

**TECHNOLOGY
ADVANCES.**

**FEDERAL
IMPACTS.**

**Intelligent Enterprise Unleashed
Accenture Technology Vision 2018**

Introduction

Technology is now firmly embedded throughout our everyday activities, but its reach is larger than that: businesses are using their products and services to reshape, reimagine, and transform how our society works, communicates, and lives.

In the global Accenture Technology Vision 2018 Survey, 84 percent of business and IT executives agreed that through technology, companies are weaving themselves seamlessly into the fabric of how people live today.

For the federal government, the ramifications are huge. Many agencies must decide how they should both foster and govern these innovations. All need to determine how to integrate them into their own operations to deliver against ever-growing expectations and scrutiny.

For the first time in history, technology is truly enabling deeper two-way relationships between businesses and government and the people they serve. People no longer just consume organizations' products and services. They also interact with them and with each other. Savvy federal agencies are realizing that this level of connection requires a new type of relationship based not only on an agency's services, but also its goals and values. They also know it requires a new level of trust.

A new level of trust

The development of requests for proposal (RFPs) is one aspect of government operations that is ripe for stronger trust both within agencies and with citizens. Creating RFPs has traditionally been a complex, opaque process. That appears poised to change—as evidenced by the collaboration underway between the State of Alaska and the General Services Administration's 18F team. Together, they're testing how an online platform for open source software developers can provide unprecedented transparency into how government develops RFPs.

The collaboration is leveraging GitHub, an online tool that software developers use when building open source software.

Alaska's Department of Health and Human Services is using GitHub to support a new approach to product and acquisition management. The "test case" is the RFP for developing a modern and integrated eligibility system for the state's Division of Public Assistance. Rather than conduct RFP development behind closed doors, the state is using GitHub to open the process so that anyone can see and comment on the progress.

This approach is designed not only to deliver greater visibility to the public but also to help the state attract modern software vendors—the kinds of partners who will be equally willing to deliver the project in a highly transparent manner.¹

THE OPPORTUNITY

Organizations around the world are leveraging the rapid advancements in technology to create increasingly innovative products and services.

With the help of AI, for example, learning systems are delivering personalized and adaptive training to millions of people. Virtual reality systems are helping employees gain firsthand experience with challenging or potentially dangerous situations without real-world risk, and governments, particularly those outside the U.S., are embracing blockchain to enable fast, secure and transparent data sharing between their agencies.^{2,3,4}

In doing so, these organizations are also driving unprecedented changes in the way people work and live. By embedding themselves throughout society, companies are blurring the lines between business and personal—and blazing new trails for their own future growth. Likewise, U.S. federal agencies are reinventing themselves to meet increasing citizen expectations in the digital world and expanding their missions to address challenges of the new global reality. In this new technological landscape, agencies will be pushing the boundaries of the services they deliver.

2018 Technology Vision

UNLEASH THE INTELLIGENT ENTERPRISE

This year's Accenture Technology Vision highlights five emerging trends shaping the way technology is increasingly interwoven across society and commercial and government activities. In each chapter, you will see how expectations are growing as citizens, public servants, service members and veterans, and others seek formalized and increasingly technical partnerships with agencies and organizations.



Trend 1
CITIZEN AI
Raising AI to
Benefit Society

As artificial intelligence grows in its capabilities—and its impact on people's lives—businesses and government agencies must move to “raise” their AIs to act as responsible, productive members of society.



Trend 2
EXTENDED REALITY
The End of Distance

Virtual and augmented reality technologies are removing the distance separating people, information, and experiences, transforming the ways people live and work.



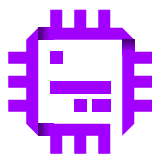
Trend 3
DATA VERACITY
The Importance of Trust

By reengineering themselves to run on data, organizations have created a new kind of vulnerability. To address this challenge, they must extend their cyber operations and data assurance technologies to demonstrate data trustworthiness.



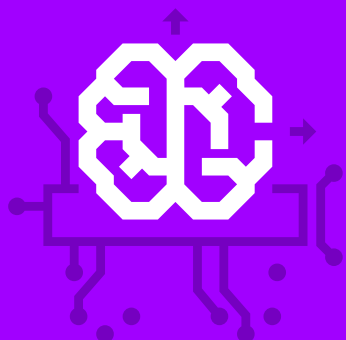
Trend 4
FRICTIONLESS BUSINESS
Built to Partner at Scale

Organizations depend on technology-based partnerships for growth and efficiency, but legacy systems and organizations aren't designed to support partnerships at scale or speed. To fully power the connected enterprise, organizations must first re-architect themselves.



Trend 5
INTERNET OF THINKING
Creating Intelligent
Distributed Systems

Organizations are making big bets on intelligent environments via robotics, AI, and immersive experiences. In bringing this kind of technology to the federal sector, agencies have opportunities to consider new ways to deliver actionable intelligence in real time to the front lines of civilian and defense missions.



Trend 1

CITIZEN AI

Raising AI to Benefit Society

With artificial intelligence (AI) growing in its reach throughout society, any federal agency looking to capitalize on AI's potential must also acknowledge its impact.

Much more than just a technological tool, AI is growing to the point where it often has as much influence as the people putting it to use, both within and outside the organization.

Deploying AI is no longer just about training it to perform a given task. Just as parents guide their children, AI must be “raised” to act as a responsible representative of the agency, and a contributing member of society. Many enterprises still treat AI as a software program—a tool to be used. No one would expect a tool to “act” responsibly, explain its decisions, or work well with others. But with AI systems making decisions that affect people, we must teach AI to do these things, and more.

By recognizing the impact AI now has in society, and raising it accordingly, organizations can create a collaborative and powerful new member of the workforce. However, collaboration will be most successful if agencies ensure ways of trusting an AI system's outputs, whether by citizens and employees, or other artificially intelligent systems.

Understanding for children begins with the use of symbols and signs before words—but ultimately, they must achieve the taxonomy of a language to scale their understanding of the world. Similarly, an organization's AI starts from basic principles, but progressively builds its skills from the baseline boundaries we set so it can create an understanding of the challenge and how to solve it.

The organizations with the best data available to train an AI how to do its job will create the most capable AI systems. However, data scientists must use care when determining constraints and training data. It's not just about scale but about actively minimizing bias in the data. Building provenance (verifying the history of data from its origin throughout its lifecycle) into a library of models preserves a link between models and the data used to train the model. When data inputs are well documented, organized, and properly labeled, organizations will build a strong library of AI models ready for reuse.

Federal executives realize that efforts around building and, importantly, using AI present unique challenges.

88%

of survey respondents feel it is important for employees and customers to understand the general principles employed by their organization to make AI-based decisions.

More than a third feel it is crucial. Regardless of the exact role AI ultimately plays, it represents its agency with every action it takes. Thus, agencies must ensure that AI-powered processes don't deny

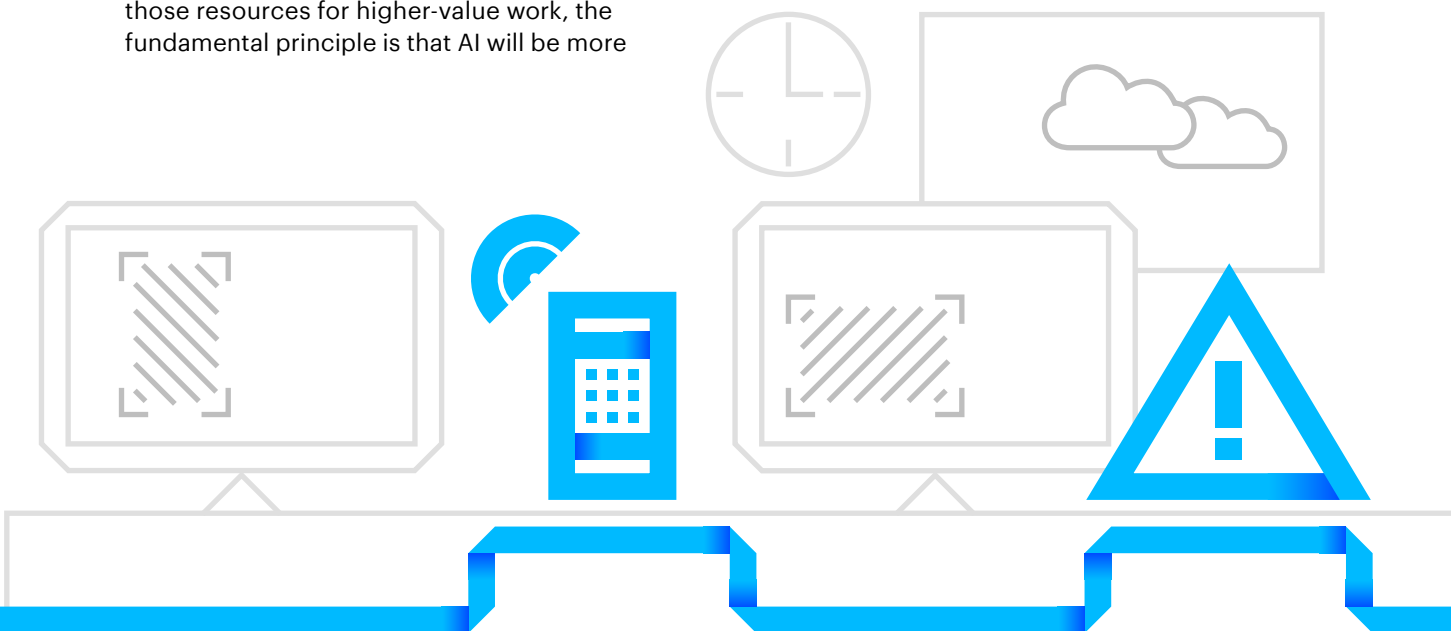
benefits to a qualified veteran or deliver confusing or conflicting instructions to a taxpayer via chatbot—to name just two examples. The agencies using the technology must think carefully about apportioning responsibility and liability for its actions.

Federal agencies are actively using AI—most commonly to take advantage of previously unused sources of unstructured data. By transforming text data into structured data, it can be modeled, summarized, and read. Generally speaking, the goal is to shift the effort from 80 percent research and 20 percent analysis to a 50/50 split. In such cases, humans are still the ones making the actual decisions.

One application with promise to accelerate the shift in decision making to AI is video analytics. Agencies have opportunities to adopt video analytics that could supplant the need to have human eyes monitoring video feeds around the clock. In addition to freeing those resources for higher-value work, the fundamental principle is that AI will be more

efficient at continuous monitoring and more thorough in spotting and alerting on even the most minute anomalies. Yet delivering against those goals requires that the analytics be “raised” well. In other words, government will need to implement processes to ensure that new technologies are used appropriately and make fair, ethical, prudent decisions. That requires accurate training data as well as conscious and continual efforts to identify and eliminate potential biases.

As AI becomes more firmly and widely integrated into society, it will have direct influence and impact on everything from benefits decisions to health, case management, fraud and risk management, and beyond. Federal agencies that hesitate to consider their AIs as something that must be “raised” to maturity will be left struggling to catch up with public demands and evolving regulations.





Trend 2

EXTENDED REALITY

The End of Distance

Virtual reality (VR) and augmented reality (AR) deliver immersive experiences that extend reality. We consider both of those capabilities to be extended reality (XR)—the first technology to let people experience omnipresent abilities, relocating them in both time and place. Forays into XR are solving a tactical pain point that federal agencies and commercial organizations share: distance.

40%

of federal executives indicated that removing distance barriers is a driver in their adoption of extended reality solutions.

The fundamental changes to enterprise and society are clear: the importance of place is disappearing. XR is removing the hurdle of distance and increasing access to people, information, and experiences.

Consider XR-based training. Organizations can bring trainers “on site” from anywhere or have students “travel” virtually to an instructor. Training scenarios can be set up anywhere, then run, rerun, and refined to give a firsthand experience of different situations. This eliminates the distance not just between student and teacher, but also between theory and practice.

Not surprisingly, the U.S. military is already working with this technology where training needs to be both realistic and sustainable. There are many use cases for the technology

—from closing the distance and bringing global teams together to simulating complex engagements. Imagine using XR to train a pilot, to test a warfighter’s readiness to perform in a certain theater, or to gauge a medic’s ability to make critical decisions not just in a medical facility but in theatre under combat conditions. XR increasingly makes it possible to create the sounds, smells, and even textures that these professionals are likely to encounter.

Extended reality is also closing the distance to new insights. Emerging XR tools express data in 3D environments, closer to the way humans actually see and imagine scenarios. This clears the way for new types of visualizations—and new discoveries. For example, XR can help improve workforce efficiency by enhancing the way technicians maintain or repair assets.

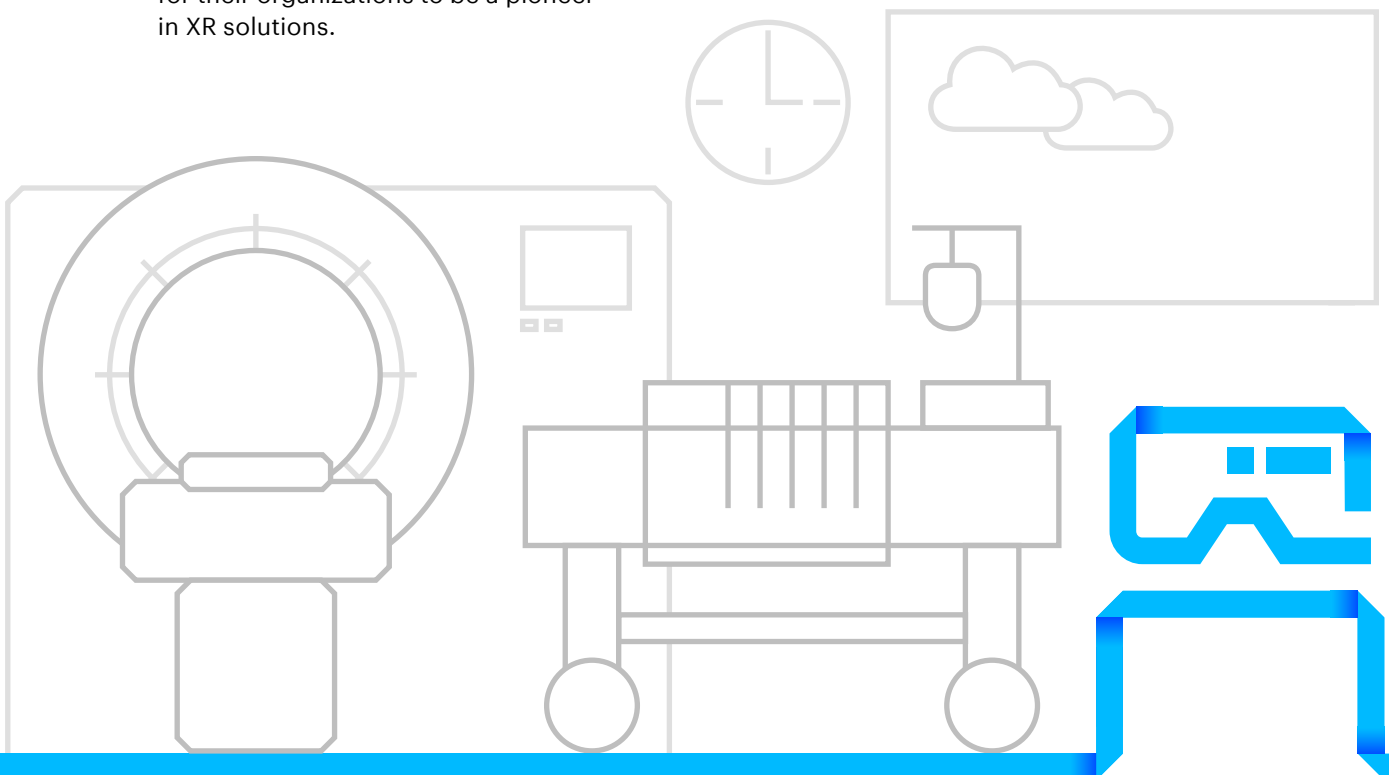
Empowering service technicians with augmented reality capabilities provides access to documentation, subject-matter experts, or overlaid step-by-step instructions for a prescribed task. This enables them to quickly identify and resolve problems from the boiler room to the operating room.

In health, The Body VR creates interactive 3D builds of traditionally 2D medical imaging, like CT scans and MRIs, to provide a more intuitive view of medical conditions. Similarly, Oxford researchers have created VR models of genetic data to better visualize what happens within living cells.^{5,6}

In short, extended reality is changing the viewer's relationship to information: how people parse, communicate, and extract value from data.

Of course, extended reality is still evolving, and challenges such as processing lags and content creation remain barriers to full maturity. But thanks to its transformative potential, nearly one-third of federal executives agree that it is very important for their organizations to be a pioneer in XR solutions.

Making well-planned forays into immersive experiences now will help build the capabilities needed to transform entire federal sectors tomorrow. Extended reality is pushing organizations to create new solutions that bypass many of the distance-based challenges they face today—a clear advantage for leading organizations that embrace it. As XR becomes pervasive, immersive experiences will eliminate the most important distance of all: the distance between where agencies are today and where they want to be in the future.





Trend 3

DATA VERACITY

The Importance of Trust

Eighty six percent of federal executives responding to our Tech Vision survey report their organizations are increasingly using data to drive critical and automated decision making—and they’re doing so at unprecedented scale.

Industry data bears that out. Across all levels of government, total spending on big data and analytics solutions is predicted to rise at a compound annual growth rate of 10.8 percent—from nearly \$8 billion in 2016 to approximately \$13.3 billion in 2021. For U.S. federal, spending is poised to increase from \$3.4 billion in 2016 to nearly \$8.6 billion by 2021.⁷ Meanwhile, companies around the world are betting big on advances in data-hungry technologies. In 2017 alone, AI investments were projected to reach \$12.5 billion, while Internet of Things investments were expected to top \$800 billion.^{8,9}

Yet success with data requires more than large expenditures. It also requires a focus on the quality and accuracy of the data used to produce insights. Left unchecked, the potential harm from bad data becomes an enterprise-level existential threat. According to our survey, 82 percent of federal executives agree that organizations are basing their most critical systems and strategies on data—yet many have not invested in the capabilities to verify the truth within it.

Accenture recommends federal agencies address this new vulnerability by building confidence in three key data-focused tenets:

Provenance

Verifying the history of data from its origin throughout its lifecycle.

Context

Considering the circumstances around its use.

Integrity

Securing and maintaining data.

To meet these demands, every agency must bring together existing data science and cybersecurity capabilities to build a “data intelligence” practice. This requires agencies to ramp up current efforts: embedding and enforcing data integrity and security throughout the organization, while adapting existing investments in cybersecurity and data science to address data veracity issues.

Whether it’s a citizen creating a data trail by applying for benefits online or a sensor network reporting security checkpoints for a transportation system, there’s an associated behavior around all data origination. Federal agencies must build the capability to track this behavior as data is recorded, used, and maintained.

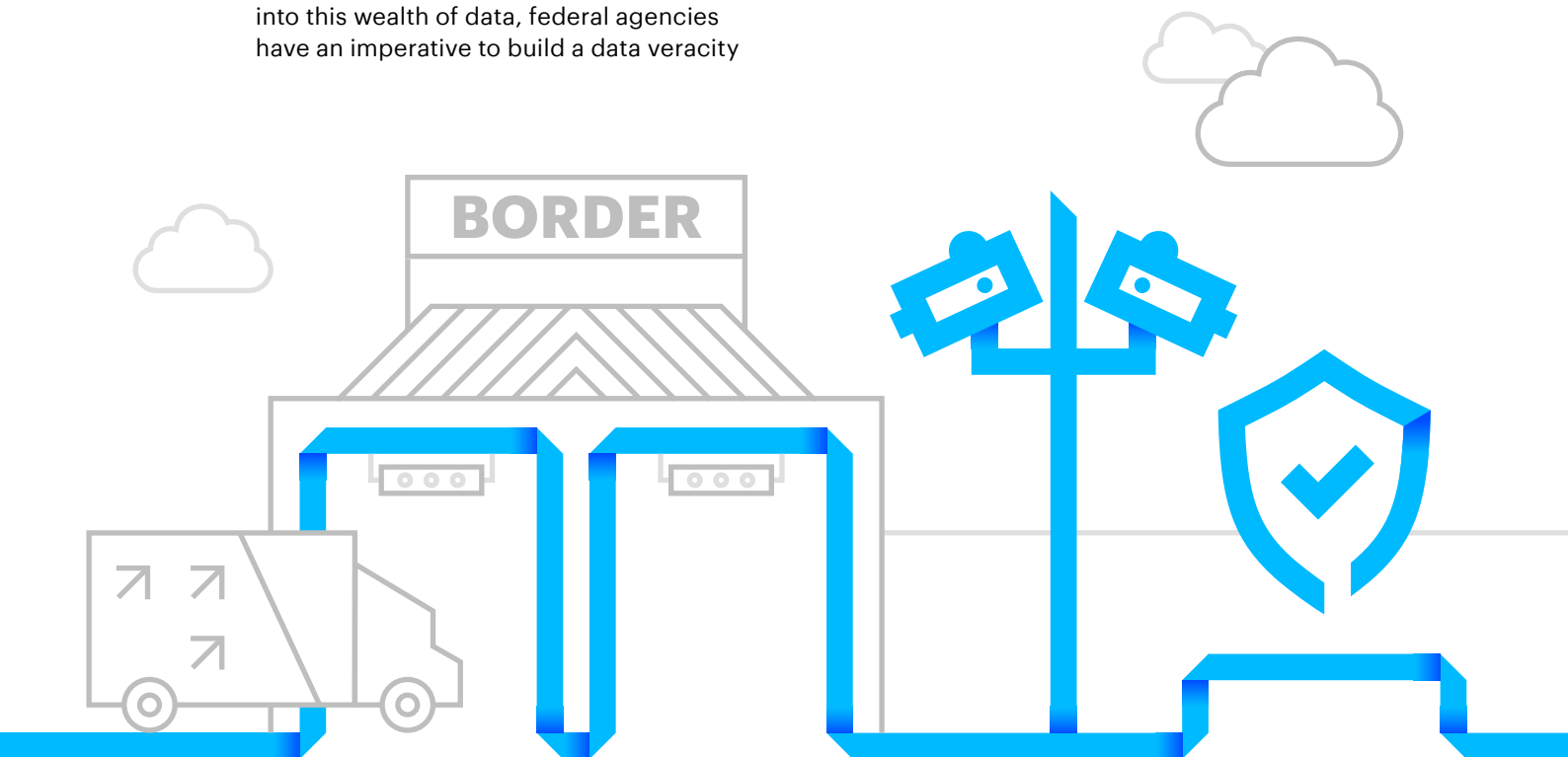
With this knowledge, agencies can provide cybersecurity and risk management systems with a baseline of normal behavior. To its credit, the Department of Homeland Security (DHS) has developed a formal process for Privacy Impact Assessments. It helps inform citizens what Personally Identifiable Information (PII) DHS is collecting, why it is being collected, and how it will be collected, used, accessed, shared, safeguarded, and stored.¹⁰

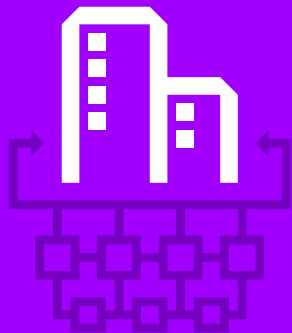
Meanwhile, agencies face growing obstacles and opportunities related to data that traditionally has been considered too risky. The most prevalent example is social media-generated information. How can agencies ensure that data gathered from social networks is high-quality? The reality is that they may be unable to verify all of it. But with U.S. adversaries already tapping into this wealth of data, federal agencies have an imperative to build a data veracity

framework to guide growing use of what have traditionally been considered “low-confidence” sources.

Whether from social media or another data source, the presence of bad data in a system isn’t always the result of malicious intent. But it may be a sign that a process isn’t working the way it was intended. Using a data intelligence practice to uncover these processes will allow agencies to reduce noise in data, so that real threats stand out.

Data is the lifeblood for federal agencies, fueling complex business decisions that drive improved efficiency. As a result, ensuring the veracity of this data becomes a cornerstone of strong leadership.





Trend 4

FRICITIONLESS BUSINESS

Built to Partner at Scale

Companies compete through strategic partnerships. When these partnerships are technology-based, they can expand partner networks more quickly and into more ecosystems than ever before. Federal agencies have similar opportunities to create extended networks—working with partners from the public and private sectors to deliver services, foster innovation and growth, and manage and regulate markets.

But legacy systems weren't built to support this kind of expansion, and outdated systems can be major hindrances. To build a strong foundation for technology-based partnerships, agencies must consider adopting microservices architectures.

They also need to explore how blockchain and smart contracts can improve trust in data shared from external sources and simplify data reconciliation. Those that invest in these changes today will redefine how they transact in the future.

~50%

of federal executives already report working with twice as many or more partners as they were just two years ago.

It's critical for federal leaders to recognize that their agency's own technology will serve as the foundation for these strategic relationships—but could also be holding them back.

To spur a new wave of technology-based partnerships, organizations must start inside their own walls. Microservices is not a single piece of technology, but rather an approach to architecture. It delivers internal benefits like application scalability and reliability, but it is also vital for building technology partnerships across agencies. A microservices architecture will push organizations to clearly define the services they offer, enable them to discover new sources of improved efficiency, and turn each service into a potential enabler of technology-based partnerships.

The U.S. Food and Drug Administration's OpenFDA initiative is a prime example of microservices in action. It provides APIs and full sets of downloadable files—easing access to some of the FDA's high-value, high-priority, and scalable structured datasets. That includes data spanning adverse events, drug product labeling, and recall enforcement reports.¹¹

APIs are the pathways by which organizations make microservices and data available to partners. But developing APIs to expose only part of an application is fraught with difficulty—from the complexity of choosing which services to expose to potential security risks.

If microservices are key to scaling and integrating partnerships, blockchain will be critical to managing and operating them. Federal agencies will be challenged to maintain a higher volume of shared and public services, and even rapidly pivot between partners, without sacrificing the integrity or security of their services. Secure blockchains will address this complexity by acting as a steward for trusted data.

As founding alliance partners of ID2020, Accenture, Microsoft and Avanade have developed an identity prototype based on blockchain technology.^{12,13} The prototype is designed to empower individuals with direct consent over who has access to their personal information, and when to release and share data. Its sophisticated decentralized, or “distributed,” database architecture is maintained by multiple, trusted parties on the blockchain, eliminating the need for a central authority. The prototype does not store any PII; instead, it taps into existing “off-chain”

systems when the individual user grants access. Importantly, this level of control over personal information benefits not only individuals but also the government organizations that may be requesting it in the first place. Access to information that is verified and secure empowers agencies to process requests and deliver services more quickly and efficiently.

The quest for frictionless government services is just beginning, with many blockchain initiatives still in early stages. Yet momentum is building: nearly one-third of federal executives responding to our survey are piloting a blockchain initiative, and another 30 percent are evaluating or planning to pilot blockchain technology over the next year.

Agencies should begin to re-evaluate how they architect their applications and services, moving toward microservices to set the foundation and quickly build the relationships needed for growth. For many, blockchain will become the future of how organizations reflect transactions, and federal leaders must begin investing in the relevant skills and tools today.

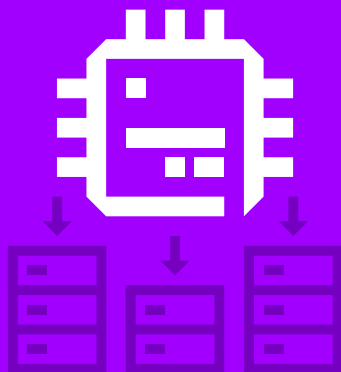


A PARADIGM SHIFT

Working with the World Economic Forum, Accenture is also involved in using emerging technologies—including biometrics, cryptography, and distributed ledgers—to advance security capabilities of industry and governmental agencies while improving passenger facilitation in international travel.

For decades, the cross-border movement of legitimate travelers has enabled and sustained international trade, supported tourism-driven economic growth, and increased tolerance across cultural and social divides. However, the travel system is under pressure from the growing number of travelers, infrastructure capacity limits, and ever-increasing risk and security requirements. In particular, efforts to address increasing cyber and physical risks to national security can have adverse effects on the benefits of international travel.

Accenture and the World Economic Forum have recommended a paradigm shift to an interoperable digital identity system. This system prioritizes traveler centricity—that is, putting the traveler at the center of streamlined, consistent processes and services rather than forcing people to adapt to each organization's distinct approaches. It also upholds privacy by design and enables trustful cooperation between the international public and private sector partners required for ensuring the safe and secure movement of people across borders.¹⁴



Trend 5

THE INTERNET OF THINKING

Creating Intelligent Distributed Systems

Robotics, immersive reality, artificial intelligence, and connected devices are bringing a new level of technological sophistication to the physical world.

The next generation of technology demands an overhaul of existing infrastructures, with a balance of cloud and edge computing, and a renewed focus on hardware to deliver intelligence everywhere.

Current infrastructures are designed around a few basic assumptions: enough bandwidth to support any remote application, an abundance of computing in a remote cloud, and nearly infinite storage. But the demand for immediate response times in physical-world applications defies this approach. Current predictions suggest that by 2020, smart sensors and other Internet of Things devices will generate at least 507.5 zettabytes of data. It will no longer be optimal to do all computational heavy lifting centrally.¹⁵ The resulting need for real-time systems puts hardware in focus: special-purpose and customizable hardware is making devices at the edge of networks more powerful and mission responsive than ever before.

Across industries, the next generation of intelligent solutions is moving into physical environments. Key strategies ride on pushing intelligence into the physical world: improving management of military fleets, using telemedicine to continuously analyze a federal field worker's condition, or conducting smart inventory tracking that prevents potentially dangerous commingling of volatile supplies, to cite several examples.

Now, federal agencies need to extend their infrastructures to reach into the dynamic physical environments they want to serve.

This extended infrastructure calls for a renewed focus on hardware, at a time when many organizations have grown accustomed to software-driven solutions as their go-to strategies.

Federal executives are taking note:

62%

of federal respondents believe it will be critical over the next two years to leverage custom hardware and hardware accelerators to meet the computing demands of intelligent environments.

Accenture sees two near-term opportunities for federal agencies to push intelligent solutions to the edge. The first is managing virtually any kind of fleet—civilian or military vehicles or even containers transporting supplies.

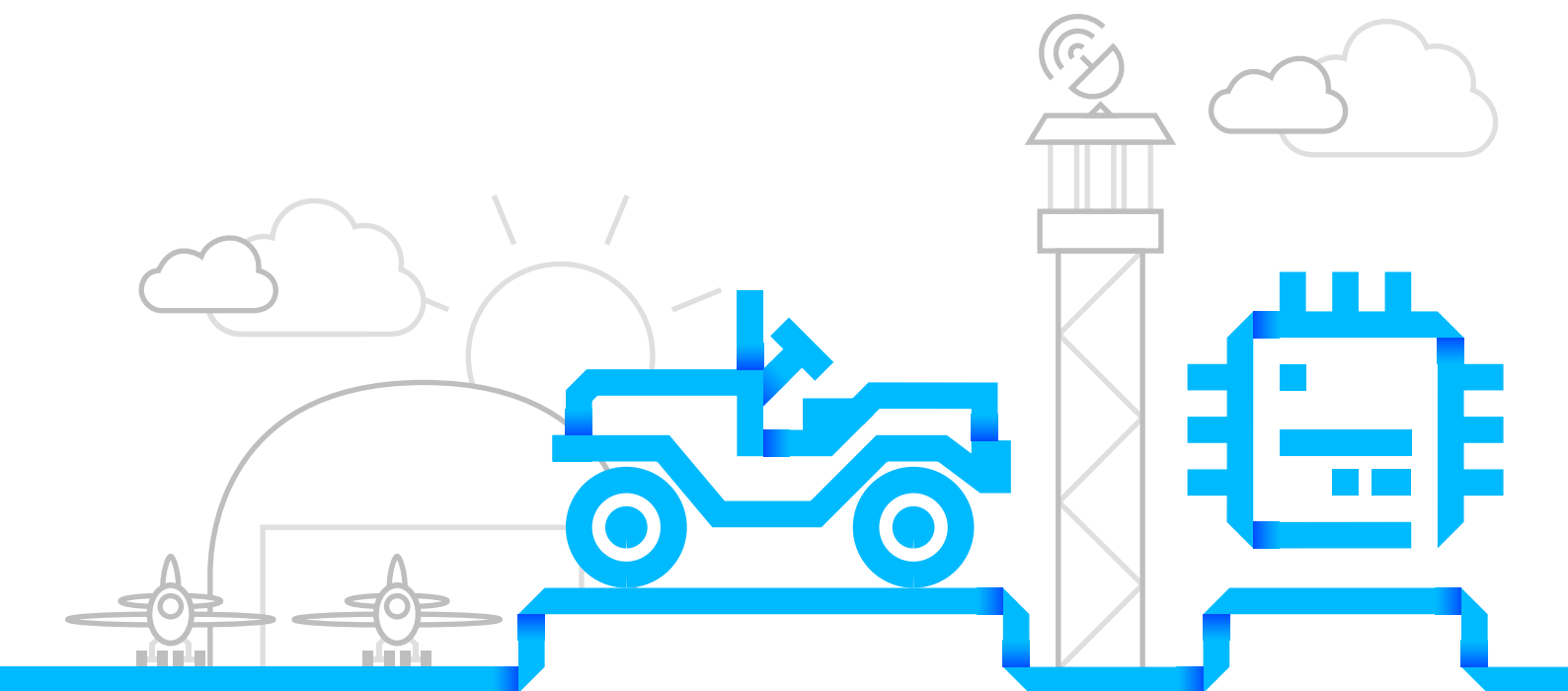
Internet of Thinking capabilities will make it possible not only to monitor location and status of such assets but also to take action at the edge based on the data gathered. That could include proactively identifying maintenance issues before they compromise the mission. It could also involve rapid identification of a container that is en route to the wrong location, making it possible to redirect it in a timelier manner. Internet of Thinking solutions could also help optimize “fleets” of supplies—identifying more efficient ways of planning and moving materials throughout the federal supply chain.

The second Internet of Thinking opportunity for federal agencies lies in health and wearables. Tracking heart rate, steps, and body temperature is now “old hat.” Future wearables will focus on translating that data into meaningful information—for example,

being able to detect possible health issues so that a soldier or border patrol agent can be proactively evaluated and treated before performance is affected.

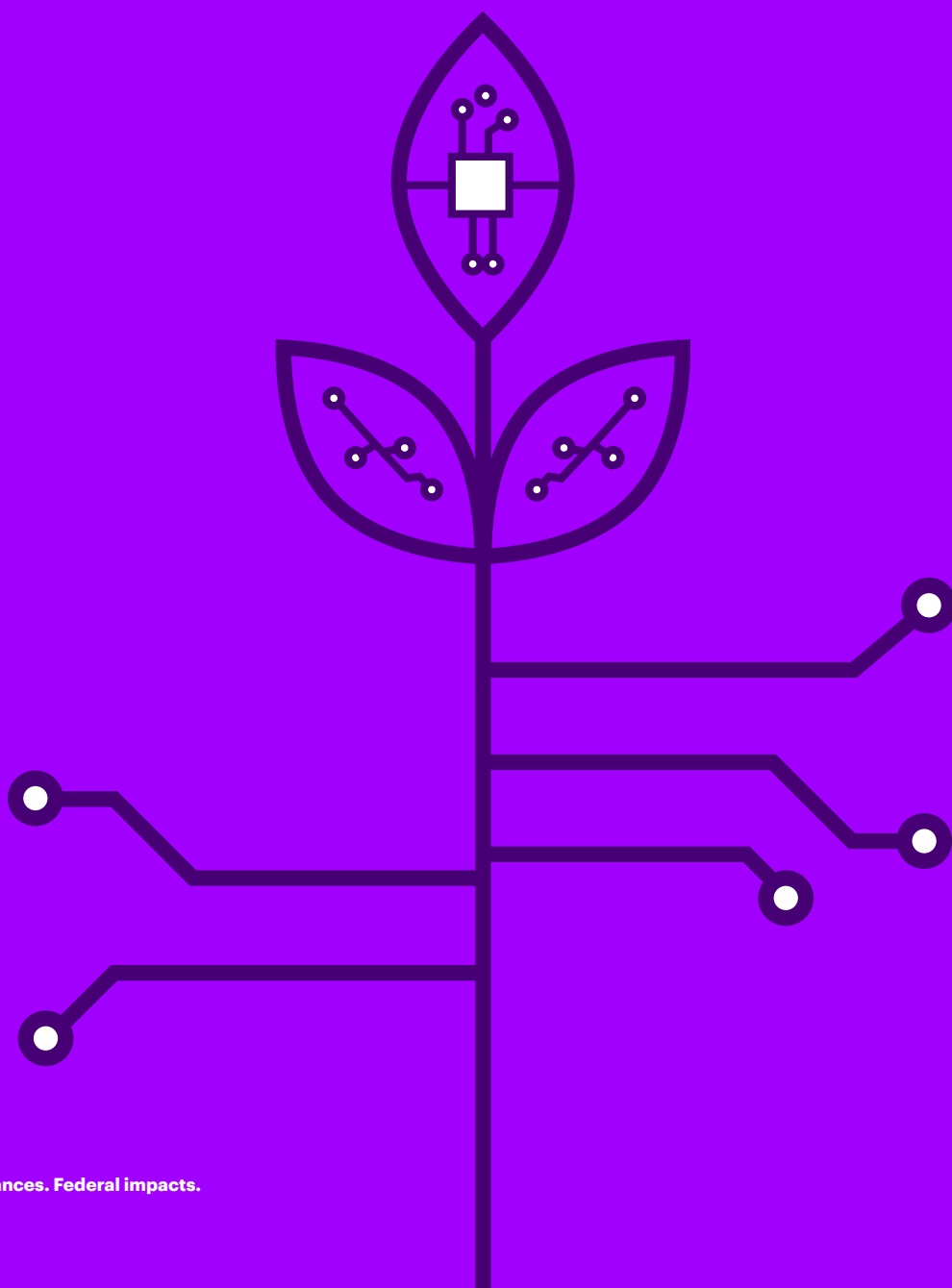
Building or leveraging custom and specialized hardware is a shift from the “one-size-fits-all-tasks” approach that proved popular in enterprises during the last decade. 87 percent of federal executives agree that edge infrastructure will speed the maturity of many technologies.

Federal agencies must reincorporate hardware-focused skills into their workforce—an added challenge for those whose cloud-first mentality may have deemphasized this need.



ENVISIONING THE FUTURE

With technology poised to further transform our daily lives, federal agencies have a central role to play as technology promoters, consumers, and regulators. To fulfill each of these roles, they must put forth deliberate plans to address the key trends highlighted by the Accenture Technology Vision 2018. At the same time, they must also prepare, empower, and support their workforces to be open to discovery, experimentation, and even occasional failure if they want to emerge as true innovators. By doing so, they can unleash the full power of the Intelligent Enterprise to create a safer, healthier, and more prosperous nation.



References

- 1 How Alaska is using transparency to attract modern software vendors, 18F Blog, September 12, 2017 – <https://18f.gsa.gov/2017/09/12/how-alaska-is-using-transparency/>
- 2 Millward, S. (2017, July 27). “AI English teacher” gets \$100m. Retrieved November 7, 2017, from <https://www.techinasia.com/ai-english-teacher-100m>
- 3 Rao, Leena. (2017, June 2). Walmart is Looking to VR to Prep Workers for Black Friday. Retrieved from: <http://fortune.com/2017/06/02/walmart-vr-black-friday/>
- 4 X-Road. (n.d.). Retrieved October 13, 2017, from <https://e-estonia.com/solutions/interoperability-services/x-road/>
- 5 The Body VR | Anatomy Viewer. Retrieved from <http://thebodyvr.com/anatomy-viewer/>
- 6 Jones, B. & Bergan, B. (2017, September 22). Virtual reality headsets might help cure genetic diseases. Retrieved September 28, 2017, from <https://futurism.com/virtual-reality-headsets-might-help-cure-genetic-diseases/>
- 7 IDC, U.S. Government Big Data and Analytics Forecast, 2017–2021: Federal and State and Local Should See Moderate Growth, by Shawn McCarthy, Dec 2017, Retrieved February 20, 2018
- 8 Worldwide Semiannual Cognitive/Artificial Intelligence Systems Spending by Industry Market 2016–2020 Forecast. (n.d.). Retrieved November 1, 2017, from <http://www.idc.com/getdoc.jsp?containerId=US42749817>
- 9 Worldwide Spending on the Internet of Things Forecast to Reach Nearly \$1.4 Trillion in 2021, According to New IDC Spending Guide. (n.d.). Retrieved November 2, 2017, from <http://www.idc.com/getdoc.jsp?containerId=prUS42799917>
- 10 <https://www.dhs.gov/privacy-impact-assessments>
- 11 <https://open.fda.gov/>
- 12 Accenture, Microsoft Create Blockchain Solution to Support ID2020 – <https://newsroom.accenture.com/news/accenture-microsoft-create-blockchain-solution-to-support-id2020.htm>
- 13 For more information on ID2020, see <https://id2020.org/>
- 14 The Known Traveller: Unlocking the potential of digital identity for secure and seamless travel, Accenture and World Economic Forum, January 23, 2018 – <https://www.weforum.org/reports/the-known-traveller-unlocking-the-potential-of-digital-identity-for-secure-and-seamless-travel>
- 15 Shacklett, M (2017, July 21). Edge computing: The smart person’s guide. Retrieved September 8, 2017 from <http://www.techrepublic.com/article/edge-computing-the-smart-persons-guide/>

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