The State of AI in Government

Policies, Challenges & Practical Use Cases
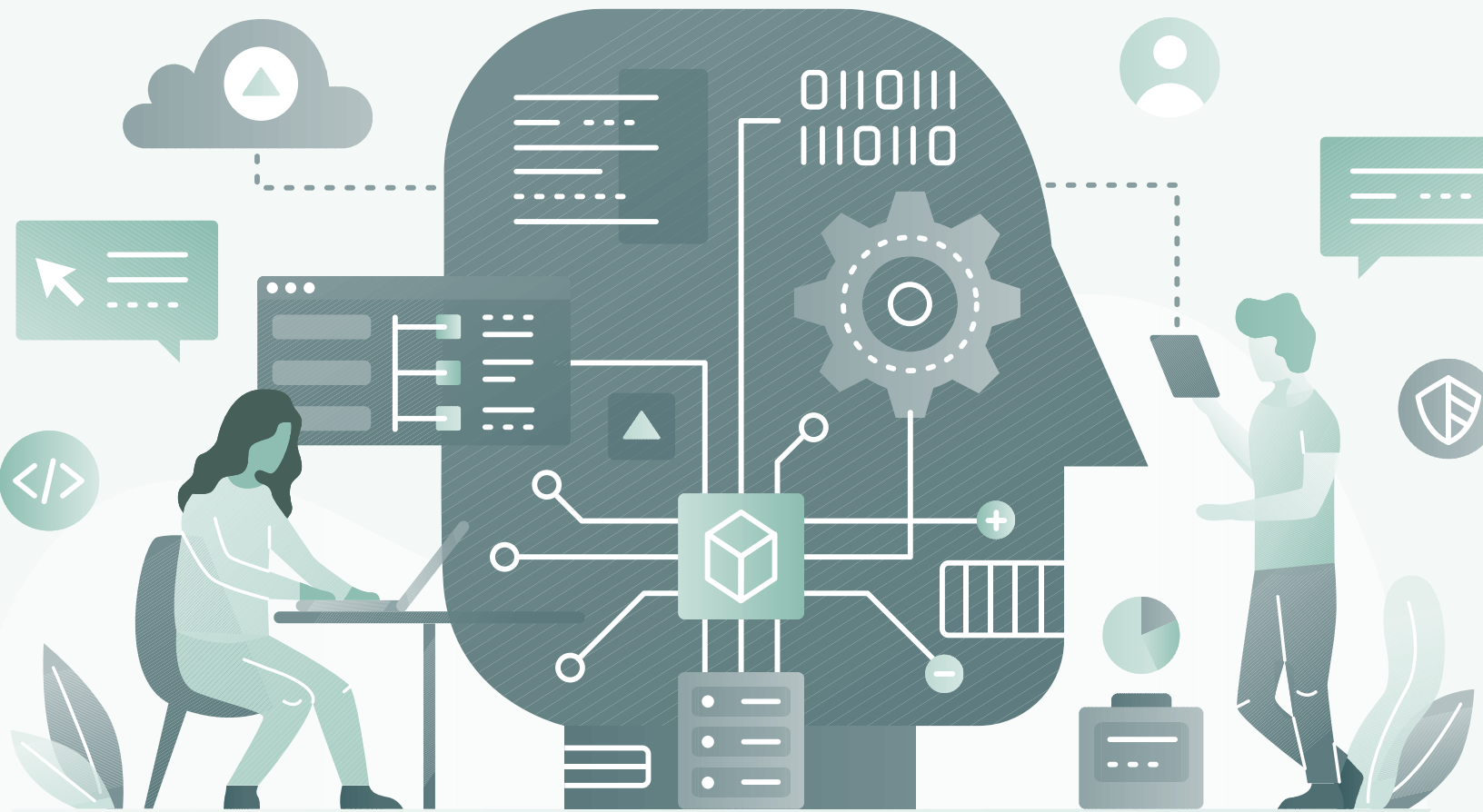
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Contents

Carahsoft and GovLoop have partnered to provide this resource around the latest government artificial intelligence initiatives and legislation. The goal is to guide government leaders and stakeholders interested in learning more about how AI can transform data into operational intelligence that improves efficiency, supports the missions and reduces costs.

Executive Summary

Believe it or not, government agencies have been talking about artificial intelligence (AI) for more than a decade. And with President Donald Trump's 2019 executive order on artificial intelligence, the focus is stronger than ever on what this technology means for the public sector. In this guide, we'll be reflecting on two years of AI progress since the order's publication.

> **"Continued American leadership in AI is of paramount importance to maintaining the economic and national security of the United States and to shaping the global evolution of AI in a manner consistent with our Nation's values, policies, and priorities," according to the order.**

The AI executive order instructs all federal agencies to prioritize and allocate funding for AI programs that serve their individual missions. Since the order's publication, the administration has developed official regulatory guidance that determines how federal agencies should approach the use of AI that the private sector develops. Today, research efforts are underway, directed by numerous agencies and even multinational partnerships, to put the U.S. at the head of the global AI table.

For the purpose of this guide, we define AI as **the ability of machines to demonstrate human cognitive functions such as learning, problem-solving and reasoning.**

But federal agencies aren't the only ones dabbling in AI. Washington, D.C., and Arkansas are among the state and local governments using various forms of AI. And although technologists in government are playing a key role in AI's secure adoption, it's the non-technical employees across program offices who are driving experimentation and delivering tangible results. That much has been clear during COVID-19.

If you're wondering what AI entails, how it could impact your job or how others in government are using the technology, this guide is for you.

Ahead, we look at the state of AI in government, current challenges and concerns, and practical use cases.

Breaking Down What You Need to Know About AI

The following section answers common questions about AI to explain how this technology might transform government. Here's what you need to know:

What is AI?

AI involves machines demonstrating human cognitive functions such as learning, problem-solving and reasoning. It is carried out through computer-programmed algorithms.

What is the difference between AI and machine learning?

Machine learning (ML) falls under the larger AI umbrella. It's different from other types of AI, however, in that it focuses on constant self-improvement — computers can change and improve their algorithms by themselves as they receive more inputs. ML is a collection of algorithms and mathematical models that computer systems use to progressively improve their performance on a specific task.

How did AI emerge, and how is it integrating with government?

Although American cognitive and computer scientist John McCarthy coined the term "artificial intelligence" in 1956, progress on AI has since occurred slowly. AI saw few breakthroughs in government until the late 1990s, when researchers focused on solving the technology's shortcomings and applying AI to real-world challenges.

In the 21st century, the government's Cognitive Assistant that Learns and Organizes (CALO) program produced a major milestone in AI research. The Defense Advanced Research Projects Agency (DARPA) conducted the program from 2003 to 2008, producing a cognitive AI assistant that ultimately inspired Apple's Siri tool.

Recognizing AI's potential, the Obama administration released a report about preparing for the technology's future in 2016. The Trump administration followed suit in 2019 with an executive order on maintaining America's leadership in AI research.

Why does AI matter?

On a global scale, the Trump administration views American leadership in AI as key to maintaining the economic and national security of the United States. AI's similarity to human intelligence means it could potentially impact every corner of society, from cybersecurity to medicine. The city of Las Vegas and Veterans Affairs Department (VA) are proof.

The benefits are enticing: AI could improve efficiency, perform dull tasks, assist decision-making and enable scores of other promising technologies, such as autonomous vehicles.

Unfortunately, AI's promise also comes with costs. For example, the potential of large-scale job displacement because of automation is one of today's most pressing concerns. Additionally, the ethics of creating machines that imitate humans are up for long-term debate. Finally, AI research is costly and time-consuming, and the future impacts aren't fully clear.

How is AI helping agencies?

How this emerging technology will ultimately transform government is still unclear. So far, however, agencies at every level are using AI for exciting purposes.

Across the board, AI is helping them analyze data, recognize patterns and perform manual tasks, such as monitoring video feeds. Agencies are also tapping AI for projects including data entry, detecting and mitigating cyberthreats, and understanding public sentiments via social media. In local government, agencies are using AI to assist citizens with online services, map out transportation routes and deliver communications to residents.

How vital is cloud to current and future AI efforts?

A number of agencies are using cloud – the provisioning of computing capabilities and services over the internet – to support their AI efforts. Consider the massive amounts of data and information that AI tools parse through to drive decision-making. Cloud supports those efforts in a secure, centralized manner by making data accessible.

Just ask the Defense Department (DoD).

The inaugural Director of DoD's Joint Artificial Intelligence Center (JAIC), Lt. Gen. John N.T. "Jack" Shanahan, called cloud the "lodestar" for DoD's AI efforts. DoD created the center in June 2018 to accelerate the delivery of AI-enabled capabilities, scale AI's impact agencywide and synchronize the technology's activities to expand Joint Forces advantages.

"Without that, it's just sidecars and side projects. It's not fast enough and broad enough," Shanahan said in a GovLoop interview.

Recently, the JAIC has made headlines for its work in filling coronavirus-related shortages in medical supplies, space and personnel. You'll read more about that in this guide.

As of 2020, the JAIC has also been designated as a Center of Excellence (CoE) by the General Services Administration (GSA). As a Center of Excellence, the JAIC – and DoD at large – will experiment with private sector partners and GSA's Technology Transformation Services team to foster AI use cases, with the hope of spreading solutions and lessons learned to other federal agencies.

"We have so much potential to use AI in a way that reduces costs, improves quality of services, empowers people, and increases efficiency."

- Michael Kratsios, Chief Technology Officer of the United States

How does AI influence other emerging technologies?

AI can play a crucial role in launching other emerging technologies such as the Internet of Things (IoT) and blockchain.

IoT networks contain devices that collect, exchange and store data. AI can automate these networks' connections and analyze the vast amounts of data traveling across them for profound insights.

Blockchain is a software-based, continuously growing digital ledger that stores records, and advocates say it's secure by design. By automating blockchain software, AI can carry out transactions and react to patterns in the information.

Is AI biased?

The general concept of AI isn't inherently biased, but bad modeling and bad data can easily skew and prejudice results.

Ironically, people are the best protection against AI bias. Humans can create objective algorithms by correcting slanted data and practicing inclusivity. That includes ensuring diversity across the teams that contribute to AI projects.

How AI Combats COVID-19

The arrival of COVID-19 to major metropolitan areas left many cities shorthanded in hospital space, personnel and equipment. Assigned to help, DoD deployed the National Guard and reserve forces to deliver supplies and construct temporary field hospitals.

How did DoD know where to focus its efforts?

AI predicted where supplies and personnel would be needed by looking at coronavirus case numbers in various areas. The JAIC, responsible for this AI implementation, analyzed supply chain information, found available resources and delivered them to hard-hit areas.

Why Do We Care About AI?

AI might well leave its mark on every part of public service. Here are some ways AI could possibly impact you and your organization:

AI is the future.

Trump's 2019 executive order on AI envisions the technology powering America's economy, national security and standard of living for years to come. **It's a vision that includes AI in every section of the public and private sectors.**

Since then, the White House has published regulatory guidance for federal agencies and regulatory principles for AI usage in the private sector. In addition to agencies generating their own guiding AI bodies, the U.S. has also funded National Science Foundation (NSF) AI research at universities pertaining to cross-cutting issues of vital importance, such as agricultural sustainability. The United States and Great Britain have also entered into an AI partnership that will see the two nations collaborate on research and development (R&D).

AI can improve health, safety and national security.

Using AI will give the United States technological advantages over its adversaries, DoD officials say. In the military, AI will analyze data to help warfighters make better decisions faster. For civilians, AI could someday produce breakthroughs in health care — for example, by recognizing long-term patterns that are too complicated for humans to identify.

AI will help define tomorrow's workforces.

AI will dramatically reduce the amount of time humans spend on manual, repetitive processes. The resulting free time could significantly impact the future of work, with menial tasks slowly disappearing. **Creating, managing and maintaining AI, meanwhile, could become a lucrative and far-reaching field with bountiful new job opportunities.** Experts suggest that it will take a coordinated effort for the government, industry and education sectors to equip the present and future workforces with the skills to work alongside

AI. Otherwise, the U.S. could see greater job displacement with the advancement of automation.

AI will lead to new discoveries in data.

The amount of government data is growing daily. Unfortunately, that data isn't useful to agencies if they can't detect insights, patterns and relationships. AI addresses this obstacle by quickly and efficiently analyzing large amounts of data for actionable meaning. Over time, AI will increasingly augment human judgment and help generate quicker, more informed decisions.

AI will lead to smoother customer interactions.

Agencies that adopt AI are starting to engage with citizens in new ways. For starters, AI can handle low-level tasks without resting, ensuring that citizens constantly receive services promptly. By streamlining public services, AI additionally improves the customer experience (CX) citizens receive. AI is even front-facing, such as when it takes the form of chatbots, as show on .

AI will save money.

Used properly, AI can reduce human error, unproductive labor and inefficiency, saving agencies energy, time and money.

AI can keep up with the competition.

AI's enticing benefits make it likely that more agencies and organizations will also embrace the technology. Other governments overseas — both hostile and friendly — are not far behind, if they trail at all. Beyond the public sector, private companies are making AI their own. With so many competitors and contemporaries leveraging AI, agencies that don't could be left behind.
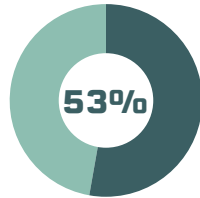
The State of AI in Government

Here we've highlighted stats and pertinent dates to illustrate the state of AI across federal, state and local governments.
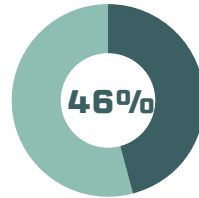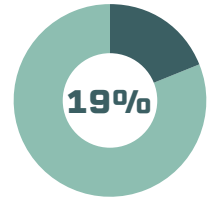
AI's impact on productivity

59%
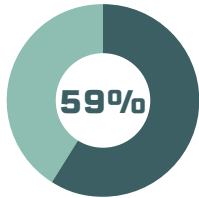
59% of federal employees believe that intelligent technologies, like AI, will reduce repetitive tasks and administrative burden.

53%

53% believe intelligent technologies will improve their productivity.

46%

46% believe intelligent technologies will reduce errors.

19%

19% growth is projected for computer and information science and engineering positions between 2016 and 2026.

Top 10 Rankings for Government AI Readiness 2018/19

Rank	Country	Score
1	Singapore	9.186
2	United Kingdom	9.069
3	Germany	8.810
4	United States of America	8.804
5	Finland	8.772
6	Sweden	8.674
6	Canada	8.674
8	France	8.608
9	Denmark	8.601
10	Japan	8.582

Source: World Economic Forum (Government Artificial Intelligence Readiness Index 2019/Oxford Insights/IDRC)

Investments in AI

› Governmentwide non-defense AI research and development spending is **expected to double** 2020 figures by 2022.

› The United States ranked **8.8 out of 10** for its government AI readiness, an analysis of the country's position to take advantage of the benefits of AI in its operations and delivery of public services.

› Twenty-seven government CIOs said AI was one of their **top tech investments**.

› High levels of federal investment into AI could save the federal government up to **$41.1 billion and 1.2 billion hours** of human labor.

› High levels of state investment into AI could save state governments up to **$931 million and 33.8 million hours** of human labor.

› By 2028, AI researchers are predicted to contribute to as much as **$11.5 trillion of cumulative growth** through the development of intelligent technologies in G20 countries.

AI Requires a New Approach to High-Performance Computing

An interview with Matt Demas, Public Sector Chief Technology Officer, Liqid, and Eric Oberhofer, Director of Sales, Public Sector, Liqid

High-performance computing (HPC) needs to evolve. The traditional HPC architecture, now decades old, worked well for previous generations of HPC applications. But today's applications, driven by AI, require a new approach.

The problem? The old systems were too static. Agencies have always bought high-performance computers the way people buy cars. They choose a model, select their features (in this case, compute capacity, storage capacity, etc.), and once they make their choice, they live with it until they buy a new model.

That means if they know they will sometimes need an SUV-equivalent of an HPC system, that's what they buy, even if they often need more of a sedan-equivalent.

Why AI Is Different

That wasn't a problem when applications had static performance requirements. But AI is different. When developing an AI system, the workload changes from one stage of the process to another, said Matt Demas, Public Sector Chief Technology Officer (CTO) at Liqid, a company that provides a comprehensive composable infrastructure platform.

For example, during the data ingest phase, the system requires high-performance network interface capacity, while the training phase (when algorithms are built based on historical data) and the inference phase (when the algorithms are run with live data) require large numbers of graphics processing units (GPUs).

The requirements are so varied, some organizations use different servers for each phase of the process – the equivalent of having a different car for each season of the year. That might be effective, but it is not efficient.

Capabilities on Demand

Liqid has developed an architecture called the Composable Disaggregated Infrastructure (CDI). With CDI, the server is stripped down to the smallest building blocks: the CPUs and dynamic random-access memory (DRAM). All other components – GPUs, the field-programmable gate arrays (FPGAs), storage, etc. – are available from a pool of resources that are available on demand as requirements shift.

In the case of AI, CDI makes it possible to choose the right mix of resources for each stage of the workflow. It's as if you could reassemble your car each time you went on the road, depending on the conditions of the day. "I don't have to under- or over-provision a system – I can right-size it stage by stage," Demas said.

That means an agency no longer needs to pay for resources that are just sitting idle. They can also start small and add more resources as an initiative grows.

"With CDI, we are providing the kind of flexibility that people have become accustomed to in AWS or other public clouds, where they can build a server on the fly by clicking on the resources they need," said Eric Oberhofer, Director of Sales for Public Sector at Liqid. "We're allowing that on premises."

Through Carahsoft, Liqid has worked with industry partners like Intel, NVIDIA and others to deliver the first-ever composable supercomputing deployments for DoD. The three installations are collectively worth $52 million.

> "With CDI, we are providing the kind of flexibility that people have become accustomed to in AWS or other public clouds, where they can build a server on the fly by clicking on the resources they need."

- Matt Demas, Public Sector CTO, Liqid

AI: The Past Four Years

2016–2017

October 2016

The National Science and Technology Council (NSTC) releases the first **National AI R&D Strategic Plan** under President Barack Obama as a framework for federally funded AI priorities. The plan is accompanied by a report, "**Preparing for the Future of Artificial Intelligence**," which surveys the state of AI, outlines possible applications and raise questions about possible implications.

December 2017

Trump's **National Security Strategy** becomes the first to state the importance of AI for the future of the American military.

2018

January 2018

The **National Defense Strategy** commits to investing in military applications of AI and ML, and DoD releases **its own AI strategy**, focusing on implementing AI to advance security.

May 2018

The White House charters a **Select Committee on AI** under NSTC to advise on AI priorities, consider private sector partnerships and identify opportunities.

November 2018

NSF announces **Early-Concept Grants for Exploratory Research** to promote an understanding of AI strategies and overcome social challenges of implementation.

2019

February 2019

Trump signs the **Executive Order on Maintaining American Leadership in Artificial Intelligence**, outlining America's AI leadership as a critical goal for the entire federal government.

June 2019

An update to the National AI R&D Strategic Plan includes a new focus on creating effective partnerships among the private sector, government and academia to generate technological breakthroughs.

August 2019

The National Institute of Standards and Technology (NIST) releases **a plan for federal AI engagement**. The plan prioritizes conscientious, inclusive and transparent AI R&D.

2020

January 2020

The White House proposes **regulatory principles** for AI's development and implementation in the private sector. The factors considered include public trust, access to federal data and federal engagement in developing technical standards.

April 2020

The Defense Department rolls out **Project Salus**, a JAIC-led project to combat the novel coronavirus. The JAIC uses AI to predict supply sites facing shortages and send over available military equipment, personnel and assistance.

September 2020

The United States and Great Britain announce a **bilateral partnership** under which their industry and education sectors will mutually research and develop AI solutions and workforce implications.

AI Policies

Global:

Canada and France led the proposal for an International Panel on AI at the 2018 G7 conference. The focus was to support and guide ethical AI adoption internationally by engaging all industries. Priorities include the responsible development of AI grounded in human rights, inclusion, diversity, innovation and economic growth. The panel launched at the G7 Biarritz Summit.

Federal:

The American AI Initiative and Executive Order 13859: Maintaining American Leadership in AI encourage federal investment in AI through R&D investment, improving access to necessary cyber infrastructure and providing training opportunities, among other initiatives. The U.S. government aims to establish AI governance standards, build an AI workforce and promote American AI leadership.

State:

New York, Vermont, Alabama and Washington have all launched AI commissions dedicated to uncovering the best use cases and policies for implementing AI. While the details of commissions vary from state to state, most missions include focuses on reducing AI bias and making recommendations on future AI legislation.

Local:

Chatbots are one of the most popular ways that government agencies are implementing AI at the local level. For example, the city of San Francisco relies on an internal chatbot called PAIGE to answer procurement questions from staff.

State & Local Chatbots

› **Missi**, Mississippi's state website's chatbot, saved the state $35,000 in its first six months by fielding nearly 2,000 questions that could have been phone calls.

› The Los Angeles Police Department installed **Officer CHIP** to help answer questions about hiring and recruitment. Now, the AI chatbot helps the department better understand candidates' recruitment experiences.

› The **Arkansas chatbot** uses AI to connect constituents to information on both state and local government services. In its first year, the chatbot was used nearly 4,000 times.

› **BEN** and **Cami** are two chatbots from the state of Montana. BEN helps constituents navigate the state website and find information, while Cami helps constituents find specialized representatives.

⚡ by **Skycivic**

Hi, I'm Cami!

You can submit your questions and remarks to me. I will send it to the appropriate MVD representatives, who will contact you to resolve any concerns you may have!

Alternatively, you can view all of MVD's contact information on the web page below.

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Welcome to ms.gov! I'm MISSI and I'm here to help you find what you need. Just type what you're looking for and I'll do what I can to help you out!

If you need help, here are some popular links to get you started.

(COVID-19) (I Need Job Help)

(Elected Officials)

(Driver License Help) (DOR/Taxes)

(ACE Log In)

Federal AI Initiatives

National Institutes of Health

Strategic Plan for Data Science

June 2018

Includes debuting AI training programs for individuals and the institution, offering AI internships for industry, research and students

Defense Advanced Research Projects Agency

AI Next Campaign

September 2018

Aims to create data-efficient approaches that are less reliant on large-scale data

Food and Drug Administration

Regulatory framework for AI medical devices

April 2019

Considers allowing modifications to software health devices based on real-world learning and adaptation during the lifecycle

U.S. Patent and Trade Office

Request for information on patenting AI

August 2019

Explores whether new forms of intellectual property protection are needed

Energy Department

AI and Technology Office

September 2019

Pioneers AI research and development, including the use of its supercomputers to study cancer

National Oceanic and Atmospheric Administration

AI Strategy

November 2019

Expands AI usage in NOAA mission areas, incorporating satellites, unmanned systems and commercial data sources

Veterans Affairs Department

National AI Institute

December 2019

Designs, coordinates and collaborates on AI R&D initiatives dealing with the wellbeing of veterans and their families

Transportation Department

Autonomous Vehicles 4.0 Guidance

January 2020

Compiles guidance for integrating autonomous vehicles into existing transportation systems

National Science Foundation

AI Institutes

August 2020

Awards $140 million over five years to expand AI R&D in topical areas at universities

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- ML Model Management
- ML Operations (MLOps)
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- All Other Model-Related Topics

Tracks:

- Industry Applications
- Government and Public Sector Sessions
- Technology Deep Dives

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DoD's Battle Against COVID-19, With AI at the Helm

The U.S. military has been an AI trailblazer for more than five decades. Not only has its work on artificial intelligence been groundbreaking, but its findings have also been extremely cool — there's no other way to put it. Advanced warfighting systems and augmented reality are coming down the pike, and DoD has deployed AI to streamline its supply chain and keep personnel safe.

And yet, in its five decades-plus of AI experience, DoD and its Joint Artificial Intelligence Center dealt with a different kind of enemy in a 2020 call to action. In an interview this summer, Sunmin Kim, Chief of Policy at DoD's JAIC, told GovLoop about how DoD is using AI in its fight against COVID-19 and offered her advice for maximizing AI and data.

"In the height of the pandemic, we were able to deploy a lot of our medical personnel, as well as other job functions that the military could provide, to help New York City respond to the pandemic," Kim said.

GovLoop: What sorts of use cases for AI have been applied to COVID-19?

Kim: Project Salus: That's our COVID-19 project. That started in the beginning of March, so as telework started for everyone. **That project uses AI and builds predictive models to predict supply chain issues, in order to assist North Com as well as the National Guard in their COVID-19 operations.** So we delivered probably 30-plus models. We have 70-plus different data sources that feed into those models, and they are all delivered as a COP, or a common operating picture.

What sorts of data are you collecting for Project Salus? And how are you turning that into predictive models?

DoD's mission is one, to make sure that it doesn't hurt our readiness to go to war. Two, to protect our service members, and I mean both service members and the civilian population of DoD. So within that, those are pretty clear DoD missions. **But when you're talking about a domestic threat like COVID-19, for us to, for instance, predict how COVID-19 is going to be affecting a certain military installation, you might need data from things that would be nontraditional DoD data.** So, you might need data from CDC, [or] from Department of Labor when it comes to unemployment. You might need data from retailers to see where you could be looking at certain shortages in the supply chain as a predictor of, or as a proxy for, where COVID-19 is moving across America. So, these sorts of datasets I think are really hard for the DoD to have, because they're not traditional military data. But at the same time, for us to do accurate modeling, we do need datasets like that. So, this project had a lot more sort of rigorous policy review for data, more so than a project like predictive maintenance, for instance.

Are there certain best practices or is there any advice that you have for other agencies in advancing their data and AI efforts?

Just having that catalog and inventorying is important — that can describe what that dataset is in a machine-readable way, as well as identifying who the data owner is and what the intended use of that data is. **We, the government, have an obligation to our constituents saying if we're collecting data on them in order to administer certain public programs.** For me as a constituent, I wouldn't expect that data to be used in an unexpected way. And I think the more we do about making that data interoperable and open, the more careful we have to be about what's the promise that we made to our constituents when we collected that data in the first place. But I think that inventorying can really help within agencies. And then I would say the next step is: How do we figure out how to share that inventory across the interagency? So when there are issues like COVID-19, where it's going to be a very heavy interagency effort, how do we make sure that that data can be shared responsibly but also easily? We're not wasting our time and money by collecting data that we already have in the first place.

To guarantee data privacy and trust, DoD debuted five principles for ethical AI earlier this year.

› **Responsible:** Carrying out projects with proper judgment and care.

› **Equitable:** Taking active steps to reduce unintended bias to the lowest level.

› **Traceable:** Understanding the technology itself, as well as the different data sources and methodologies used to generate decisions.

› **Reliable:** Testing and defining clear use cases for the models to ensure effectiveness and security.

› **Governable:** Shutting down any system that does not follow instructed guidelines, and having the ability to detect and avoid aberrant behavior.

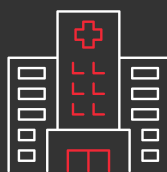# MAKE REAL-TIME AI-DRIVEN EDGE PROCESSING A REALITY

View the resources at
Carah.io/kubeframe
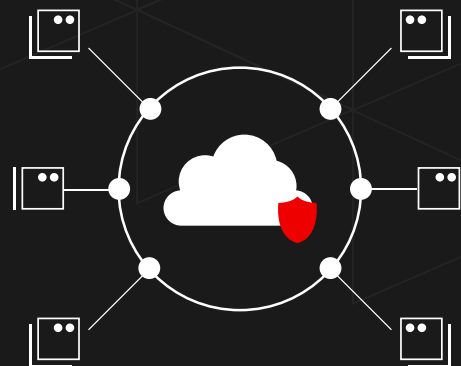
Identify your use case:

Smart Cities

Hospitals

Military

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Defense Industry

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Bring AI to the Edge

An interview with Jeff Winterich, Defense Department Account Team Technologist, HPE, and Ryan Kraus, Staff Solutions Architect, Red Hat Public Sector

Most people think modeling is the hardest part of artificial intelligence.

But really, the most obstinate AI barrier isn't code or sampling, according to Ryan Kraus, Staff Solutions Architect for leading enterprise open source provider Red Hat; instead, it's having user-friendly infrastructure available to consistently develop AI.

"Right now, they need to focus on building that infrastructure in a way that isn't going to limit them in the future, which is a pretty tough ask," Kraus said.

So, where does that leave agencies, many that have spent years accumulating static hardware? Well, they need to move away from the monoliths of the traditional data center model, said Jeff Winterich, Defense Department Account Team Technologist for Hewlett Packard Enterprise (HPE), an edge platform provider.

GovLoop recently interviewed Kraus and Winterich about how agencies can develop and scale AI across the enterprise. They offered the following steps.

1. Be ready to move away from monolithic data centers.

Legacy computing structures always glued data scientists to data centers. The two were tethered together, meaning scientists couldn't work where the data didn't reside, much like how a lab scientist needs their lab chemicals and instruments.

Data science, however, is not entirely like lab science, because endless inputs come outside of a controlled environment. AI models are most effective when exposed to open air.

"We have accelerators on our phones. We have compute everywhere," Winterich said.

The solution is to bring software-based applications to the edge, except for massive data projects.

Software is available anywhere – it just has to be downloaded onto hardware – and can receive updates over the internet, so agencies aren't weighed down by having to send information to the cloud or data center for processing.

2. Embrace containers and open source.

The most portable, standard software unit is a container. Containers are self-sufficient packages of code that contain all that an application needs to run.

Since containers include all dependencies, they are well-suited to environments everywhere. As long as containers are orchestrated and standardized, they can intake, process and execute data consistently.

3. Bring AI to the edge.

Now that containers are on the edge, AI can join them. Agencies presumably already have devices with compute at the edge, but those often can't tap into the rest of the enterprise.

The key for agencies is to roll out all the security, storage and processing power they need on the edge. With containers as a standard unit of exchange, the data doesn't have to travel back to the cloud or data center. Instead, AI can analyze it on the edge, where it's generated.

Red Hat, HPE and NVIDIA — an AI specialist — have partnered to develop such a solution. KubeFrame for AI-Edge is a turnkey, field-deployable solution that combines the three vendors' offerings into an out-of-the-box, open source-based AI system.

Processing data at the edge can mean faster analysis and better models.

"The value we're talking about is making data science easier," Winterich said.

> "The value we're talking about is making data science easier."

- Jeff Winterich, DoD Account Team Technologist, HPE

Using AI to Improve Veteran Care and Save Lives

VA is helping to blaze the trail of innovation for AI and emerging technologies in the federal government. But its journey hasn't been without bumps on the road. Since the 2014 VA health care scandal, when wait times far exceeded the targeted amount and staff fabricated statistics to show otherwise, the department has reinvested and retooled its health care.

AI is playing an increasingly critical role in that effort. During COVID-19, VA has even set up an AI project to quickly predict patient outcomes and accordingly determine treatment. In the pilot, ML and AI evaluate patient data and weigh whether key comorbidities, or existing health conditions, could complicate recovery. The technologies can then also help decide whether hospitalization is needed, as well as what treatments can help.

But to effectively implement AI in these and future contexts, VA has had to learn from the past.

GovLoop sat down with three leaders from VA's Veterans Experience Office — Lee Becker, Chief of Staff at the time of the interview; Anil Tilbe, Director of Enterprise Measurement and Design; and Laura Prietula, Acting Executive Director of Multichannel Technologies — to discuss AI's journey at VA and lessons learned.

GovLoop: In what ways generally is VA implementing AI? Specifically, how did the agency get started?

Becker: It's been an amazing journey from a veterans' experience perspective. The Veterans Experience Office came out of the crisis of Phoenix, when there were the issues with the lists of appointments and veterans were not getting timely appointments – and the data was showing things differently.

We did not have the customer datasets. We had a lot of operational data, we had a lot of financial data, but we did not have necessarily the data for [customers]. And I think that from the customer perspective, I think that's a key aspect with AI. **You can't have AI if you don't have the right data in place** … and that's something the VA has been very diligently working on.

Tilbe: So for the purpose of how we are implementing AI, we've been able to bring in industry best practices with regards to: How do you go about creating a data strategy? How do you create use cases so the use cases drive the data strategy? We're creating an innovative architecture that informs the data strategy that will enable the deployment of the use cases. The fourth domain is the data governance piece, and that's very specific to how you set it up in a robust way to ensure there's data quality, there's appropriate definition of data brokerage roles that are ownership roles. Finally, as we're deploying and have deployed AI capabilities at the VA, it's the change management and the mobilization — how you make sure that the department is appropriately positioned.

Prietula: As we also established the VA customer profile for VA, in which we are harnessing the information from various datasets, we need to be responsible as well. So, we are delving into the ethical vs. the value proposition of the data. It's all toward rendering the best customer experience, creating that loyalty from our customers and making sure that they're treated with empathy and respect for what they need.

Can you tell me more about some tangible examples?

Tilbe: At any given time, VHA knows what are their [customers'] top five concerns in the last 90 days. These are [not] the top five concerns, explicitly, but it could be [customers] asking in the last 90 days [about] pain management [or] neurology services. Also, we're able to inform using deep learning, machine learning and natural language processing by building it all together. You can't do one without the other because you're dealing with free text here. Using advanced analytics, which is made up of AI, machine learning and natural language processing, we're conducting descriptive analytics to look backward to inform what happened, but we're also conducting prescriptive analytics to predict emerging concerns. Emerging concerns are huge because you're trying to get ahead of what could happen.

What takeaways from your journey can you share with other agencies?

Prietula: It's not easy. It needs to have deliberative planning and strategy and actual commitment from leadership.

Tilbe: The determination of what AI capability you want to deploy really needs to be anchored to business value. **A lot of times we've noticed that technology comes in and then we start to think about the strategy and the use cases. It has to be the other way.**

Becker: I think the lesson learned from VA is how important having CX data is. The private sector has figured that out. Amazon, they've figured it out. Marriott has figured it out. USAA has figured it out. I think, in the government, what's fantastic is there's this really tremendous renaissance now on the importance of CX data. And VA has not only just said and has been spreading the word, but actually applying it. It's very tangible, and it's saving lives. CX data is saving lives.

Amazon AI

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3 Ways Cloud Improves AI

An interview with Joe Pringle, Tech Business Development Manager, AI and ML, Worldwide Public Sector, AWS

The pandemic has put governments around the world to the test. To cope with increased demands, services have needed to be bigger, faster and stronger — bigger in availability, faster in handling requests, and stronger in the face of cyberattacks and network strain.

"We've seen a huge increase in artificial intelligence being put into production, including supporting mission-critical activities," said Joe Pringle, Tech Business Development Manager of AI and ML for Worldwide Public Sector at Amazon Web Services (AWS).

Cloud services have gotten the job done. They've allowed agencies to quickly and securely spin up AI projects across a spectrum of use cases, from education to health care. Those projects have real, tangible benefits for constituents, like more individualized curriculums and more accurate diagnoses.

GovLoop recently asked Pringle about the steps agencies should take to elevate AI using the cloud.

1. Expand

The benefits of the cloud begin when you launch AI projects. Delivered by the cloud provider, managed services for AI-enabled computer vision, speech, predictions and search have industry partners assume the onus of training, deploying and maintaining underlying models. Agencies' biggest responsibility is developing use cases.

Moreover, once services are online, agencies don't have to worry about overloads and crashes, because they can scale up or down to meet demand.

For agencies, cloud managed services have come in handy when they've needed to launch innovative programs in response to the pandemic. Those have included using computer vision to detect objects in videos, such as recognizing whether people wore masks in crowded settings.

2. Accelerate

Cloud-based AI can help agencies move faster, too. During the pandemic, it has.

"We're seeing a lot of governments using AI to automate highly repetitive and time-consuming tasks," Pringle said.

One example is automating document workflows so that AI replaces manual data entry and extracts metadata to enhance search capabilities. As a result, AI speeds up timelines for constituents. Without having to wait on employees to manually enter data or respond to simple queries, citizens receive the front-facing information and services they need faster.

Agencies can build AI faster in the cloud, too. Developers access capabilities through simple application programming channels, so they don't have to build or integrate models from scratch. Cloud services like Amazon SageMaker remove the busywork and infrastructure so that data science teams are more productive and efficient when rolling out ML.

3. Strengthen

In government, developing models quickly and broadly is useless if they fail the necessary security and compliance checks. AWS can step in at any point to shore up the ML pipeline so that the whole process — from data acquisition to service delivery — is secure.

"Security and compliance are critical at each and every stage of a machine learning pipeline," Pringle said.

To maximize success, Pringle suggested three steps for launching a project. First, gain familiarity with how you can use AI. Then, build in-house capabilities and expertise, both business and technical, to vet vendors and assess offerings. Finally, start with a small proof of concept with clear value and minimal risk.

"Security and compliance are critical at each and every stage of a machine learning pipeline."

- Joe Pringle, Tech Business Development Manager, AI and ML, Worldwide Public Sector, AWS

AI in Action: Government Case Studies

Here we've highlighted case studies at the federal and local levels. What's clear from these is that AI serves multiple purposes, in both the short and long terms. And AI, in all situations, requires innovative thinking and a clear application. Fortunately, there isn't any shortage of possibilities.

How AI, Cloud Powered SBA's Pandemic Loans

When the Coronavirus Aid, Relief and Economic Security Act (CARES) Act passed in March, the Small Business Administration (SBA) was suddenly in charge of 10 times the usual amount of funds to distribute to small businesses.

"We are trying to push about $349 billion through the program in about 10 days or less," said Sanjay Gupta, Chief Technology Officer of SBA.

During the pandemic, two of the main programs through which the agency supports small businesses have been the Economic Injury Disaster Loan (EIDL), which offers financial relief to businesses hit by a disaster, and the Paycheck Protection Program (PPP), which helps companies cover payroll for eight weeks.

"You can imagine from a scaling standpoint, this is a humongous challenge," Gupta said during a GovLoop online training event.

AI and ML have crucially risen to the challenge. SBA partnered with PPP lenders such as data and technology firm Kabbage to process parts of the loan application process. One key, nontraditional solution automated the taking in and verification of payroll documents and data, saving employees crucial time.

"In a matter of two weeks, the team stood up a fully automated system for any eligible small business — including new customers, regardless of size or stature — to access government funds," according to the company's head of data science.

Although one of the key enablers that keeps the agency's operations running during the pandemic is innovative, improvisational thinking, another is the technology modernization effort that laid a foundation to allow the agency to scale up.

These modernization initiatives are namely network updating and cloud migration, Gupta said. With an upgraded network, the agency had the base to scale its infrastructure up to the volume it needed to handle its massive loan distribution and remote workforce.

How DC Water Uses AI and Cloud to Improve Services

In the nation's capital, public water management implements AI and cloud technologies to conduct predictive analytics on water distribution, detect pipe defects and improve the constituent experience. To continue successfully collecting and treating nearly 300 million gallons of wastewater each day, DC Water's next frontier relies on AI innovation.

To set the foundation for AI, DC Water first implemented other modernization initiatives to steadily improve operations. An Internet of Things water fountain to monitor water quality, for example, brought cloud into the fold.

Now, the agency is using AI to replace the manual pipe monitoring systems in place. Pipe damage can be costly and inefficient as gallons of filtered water are wasted or sewage infiltrates clean systems through deterioration.

AI image recognition and processing is faster and cheaper than manual inspection, allowing for quicker response times to fix damage. Pipe maintenance and detection saw clear improvements with AI, preparing DC Water to embrace intelligent technologies for more projects.

Because of the scale of DC Water's infrastructure, the agency has amassed large datasets over time. The data is the fuel for AI success because DC Water has the bulk of the resources to create strong algorithms. Going forward, DC Water hopes to use AI to gain insights about decision-making, reduce energy consumption and eliminate waste.

In combination, all of these initiatives are good for DC residents and tourists, too. AI helps DC Water anticipate what its systems need, which leads to fewer outages and higher-quality water.

NSF Establishes Institutes in Targeted AI Research

The National Science Foundation has established AI Institutes across the country, pairing up with universities and other agencies to apply AI to a number of pressing problems. Each institute is awarded $20 million, with some institutes housed within the same university system.

The first round came in late 2019, and results are expected to continue trickling in. These studies are designed to advance the science of AI and bring more students and researchers into the fold with the incorporation of timely topics. Examples from the latest round include using AI to study weather, climate and food stability.

"In terms of scientific discovery, in terms of improving society so that people are learning better, in terms of engineering, in terms of business: We would like to see how AI can contribute to all of these fronts," Rebecca Hwa, Co-Leader of the National AI Research Institutes at NSF, said in an interview with GovLoop.
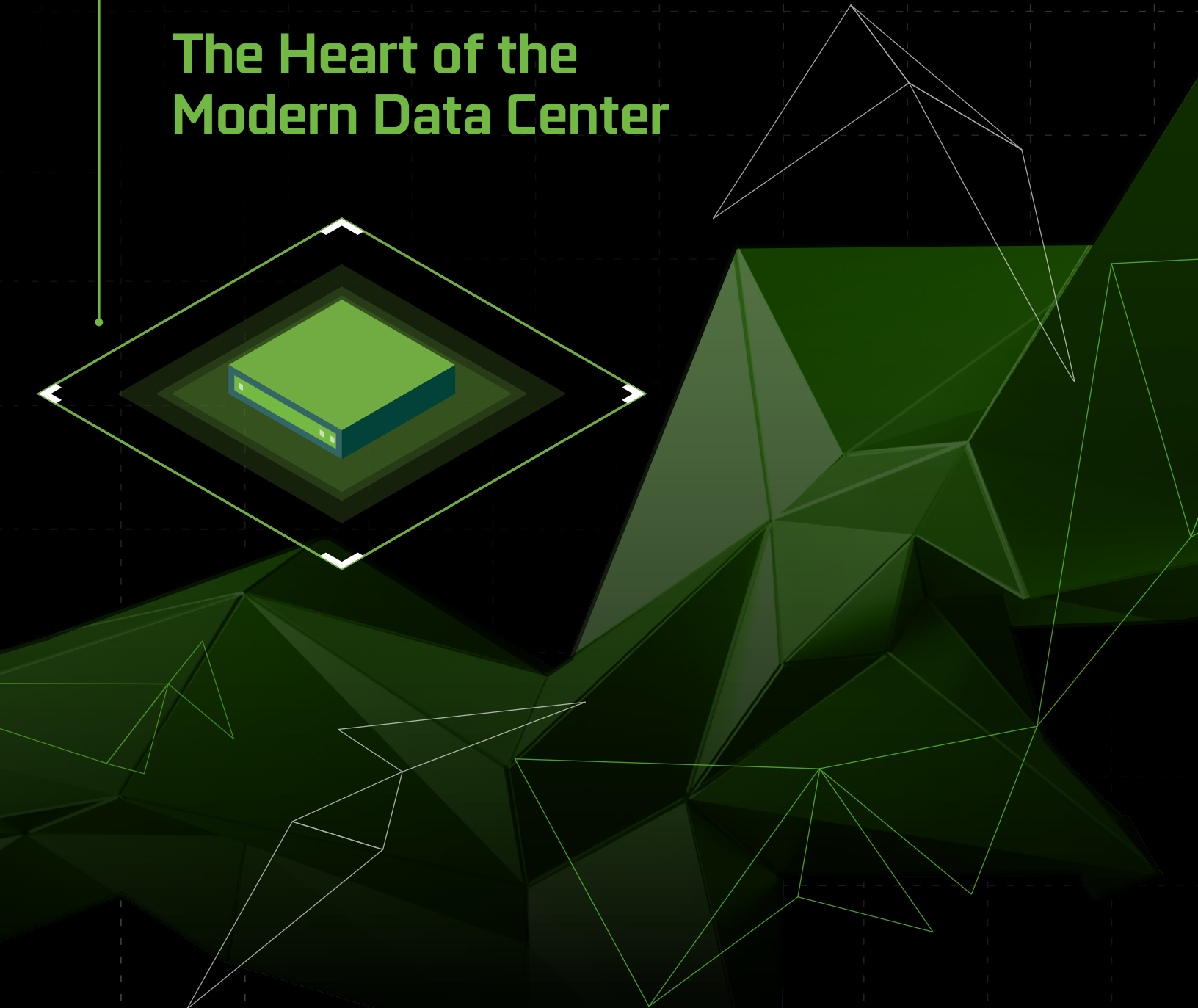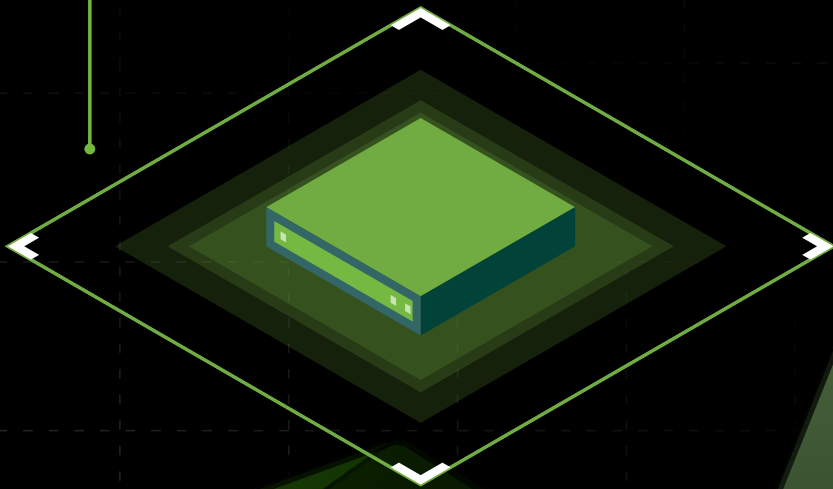
NVIDIA DATA CENTER GPUs

The Heart of the Modern Data Center

How AI Demands a New Vision of the Data Center

An interview with Curt Smith, Vice President, GPU Data Center Architect, NVIDIA

Technology originally developed to improve PC-based gaming and multimedia applications nearly 30 years ago is now driving advances in the field of artificial intelligence.

In the early 1990s, when PC gaming was beginning to take off, the Graphics Processing Unit (GPU) was invented by NVIDIA to render an image by breaking it up into multiple tasks that could be executed in parallel.

Today, the same approach accelerates processing for a wide range of applications, not just on PCs but also on the world's fastest computers.

NVIDIA is working with the federal government to incorporate AI to enhance decision-making and operations across key mission areas. The focus is on AI to improve situational awareness and decision-making, to enhance maintenance and supply operations, and to augment the capabilities of personnel with new ways of working that offload tedious cognitive and physical tasks.

With the advent of AI, the GPU is more important than ever, said Curt Smith, Vice President, GPU Data Center Architect, for NVIDIA, a pioneer of graphics processing technology.

Accelerated Learning

To learn how to interpret data and automate tasks – for example, to recognize objects or understand human speech – AI needs to ingest and analyze large amounts of data. As the AI market booms, the programs are growing more complex and the demand for compute power is accelerating.

When it comes to AI training and inference, GPUs can accelerate performance 10x over CPUs, said Smith – which means that the time it takes to train an AI model can go from days to hours or even minutes.

"The compute processing needed with AI is doubling every few months," he said. "GPUs are the key to staying at state of the art."

But NVIDIA believes that AI doesn't just require more compute power – it requires a different way of thinking about the data center.

The Data Processing Unit

Traditionally, government data centers are focused on general processing and running mission systems. As AI becomes more advanced and more important to the nation, government organizations need to look at reorganizing their infrastructure, Smith said.

In addition to the CPU and GPU, agencies also need to think about the DPU – that is, the data processing unit, which encompasses compute, networking, storage and other core data center functions. The DPU is "a single compute entity that's programmable, AI-enabled and can deliver greater levels of security, performance and efficiency," Smith said.

This advanced infrastructure also enables the rapid deployment of AI-enabled services through the cloud and data centers, he said. "You can work with larger and larger and larger datasets, and more and more complex models, to build better real-time AI services. Today, GPU-accelerated systems assist during natural disasters; serve communities by improving safety; power efficiency and traffic flows; and help leaders solve previously unsolvable problems in cyberdefense and cyber resilience. These revolutionary solutions are made possible with NVIDIA technology."

That's NVIDIA's vision for the government data center, said Smith. "Our hope is to deliver solutions that they never thought possible – and to enable customers to make data-driven high-quality decisions faster than ever before."

> "The compute processing needed with AI is doubling every few months. GPUs are the key to staying at state of the art."
>
> *- Curt Smith, Vice President, GPU Data Center Architect, NVIDIA*

Improving Public Health Through AI

Paula Braun, armed with curiosity and a passion for data, stepped into a unique public sector role as an Entrepreneur in Residence (EIR) at the Centers for Disease Control and Prevention (CDC). The Health and Human Services Department (HHS) brought Braun in from the private sector in November 2014 to work alongside staff solving complex health problems and challenges with the delivery of human services.

What began as a four-year stint at CDC has morphed into a full-time position as a civil servant focused on critical health issues, mainly around mortality reporting. Braun believes that through the power of data and modern tools, health care professionals can better predict causes of death. Part of the challenge, though, is that federal data assets are only as strong as the information from state and local public health entities – a fact reinforced when HHS collected disparately coded COVID-19 data from various hospitals and governments.

Before COVID-19, GovLoop spoke with Braun, lauded as an AI influencer in the public sector, about the power of AI to support public health efforts at CDC and beyond.

This interview has been lightly edited for clarity and length.

GovLoop: How would you describe the nature of your work at CDC?

Braun: What I brought was an abundance of curiosity. And I knew how the data could and should be used further downstream, and so my first task was to look at the way that mortality reporting happened across our country and ways that we could improve throughput and equality of the information.

What I didn't know, and what I quickly learned, was that it was a lot more complicated than what I initially imagined. **You have lots of different entities who are responsible for collecting the information. Depending on where you die and how you die, that determines who's going to complete your death certificate.** But I had a sense that we could do more than just take the centuries-old paper process and translate it to electronic processes; that we could really think about what was happening with the digitization of health care data and ... assist the physicians or the medical examiners and coroners with diagnosing the causal pathway.
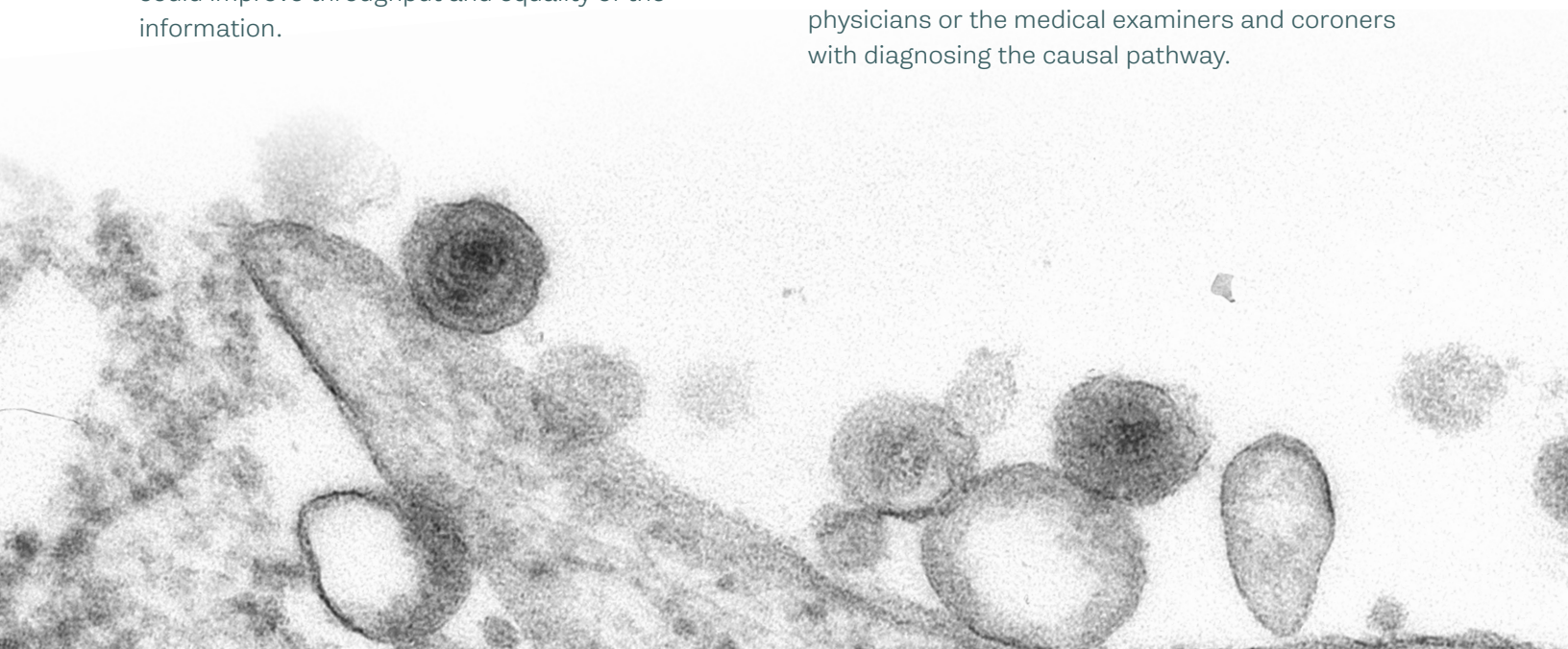
And creating a tool that wasn't just an administrative burden on them, but actually helped them feel like they were smarter, and helped them get the experience of piecing together the clues and arriving at an answer. And as a byproduct of that emotional exchange with the AI tool, they would hopefully improve the quality of the information that they're reporting to public health. Now, of course, all of that was a moonshot, and I knew it was a moonshot at the time that I proposed it. But what it did is it galvanized people across the country to start thinking about ways that public health reporting, and specifically mortality reporting, could be looked at through a fresh set of eyes.

You mentioned "the AI tool." Does that tool have a name?

It's called "Death Worm." It's still very much a work in progress. What I would say about Death Worm is … it got people to understand that if we wanted to have plug-and-play interoperability, that we couldn't just develop the sexy app part of it. We really had to invest in understanding the circuit board that it would plug into.

What they've done is say, "OK, let's continue to think about this concept of the Death Worm," but knowing that the predicate to that is having a standard for death reporting that leverages these packets of information that everybody else is coalescing around.

This push that's been happening toward giving individuals access to their own data in a machine-readable, standardized format is so powerful in terms of what we might be able to do further downstream with predictive analytics.

Can you talk about the connection between predictive analytics and AI?

Traditionally, public health plays the role of a data aggregator. We're collecting large volumes of information because we're interested in understanding how often illnesses or injuries occur, not just at an individual level, but across entire communities or entire populations as a country at large. **And we use that information to try to understand why those diseases or injuries occur, and then we use that to take action that will allow us to address really significant threats to the public health at their source.** AI can play a role at many different places in that information chain.

You can imagine this scenario where there is emergency department data that gets reported to our state and local counterparts, and a subset of that gets reported to CDC. You could imagine a place where AI would be mining that information, looking for patterns, sending alerts, giving us a sense that something out of the ordinary is happening here.

As an AI influencer, what advice do you have for others in government who want to adopt the technology?

The first thing I'd want to get across is that you don't need a fancy title. The EIR title is a double-edged sword. It's polarizing. There are people who see that and they come to snap judgments. And so while it was helpful in terms of having ties with the department and getting top cover for certain types of things, it was also a challenge to overcome. And I think like anything else, there are people with really great ideas everywhere.

I think what holds people back is fear, and what holds people back is culture and social-cultural norms. The one thing that I'd like to get across for anybody who's sitting anywhere in a federal agency or big bureaucratic organization and just feels like they're getting swallowed up by it is not to take "no" as no. It's a matter of thinking about where we are now, where can we go, where are the gaps and who's ready to come on this journey with me.
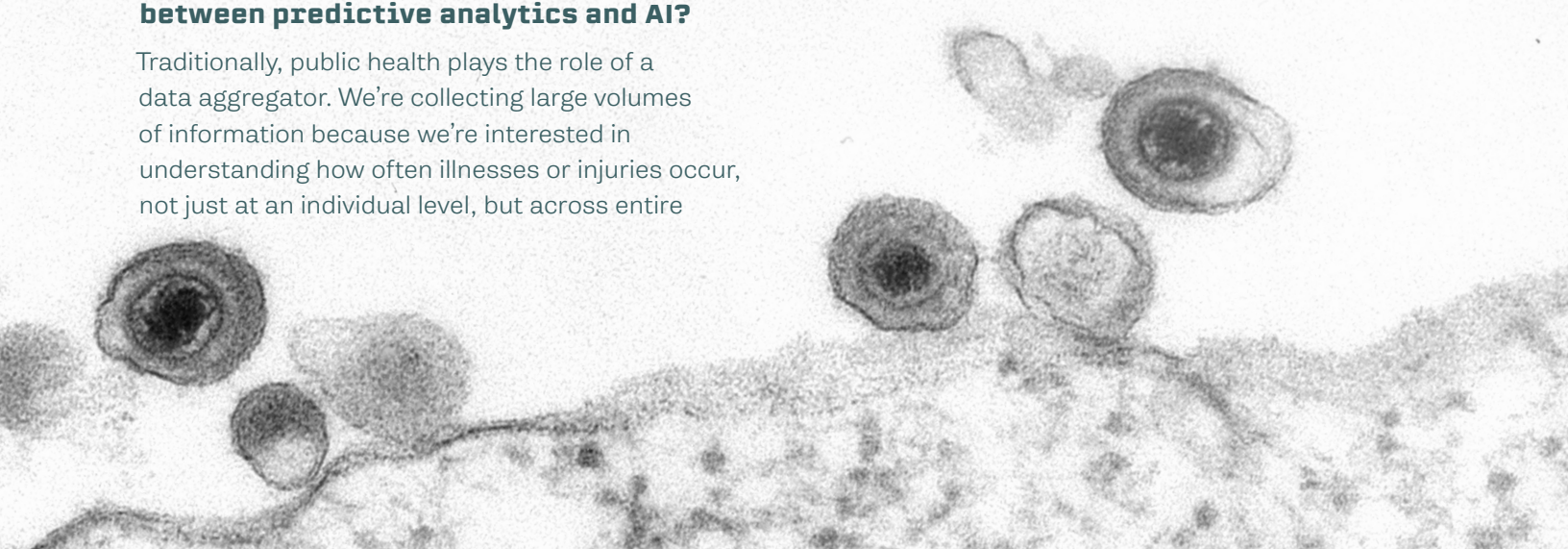
Best Practices to Getting Started With AI

The journey to AI implementation will vary for every agency, but there are a few tangible ways for how every public sector organization can set the groundwork. These suggestions will provide actionable steps toward using and understanding AI at your agency and offer best practices and further resources to aid the transition.

Identify a specific use case for AI.

Before your agency considers investing in AI, align an agency-specific goal or problem with an AI-based solution. This helps define the AI strategy early, court necessary support and resources, and keep the team on track.

Modernize legacy IT systems.

Before implementing AI in any capacity, your agency must ensure that its current systems can handle the new technology and the mass data processing that comes with it. Transitioning to the cloud, for example, can help agencies with the data management necessary for AI.

For more on IT modernization, visit the Report to the President on Federal IT Modernization.

Improve available data.

Data can be messy and sporadic. For AI technology to conduct trustworthy analysis, data must be clean and organized. Break down silos that separate data for easier access with a holistic data management platform or by improving internal data organization.

For more on data management, visit the Data Center Optimization Initiative.

Break down management silos.

The silos that separate an agency's development, security and operations teams also need to go. Consider a DevSecOps approach or a unified management platform to foster collaboration and innovation on this front.

For more on DevSecOps, visit GSA's DevSecOps Tech Guide.

Provide training on AI fundamentals and agency-specific use.

Your team must understand how AI works, where it will fit within the team's existing framework and the plan for implementation. An understanding of the big picture and individual roles in meeting goals goes a long way.

Establish a way to track success.

Based on your goals, consider what success will look like as your team progresses. Although the end goal may be clear, embrace the small wins to encourage progress.

Build an AI model around the available data and infrastructure.

Once the staff and IT infrastructure are ready to implement AI, your agency is ready to build a model with a specific goal. The model should rely on the data and infrastructure that your agency already has to optimize existing resources.

Test the model and analyze results.

Before rolling the model out, it's important to test for possible flaws. Implementing new tools has huge stakes, and you'll want to ensure your agency is ready to mitigate shortcomings throughout the transition. Test rigorously, and enhance data to keep improving.

> "The development of standards for IT is integral to AI technologies and systems."
>
> *- National Institute of Standards and Technology*

Conclusion

Artificial intelligence is emerging as a game-changing technology that empowers employee innovation, improves citizen services and creates new and valuable insights from agencies' data.

But as with any emerging trend, there will be starts and stops. Some projects will soar while others will need to be retooled and/or enhanced. That's what innovation is about — continuous improvement and experimentation.

Use this guide as a starting point to consider the possibilities of AI. But don't stop there. Connect with others who are using AI and learn from their work; tap into the power of community to explore how AI can power your transformation journey now and into the future.

Thank You

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