computational statistics, programming, and data science. Agencies could also learn from the strategies of top recruiters who seek candidates in non-top-tier universities, training academies such as coding boot camps, and diversity-focused programs or professional associations.[10] To compensate for potentially modest salaries, recruiters could stress the state's progressive role in implementing GenAI and its significant impact on the lives of millions of citizens.
- **Talent development**: To close skills gaps, many governments can create new training plans for employees and offer training in centers of excellence (CoEs) or through other means. Some could make AI fundamentals training mandatory for all technology staff.

  "Everyone in IT has to be conversant in the AI world."

[10] "The state of AI in 2022—and a half decade in review," McKinsey, December 2022

Given that most states are constructing centers of excellence or innovation hubs, this new structure could be used to coordinate the workforce requirements outlined above, in coordination with line agencies.

Exhibit 18: Example training plan related to GenAI

Non exhaustive

	Target audience	Objective	Illustrative modules
Level 1: Awareness	• Govt stakeholders • (e.g., end users)	• Ensuring effective and responsible usage of GenAI • Understanding security and risk implications	• Introduction to GenAI • GenAI guidelines & usage risks • Principles of responsible AI
Level 2: Productivity	• Leadership team (including • tech and functional leaders)	• Steering the GenAI strategy for the organization with a focus on business and client value creation • Understanding how GenAI impacts policy in their domain	• Ideating with GenAI (value pools & tools) • Market and industry analyses of GenAI impact on their industry • GenAI use cases, guidelines and risks
	• Developers using GenAI to code	• Enabling developers with required skills to be able to contribute to GenAI solutions	• Introduction to GenAI tools • Guidelines on using GenAI modules • Cloud platforms, code contextualization & integration • EDA using notebooks
Level 3: Build	• Data scientists, AI/ML engineers, data engineers building gen AI solutions	• Developing new services and solutions by fine tuning GenAI models, training new models • Reimagining existing offerings with GenAI	• Introduction to Foundation models, LLMs, VAEs • Introduction to neural networks (CNNs, RNNs) • Introductions to libraries • Open-source Models, Transformer Models, Encoder-decoder architecture, Latent Spaces, & LLM orchestration frameworks • Deep Learning • Platform based courses • Deep dive into NLP models

- **Talent management**: Many government organizations will update job descriptions to include GenAI requirements—and anticipate that staff involved in GenAI deployment will become more attractive to private-sector recruiters. While some attrition may be unavoidable, state governments could create more attractive pathways to help these staff grow their skills and bolster community impact.

Exhibit 19: Many existing roles could need to be upskilled

Not exhaustive





Key roles impacted by GenAI	Data Scientist	Data Engineer	MLOps/ LLM OPs Engineer	Risk/ Legal/ Ethics Specialist (AI-focused)	Product Manager (AI-focused)
New GenAI responsibilities	Design, develop, test and tune GenAI-based solutions Evaluate outputs from LLMs (e.g., recommended actions)	Build and enhance training data infrastructure Manage unstructured datasets in non-relational sources	Build automation necessary to promote GenAI solutions from Dev through Prod	Ensure AI-powered systems are compliant with all applicable laws & regulations & ensure data is collected / used ethically	Define the GenAI centric product vision, strategy and delivery of AI products
New GenAI skills and knowledge	Prompt engineering, in-context learning, Bias detection, pattern identification, reinforcement learning from human feedback (RLHF), hyperparameter / LLM finetuning; transfer learning, natural language processing	Data wrangling and data warehousing, data pipeline construction, multimodal processing, vector database management	ML Ops toolchain, core DevOps toolchain, LLM Ops skills	Risks and security considerations for GenAI; ethics, privacy and legal considerations of AI	Impact and opportunities of GenAI in their domain, Strong understanding of AI and ML technologies, Possible use cases of GenAI

Note: Most organizations will likely benefit from evolving and/or upskilling existing tech roles (e.g., data scientist) with emerging gen AI skills (e.g., prompt engineering) instead of having separate roles for emerging skills

The below exhibit comprises examples of role cards that may need to be updated to cater for GenAI related skills.

Exhibit 20: Update role descriptions to include GenAI aspects

Example role card: Product manager

Role Summary

- Creates shapes and owns the digital vison and roadmap, prioritizing for end-user impact and business value to deliver product and coverage solutions digitally
- Manages Stakeholder leading the product to through representing the voice of the customer, defining and prioritizing team efforts
- Collaborates with team members to design, build and launch the product while also interfacing with other Product Managers across different organizational digital domains to overall alignment

Education, Knowledge, Experience

- Background in business, computer science or technology

OR

- MS/BS degree in software development, product management IT, finance, or business

Responsibilities

- Leads solutions to overall success using input from the team, stakeholders and customers
- Balances and oversees large sets of training data to set direction for journeys and own the product strategy that is shaped through the domains and the business
- Works with business intelligence and process engineering partners to track and measure processes, product progress and outcomes, using well defined KPIs that tie back to OKRs
- Owns team vision and priorities to deliver sustainable, quick impact to the customer
- Observes, learns about contacts and analyzes end users of the product, and clearly communicates the requirements to the team
- Integrates studies and research into product requirements to enhance satisfaction and product viability
- Facilitates planning of continued team retrospectives and learnings to reaffirm priorities and agree on business requirements
- Creates, maintains and prioritizes the team backlog using input from the team, stakeholders and customers
- Facilitates release planning with stakeholders and participate in sprint meetings
- Coaches technical talent teams with detailed guidance during model development, pre-training, training, and fine-tuning stages
- Maintains active interest in industry innovations, technical breakthroughs, and regulatory developments to establish future-facing team culture

Functional Competencies

- Able to combine both deep business and product knowledge with a strong understanding of ML frameworks and GenAI use cases
- Demonstrate ability to think both strategically and tactically
- Experience managing and launching an AI or ML solution, especially one leveraging GenAI
- Excellent communication and presentation skills, very comfortable speaking with senior leaders and translating technical language
- Strong self-motivator, with a contagions ability to spread energy to team
- Knowledge of Agile values, principles and practices

Technical Competencies

- Experience as a Product Owner/Product Manager delivering GenAI, deep learning, analytical AI, or ML-powered solutions
- Strong Knowledge Of Software development lifecycle related to the GenAI industry and relevant adjacent industries
- Experience in Agile methodologies
- Experience with customer journeys and customer experience, with particular reference to insurance industry expectations for clients, business partners, and employees

Example role card: Machine learning engineer

Role Summary

- Implement machine learning models by using state of the art tools/algorithms and methodologies, following DevOps and a test-driven development process
- Connect and model complex distributed data sets to build repositories, such as data warehouses, data lakes, using appropriate technologies
- Manage data contexts with large training data sets or LLMs, structured/unstructured or streaming data, extraction, transformation, curation, modelling, prompt engineering, identifying right tools writing Python/R code, etc,,

Education, Knowledge, Experience

- Background in programming, data analytics, or data visualization with familiarity with at least 3ML frameworks

OR

- Background in computer science or engineering with focus on Machine Learning models/aspects of data

OR

- Masters/PhD in mathematics, statistics, computer science, physics, economics or another quantitative field

Responsibilities

- Acts as a thought partner with Product Managers and experts on shaping the problem to be solved, the insights generated, and the continuous learning required to improve the solution
- Identifies, designs, and implements internal improvements: automating manual processes, optimizing data delivery, re-designing infrastructure for greater scalability, etc,,
- Build the infrastructure required for optimal extraction transformation, and loading of training data from a wide variety of data sources 'big data' technologies
- Tests and scale new algorithms through pilots and later industrialize the solutions at scale
- Influences, builds and maintains the LLM infrastructure required for the AI projects, and integrates with external IT infrastructure/service to provide an E2E solution
- Leverages an understanding Of LLM architecture and design patterns to write scalable, maintainable, well-designed and future-proof code
- Designs, develops and maintains the framework for the machine learning project
- Develops common components to address pain points model lifecycle management, feature store and data quality evaluation
- Provides input and help implement framework and tools to improve data quality
- Create and maintain optimal data pipeline architecture
- Assemble large, complex training data that meet functional/non-functional business requirements

Functional Competencies

- Ability to transform proof of concept machine learning models into scalable solutions
- Passion for leveraging generative AI to create innovative content
- Good understanding of Agile methodology, keep team focus on delivering business value
- Knowledge in data architecture, defining data retention policies, monitoring performance and advising any necessary infrastructure changes
- Extensive experience working with Big Data tools and building data solutions for advanced analytics and LLMs

Technical Competencies

- Strong computer-science foundation to understand how to structure data and make efficient use of computing resources(e.g., memory, CPU, et cetera) when designing and implementing machine-learning algorithms
- Fluency in computing techniques: experience using different machine-learning algorithms and applying them effectively (e.g., choosing the right model, deciding on learning procedures to fit the training data, understanding different parameters that affect the learning)
- Ability to program in data computing environments (e.g., Python, R) and understand how to refine the algorithms in software code

7. Conclusion

GenAI offers the potential to state governments to improve service, the speed and accuracy of human decision-making, working conditions for employees, cost efficiencies, and more.

Now that most states have risk guardrails in place, state CIOs can focus on the elements required to deliver benefits at scale. This could require careful planning and upskilling of government workforces and new ways of working, including collaboration across agile teams from multiple disciplines including infrastructure, security, DevOps, data, product management, law, ethics, and subject-matter experts embedded in line agencies. Such planning and upskilling can be coordinated from centers of excellence or innovation hubs.

8. Credits

About NASCIO

Founded in 1969, the National Association of State Chief Information Officers (NASCIO) represents state chief information officers (CIOs) & information technology (IT) executives & managers from the states, territories & District of Columbia. NASCIO's mission is to advance government excellence through trusted collaboration, partnerships & technology leadership. NASCIO provides state CIOs & state members with products & 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.

Relevant contacts

NASCIO:

Meredith Ward mward@nascio.org

Amy Glasscock aglasscock@nascio.org

www.nascio.org

McKinsey & Company:

Aldous Mitchell aldous_mitchell@mckinsey.com

Sameer Chowdhary sameer_chowdhary@mckinsey.com

www.mckinsey.com

McKinsey Global Institute: https://www.mckinsey.com/mgi/