emerging tech in government:

what it means for your career

govloop

contents

executive summary

We've come to expect new announcements about futuristic technologies in our private lives — you know, the gadgets that companies convince us will make us live longer, feel better and be digitally connected at all times.

But if you look at public dialogue around emerging technologies, government is glaringly missing from those conversations.

"Oftentimes, if a government body isn't publicly issuing guidance or a regulation, people assume that they are not thinking about it," Justin Herman, Emerging Citizen Technology Lead at the General Services Administration (GSA), said during the 2018 State of the Net Conference in Washington, D.C. "Nothing can be farther from the truth."

The focus for many agencies is gaining a better understanding of how emerging technologies can benefit them, how they fit into their current ecosystem of IT investments and what risks they may pose, particularly from security and privacy standpoints.

For the purpose of this guide, we define emerging technologies as those that hold great promise to change the status quo in government. The term includes new and older technologies that are transforming the way agencies operate and serve citizens.

We developed this resource guide to provide pertinent details about key emerging technologies, including blockchain, artificial intelligence (AI), the Internet of Things (IoT), social and collaborative tools, and biometrics. You will learn:

- How these technologies are defined and what they entail.
- Key stats.
- Short, practical use cases for government.
- How the technologies could affect the way government employees work.
- Additional resources to tap to learn more and connect with others who use the technologies.

Let's get started by reviewing the current emerging technology landscape in government.

your emerging tech primer

what are emerging technologies?

Depending on whom you ask, you'll likely hear varying definitions for the term emerging technologies. For example, some Pentagon officials view cloud computing and smartphones as emerging technologies that provide military personnel with new capabilities. Others see emerging tech as cutting-edge gadgets that have yet to hit the consumer market but could have far-reaching implications on the way we live, work and play.

For this guide, we're using a definition of emerging technologies highlighted by the Institute for Ethics and Emerging Technologies. Technologies that are emerging:

Arise from new knowledge, or the innovative application of existing knowledge.

Lead to the rapid development of new capabilities.

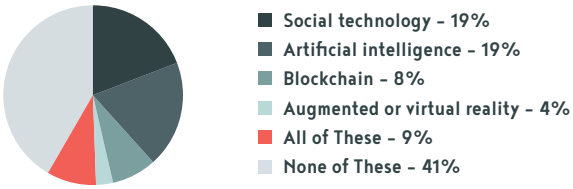
Are projected to have significant systemic and long-lasting economic, social and political impacts.

Create new opportunities for addressing global issues.

Have the potential to disrupt or create entire industries.

what plans do agencies have for pursuing emerging technologies?

To get a pulse of the current emerging tech landscape in government, we asked our GovLoop community which of the following innovations their agencies plan to pursue in 2018.



It's not surprising that social technologies and AI, which includes automation and the chatbots more agencies are deploying to better serve citizens, top the list.

Within the past year, there has been an overwhelming demand across federal agencies for more governmentwide programs, knowledge networks and joint pilot opportunities to explore emerging technologies. But agencies are cautiously optimistic about the benefits of newer technologies such as blockchain that require a steep learning curve. Those that are investing in emerging technologies must find practical use cases that push past the hype and show results.

Agencies that manage more sensitive data, such as healthcare and financial information, are carefully rolling out proof-of-concept demonstrations to better understand how these technologies would work in an operational environment.

To date, more than 320 federal, state and local agencies are collaborating around emerging technologies such as blockchain, AI, and social and collaborative technologies under the umbrella of GSA's Emerging Citizen Technology Office. In 2017, the office launched a technology atlas that serves as an open and crowdsourced repository of emerging tech use cases, reports, testing and evaluation resources, and more.

what is the administration's stance on emerging technologies and the federal workforce?

Technology in general will play a key part in the Trump administration's efforts to reform the federal workforce.

An April 2017 Office of Management and Budget memo directed agencies to "keep positions current" by exploring which should be redesigned or eliminated to adapt to changing technology needs. The memo mentions database administration, invoice processing and financial management as potential processes that can be automated or contracted to the private sector.

Although these changes won't take effect immediately across all departments, the new administration has made clear that's where things are heading. The president's fiscal 2019 budget proposal expressed similar sentiments.

"Agencies for too long have devoted too many positions to low-value work," according to the budget proposal. "Currently, many professionals are performing tasks that the private sector dispatches via technology tools such as bots and artificial intelligence."

But agency leaders who spoke with GovLoop see investments in emerging technologies as complementary to the workforce. For example, they see AI as an assistant, not a replacement. Their argument is that tech still relies on human smarts, and AI can't solve every problem.

At a time when many agencies have been forced to reduce the size and cost of their workforces, some leaders have embraced AI and other technologies to help fill gaps and free up employees to solve more complex problems.

emerging tech evolution

Here we highlight key events in the evolution of emerging technologies. These include when the technology came on the scene, when it emerged in government and recent milestones.

blockchain

2008

A person or group of people operating under the pseudonym Satoshi Nakamoto publishes a whitepaper describing the digital currency bitcoin and devising the first blockchain database.

2016

The Homeland Security Department awards one of the government's first blockchain contracts to use the technology to prove integrity of captured data from border devices.

2017

Government agencies in more than a dozen countries – including Brazil, Canada, China, India and the United Kingdom – are running blockchain pilots, tests and trials.

artificial intelligence

1964

The first chatbot, ELIZA, is created.

1990s

The U.S. Postal Service uses machine vision methods to recognize handwriting on envelopes and automatically route letters.

2015

U.S. government investments in unclassified research and development for AI-related technologies reach about $1.1 billion.

social & collaborative tools

1979

Tom Truscott and Jim Ellis conceive the idea of Usenet, which is in many ways the precursor to today's internet forums.

2007

A report notes 37 collaboration technologies and tools in use by the U.S. military or government.

2018

GSA maintains a list of more than 80 negotiated terms of service agreements for government agencies to use free, digital tools.

biometrics

1900

The Galton-Henry system of fingerprint classification is published. It was soon introduced at Scotland Yard and quickly became its basis for criminal-identification records.

1999

The FBI began operating and maintaining the world's largest person-centric database, using it to digitally store, compare and exchange fingerprint data faster and more accurately.

2018

U.S. Customs and Boarder Protection increases efforts to implement the Biometric Air Exit program, aimed at verifying travelers' identities as they leave the country.

internet of things

1999

British technologist Kevin Ashton coins the term Internet of Things.

2004

The Food and Drug Administration issues compliance policy guidance to facilitate the use of radio frequency identification technology in the pharmaceutical sector to help combat counterfeit drugs.

2017

U.S. senators introduce a bill to improve IoT cybersecurity.

EMERGING TECH TREND #1

blockchain

is a digital, decentralized log of transactions that can be openly shared with the public or a designated network of users. Think of it as a record or digital database that's managed across a network of computers. Those computers work in unison to verify any information or recorded transaction that's added to the blockchain.

how does it work?

Within the distributed ledger, or blockchain, each transaction is batched and stored in a fixed structure called a block. Once a cryptographic protocol verifies a block as accurate and trustworthy, the information is posted simultaneously to each participating member's copy of the distributed ledger. After a transaction is confirmed, it cannot be erased and becomes a permanent, immutable part of that shared record. Each block has a unique digital signature, or hash, and every block that comes after it references the fingerprint of other blocks before it. This chain of records forms the blockchain.

concerns & challenges

Some liken blockchain's development to the early days of the internet, meaning there are growing ideas about initial use cases, but it's impossible to know how this technology will evolve and be used years from now. Government agencies want to ensure they fully understand the risks, resource requirements and return on investment before significantly investing in blockchain and other emerging technologies. As they conduct pilot projects, they'll need to assess how blockchain aligns with their existing investments, how the technology will be supported in the long term and how security will be maintained.

But the educational piece around blockchain isn't robust. It can be hard for potential beneficiaries to understand what it is, how it works and how it can apply to their work.

potential blockchain use cases

Blockchain is often mentioned when talking about the cryptocurrency bitcoin, but that's only the first of many applications for blockchain technology. The features that make blockchain viable for digital currency, such as data integrity and a cryptographically secured and verifiable record, also make it viable for other applications, such as:

- Financial management
- Procurement
- IT asset and supply chain management
- Smart contracts
- Patents, trademarks, copyrights and royalties
- Appropriated funds
- Government-issued credentials such as visas, passports, Social Security numbers and birth certificates
- Federal personnel workforce data
- Federal assistance and foreign aid delivery

"Federal agencies are eager to better evaluate, test and potentially adopt distributed ledger technologies like blockchain that use encryption and coding to improve transparency, efficiency and trust in information sharing."

– U.S. Emerging Citizen Technology Atlas

case studies

tracking physical assets

Keeping track of every laptop, cellphone and device issued to government employees is time- and resource-intensive. The annual process can require trackers to fly to multiple offices to get the job done.

"I am one of the people who validates and verifies transactions," said Craig Fischer, Innovation Program Manager at the Bureau of the Fiscal Service's Office of Financial Innovation and Transformation. "That is my additional duty but not my main responsibility."

With the goal of realigning job duties and focusing less on activities that don't add value, Fischer and his colleagues are exploring how blockchain technology can help the office streamline asset inventory.

The team is finishing a narrow proof of concept using blockchain technology that launched in September 2017. For now, the technology is not connected to Treasury Department systems.

Here's how it works: When someone enters a password and uses an asset, that action pings the ledger and updates the inventory, confirming that the user is in possession of the asset and actively using it. A mobile app component provides a real-time inventory of who is using what assets.

When launching blockchain projects, Fischer recommends that agencies understand what the technology entails and the business processes and pain points that could benefit from it.

streamlining government acquisitions

The process for getting new vendors on the GSA's IT Schedule 70 can be long and arduous. At one point, it took an average of 110 days.

These waiting periods hinder agencies' ability to access products and services at the speed of innovation. That's why GSA launched its FASt Lane program — to get new, innovative vendors on IT Schedule 70 faster.

Currently, the requirements are 45 days or less to process new contracts, but during a procurement symposium in October 2017, Jose Arrieta, former IT Schedule 70 Operations' Director, said a blockchain overhaul could get that number down to nine days. To meet this goal, GSA completed a blockchain-based proof of concept that could fundamentally change its acquisitions process.

Using blockchain, GSA can review vendor-submitted financial information almost instantaneously. And because it becomes the system of record for an entire offer, it drastically reduces the time it would otherwise take to prepare a pre-negotiation letter.

In the next year, GSA hopes to scale the concept out and automate it through the entire business process. In the same way the internet automated communication, blockchain automates trust. For government procurement processes, that means less paperwork, more easily verified acquisitions and significantly lower direct costs when awarding a contract.

"Blockchains matter because they allow non-trusting members to interact over a network in a verified way, without a trusted intermediary."

– Transportation Department's John A. Volpe National Transportation Systems Center

get smart quick

To better understand the promises, challenges, unanswered questions and path forward for blockchain, especially in government, check out this **Blockchain Task Force report** the state of Illinois released in January 2018.

There are several free and low-cost courses to learn more about blockchain. Here is one offered by Udemy called **"Blockchain Technology: A Guide to The Blockchain Ecosystem."**

This primer by the Deloitte Center for Government Insights provides government executives and nontechnical leaders with a practical understanding of blockchain and a simple framework for understanding how it could bring value to an organization.


Elastic
Map
Reduce
Amazon
Machine Learning
AMAZON
WEB SERVICES
BUILD
ON
aws
www.BuildOn.aws
REAL TIME
DATA
Amazon EC2
Model Repository
Developers

INDUSTRY SPOTLIGHT

how you can harness emerging tech on a budget

An interview with Ben Butler, Principal Business Development for Cloud Innovation Centers & Accelerators, AWS Worldwide Public Sector

There's a growing buzz in government around potential use cases for emerging technologies such as artificial intelligence (AI) and the Internet of Things (IoT). Some agencies have already launched successful pilots and are looking to move their projects into the production phase.

But ramping up these capabilities requires both the technical expertise and infrastructure to support computing, data storage and other needs. To manage these demands, many agencies are forging relationships with third-party vendors to complement their in-house expertise and provide the necessary IT resources and capabilities.

GovLoop sat down with Ben Butler, Principal Business Development for Cloud Innovation Centers & Accelerators for Amazon Web Services (AWS) Worldwide Public Sector, to learn how AWS is enabling emerging technology adoption across government.

"AWS's machine learning services and platforms allow customers of all sizes to create innovative artificial intelligence applications, and it is all available on-demand at low cost," Butler said. "AWS cloud computing merges the compute, storage, networking, and database with expertise in specific technologies to provide a robust capability that is simple for our customers to use."

At a time when agencies are operating with limited budgets and resources, AWS enables them to take advantage of secure, deep learning capabilities without having to start from square one.

For example, agencies can leverage Amazon Rekognition for facial recognition, sentiment analysis, and object detection without having to know the computer vision models or do data preparation that's required to improve the algorithms. The cable and satellite television network C-SPAN uses the solution to identify who is speaking at on-camera congressional hearings and at what time — down to the second. By using AWS, C-SPAN was able to double its capacity to easily index an archive of more than 97,000 congressional hearing videos.

At the State Department, officials there are planning to deploy a machine learning-based platform and software application suite on AWS GovCloud (US). This isolated region is designed to host sensitive data and regulated workloads in the cloud. Once the new capabilities are in place, the department will be able to predict impending failures of critical facility equipment; automatically monitor, analyze, and manage energy usage across all assets; and assess the health of the sensor and device infrastructure.

"Startups can also leverage AWS and gain access to technology on-demand, at a low cost," Butler said. "This enables entrepreneurs and employees in government to try out ideas without having to break the bank. Low costs to experimentation increases the frequency of those experiments, which then increases the chances for significant innovation."

For example, within the United States Institute of Peace in Washington D.C., there is a PeaceTech Accelerator sponsored by AWS, C5 Accelerate, PeaceTech Lab, and SAP NS2. The program provides a space for startups to connect with mentors to reach the next stage of development. These startups are working on high-impact projects, such as using blockchain technology to make transactions transparent and reduce corruption.

In terms of IT infrastructure, another benefit that agencies are taking advantage of is serverless computing. Serverless enables agencies to focus on their business logic because the vendor oversees the provisioning and management of operating systems, applications and servers.

Agencies can create microservices with AWS serverless offerings, such as computing, streaming data in real time, using NoSQL databases, and accessing durable storage that can scale up or down in a matter of milliseconds.

NASA Johnson Space Center is among the agencies taking advantage of a serverless architecture. More specifically, the space center is using a serverless architecture solution to perform optical character recognition and indexing of more than 100,000 pages of spacesuit safety and test documentation each month. The NASA solution enables users to put documents into Amazon S3, which is an object storage built to store and retrieve any amount of data from anywhere. Once the documents are uploaded, a swarm of AWS Lambda functions split the documents and run optical character recognition software on each page in parallel and put the text files into AWS ElasticSearch for quick reference.

"There's definitely a network effect of using these technologies," Butler said. "As agencies familiarize themselves with all the capabilities, they can launch new use cases that support their missions."

EMERGING TECH TREND #2

artificial intelligence

is the ability of computers and algorithms to learn on their own to perceive things around them and to act using data. AI has been around for decades, but public and private organizations are finding new ways to supplement human insights with machine intelligence.

"Agencies will continue to examine their workforces to determine what jobs they need to accomplish their mission, taking into account the impact of technological investments that automate transactional processes, artificial intelligence that can streamline the byzantine compliance and regulatory processes, online and telephone chat-bots to improve customer service, and other such tools that may reduce agency personnel needs."

– President's Fiscal 2019 Budget

artificial intelligence by the numbers

45%

Currently available technologies could automate 45 percent of the activities people are paid to perform.

20 years

Although its use is expected to grow, AI that is as intelligent as a human is not expected to occur in the next 20 years.

$3.3–$41.1 billion

Automation of federal government employee tasks could save 96.7 million to 1.2 billion hours annually and $3.3 billion to $41.1 billion, respectively.

what types of federal jobs could machines impact?

This McKinsey report lays out five factors to consider:

1. Technical feasibility or the ability of current AI tools to do the job
2. Costs to automate
3. Relative scarcity, skills and cost of workers who might otherwise do the activity
4. Benefits of automation
5. Regulatory and social acceptance of automation technologies

case studies

automating mundane tasks

Bureau of Labor Statistics employees process millions of data points every month, including survey responses about workplace injuries and illnesses that are used to identify preventative measures. To process data more efficiently, accurately and consistently, the agency turned to AI.

One year, the agency received more than 2,000 distinct job titles to represent janitors or cleaners who have been injured on the job, William Wiatrowski, Deputy Commissioner at BLS, said during a recent event hosted by the Partnership for Public Service and IBM's Center for the Business of Government. Trying to manually slot all those responses into one category was tedious. In fact, 80 percent of the surveys never used the words janitor or cleaner.

Despite the growing use of AI to do these and other coding tasks, the technology still has limitations. Machine learning couldn't solve every problem, Wiatrowski said. BLS still relied on the smarts of its employees to address the most difficult cases.

streamlining government-to-citizen interactions

As virtual personal assistants and smart speakers grow in popularity, state and local governments are using these technologies to better connect with citizens.

For example, Indiana is among a growing number of state and local governments that use Amazon's Alexa, a digital assistant built into the company's Echo product, to make information more readily available to the public.

In February, the Hoosier State released an update to its Amazon Alexa skill that enables residents to easily find current travel advisories by county and locate contact information for more than 20,000 government employees. To search for travel advisories, users say, "Alexa, ask Indiana for travel advisories." Users can ask for the status of a specific county when making the request. If a county isn't named, Alexa will ask for one.

Alexa users can also request contact information for thousands of government workers. Using the employee's first and last names, they can quickly learn what agency they work for and their job title, phone number and email address.

New features will be added to the skill regularly to streamline government-to-citizen interaction.

improving grant management

The National Institutes of Health — more specifically, the agency's grants side — is also using AI. NIH undertakes a massive effort to sort spending across hundreds of categories. To do this, it creates a catalog of about 500,000 projects and categories each year to report publicly, said Richard Ikeda, Director of NIH's Office of Research Information Systems.

"To do this manually would take about 700 full-time equivalents, but we do it in an automated fashion with text mining with about 10 percent of the expense of the manual effort that is required," Ikeda said.

Right now, it is a rules-based text mining system, which means that employees establish the categories manually. A set of rules allows research and projects to be properly categorized. But NIH is experimenting with machine learning to train the system to handle these types of tasks, particularly when it comes to categorizing similar projects.

get smart quick

For more AI government case studies, **check out this report** by the IBM Center for the Business of Government and the Partnership for Public Service.

Join **GSA's listserv and Artificial Intelligence for Citizen Services Program** to connect with others in government working on similar projects.

You can also review current notes and action items from GSA's emerging citizen technology meetings here. The **February 2018 meeting** included discussions about negotiating the terms of service for AI programs and digital capabilities.

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Content Management

Case Management

Digital Asset Management

INDUSTRY SPOTLIGHT

bringing your agency's content management into the future using AI-infused content services

An interview with Dave Jones, Product Marketing Director, Nuxeo

Advancements in digital capabilities are transforming the way agencies create and manage data, whether it's content from social media platforms, law enforcement surveillance footage or mobile imagery.

Given the volume of information that agencies gather on a daily basis, they need modern tools to help them effectively manage and make sense of their data. To keep pace with these growing demands, agencies are increasingly supplementing human intelligence with artificial intelligence (AI).

To explore how AI is enhancing content management and data usage in government, GovLoop sat down with Dave Jones, Product Marketing Director at Nuxeo, which specializes in making enterprise content services accessible, flexible, scalable and AI-enabled.

"AI is starting to become heavily used in government," Jones said. "But probably 90 percent of that use is behind the scenes and is focused on automation."

Consider the information collected from drones, traffic cameras and citizen-facing portals that agencies gather, manage and analyze. That information is of no use to government if it's sitting dormant in multiple systems or databases. This is where AI comes into play.

"It might be as simple as scanning through piles of invoices every month and processing them more efficiently than humans," Jones said of current AI applications. "It could be producing thousands of automated emails, letters, text messages, or informing those with benefits claims of their entitlements. Or it could be as simple as providing scheduled roadwork updates through online services such as Google Maps."

Jones also highlighted more advanced use cases for AI. For example, imagine a homeland security system that could trawl through live surveillance video footage to identify the location and activities of known criminals. Or a welfare system that could automatically identify and provide assistance to citizens struggling with mental health issues based on their social media posts. The potential benefits in data classification are vast and far-reaching.

Essentially, these AI applications are trained using a sample set of data, learning how to extract key information from whatever document or systems they trawl. That allows the applications to process large quantities of documents with minimal human interaction, which is a crucial function considering the expanding size and scope of data sources.

"We've currently been hit with information overload," Jones said. "If you think about the amount of information that you receive personally on a daily basis, scale that out to an agency and you start to see the challenge."

Of course, there are concerns regarding AI, including the fear that it will replace employees and threaten their jobs. Jones understands the concerns, however, he believes that's not the case.

"The purpose of AI is not to replace humans, but to make those humans more engaged with the job that they're doing and also to cut the dreariness out of daily tasks," he said. "It's meant to actually get the right people doing the things that they're skilled in and paid to do."

Additionally, machines don't tire of their workloads. They can complete tasks with a higher degree of accuracy and for a longer period of time than their human counterparts.

"Humans tend to, by nature, take shortcuts; AI doesn't," Jones said. Likewise, human performance tends to decrease as a project increases in size. But AI delivers the same level of accuracy every time you use it. In fact, it gets better the more it is used.

Due to its ability to complete repetitive tasks with record accuracy, modern content services platforms are utilizing AI to help agencies better classify and manage their data. Take the earlier use case of a homeland security system trawling through surveillance video footage to identify criminals. Using AI tools law enforcement agencies can aggregate detailed identifiers from the footage like a hat, license plate or specific location. AI classification typically returns over 20 tags per image, compared to 5 for humans, with that number decreasing the more images you ask them to classify.

"AI allows agencies to classify content much faster, and on a much wider scale. That allows agencies to make use of more data, faster and more efficiently than ever before," Jones said.

It's become clear that AI will factor heavily into how government operates in the coming decades. In terms of data processing and classification, the future will be automated, and government agencies of all sizes must be ready for it.

EMERGING TECH TREND #3

social & collaborative tools

help people or groups interact and share information. Often, these tools find a natural home on the internet. Examples include Slack, Google Drive and Basecamp.

"Too few federal workers and teams leverage modern collaboration tools like real-time shared documents, instant messaging, video conferencing, wiki-based sites for team projects, and more.... The situation is a hidden tax on productivity; it wastes time, creates missed opportunities, and slows coordination and creativity and can even pose a challenge for recruiting and retaining employees."

- GSA

social & collaborative tools by the numbers

75%

of employers rated work and collaboration as very important...

18%

...but only 18% of employees get communication evaluations at their performance reviews.

1/2

of millennials believe social networks boost productivity.

5x

Among more than 1,100 private-sector companies, those that promoted collaborative working were five times as likely to be high performing.

case studies

requesting collaboration tools

In late 2016, GSA published a request for information for "industry input on modernizing and securing email infrastructure while simultaneously improving collaboration capabilities within and across federal departments and agencies."

"Too few" federal personnel use modern, cloud-based collaboration tools, according to GSA. By failing to adopt these tools, GSA argued, agencies hinder collaboration, creativity and recruiting.

"Ideally, it should be as easy to collaborate in one room face-to-face as sitting in different rooms, different agencies, and organizations," according to the RFI.

GSA divided collaboration tools into two categories: asynchronous, such as email, calendaring and file sharing, and synchronous, such as instant messaging and audio, web or videoconferencing.

The agency also invited industry representatives to respond about perceived procurement gaps that make it difficult to sell these tools to agencies.

adopting a modern communications system

This Washington state county adopted Skype as a unified communications system for internal and external communications.

King County uses Microsoft's Skype for Business — a more robust version than the personal/consumer edition — which allows for instant messaging, screen sharing, conference calls and voicemail, and shows whether someone is free to take calls or messages.

The county also rolled out other Microsoft tools, including SharePoint and Office 365 U.S. Government, several years ago.

"We've seen a tremendous increase in staff productivity and savings from not having to travel to and from meetings — and there are thousands of meetings that occur over a month's time," county Chief Information Officer Bill Kehoe told *StateTech Magazine*.

Beyond the productivity pros, these kinds of applications can also save government money. Using Skype for Business for instant messaging keeps those quick, check-in emails out of employees' inboxes and provides a free alternative to other vendor solutions, Communications Specialist Lilia Cabello Drain wrote on the King County Employee News blog.

connecting with citizens to fight HIV

When it comes to healthcare, government has two roles. In some cases, it's directly responsible for providing medical care. In others, its job is to inform citizens so they can effectively engage in their own health.

This latter task is where HIV.gov has especially excelled with its new suite of digital tools. Not only does the program use multiple online and social media platforms to spread its messages, it also highlights other effective social campaigns.

Those examples, coupled with a repository of best practices and weekly virtual office hours, empower other organizations and individuals to effectively engage citizens in the fight against HIV.

Finally, the program focuses on constant improvement. HIV.gov gets feedback directly from constituents through an annual survey that it uses to discover how it can "better elevate and enhance messaging about HIV in America."

get smart quick

This GovLoop post explores how social tools can improve interagency collaboration.

If you need guidelines around using social media for official government business, **check out this guide** that the Texas Department of Information Resources developed in collaboration with 34 state agencies and institutions of higher education.

Stay current on government tools, methods, practices and policy guidance for delivering effective and accessible digital services via **DigitalGov.gov**.

EMERGING TECH TREND #4

biometrics

is the measurement of physiological characteristics such as fingerprints, iris patterns or facial features that can be used to identify an individual. Biometrics help secure facilities, protect access to computer networks, counter fraud, screen people at U.S. borders and fight crime.

"For the majority of the public, biometrics remains a technology they are more familiar with due to science fiction movies than practical experience. This lack of familiarity impacts perceptions of both the technology and its application by government agencies."

– "Biometrics in Government Post-9/11"

biometrics by the numbers

200,000,000

DHS' Automated Biometric Identification System, or IDENT, holds more than 200 million unique identities and processes more than 300,000 biometric transactions per day.

$8 billion

According to Technavio's latest research study, the biometrics market in North America is expected to reach more than $8 billion in revenue by 2020.

case study: continuously authenticating employees on workplace computers

The Defense Department is evaluating behavioral biometrics software that can uniquely identify people by the way they use government computing devices, such as laptops, desktops and servers.

After 20 minutes of tracking a user's keystroke style and speed, mouse use, and other behaviors, the software builds a biometric profile of that user, according to a news release. A continuous authentication algorithm enables the platform to know who is on the network, when, and where they are located. The hope is these capabilities will enable the department to detect intruders in real time.

DoD's Defense Innovation Unit — Experimental, which identifies emerging commercial technologies for the department's use, is spearheading evaluation of the solution. The plan is to strengthen the department's information security by integrating several multifactor authentication technologies, including behavioral biometrics software.

Part of that plan includes augmenting or replacing the Common Access Card or username/password forms of authentication that employees currently use to access government buildings and systems.

case studies

confirming the identity of airline travelers

A U.S. Customs and Border Protection (CBP) program that uses facial recognition technology to verify travelers' identities as they leave the country is now being demonstrated at eight U.S. airports.

"In June 2016, CBP launched its first facial biometric demonstration at Hartfield-Jackson Atlanta International Airport for biometric exit in partnership with an airline," according to the agency. "Based on the Atlanta success, CBP has now expanded this demonstration and developed a robust cloud-based service called the Traveler Verification Service (TVS). CBP is implementing capability demonstrations of the TVS at several additional airports."

Under CBP's Biometric Air Exit project, either the agency or airline partners will photograph passengers as they board international flights in the United States. "The purpose is to confirm that each passenger is the true bearer of the travel document required for travel," CBP said. "In addition, for non-U.S. citizens, the photograph will be used as biometric confirmation of departure from the United States, as required by law."

Privacy advocacy groups and think tanks have used CBP information-sharing sessions and other means to vent their concerns about the "privacy-invasive commercial technology" scanning Americans and the system's legal and technical problems.

In addition to Hartsfield-Jackson, the program is also being demonstrated at Washington's Dulles International Airport, Houston's George Bush Intercontinental and William P. Hobby airports, Chicago's O'Hare International Airport, Las Vegas' McCarran International Airport, New York's John F. Kennedy International Airport, and Miami International Airport.

improving the security of biometric security systems

The Intelligence Advanced Research Projects Activity launched a multiyear research effort to develop and evaluate technologies that ensure the integrity of biometric security systems.

The Odin program, which launched in 2017, will focus specifically on detecting known and unknown presentation attacks, or spoofs, lodged against systems that collect face, finger and iris biometrics to disguise a person's true identity.

If the Odin program proves successful, it will provide solutions to the Intelligence Community and its partners that can resolve critical vulnerabilities in today's biometric systems, according to the Office of the Director of National Intelligence (ODNI).

"Within Odin, a component named Thor will develop new algorithms, sensors, and technologies to identify presentation attacks," ODNI said. "John Hopkins University Applied Physics Lab and National Institute of Standards and Technology will work together to independently test the new systems — drawing on thousands of volunteers to try them out and learn how well they work."

"Government and industry have a common challenge in today's global society to provide more robust identity management tools and identify governance principles on how to deploy these tools intelligently to meet national and international standards."

– National Science and Technology Council Subcommittee on Biometrics and Identity Management

get smart quick

The Institute for Defense and Government Advancement offers a **variety of resources** on biometrics for government and law enforcement.

DoD has made strides to deploy long-term biometrics capabilities but more work must be done. Learn **what GAO has to say** about the matter and what DoD is doing to address it.

If your agency needs to create or update its biometric information security policy, **here's one** that defines the Madison County, Ill., government's policy and procedures for the collection, use, safeguarding, storage, retention and destruction of biometric data.


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INDUSTRY SPOTLIGHT

how serverless computing enables agencies to innovate faster

An interview with Steve Michelotti, Senior Program Manager, Microsoft

A growing number of agencies are exploring ways to further leverage the promise of cloud computing. Although initial Infrastructure-as-a-Service (IaaS) capabilities provide agencies with significant benefits, such as cost savings and improved security, there are still untapped advantages of cloud that agencies have not fully realized. One of those advantages gaining momentum is serverless computing.

To better understand what the term means in a government setting, GovLoop sat down with Steve Michelotti, Senior Program Manager, Azure Government, Microsoft.

"Serverless computing is the natural evolution of the promise of cloud computing, and cloud vendors like Microsoft are bringing this capability to bear in government," Michelotti said.

Serverless is the abstraction of servers, infrastructure and operating systems, Michelotti explained. It's where cloud vendors make server management and capacity planning invisible to developers, while the cloud platform enables auto scaling and addresses critical security and data requirements. This means agencies can focus on innovating and delivering apps faster instead of worrying about infrastructure.

A significant feature of serverless is instant scaling, which also simplifies DevOps efforts. Agencies can go from nothing to tens of thousands of concurrent functions in seconds without requiring configurations. Serverless reacts to events and triggers in near-real time. This also enables micro-billing, which means agencies only pay for resources consumed or the actual time code is running.

For IT personnel, serverless means they can focus on business logic and architecture, rather than software versions, installations and managing servers. The same is true for government employees on the frontlines. They can spend their creative energy on innovation and getting technology and services to citizens faster.

"Agencies want to be more efficient in how they're innovating and delivering on their mission," Michelotti said. "That's why we're starting to see interest in serverless from government. It's an exciting time for agencies ready to take the lead in this area and reap the benefits."

When agencies use serverless computing in a dedicated, government-only cloud, such as Microsoft Azure Government, they also benefit from the protection, mission-critical security and compliance provided by that cloud environment.

"To reap the benefits of serverless, agencies must start with cloud and move up the IT stack from IaaS to higher-level capabilities delivered by PaaS (Platform-as-a-Service). This is the evolution of your cloud journey," Michelotti said.

To better understand this, Michelotti said it helps to look at how apps have historically been built to the compute options available today.

On-premise servers entail owning hardware, installations, and hosting data centers. Maintenance is complex, resource intensive and costly. Myriad considerations include size and number of servers, scaling, selecting an operating system, patching, physical security, disaster recovery, and more.

IaaS is the next phase and marks the first move to cloud. "You're essentially renting virtual machines from a cloud provider like Microsoft," which means vendors are charged with responding to power outages or hardware failures. While IaaS takes away the burden of hardware, there are still many things to worry about including number of servers rented and how they're monitored.

PaaS is a significant improvement to IaaS, where agencies no longer have to worry about patching or monitoring servers, however they still must think about things including server size and scaling.

Serverless provides the ultimate PaaS experience, where agencies pay only for actual compute time and can focus on deploying code rather than infrastructure management. "There's no provisioning of services, no analyzing, no scaling. Just specify your connections and go." Any function that needs to respond to an event is a candidate for serverless.

According to Michelotti, serverless computing with Microsoft supports many scenarios agencies often face, including real-time stream processing of data, timer-based processing that follows a specific schedule, and real-time bot messaging where features like translation and sentiment analysis can easily be injected.

Azure Functions, an event-driven, code-focused service, frees users to focus on building apps instead of managing servers. With Functions, for example, an administrator could provide an endpoint enabling a visitor to look up information from a database with just two or three lines of code.

Michelotti also noted Azure Logic Apps, which automates workflows without requiring any code. Logic Apps allows developers to connect the apps and services their organization relies on.

For agencies that are wary of jumping into serverless computing, there are opportunities to try the technology for free, including Microsoft Azure serverless quick starts. But the benefits are clear for government, and serverless is on the rise.

EMERGING TECH TREND #5

the internet of things

is the network of machines, objects, animals and humans that have unique identifiers and can transfer data via the internet. Think smart televisions, Wi-Fi-enabled cars and voice-recognition devices like Alexa. This field is growing rapidly.

"The Internet of Things is super-promising for local and state governments, but because it's an emerging technology, it can be expensive, and it is relatively untested. That creates a high level of perceived risk."

– Joshua New, Policy Analyst at the Center for Data Innovation

IoT by the numbers

75.44 billion devices on the Internet of Things by 2025.

$457 billion global IoT market by 2020, compared with $157 billion in 2016

350k traffic accident injuries prevented by internet-connected cars by 2025, as well as 11,000 lives saved.

case study: constructing smarter buildings

Since launching in 2012, GSA's Smart Buildings initiative has sought to modernize federal government buildings with connected technologies.

The first phase saw the installation of thousands of sensors in 50 of the government's most energy-intensive buildings to collect at least 1,000 data points related to energy use and operational efficiency per building.

Technologies range from simple sensors that turn off lights when employees leave their desks to more advanced systems that raise and lower shades based on the amount of sunlight coming through windows. GSA has estimated that this initiative has generated $15 million in annual savings.

The agency has sought other opportunities to increase efficiency using this data. In June 2013, it partnered with IBM to implement a new analytics program to solve subtler efficiency problems, such as irregular air flow from specific building vents.

Further, GSA connected its desk-reservation system, called BookIt, to its security system, so that whenever an employee scans an ID badge to enter a building, their desk powers up and lights turn on once they sit down.

case studies

enhancing 'america's main street'

Washington, D.C., has begun implementing its own IoT applications — specifically along Pennsylvania Avenue near the White House. The project, titled "PA 2040," will deliver publicly accessible internet by way of DC-Net Wi-Fi and sensor-based LED streetlights, in addition to enhanced wayfinding, managed parking demand, and improved maintenance and emergency response capabilities.

The city's Office of the Chief Technology Officer (OCTO) is hoping to use the streetlighting infrastructure to deploy an environment sensor and video-based lighting solution. The data OCTO collects will be used to create applications that will improve District operations and reduce costs as part of a wider effort to enhance and revitalize the historic corridor.

As Phase One of the deployment — sensor-based streetlighting and ubiquitous public Wi-Fi throughout the area — approaches completion, OCTO is planning for Phase Two, which includes enhanced closed-captioned television, smart parking, environmental sensing and smart metering.

The goal, OCTO states, is to "encourage efficient use of District infrastructure, effectively engage the local community in the innovation process and improve the collective intelligence of the District's institutions." The city is also hoping this IoT framework will prove beneficial to technological advancements in the next decade.

"A couple of years ago, a lot of projects were just ideas, and the focus was on whether they were even possible. Today, nobody really asks whether IoT and smart cities are feasible. We know that it's possible. Now, it's more about how can we deploy this."

– Sokwoo Rhee, Assistant Director of Cyber-Physical Systems at the National Institute of Standards and Technology

deploying smart streetlights

For several years, Los Angeles has been updating its network of LED streetlights with mobile sensors that alert officials when bulbs burn out. Eventually, officials will also be able to brighten, dim and blink the lights, and gather environmental information on an area.

Cities such as Chicago have undertaken similar projects. Others, including San Diego, have gone even further. It installed streetlight sensors to collect information about parking spaces, gunshots and air pollution. In that city, officials plan to make the information publicly available and to allow software developers to build apps that use the data.

Because of the relative low cost and variety of benefits, more U.S. cities are likely to install similar IoT sensors on their streetlights in the coming decade.

Austin Ashe, General Manager of Current, which operates the sensors in San Diego told IEEE: "We think streetlights are the place to do this, because they have power, ubiquity and the perfect elevation — high enough to cover a reasonable radius, low enough to capture a lot of important data."

get smart quick

Looking for a quick video explainer about the technology? Spend a few minutes watching IBM Think Academy's **"How It Works: Internet of Things."** Not only is it comprehensive, but it's also well animated and an engaging watch.

If you're interested in learning about IoT on a technical level, check out the **overview on CodeProject**.

NIST is conducting ongoing work focused on the cybersecurity of IoT. Learn more about that and resources **here**.

Bringing Together the Internet of Things

Information Builders

Smarter devices in the IoT are increasing the need to centralize, contextualize, and manage data to improve decisions and business processes.

The Internet of Things (IoT) is literally all around us. Google, Apple, Amazon, and Microsoft all exploit smart devices to provide advanced services to technology-addicted consumers. Those companies have this in common, too: they send vital data back to centralized information hubs to improve the services they provide and to find new ways to make and save money.

The same thing is true in other IoT applications. Although people often focus on devices and smart endpoints, it's just as important to capture, contextualize, analyze, and share the data they collect.

Manufacturing

Consumers expect value-added services in almost every manufactured object. By sharing smart device data with information services, manufacturers can differentiate their products with the power of digital technology.

Logistics and Supply Chain

The IoT can notify an aircraft when a part will soon fail – but advanced analytics can bring the aircraft, a replacement part, and a skilled technician to the same place at the same time.

Government and Smart Cities

Sensors can measure every aspect of a city – pollutants, traffic, noise, and more – so central planners can decide how to best deploy resources and regulate requirements.

Healthcare

While the IoT can show the movement of equipment, patients, and medication, only centralized, advanced analytics can predict, prevent, and help prosecute fraud, theft, and inefficiencies that affect patient outcomes.

Information Builders provides one smart platform for integration, data quality, and analytics. From enabling smart factories to laying the foundation for connected cars, we help companies access and integrate their IoT data with other enterprise data for more meaningful insights, ultimately creating value from IoT initiatives.

INDUSTRY SPOTLIGHT

how to make the most of your IoT data

An interview with Michael Corcoran, Chief Marketing Officer, Information Builders

One of the greatest assets agencies possess is the data they create, collect and analyze.

When that data is combined across systems, it provides actionable insights for improving efficiencies to better achieve the mission, serve citizens and preemptively avert issues. The data also empowers agencies to tackle national issues including cybersecurity and the opioid epidemic.

Today, an increasing amount of this data is generated from internet-connected devices, outfitted with sensor technology that can collect specific details on a range of issues. But as the volume and variety of data that agencies collect increases, the challenge becomes how best to extract that data from sensors and use it in a meaningful way.

"If I asked government managers about their biggest challenge, 10 years ago they would have said, 'I don't have the information that I need to do my job," Michael Corcoran, Chief Marketing Officer at Information Builders said during an interview with GovLoop. "Today if you ask them what's your biggest challenge in terms of information, they say, 'I need to look at too many different dashboards to figure out what's going on.'"

Corcoran explained the benefits and challenges agencies grapple with as they invest in emerging technologies like the Internet of Things (IoT) and how his team at Information Builders is partnering with agencies to make the most of data collected from IoT systems.

Despite the promise of having real-time data from IoT devices, this technology alone will not solve government's most complex issues, whether that's tackling air pollution or improving healthcare. What agencies need is context with the data that can add value. Some of that pertinent data may even be in other emerging technology formats, such as blockchain, which can be mastered with other data for a comprehensive understanding.

To truly reap the benefits of IoT data, it must be integrated, cleansed and combined with other relevant data in a format that people can use.

"It's about being able to correlate that data on the fly, to add value to it," Corcoran said. "That context from other data sources is really what adds the value."

Working in partnership with agencies, Information Builders' technology helps transform big data from IoT into insights that are useful. By breaking down data silos, cleansing the data, and integrating it with their existing data, agencies can share those insights with stakeholders in real time.

When it comes to making IoT data accessible and available in formats that people can use, agencies must consider potential consumers of the data both inside and outside of their organization. For example, citizens are also using data to better understand environmental conditions, crime trends and other issues that affect their lives, Corcoran said.

Historically, government has lagged behind in adopting emerging technologies and new capabilities, but that hasn't been the case with IoT, he said. "I'm seeing some really interesting creativity on the government side, which in some cases is more advanced than what's happening in the private sector."

To further enhance the benefits that IoT data can offer, the next step agencies should consider is combining that data with advanced analytics to drive better outcomes. The goal is to use data and analytics to predict what is likely to happen. Adding a predictive component to the IoT data helps to complete the solution.

For instance, several customers are using their machine sensor data to proactively predict equipment and component failures. This allows the organization to make repairs on a recommended schedule and avoid the downtime and critical impact of having a plane out of service, a ship in dock for weeks without the needed repair component, or refrigeration units for medication storage malfunctioning.

Corcoran advised that agencies invest in capabilities that offer an analytics platform, data integration tools and the ability to correlate the data to find trends and future insights. Not only that but agencies must ensure information from various sources can be delivered in real time and displayed in a way that makes sense to decision-makers.

As the demand for actionable data increases, agencies can no longer rely on dated back-office functions that only provide a historical view of what has happened in the past. Government is under pressure to optimize their operations and reduce costs, and the combination of IoT and advanced analytics is charting a path for agencies to meet those goals.

how to get buy-in for emerging tech projects

1. Educate yourself on what the technology entails. Use internal briefings to facilitate dialogue, field questions and share information with stakeholders.

2. Identify a business problem to solve and a use case that people can grasp and understand. Start small, being mindful not to bite off more than you can chew.

3. Map out business processes and identify where there is friction and where the emerging technology can be of value.

4. Consider launching a proof of concept that demonstrates how the technology can solve your business problem. This can be done in a development setting without touching your agency's actual systems.

5. Use your proof of concept to educate leaders and potential users about the technology.

6. Don't rush. Document your lessons learned and share updates and results regularly with stakeholders.

conclusion

Embracing emerging technology is a cultural change for many government employees. Technologies such as AI, collaborative tools and IoT are changing the way they complete routine tasks, interact with their colleagues and serve citizens.

These new approaches also bring real privacy and security implications that must be considered as agencies contemplate expanding pilot projects to operational environments.

Another challenge is that people often take a zero-sum approach to government technology. They assume that if an agency is dedicating time to emerging technology, that means they are not paying attention to cloud or other priorities.

Instead, the focus should be on how cloud, data services, AI, blockchain and other technologies can improve government operations as part of an integrated technology approach. To help you on your journey, we've provided some quick tips to gain support for an emerging technology project.

about GovLoop

GovLoop's mission is to inspire public-sector professionals by serving as the knowledge network for government. GovLoop connects more than 270,000 members, fostering cross-government collaboration, solving common problems and advancing government careers. GovLoop is headquartered in Washington, D.C., with a team of dedicated professionals who share a commitment to the public sector.

For more information about this report, please reach out to info@govloop.com.

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