

BUILDING the FUTURE AI Infrastructure

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From the editor's desk



Sarah Sybert, Managing Editor



AI's Future Relies on Sustainable Infrastructure

Artificial intelligence has made innovation a national priority. Tech leaders are rethinking the resources and strategies needed to sustain its growth. Energy infrastructure, research and budgeting all come into play in shaping the future AI landscape.

With anticipated shifts in federal priorities amid a new presidential administration, some of the focus has turned to what that means for AI. New strategies are laying the groundwork for progress while addressing challenges like energy consumption, data integrity and computational demands.

The growing utility for AI is putting pressure on the capabilities of the existing power grid. Organizations are prioritizing investments in

renewable energy and advanced grid technologies to address these challenges. At the heart of this effort lies a broader commitment to ensuring the security and resilience of energy systems.

Innovation plays a critical role in the future of AI and its integration in government. New initiatives aim to foster innovation by providing resources to develop cutting-edge technologies across industries.

Federal leaders are increasingly strategizing how to budget for AI and how to measure its return on investment. One solution might lie in creating more shared services on an enterprise level.

Inside, we dive into some of these issues and highlight how government is shaping the future of AI infrastructure. 🌟

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BY SARAH SYBERT AND SILVIA OAKLAND



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AI infrastructure requires a combination of hardware, software, skilled workforce and supportive policies.

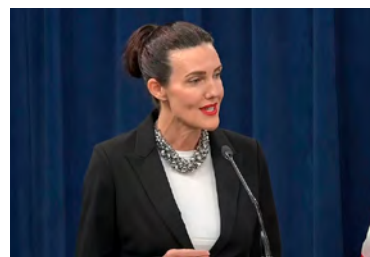


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Organizations are enacting holistic data management strategies to enhance AI implementation.

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Agencies are finding ways to keep pace with the growing demand for AI systems while balancing budget and processing constraints.

BY ROSS GIANFORTUNE

Energy, R&D Drive Future AI Infrastructure

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Artificial intelligence has been such a prominent focus in the federal government over the past year that officials have been eyeing what that means for Donald Trump's administration.

"As the administrations have handed the baton to each other, even though the political parties have changed, the overall emphasis on investing more in AI, and seeing AI as a key emerging technology has only increased," Kumar Garg, former senior advisor to the deputy director at the White House Office of Science and Technology Policy (OSTP), told GovCIO Media & Research.

What Will Trump Do For AI?

Trump, in 2017 during his first term, had named AI as a research and development priority. In 2019 he signed an executive order dubbed the American AI Initiative, a national strategy aimed at promoting U.S. dominance in AI research, development and deployment. This was followed by a December 2020 executive order promoting trustworthy AI.

Former President Joe Biden's 2023 AI executive order focused on developing standards focused on AI safety, security and trust.

The 2024 Republican Party Platform criticized Biden's executive order on AI for what it perceived as creating barriers to innovation. "Republicans support AI development rooted in free speech and human flourishing," the document said.



President Donald Trump speaking with attendees at The Believers Summit at the Palm Beach County Convention Center in West Palm Beach, Florida.

Regardless of how the new administration approaches policymaking around AI, Garg said investments in the U.S. energy infrastructure and R&D will be critical to the nation's competitive advantage.

As agencies have worked over the past year to complete some of the initiatives from the executive order, including naming chief AI officers, some

Dorothy Aronson

Chief AI Officer,
National Science Foundation



officials point to the commonalities between the two administrations that could drive future AI efforts.

The bipartisan House Task Force on Artificial Intelligence outlined what a politically shared vision for AI looks like in its newest report released at the end of 2024. The report outlined numerous key findings and recommendations about standards development while also emphasizing the value of the private sector.

“Despite the wide spectrum of political views of members on our task force, we created a report that reflects our shared vision for a future where we protect people and champion American innovation. We have made our best efforts based on the information we have, but with the rapid pace of change in both AI software and hardware, we are fully aware that we don’t know what we don’t know. This initial report is only the first step,” said the task force’s co-chair Rep. Ted Lieu about the report.

Building the Energy Infrastructure to Power AI

The growing demand in AI means electrical demand to power it is also increasing, presenting challenges for physical infrastructure availability, electrical grid reliability and affordable electricity.

Department of Energy (DOE) officials said electricity consumption in the U.S. has grown at 0.5% per year in the last two decades, with recent estimates suggesting an annual growth of at least 0.9% until 2030 and an increase in the five-year cumulative growth forecast from 2.6% to 4.7% due to the surge of AI and data centers.

“A new, emergent issue is this intersection between AI and energy. Can we build out enough energy capacity to sustain [AI]? If the scaling laws hold, and the leading firms continue to build out large need for compute and training, what kind of data center capacity will be needed? And how much will that put pressure on the grid? And where can we build?” Garg said.

Garg noted the second Trump administration would face two key challenges

“The benefits of AI can only be shared broadly if many people are informed and aware, and the right methods are developed in ways that solve important problems.”

— Dorothy Aronson, Chief AI Officer, National Science Foundation

in building out energy capacity to support AI: permitting and transmission.

“For example, we’ve seen in states like Texas and others that have [built] regulatory policies ... and outstrip in clean energy deployment,” Garg said. “Then comes things like transmission, which is if you’re building in one place and you want to move to another ... that might create a little bit of a race between the states to say, ‘if we don’t build a relevant energy capacity, folks are not going to build their data centers in our state.’”

Innovations in the energy sector are essential to the future of AI. Analysts from the Special Competitive Studies Project (SCSP), a think tank based in Arlington, Virginia, noted the role of the energy sector for U.S. dominance in AI.

“China’s aggressive pursuit of renewable energy technologies and dominance in critical mineral supply chains presents a direct challenge to U.S. leadership in the energy sector,” said its recent memo.

It outlined five key obstacles: insufficient supply of existing energy sources to power AI, regulatory hurdles that create barriers to innovation, physical infrastructure limitations of the U.S. electrical grid, market fragmentation that limits collaboration and global competition from foreign adversaries.

Some of its recommendations include streamlining regulatory processes, securing the grid and fostering partnerships.

The Biden administration during a roundtable in fall 2024 launched several

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new actions targeted at the energy infrastructure, including a new task force on AI data center infrastructure to coordinate policy across government, scaling up technical assistance for data center permitting and creating an AI data center engagement team within DOE.

The Congressional task force's AI report recommended federal leaders support and increase investments in scientific research that enable energy infrastructure, strengthen efforts to track and project AI data center power use and ensure that AI and the energy grid are a part of broader discussions about grid modernization and security.

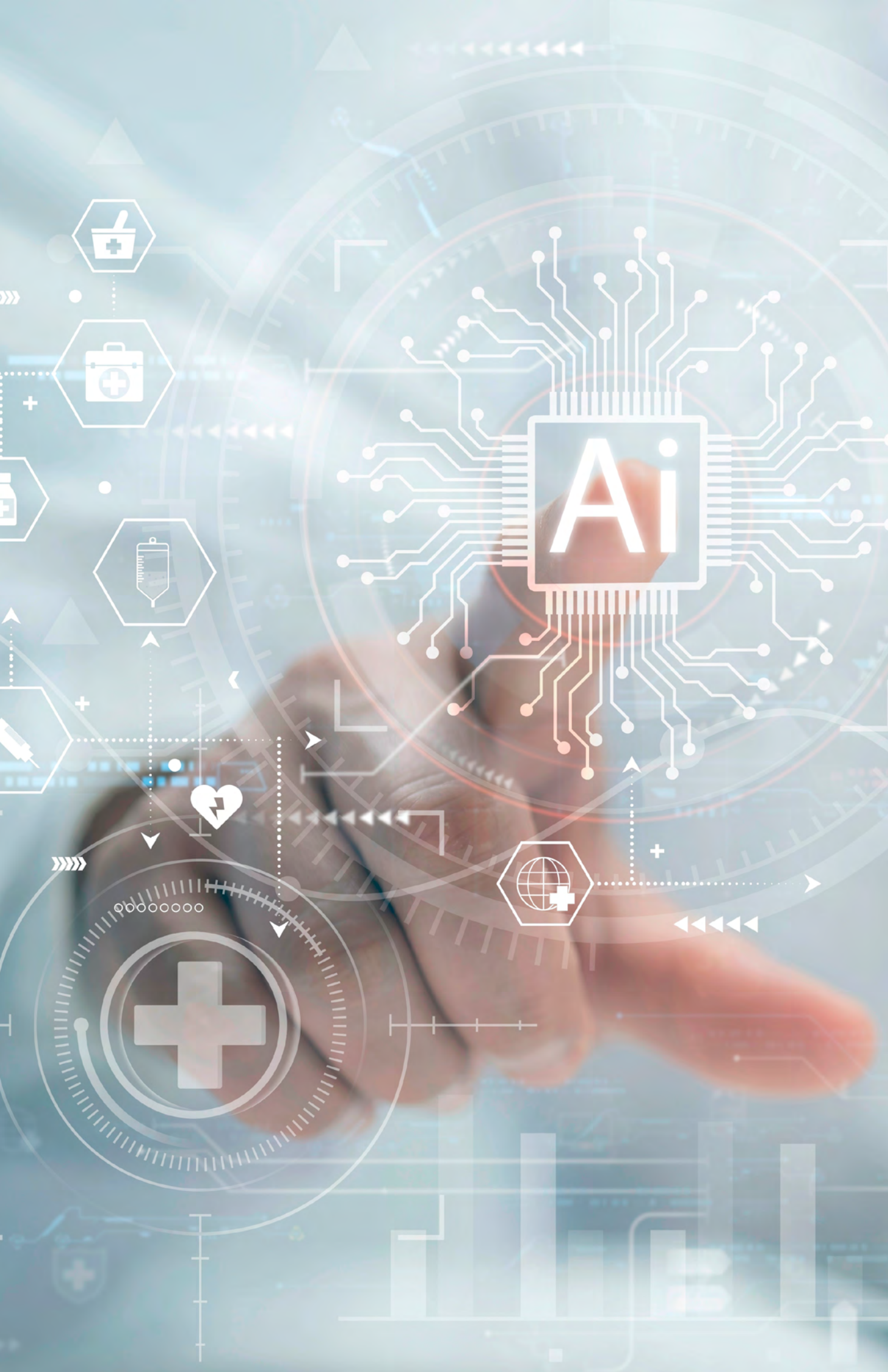
Another matter in the increased needs from the power grid includes ensuring it's cybersecure.

"The DOE, the Department of Homeland Security (DHS), the North American Electric Reliability Corporation (NERC), FERC and the Electricity Information Sharing and Analysis Center (E-ISAC) should implement comprehensive and advanced cybersecurity measures, such as real-time threat monitoring, to protect the entire energy system — from generation to distribution — from cyberattacks," said SCSP's report.

DOE and the Cybersecurity and Infrastructure Security Agency (CISA) released new measures in 2023 to ensure security and resilience of the power grid in response to various incidents throughout 2022 that threatened electrical substations throughout the U.S.

"While the work has always been ongoing, it was critical to bring it back to the attention of everyone and remind them of those best practices," DOE Preparedness, Policy and Risk Analysis Deputy Director Mara Winn told GovCIO Media & Research in a 2023 interview. "We wanted to make sure there were resources to guide the awareness of the threat environment, what implementation of protective physical security measures were possible and have that layered security strategy to ultimately reduce or minimize the impact of an attack." (ctd.)





Investing in AI R&D

Public sector leaders agree that research and development is essential for the U.S. to stay competitive in AI.

“Maintaining strategic leadership on AI has been pretty consistent. Then the question becomes what are the big parts of that? Part of that is R&D. So if there are cuts to the U.S. investments in R&D, I think that would be quite negative,” said Garg. “Some of these other blockers that are popping up, like energy — [the Trump administration] has already said that they’re going to make sure that there are strong federal partnerships with the emerging industry.”

Under Biden’s AI executive order, federal agencies are required to inventory AI use cases and share them across government and with the public. At the end of 2024, agencies published an updated inventory that listed over 1,700 use cases.

The National Science Foundation (NSF) has been at the forefront of AI R&D with 16 published AI use cases in the inventory, including AI voiceover, FOIA processing and its “Ask NSF Initial Pilot.”

As part of Biden’s executive order, NSF launched the National AI Research Resource (NAIRR) pilot program in partnership with 10 other federal agencies and 25 non-governmental partners to make additional resources available to support the nation’s research and education community. The agency intends to institute the full program in 2026.

Dorothy Aronson, chief AI officer at NSF, told GovCIO Media & Research the pilot activities are laying the groundwork for eventual full-scale AI research infrastructure. So far, more than 200 resource awards have been made to support AI innovation and cybersecurity in agriculture, health care and wildfire detection.

“The AI breakthroughs we are seeing are the result of many years of investment in AI research and education, in which NSF played a critical role,” Aronson said. “Development and education are just as important, as the benefits of AI can only be shared broadly if many people are informed and aware, and the right methods are developed in ways that solve important problems.” (ctd.)

Aronson said listening to the researchers on the frontline is the most important method NSF uses to stay ahead in research and development. As the U.S. tries to maintain its edge with AI, trends and feedback from the research community will influence the development of new programs and funding opportunities.

“Competing with China will likely remain front and center. I think that there’ll be much more of a focus in [Trump’s] administration around research and development funding through agencies like DARPA [and] NSF,” Bill Wright, who had served as senior operations officer at the Office of the Director of National Intelligence and now leads government affairs at Elastic, told GovCIO Media & Research in an interview.

What’s Next for AI Policy?

Amid Trump’s intentions to counter Biden’s approach to AI, he recently tapped former chief operating officer at PayPal David Sacks as his White House AI and crypto czar.

Garg’s perspective is that leaders should develop a flexible approach and focus on improving forecasting to drive data-driven decision-making across government, building institutions to manage AI, and recruiting and retaining a top AI talent pipeline.

“The best way to think about the regulatory framework is not [that] you’re trying to manage for today. What you’re trying to do is say, ‘Okay, do we have the talent in place? Do we have the cooperative models between industry and government in place and others so that, as the models keep getting more powerful, you’re able to figure it out?’” said Garg. “It’s very hard to create these bright-line rules because very often with a rapidly evolving technology, the rules end up being brittle. So, you need to build more of a flexible approach.” ❁



Building Blocks for AI Development

AI infrastructure requires a combination of hardware, software, skilled workforce and supportive policies.

HARDWARE

Advanced hardware, like high-performance computers and specialized AI chips, serve as the “brain” behind AI and is essential to powering the tech.

SOFTWARE

AI runs on advanced software. Cloud, data management platforms and security systems are critical to enable the speed of AI and protect the data that flows through the AI tools.

ENERGY

Training AI models can use an enormous amount of power. Tech leaders are eyeing renewable energy to make these systems more sustainable. Energy optimization tools can help manage and reduce the overall consumption of electricity.

DATA

AI needs clean, high-quality and properly classified data. There also must be rules and systems in place to ensure data is used responsibly, protecting privacy and meeting legal standards.

WORKFORCE

AI requires a highly skilled and tech-literate workforce to support implementation. While researchers and engineers are the ones developing the tech, its critical organizations invest in training for its entire workforce to ensure responsible use as AI becomes commonplace.

POLICY

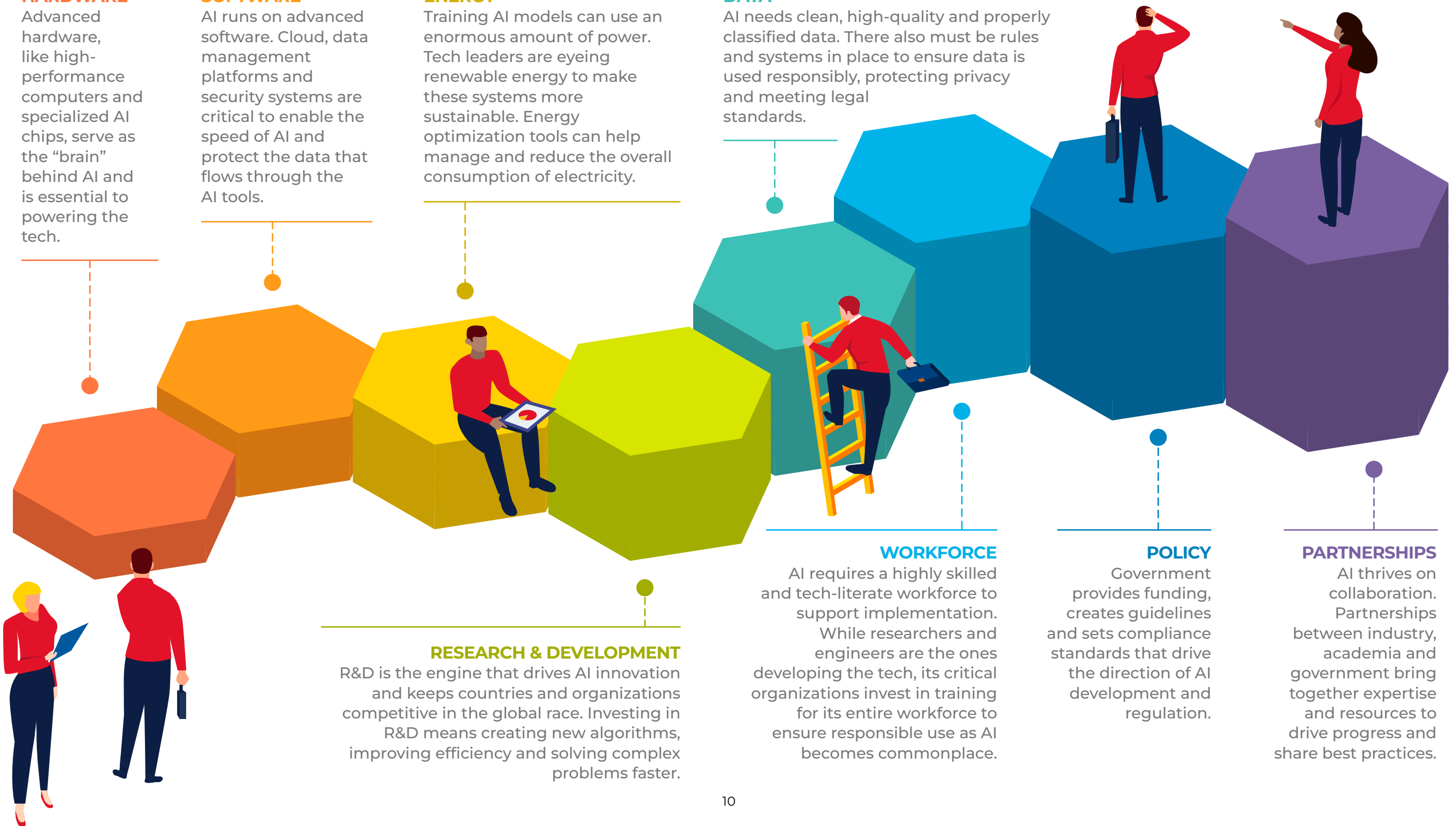
Government provides funding, creates guidelines and sets compliance standards that drive the direction of AI development and regulation.

PARTNERSHIPS

AI thrives on collaboration. Partnerships between industry, academia and government bring together expertise and resources to drive progress and share best practices.

RESEARCH & DEVELOPMENT

R&D is the engine that drives AI innovation and keeps countries and organizations competitive in the global race. Investing in R&D means creating new algorithms, improving efficiency and solving complex problems faster.





Aligning Infrastructure and Data to Optimize AI

Organizations are enacting holistic data management strategies to enhance AI implementation.

What challenges do government agencies face as they start to adapt their infrastructures to take advantage of AI?

McFate The high upfront costs of AI infrastructure can hinder adoption, especially as federal agencies work within tight technology budgets.

To leverage AI's potential, agencies must develop strategic investment plans that optimize their infrastructure while staying within their budgets.

AI models, especially large language models and deep learning systems, require immense amounts of compute and power to scale complex datasets and meet the demands of federal missions.

Some of the most valuable data to government agencies is historical data. This poses a challenge for federal agencies as they work to rationalize distributed and fragmented datasets. Agencies must find and extract the correct data, then transfer and organize it, so it can be used in ML/AI.

Agencies also need to build a modular structure to bridge legacy



Marlin McFate
Federal CTO and CISO,
Cohesity

systems with new systems and capabilities to utilize the data. It's critical for agencies to build a modern infrastructure to handle complex data and leverage AI, especially as adversarial attacks become more sophisticated.

What are some of the successes or use cases that are helping government in this arena?

McFate First is cybersecurity. Agencies are using AI to identify and proactively neutralize cyber threats faster.

Second is predictive maintenance, like we've seen in the F-35 project, where AI not only predicts when parts are likely to fail, but also helps maximize the lifespan of these costly components. Through these initiatives and supply chain optimization, AI is saving the government millions of dollars while ensuring the warfighter's needs are met.

The Defense Department also developed AI-powered language translation, which has greatly improved collaboration with our allies.

Customs and Border Protection (CBP) is using AI to do smart border protection analysis with facial recognition and anomaly detection to identify high risk individuals.

The Pentagon's Project Maven initiative leveraged machine learning and data fusion to analyze data from multiple sources, identify potential targets and relay human decisions to weapon systems.

This program has become so effective that it has been widely adopted by intelligence agencies, increasing the demand for AI, but also exceeding the available computing power to support them.

What do you look forward to seeing in the next few years in this area?

McFate The CEO of Nvidia has said that Moore's Law is dead. Instead of the two times acceleration of AI capability, we're going to see 1,000 times increase in capability. With all the obstacles we've seen with AI infrastructure, there's no

“While some say AI is the next industrial revolution, it is important to realize the data is fundamental to AI as a technology. Without data, you really don't have anything.”

— Marlin McFate, Federal CTO and CISO, Cohesity

shortage of organizations and agencies that are trying to innovate and solve these challenges.

Cohesity's capabilities focus on data. While some say AI is the next industrial revolution, it is important to realize the data is fundamental to AI as a technology. Without data, you really don't have anything.

You can have all the infrastructure in the world, but with that infrastructure comes difficulties with data movement, management and rationalization.

When you look at the immense amount of data that organizations have, only a small amount of that data is what you're looking for. With our development of holistic data management, coupled with cyber resiliency, we're able to solve a lot of the problems we have been talking about today.

How do we figure out what's relevant in all that data? That's what we're doing with Cohesity Gaia. We're continuing to enhance data usability with future innovations. 🌟

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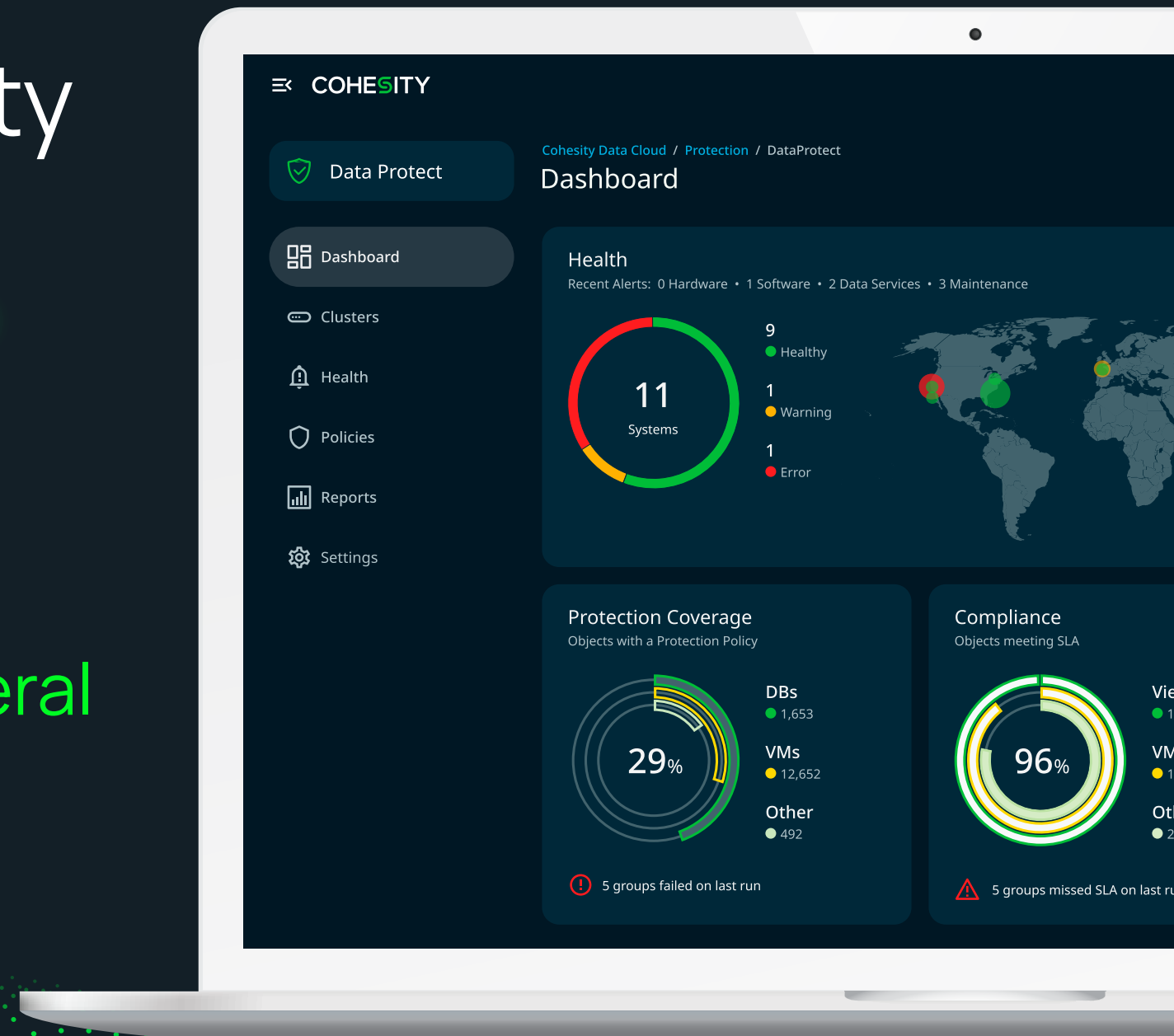


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Balancing AI Budgets to Augment Defense

Agencies are finding ways to keep pace with the growing demand for AI systems while balancing budget and processing constraints.

BY ROSS GIANFORTUNE

Defense officials are grappling with the challenges of finding more financial and power resources for AI implementation as the technology becomes more advanced and integral to government operations.

“The processing and compute can get expensive very quickly,” Marine Corps Cyberspace Command CTO Shery Thomas told GovCIO Media & Research. “We have to make a deterministic business case analysis on which efforts are worthwhile to pursue, and which increase user productivity in the long run.”

Agencies are spending more on AI technology each year. According to a 2024 Brookings Institution report, the potential value of AI-related federal contracts increased by almost 1,200%, from \$355 million in August 2022, to \$4.6 billion in August 2023. Most of that increase came from the Defense Department and its components. The potential value of the Pentagon’s AI-related contracts rose from under \$200 million in August 2022 to more than \$550 million in August 2023, according to Brookings.

Even with that jump, budgets for new technology are strained.

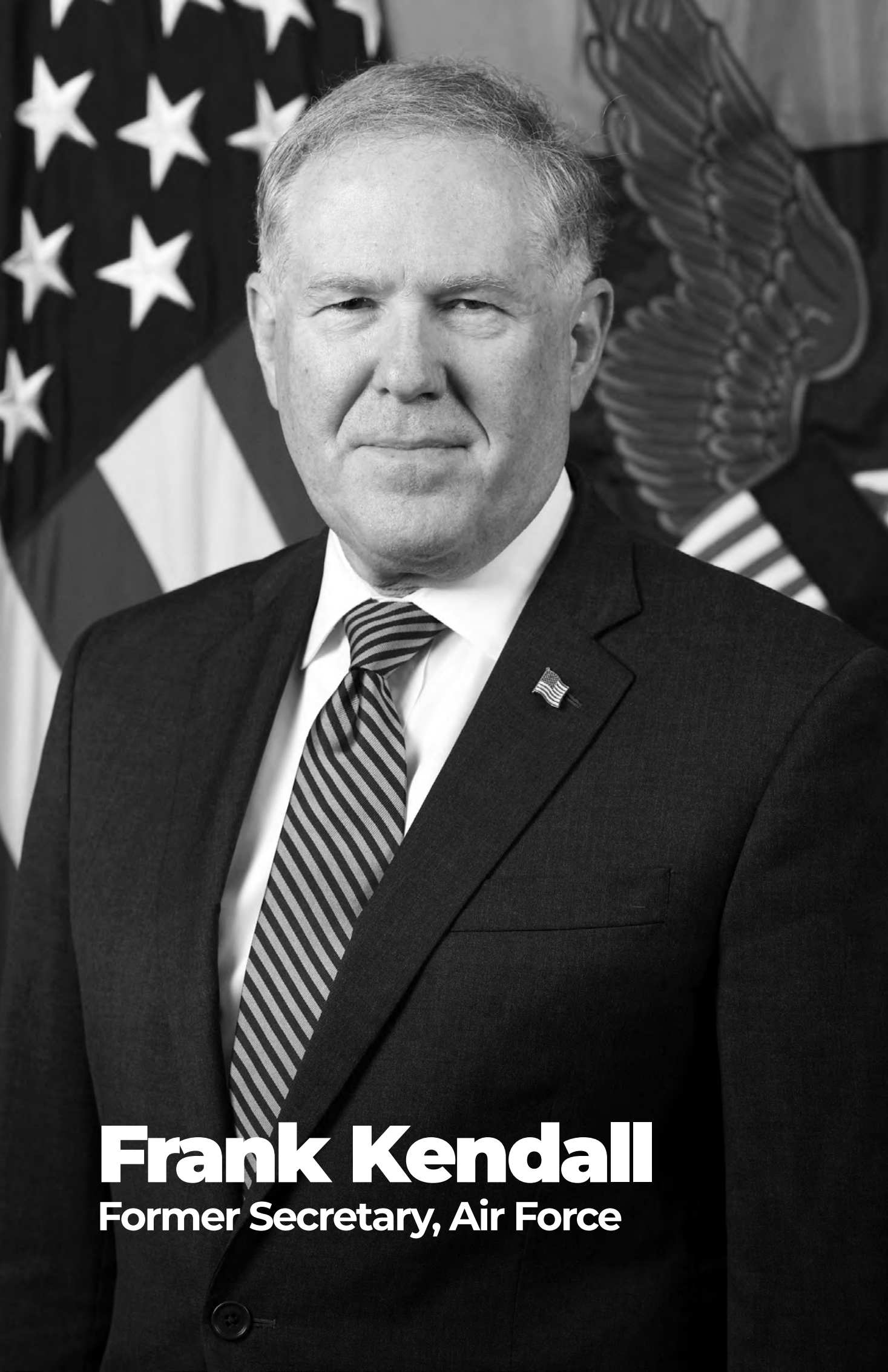
“It is clear to me that more resources will be required,” said former Air Force Secretary Frank Kendall at the Air & Space Forces Association’s 2024 Air, Space &



Air Force Research Lab CIO Alexis Bonnell testified at a Defense Innovation Board meeting on July 17, 2024.

Cyber Conference. “The Space Force is beginning a transformation that must be executed quickly and at scale. That takes resources. The Air Force must move to a new generation of more competitive capabilities as quickly as possible.”

With limited budgets, Defense components need to make decisions about which AI systems truly augment mission, Air Force Research Laboratory CIO and



Frank Kendall
Former Secretary, Air Force

Director of the Digital Capabilities Directorate Alexis Bonnell said at the conference.

“[We are] recognizing that, when we navigate a new technology or emerging technology, it isn’t a question of having to redo everything,” said Bonnell. “It’s really asking ourselves ‘what is additive? What is actually different and unique?’”

The Marine Corps is increasingly using AI. Decisions about different AI systems rely on use cases and return on investment, Thomas told GovCIO Media & Research.

“We have to get to the specific use case on where artificial intelligence or machines can augment the user in their tasks. Additionally, it should provide value-added ROI and these become the factors in judging if a business or warfighting mission area should be supplemented with AI,” said Thomas. “The processing and compute can get expensive very quickly, and therefore, we have to make a deterministic business case analysis on which efforts are worthwhile to pursue increases on user productivity in the long run.”

Military services use risk-based approaches to make budget decisions about AI system acquisition and implementation, said Army Principal Deputy Assistant Secretary for Acquisition, Logistics and Technology Young Bang. Those tradeoffs need to be explained and examined by all involved.

“We need to inform our consumers, our operation operators, our commanders, to say, ‘this is the technology, help us understand the mission or the use case that you want resolved,’” said Bang during the 2024 Nvidia AI Summit in Washington, D.C. “We can make a risk-based decision. [The Army wants] to enforce and push and run around algorithms and generative AI, but we want to do it carefully and very deliberately.”

Thomas said that AI’s ubiquity creates conundrums regarding which systems to buy and where to add them.

“As AI technology proliferates, we have to make careful decisions on which systems are capable to add this capability,” said Thomas. “Legacy system data will need to be tagged, analyzed, synchronized and federated so it can processed

with AI tools ... We have to keep pace with the new technology to stay on top of it — all of which require additional budget.”

Processing Power Needed

Money is not the only scarce resource. AI uses more processing power than traditional applications, and government organizations must find the computing to run AI programs. According to a February 2024 report by the Centre for the Governance of AI, “the amount of compute used to train leading AI systems has

increased by a factor of 350 million.” The scarcity of compute is a challenge that faces AI implementation as much as funding does, according to officials.

“We’ve got to answer a lot of questions about [boosting] infrastructure,” said Bonnell at the Nvidia event. “We had to pull a couple miracles with some folks in this room, when we started hitting compute demands.”

Agencies cannot count on miracles, however, to solve compute problems. At the Space Force, the budget issue and the compute issue dovetail, Space Force Data and AI Officer Chandra Donelson said at the Nvidia event. (ctd.)

“The Space Force is beginning a transformation that must be executed quickly and at scale. That takes resources. The Air Force must move to a new generation of more competitive capabilities as quickly as possible.”

— Frank Kendall, Former Secretary, Air Force

“We need industry’s help ... understanding what our compute and infrastructure needs are, and then helping us map out our strategy to be able to scale that across the department,” said Donelson. “We do want to invest heavily into compute this year for fiscal year 2025. It’s something that is a top priority for me.”

National security uses AI more each year, bringing more data to train systems. More compute power is needed daily, Thomas said, however it be summoned.

“The budget concerns have increased as the data increases each day, and therefore, the processing and compute required increases exponentially to be able to have machines make decisions on data sets,” said Thomas.

Creative thinking is integral to solving the compute resource problem, national security leaders said. Defense Information Systems Agency (DISA) CTO Stephen Wallace told GovCIO Media & Research that cloud computing and lessons learned can help solve problems with computer power scarcity.

“[Cloud computing] is helping also to bring the resources though to the AI game that we wouldn’t have if we were trying to do all of this on our own,” Wallace said. “[DISA has] thousands and tens of thousands of [ultrapowerful processors] that are out there actively training models and working through data sets and the ability to store the data in mass, you know, within the cloud environments. It is an absolute game changer.”

At the National Security Agency (NSA), sharing resources at speed is critical for AI implementation. NSA Director Gen. Timothy Haugh said that collaborative work in AI implementation can help compute power stretch across organizations.

“We’ll also look to share compute resources to allow us to scale and then do so faster. So, I think those opportunities for us can be unique in the department, with our workforce, and with the way that we apply both our experience in AI



and ML,” Haugh said during an Intelligence and National Security Alliance leadership dinner last year. “Certainly, NSA has done that for decades. Now, how do we bring that to other partners in the government? We think there’s still a lot more we can do.”

Ultimately, each agency or organization in the national security ecosystem needs to take the fullness of the mission into any decision about AI and resources like compute power and budget.

“The basis of any AI informed system is the ability of the data to be visible, accessible, understandable, linked, transparent, interoperable and secure,” Thomas said. 🌟