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A REPORT FROM THE DELOITTE CENTER FOR GOVERNMENT INSIGHTS

# Government Trends 2020

What are the most transformational trends in government today?

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The Deloitte Center for Government Insights shares inspiring stories of government innovation, looking at what's behind the adoption of new technologies and management practices. We produce cutting-edge research that guides public officials without burying them in jargon and minutiae, crystalizing essential insights in an easy-to-absorb format. Through research, forums, and immersive workshops, our goal is to provide public officials, policy professionals, and members of the media with fresh insights that advance an understanding of what is possible in government transformation.

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# Introduction

## What are the most transformational trends in government today?

How is government adapting to the unprecedented changes reshaping our world? How can public officials navigate the tech tsunami? What can be done to ensure that democratic government, an institution designed to limit rapid change, can continue to fulfill its mission in the midst of a rapidly changing environment?

We are now entering what the World Economic Forum has termed the Fourth Industrial Revolution. With stunning expected technological advances on the horizon, it could be one of the momentous times in human history, akin to the invention of the printing press, the steam engine, the automobile, and vaccines.

**In a world of constant change, governments will need to be more *intuitive*, to sense and respond to new technology opportunities, social challenges, and citizen needs as they emerge.**

When these innovations took place in the private sector, they reverberated in the public sector as well. Big changes outside government prompted new forms of government, adaptive changes appropriate for the times. We need a similar adaptive response today.

In a world of constant change, governments will need to be more *intuitive*, to sense and respond to new technology opportunities, social challenges, and citizen needs as they emerge. And to serve citizens well, governments will need to be more *integrated*. Breaking down silos and seamlessly connecting and streamlining data and process flows are integral to finding new solutions, enhancing security, and creating personalized and engaging citizen experiences. In short, transformation will require uprooting outdated systems and practices and replacing them with new models better suited to the age of artificial intelligence (AI).

The future is arriving in a blur, and we have no crystal ball. But we know that fundamental shifts—as momentous as the shifts of the progressive era—are starting and likely to accelerate in the years to come.

Since our launch nearly three years ago, the Deloitte Center for Government Insights has been researching and writing about the changes coming to government agencies that will fundamentally transform government. Over the course of this time, we have published more than 150 in-depth studies, exploring dozens of topics, ranging from the future of regulation to the impact of blockchain and other emerging technologies in the public sector. This large body of work is informed by the work in the trenches Deloitte does with governments all over the world to solve vexing problems amidst massive constraints. Together with our horizon scanning capabilities, this has given us wide visibility into the major trends and innovations impacting governments around the world.

The *Government Trends 2020* report distills our research to focus on nine of the most transformative trends in government today. It is designed to assist government leaders who see the necessity for change and are looking for innovative ideas for the best way forward.

## The nine government transformation trends

The nine trends highlighted in this report have three things in common.

First, the trends all focus on government operations, as opposed to policy issues such as immigration or health care.

Second, each trend has moved beyond pilots and experiments and has begun to penetrate into the heart of government.

Third, they are all global in scope, happening in both developing and more economically advanced nations as more and more emerging-market governments leapfrog over yesterday's legacy IT systems straight to more agile, digital-age models, such as cloud computing and cognitive technologies.

Understanding these trends is the first step in navigating the journey ahead.

1. **AI-augmented government: Climbing the AI maturity curve.** Cognitive technologies that are upending the consumer world are coming to a government near you. The way governments respond to AI, both as a regulator and as a user, will shape our societies and even geopolitics for years to come.

   STATE OF PLAY: Applications are beginning to be deployed, and the technology is improving rapidly. Both government and the private sector are adapting to the new possibilities.

2. **Digital citizen: Improving end-to-end public service delivery via a unique digital identity**. Unique digital identifiers open the door to integrated data and a seamless citizen experience, enabling dramatic leaps in service quality, massive efficiency gains, and the move to a digital delivery model.

   STATE OF PLAY: This trend is beginning to disperse. Mature digital authentication technologies in the private sector are starting to hit some governments—Estonia, India, and EU countries are leaders—but are lagging in parts of the world such as North America.

3. **Nudging for good: Using behavioral science to improve government outcomes.** As the field of behavioral economics advances our understanding of how people make choices, "nudging" is replacing incentives and punishments—promising lower costs, better outcomes, and an enduring respect for human autonomy.

   STATE OF PLAY: Nudge units have been established in 200 governments worldwide, but there is still a huge number of untapped opportunities.

4. **The rise of data and AI ethics: Managing the ethical complexities of the age of big data.** Information is power, and power can be used for good or ill. Governments will play a major role in the rise of data ethics, not only as the "owner" of massive amounts of data but also as a regulator of corporate data use. As smart machines know more about us, we need to ensure that privacy, equity, and transparency guide their operations. Is your algorithm ethical? It should be.

   STATE OF PLAY: Across the world, from Canada to China, governments are passing laws, establishing task forces and specialized ethics units, and scrutinizing their own algorithms for biases. The private sector is also deeply engaged in collaborative efforts.

5. **Anticipatory government: Preempting problems through predictive analytics.** Data analytics, scenarios, and simulations allow us to target likely problems before they erupt. From spotting fraud to combatting the opioid epidemic, an ounce of prevention really is worth a pound of cure, especially in government.

   STATE OF PLAY: Emerging across many areas of government, from social services to food safety to law enforcement. The challenge is to change ways of working to fully take advantage of these new capabilities.

# Understanding these trends is the first step in navigating the journey ahead.

6. **Cloud as innovation driver: The foundation for employing emerging technologies in government.** Cloud computing is already a key enabler for other innovative trends (for example, nearly 87 percent of companies using AI do so in the cloud). It offers enormous leapfrog opportunities for governments in developing countries. And because cloud provides a mechanism to connect technology developers and users, its role as a foundation for innovation will only become more important (almost 50 percent of new software today is developed only in the cloud).

   STATE OF PLAY: While cloud adoption is growing rapidly, many public sector organizations struggle to realize its full potential.

7. **Innovation accelerators: Creating safe spaces for government innovation.** Iterative, reality-tested, safe experimentation is critical to innovation, in everything from health care to currency. Accelerators, incubators, and government "labs" are part of the emerging trend. In addition, regulatory sandboxes are a way to allow private innovations much greater flexibility within a limited space.

   STATE OF PLAY: This trend is growing rapidly. Some of the innovation units focus on "spinning in" promising solutions and adapting them as needed to a public sector context. Others focus on developing solutions in-house.

8. **Smart government: Smart city solutions for the public services landscape.** As we see with smart cities, integrated, connected, and sustainable governments will deploy technology to serve citizens in a collaborative and comprehensive manner, improving everything from mobility to health care to the environment. Cities are at the forefront of the trend, but it is now coming to regions, universities, military bases, and rural communities, among others.

   STATE OF PLAY: Early adoption is scattered across the world, with governance and funding (not technology) representing the largest constraints.

9. **Citizen experience in government takes center stage: Treating citizens like customers to drive triple value impact.** How can large public systems deliver services that meet the needs of individuals? They can start by walking in citizens' shoes and understanding that "one size fits all" won't cut it. Customer experience (Cx) tools can be effectively used to serve not just government's customers but also government employees, regulated entities, and businesses.

   STATE OF PLAY: The approach is growing but still being narrowly deployed in government; the trend is more advanced in the private sector.

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# AI-augmented government

## Climbing the AI maturity curve

Artificial intelligence (AI) is not a new technology.[1] Computers in the past, however, were mostly limited to performing routine processing on structured inputs. Today, AI can perform wildly complex tasks—from driving a car to playing chess to grading essays—at a level often equal to or surpassing the most talented humans, while performing these tasks at scale. AI can also work with humans to produce value in unprecedented ways.

The growing toolkit of AI—computer vision, natural conversation, and machines that learn over time—has the potential to enhance almost everything government does, from education and health care to policing and defense. Until recently, many governments struggled to understand what AI could accomplish; today, more than 80 percent of early adopter public sector organizations we surveyed are using or planning to use AI, and nearly 90 percent consider cognitive technologies to be of extreme strategic importance for their internal business processes.[2] And AI is just at the beginning of the adoption curve.

One reason AI can work well for government is that it needs volumes of data—and governments have plenty of volume. Already, the US federal government has digitized more than 235 million pages of government records, and it plans to reach 500 million pages by fiscal year 2024.[3] Imagine the value of intelligent machines processing this vast trove of data. As the connected sensors on the Internet of Things produce ever-more data, and as cloud computing makes data-sharing easier, AI should make it possible to tackle more ambitious problems in various industries:[4]

- **Health care.** The United Kingdom's National Health Service is using AI-driven chatbots to assist patients with non-life-threatening conditions. This frees doctors' time to focus on patients who actually need emergency care.[5] In Japan, the government is planning to invest US$100 million to build 10 "smart" hospitals to address the shortage of medical professionals. The hospitals will use AI to analyze medical test results and recommend appropriate treatments.[6]

**One reason AI can work well for government is that it needs volumes of data—and governments have plenty of volume.**

# COUNTRY NATIONAL AI STRATEGIES


Note: All currency amounts are given in US dollars.

- **Transportation.** Pittsburgh has installed AI-enabled traffic lighting, which has helped cut travel times by 25 percent and idling times by 40 percent.[7] Singapore is using AI and data analytics for its intelligent transportation system to reduce traffic congestion and improve the punctuality of its public transport.[8]

- **Human services.** Australia's Department of Human Services (DHS) deploys an internal chatbot called Roxy that uses AI to answer queries from case-processing officers. The chatbot can answer about 85 percent of the questions asked by case-processing officers, thus reducing the DHS staff's workload.[9] In the Netherlands, a government agency has used machine learning to detect fraud and waste in its social benefit programs.[10]

- **Law enforcement.** The city of Chicago is attempting to prevent violent crimes before they happen. The city's predictive analytics unit runs spatial algorithms on 911 call data to identify where and when violent crimes or robberies are most likely to happen.[11]

- **Defense and national security.** The United Kingdom's Institute for Strategic Dialogue has developed a natural-language-based solution to monitor the internet for signs of radicalization. Of the total sample of 42,000 individuals identified online, nearly 800 were found to indicate signs of extremism.[12] In South Korea, the armed services launched the AI Research and Development Center in January 2019. The center will comprise 50 military and civilian staff with knowledge of AI, big data, and other emerging technologies; they will collaborate with nongovernment partners to develop AI capabilities for military use.[13]

As these examples show, AI often augments human workers, relieving public employees from more mundane tasks to focus on the most important. AI-augmented government isn't about replacing humans; it's about taking advantage of the best capabilities of both humans and technology. The AI journey can be divided into three stages:[14]

1. **Assisted intelligence.** Here, government organizations can harness the power of big data, cloud, and data science to aid decision-making.
2. **Augmented intelligence.** In this stage, machine learning capabilities are layered over existing systems to augment human intelligence competencies.
3. **Autonomous intelligence.** In the most advanced stage, processes are digitized and automated to deliver intelligence upon which machines, bots, and systems can act.

**Applied wisely, AI can be a national asset and a source of global competitive advantage.**

AI adoption in government isn't without its challenges, which range from algorithmic bias to data privacy to funding. (Read more about bias, data privacy, and other issues in our other trend, "The rise of data and AI ethics.") But AI's power to multiply human productivity makes its continued growth in government seem inevitable.

Applied wisely, AI can be a national asset and a source of global competitive advantage. Numerous governments are investing in national AI strategies, involving both the public and private sectors:

- Germany has earmarked US$3.4 billion for AI in its national strategy released in 2018.[15]

- France is planning to spend US$1.8 billion.[16]

- South Korea has budgeted US$2 billion for AI research and development, with the goal of becoming one of the top four AI nations by 2022.[17]

- China, which has pledged to spend US$100 billion of tax revenues on AI, has the ambitious goal of developing a US$1 trillion AI industry by 2030.[18]

- Other nations such as Canada, Japan, Singapore, and India have also developed national AI strategies.[19]

With AI use in government rising significantly, there will be big implications for the government workforce. Workforce planning will need to consider the interplay between people, technologies such as bots and machine learning, and outside partners. Cognitive technologies may well prompt governments to reimagine the nature of government work itself, and redesign that work to make the most of both human and machine skills.

## DATA SIGNALS

- Around **1.3 billion hours** can potentially be freed up through automation in the US federal government.[20]

- Approximately **44 percent** is the estimated growth rate for AI spending in central governments around the world through 2022, faster than AI spending in personal and consumer services.[21]

- **Eighty-four percent** of US public sector executives cited data privacy and quality issues as the biggest challenges for AI adoption.[22]

- **Sixty-eight percent** of respondents in a Deloitte-NASACT survey indicated that their staff will be provided more training in cognitive technologies and automation to plug skills gaps.[23]

- **More than 25** countries have launched national AI strategies.[24]

## Moving forward

- **Define the broad AI strategy** and have clarity on purpose: Is the goal to reduce cost or add value or a combination of both approaches?
- **Define the problems** the agency faces and how and which AI technologies might best address them.
- **Identify the right use cases to pilot** and have a long-term plan to scale them.
- **Build the AI talent capacity**, both internally and externally, to execute on projects.
- **Identify relevant data** and determine its accessibility.

## Potential benefits

- Augment human effort to create value at scale;
- Improve the quality of services;
- Reduce paperwork; and
- Catalyze economic development.

## Risk factors

- Getting the government workforce ready for the AI era;
- The growing complexity of AI technologies;
- Funding AI technologies; and
- Growing concerns over algorithmic risk, black box, and bias.

Read more about AI-augmented government in the **AI in government** collection.

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# Digital citizen

## Improving end-to-end public service delivery via a unique digital identity

What if government could authenticate citizens—and businesses—the same way that most digital companies do their customers?

Imagine logging into government the way you log into your bank account. A land developer could, for example, upload blueprints, check the status of a building inspection, and then click another tab to apply for government grants. A homeowner could apply for an easement, buy a bus pass, and then pay taxes, all in one place. A unique digital identity could enable all of this and eliminate the need for citizens and businesses that opt in to provide the same information again and again to different government agencies.

For decades, governments have relied on a sprawling patchwork of systems to identify and manage people, using everything from passwords and smart cards to biometrics; moreover, in developing countries more than a billion people around the world have no formal way of proving their identity.[1] A unique digital identity for citizens could enable dramatic leaps in service quality and massive efficiency gains for governments, as well as drive financial and social inclusion by providing citizens access to health care, education, and other government benefit programs.[2] This model is beginning to be adopted across the world.

**An advanced model in Estonia.** Estonia's digital infrastructure enables every part of the government to easily identify citizens and offer services more efficiently. Basic citizen information is entered just once and shared across agencies. As a result, an Estonian citizen preparing his or her taxes starts with a prepopulated tax form, rather than a blank slate. Moreover, Estonians can vote online, access their e-health records, and conduct just about every government transaction online (barring marriage, divorce, and real-estate transactions).[3] Estonia even allows citizens of other countries to become an "e-resident" of the country to make it easier to do business in Estonia.

The European Union is heading down a similar path.

**An intercontinental identity**. The EU Once-Only project has a pivotal role to play in creating a digital single market across the continent. As the name suggests, the goal of the initiative is that citizens and businesses need only provide their information to government once, thus reducing administrative burdens and facilitating the ease of doing cross-border business.[4] The project will also allow citizens and businesses to use their respective national electronic IDs to seamlessly access public services in other parts of the European Union.[5]

**The world's largest digital identity program.** A number of developing economies—including

# GOVERNMENT DIGITAL IDENTITY INITIATIVES

Peru, Uruguay, Chile, the Philippines, Thailand, Indonesia, and Pakistan—have launched digital identity programs.[6] India's Aadhaar program is the world's largest digital identity program, providing a unique 12-digit identifier assigned to each of its 1.3 billion citizens based on their biometric and demographic data.[7]

The Indian government launched the Jan Dhan-Aadhaar-Mobile (JAM) initiative in 2014–2015,[8] aiming to link Jan Dhan bank accounts, Aadhaar, and mobile numbers to plug any potential leaks in government benefit programs. The linkages have made Aadhaar-based verification easier and helped millions of Indians enter the formal banking system for the first time. Now, more than 80 percent of Indian adults have a bank account, compared with just 35 percent in 2011.[9]

**Health cards as key lever.** Some governments are using universal health insurance cards as the key lever for unique digital identities. British Columbia, for example, replaced its legacy CareCards with BC Services cards to access publicly funded health services. The card also acts as an authenticator to access other public services online.[10]

**Unique digital identities for business.** Some countries are also focusing on easing business by assigning companies unique digital identities. For example, New Zealand launched a program to assign a 13-digit unique identifier number to businesses operating within its borders. The identifier number is associated with basic business data such as address, phone number, and the business's trading name, so businesses need not furnish this information every time they interact with government agencies: The information will be prepopulated every time they enter the number in any form. The number will also facilitate e-invoicing of payments and receipts between two different business entities.[11] The unique identifier initiative is expected to save businesses up to US$60 million annually.[12]

Unique digital identity epitomizes the idea that the future is here, but it's just unevenly distributed. While many countries have made great strides in this area, others, have not. Governments that have been slower to gain traction and acceptance of government-issued (or approved) digital identities have encountered two main challenges: trust and federated political systems.

**Trust in government.** Would you trust your government to build an identity management system that helps join the dots on personal data such as tax filings, driver's licenses, health records, land records, and other personally identifiable information? The answer might depend on which part of the world you are from. In some countries, such as Switzerland and Indonesia, trust in government is high, while in many others, trust in government is quite low.[13] Trust can be of paramount importance for getting citizen buy-in for the universal digital identity system, since it raises thorny questions about data ownership, data privacy, and data-sharing. In low-trust environments, political opposition can derail the drive for digital identity.

**Integrating identity systems across levels.** Political and governmental structures may prevent some countries from moving toward a national digital identity and instead opt for a federated system with multiple IDs across government levels. For instance, Australia has multiple IDs across different government tiers including the Federal Digital Transformation Agency[14] and the state of New South Wales.[15] In the United States, many states have their own state-specific identity management systems, such as MILogin for the state of Michigan[16] and OH|ID for the state of Ohio.[17]

Tackling these thorny issues continues to be a challenge for many countries.

## DATA SIGNALS

- An estimated **US$1B** was saved on civil service staff in Nigeria using digital IDs, which removed 62,000 ghost workers.[18]
- **Twenty-four** of 28 EU member countries have begun implementing the Once-Only initiative, which is expected to save **855,000 hours** for citizens and **11 billion euros** for businesses annually.[19]
- Estonia's use of digital signatures helped achieve **2 percent** in annual GDP savings.[20]
- Worldwide, **1 billion** people lack access to a legal way to identify themselves.[21]

## Moving forward

- **Formulate a legal and policy framework** that defines scope, objectives, and institutional accountability.
- **Establish privacy-by-design principles and frameworks** that protect user privacy and citizen rights.
- **Develop a multiyear road map** for integrating essential government services with the digital identity system.
- **Consider technologies and ways in which a citizen can authenticate identity:** smart cards, biometrics, iris scan, facial recognition, and mobile app, among others.

## Potential benefits

- Reduce friction while interacting and transacting with government;
- Lower administrative costs;
- Improve ease of doing business;
- Provides foundation for digitally unifying markets;
- Reduce fraud and waste; and
- Accelerate citizen-first digital transformation.

## Risk factors

- Growing risk of state surveillance; and
- Cybersecurity and privacy concerns.

Read more about how governments are approaching digital transformation in the **Digital government transformation** collection.

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# Nudging for good

## Using behavioral science to improve government outcomes

Ten years ago, Richard Thaler and Cass Sunstein's book *Nudge* introduced the powerful concept of choice architecture: the idea that subtle tweaks to choice environments can significantly impact our decisions. By designing choice environments in ways that work in harmony with human psychology, we can prompt better decisions—decisions that individuals *would* make *if* they had unbounded cognitive abilities and no self-control problems.

Behavioral science, or "nudge thinking," is the use of choice architecture and other techniques to try to influence the choices people make. Academic research has provided powerful theories about human decision-making, and these theories have shown impact in real-world settings across the globe. It turns out that human beings are often busy, distracted, and socially motivated. As a result, our "decisions" are often the result of subconscious, nonrational influences. If the default option for our 401(k) is to invest, we are more likely to save for retirement. If we know our neighbors are recycling, we are more likely to recycle. And if the financial aid form is prepopulated with the family's income data, the student is more likely to attend college.

Though private companies are increasingly taking notice, government agencies have been in the vanguard of this movement, testing nudge theories in hundreds of real-life settings around the world.

In 2010, the United Kingdom's Behavioural Insights Team became the first governmental "nudge unit" to study and harness behavioral patterns for more informed policymaking and improved government services.[1] Since then, there has been a proliferation of formal and informal nudge groups within government agencies, as hundreds of countries, states, and cities have applied the concepts of nudge thinking to improve outcomes.[2]

**Broad use cases across government.** Recent years have seen nudges go from a novelty to a commonly used tool in the public sector thanks to the presence of hundreds of government nudge units and their impressive track record of beneficial results. Nudges have increased tax compliance in the United Kingdom[3] and the United States,[4] and reduced littering in Scotland.[5] Nudges have encouraged citizens to save more for their retire-

**Recent years have seen nudges go from a novelty to a commonly used tool in the public sector.**

# NUDGE UNITS IN GOVERNMENT

ment in Oregon,[6] more businesses to comply with regulations in Ontario, Canada,[7] and pedestrians to stop jaywalking in Bogota, Colombia.[8]

In public health, in order to reduce antibiotic over-prescribing, the Australian Department of Health's Behavioural Economics and Research Team (BERT) identified general practitioners with high antibiotic prescribing patterns and sent them letters that compared their prescribing patterns with those of other doctors. This intervention, based on a behavioral concept called "social proof," proved successful: BERT was able to reduce the number of antibiotic prescriptions by more than 125,000 over a six-month period.[9]

**Partnerships.** Another way many governments are using behavioral insights to develop effective policies is to partner with academia, nonprofits, and multilateral organizations. For instance, the World Bank's Mind, Behavior, and Development Unit works closely with local governments worldwide on some of the biggest economic and social problems by evaluating behavioral patterns and designing appropriate interventions.[10] In Tanzania, the World Bank, in partnership with a local mobile service provider, developed behaviorally informed text messages to encourage low-income individuals to save more; the highest savings achieved here was more than 11 percent.[11]

## While the application of behavioral insights has succeeded in accomplishing a variety of effective policy outcomes, there are certain risks associated with the approach.

**Next-generation nudges.** Some governments have also begun transitioning to the next generation of nudges, which increasingly embed design thinking, data, and predictive analytics into government programs. Predictive models based on big data can be used to flag the issues most in need of attention, while behavioral insights can provide the tools to prompt the desired behavior change.[12] Small, often inexpensive changes can yield outsized results. By leveraging big data and machine learning, government agencies can create prescriptive nudges, customized to provide the right nudge to the right person at the right time, thereby maximizing impact. Analogous to precision medicine, the "3D" trifecta of data, digital, and design can ultimately enable what might be called "precision engagement."[13]

New Mexico's Department of Workforce Solutions has applied these tools to tackle a thorny problem: claimants improperly collecting unemployment insurance benefits due to inaccurate disclosure of earnings and other information.[14] Officials recognized that most improper claims were minor, rather than serious, scams. So, rather than taking the traditional (and expensive) approach of criminal enforcement, they used low-cost "pop-ups" and other nudges—customized using machine learning—to prompt more accurate disclosure.[15] In the year after the smarter system went live, improper payments fell by half, and unrecovered overpayments have shrunk by almost 75 percent, saving the state almost US$7 million annually.[16]

## DATA SIGNALS

- More than **200** public entities worldwide apply behavioral insights.[17]
- In 2017, the Organisation for Economic Development and Cooperation (OECD) published "the first-ever global collection of **more than 100** behavioral insights case studies from around the world and key lessons for public institutions."[18]
- Since 2015, the GSA Office of Evaluation Sciences has completed more than **60 tests** with more than a dozen agencies.[19]
- Dozens of nudge experiments have been conducted by the US Internal Revenue Service.[20]
- Approximately **780** projects have been undertaken by the Behavioural Insights Team (BIT) since its inception.[21] The team has also conducted **99** trials in **37** US cities as part of the "What Works Cities" program.[22]

While the application of behavioral insights has succeeded in accomplishing a variety of effective policy outcomes, there are certain risks associated with the approach. In some cases, government nudges may come off as overly paternalistic, or worse, manipulative. Richard Thaler says that whenever he autographs a copy of *Nudge*, he writes, "Nudge for good!" Good nudges can help individuals overcome natural human limitations to make better choices. In contrast, choice architecture can also be used in ways that manipulate or exploit our human limitations. (Some commercial nudges—"buy now, pay later!"—fall into this category.) Furthermore, poorly designed nudges may produce counterproductive results or unintended consequences—making thoughtful design and a commitment to testing and learning critical. Despite these concerns, nudge thinking has shown its effectiveness, and should be considered for any policy that involves human behavior.

## Moving forward

- **Identify the ultimate objective** of a policy, whether it's to discourage rule-breakers or to encourage program buy-in. Behavioral insights can be applied if traditional approaches have failed to yield the desired outcomes in the past.
- **Choose your nudges.** Start with considering the outcomes you are seeking. What design factors may be influencing people's behaviors? Are there social influences at play? What types of nudges might be appropriate? What is the choice architecture and default choice? Are there small barriers that discourage people from making better choices? What interventions can we design to improve outcomes?
- **Test and assess the impact of the program**—this can be crucial to its overall success.[23] Find out what works for whom, why, and how to scale for maximum impact.

- **Incorporate end-user insights.** Check for any behavioral barriers to effective policy response. Reframe and redesign the policy or intervention based on the end-user insights.

## Potential benefits

- Improve rule compliance;
- Increase engagement in public programs; and
- Better cost-effectiveness.

## Risk factors

- Overbearing nudges may affect citizen autonomy;
- Poor design or lack of impact measures may yield unintended, possibly negative outcomes; and
- May adversely impact welfare for certain target groups.

Read more on how governments are applying behavioral science for better policymaking in the **Behavioral economics and public policy** collection.

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# The rise of data and AI ethics

## Managing the ethical complexities of the age of big data

Governments have defined almost every conceivable aspect of property ownership. Can I cut down my neighbors' tree if it grows over my patio? Only those limbs that grow over the property line. Can I play music on my porch? Only if it doesn't interfere with your neighbor's enjoyment of their property. The complexity of the legal questions surrounding physical property is immense, but years of developing constitutions and legislation, as well as court decisions, have made the gray areas manageably small, and property owners and other citizens understand their property rights and responsibilities.

The same is not true of data rights. The entire notion of "data and AI ethics" has become of central interest for many individuals, businesses, and governments due to the burgeoning role of data in our lives. The internet, the Internet of Things, and sensors can track an astounding amount of data about a person—from sleep habits, to moment-to-moment location, to every keyboard click ever executed. Moreover, as artificial intelligence (AI) systems make more decisions, AI ethics become increasingly relevant to public policy. If a self-driving car faces a dangerous situation, should it choose the course least risky to the passengers or to a pedestrian—even if the pedestrian is at fault? Data ethics can be tricky, and very little of it is defined by existing law.

The United States Constitution guarantees "the right of the people to be secure in their persons, houses, papers, and effects"—but how does that apply to an individual's data and privacy? In what ways may companies, or individuals, or even governments that collect data about an individual use that information?

Here are four of the biggest issues driving the conversation around data and AI ethics:

1. **Privacy.** Citizens face widespread threats to their privacy, such as data collected on smartphones, while governments could potentially examine a citizen's online activity. Law enforcement agencies worldwide are deploying facial recognition technology, and retail outlets have begun cataloging shoppers with facial recognition, which can be matched to their credit cards—often without customers' awareness or consent.[1] These occurrences are increasingly common.

2. **Lack of transparency.** AI-based algorithms are often closely held secrets or are so complex that even their creators can't explain exactly how they work. This makes it harder to trust

# DATA AND AI ETHICS INITIATIVES

**Canada** issued a directive on automated decision-making to ensure decisions made by automated systems are interpretable and transparent and reduce the risk for Canadian citizens.

**Germany's** Ethics Commission on Autonomous Vehicles is developing ethical guidelines for AVs.

**Serbia's** National Assembly enacted a new data protection law in November 2018 modeled after the European Union's General Data Protection Regulation.

**Singapore** has established an advisory council on the ethical use of AI and data to advise on the responsible development and deployment of AI.

The **European Union's** General Data Protection Regulation mandates organizations, private and public, to provide "data protection by design" and "data protection by default.

**Japan's** Ministry of Internal Affairs and Communications launched guidelines for AI research and development in 2017 that focus on protecting interests of citizens by mitigating risks of AI systems.

The city of **New York** has established an automated decision systems task force to explore how the city uses algorithms to make decisions.

**Brazil** approved the General Data Protection Law in August 2018.

**Dubai** has established an AI ethics advisory board to encourage fair, transparent, and accountable AI systems.

**Bahrain** passed a data protection law in July 2018, making it the first Middle Eastern country to adopt a comprehensive privacy law.

**Australia** has released a discussion paper that proposes an AI ethical framework.

The **United Kindom's** Centre for Data Ethics and Innovation has been established to advise the government on how to use AI and other technologies to benefit society.

**Hong Kong** published an ethical accountability framework in October 2018 that includes guidelines for businesses operating in Hong Kong on protecting the privacy of citizens.

The **Netherlands'** Utrecht Data School has developed a data ethics decision aid tool that is currently used by various Dutch municipalities to make ethical decisions related to data.

**The entire notion of "data and AI ethics" has become of central interest for many individuals, businesses, and governments due to the burgeoning role of data in our lives.**

their results. From bank loans to college admissions to job offers, decisions are often made based on data from these complex algorithms. Which decisions might be made by "secret" criteria? Which aren't? And what role should government play in ensuring transparency?

3. **Bias and discrimination.** Real-world bias can shape algorithmic bias. Some court systems have begun using algorithms to evaluate the criminal risk potential of criminal defendants and even begun using this data while sentencing. However, criminal risk scores and research have raised concerns over potential algorithmic bias and led to calls for greater examination.[2]

   Understanding how an algorithm works will not alone solve the broader issue of discrimination. The critical factor is the underlying data set. If the underlying data has historically comprised a certain gender, race, or nationality, then the results could be biased against cohorts outside of those groups.

4. **Lack of governance and accountability.** One of the critical issues in the AI debate is the big question of who governs the AI system and data. Who creates ethical standards and norms? Who is accountable when unethical practices emerge? Who authorizes the collection, storage, and destruction of data?

These high-profile issues, in turn, are driving responses by stakeholders ranging from governments to corporations. To learn more, read *Can AI be ethical? Why enterprises shouldn't wait for AI regulations.*

## Government's role in data and AI ethics

Governments are at the center of the data ethics debate in two important ways. First, governments "own" a massive amount of data about citizens, from health records to what books a citizen checked out of the library. Second, the government is a "regulator" of the corporate use of data collected online.

Governments are increasingly considering their regulatory responsibility. For instance, the European Union's General Data Protection Regulation (GDPR) provides strict controls over cross-border data transmissions, gives citizens the right to be "forgotten,"[3] and mandates that organizations, including government agencies, provide "data protection by design" and "data protection by default."[4]

Similar to GDPR, the state of California's Consumer Privacy Act aims for more stringent privacy requirements.[5] Other planned global efforts include South Korea's Ministry of Commerce, Industry, and Energy's "Robots Ethics Charter" that provides manufacturers with ethical standards for programming the machines,[6] and Canada and France's international panel to rein in unethical use of AI.[7]

### EVOLVING PRIVACY STANDARDS AND ETHICS FRAMEWORKS

Many governments are formalizing their approach to algorithmic risks. The UK government, for example, has published a data ethics framework to clarify how public sector entities should treat data.[8] Canada has developed an open-source Algorithmic Impact Assessment questionnaire that can assess and address risks associated with automated decision systems.[9] The European Union, too, has been gathering comments from experts on its ethics guidelines for AI.[10]

### DEVELOPING AI TOOLKITS

Many big technology firms are also invested in addressing these challenges. IBM recently released the AI Fairness 360 open-source toolkit to check unwanted bias in data sets and machine learning models. Similar initiatives include Facebook's Fairness Flow and Google's What-If Tool.[11] In another example, the Ethics and Algorithm Toolkit was developed collaboratively by the Center for Government Excellence, San Francisco's DataSF program, the Civic Analytics Network, and Data Community DC.[12]

### A CONSORTIUM APPROACH TO AI ETHICS

Industry consortia are developing standards and frameworks in their industries; examples include:

- The Council on the Responsible Use of AI formed by the Bank of America and Harvard Kennedy School's Center for Science and International Affairs;[13]
- A consortium in Singapore to drive ethical use of AI and data analytics in the financial sector;[14] and
- The Partnership on AI, representing some of the biggest technology firms, including Apple, Amazon, Google, Facebook, IBM, and Microsoft, to advance the understanding of AI technologies.[15]

## DATA SIGNALS

- **One hundred and seven** countries have formulated legislation to protect data and privacy of citizens.[16]
- Since 2013, **9.7 billion** data records were lost or stolen globally.[17]
- More than **95,100** complaints were received by the Data Protection Authorities under the EU GDPR legislation since its launch.[18]
- From 2017 to 2018, media mentions on AI and ethics **doubled**. More than 90 percent of mentions indicated positive or neutral sentiment.[19]
- The UK government launched a Centre for Data Ethics and Innovation with a **£9 million budget**.[20]

## Moving forward

- **Acknowledge the need for ethics in the AI era.** Create an AI ethics panel or task force by tapping into the expertise from the private sector, startups, academia, and social enterprises.
- **Create an algorithmic risk management** strategy and governance structure to manage technical and cultural risks.
- **Develop governance structures** that monitor the ethical deployment of AI.
- **Establish processes** to test training data and outputs of algorithms, and seek reviews from internal and external parties.
- **Encourage diversity and inclusion** in the design of applications.
- **Emphasize creating explainable AI algorithms** that can enhance transparency and increase trust in those affected by algorithm decisions.
- **Train developers, data architects, and users** of data on the importance of data ethics specifically relating to AI applications.

## Potential benefits

- More accountability from developers;
- The rise of AI for social good; and
- Growing ecosystem approach to AI.

## Risk factors

- Threat to citizens' right to privacy;
- Lack of transparency; and
- Bias and discrimination.

Read more about data and AI ethics in the **Chief Data Officer Playbook.**

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# Anticipatory government

## Preempting problems through predictive analytics

Predictive analytics and artificial intelligence (AI) allow governments to target likely problems before they erupt into crises. Recent advancements in natural language processing (NLP), machine learning, and speech and image recognition have made it possible for government to predict and anticipate problems rather than react to them. From spotting fraud to combatting the opioid epidemic, an ounce of prevention really is worth a pound of cure—especially in government. Predictive analytics is now being applied in a wide range of areas including defense, security, health care, and human services, among others.

The idea that government should focus more on preventing problems instead of just reacting to them is not new.[1] What's different today is the ability to actually do this regularly—and successfully—via an exponential increase in the ability to analyze massive historical data sets and millions of pages of unstructured text to identify patterns and forecast potential problems. This is leading more and more governments to direct resources toward fixing problems before they arise. For instance, the US Air Force has used predictive maintenance technology in an effort to predict when an aircraft may break down and then carry out preventive replacements and maintenance to avoid it. This reduces aircraft downtime and helps minimize future repair costs.[2]

Governments now use data analytics to inform preemptive measures for a host of issues:

**Reduce crime.** The police department of Durham, North Carolina, uses AI to observe patterns and interrelations in criminal activities and to identify hotspots with a high incidence of crime, thus allowing for quicker interventions. This helped contribute to a 39 percent drop in violent crime in Durham from 2007 to 2014.[3] Meanwhile, the Los Angeles Police Department's predictive models have helped predict crime events twice as accurately as trained crime analysts.[4] The models enable the department to decide where police officers should be deployed in the city to prevent crime.[5] Predictive analytics can also be used to help predict financial crimes such as tax evasion and insider trading.[6]

**Fight human trafficking.** About 75 percent of child trafficking involves online advertisements according to one survey.[7] The Defense Advanced Research Projects Agency (DARPA),

# USE OF PREDICTIVE ANALYTICS IN GOVERNMENT

in collaboration with commercial technology experts, has developed a platform that monitors dubious online advertisements and infers connections between them and trafficking rings. Both Virginia's Fairfax County Police Department and Homeland Security Investigations in New Orleans use this advanced software to identify high-risk Web advertisements and detect code words used by traffickers.[8] This type of software has helped agencies locate and rescue millions of victims and prosecute traffickers.[9]

## Governments now use data analytics to inform preemptive measures for a host of issues.

**Improve food inspections.** How do food safety inspectors prioritize which restaurants or hotels to inspect? Can they predict ahead of time which establishments are the most likely to have food safety issues? Thanks to analytics, increasingly the answer is yes. For instance, the city of Las Vegas's health department used advanced AI technologies such as NLP to analyze more than 16,000 tweets daily for food-poisoning-related clues (for phrases such as "I feel nauseous," for example) to help detect venues likely to pose public health hazards.[10]

**Prepare for natural disasters.** The government of Indonesia has teamed up with a local startup to predict and manage floods. By using historical flood data collected via sensors and tapping into citizen complaint data, it can identify flood-prone areas.[11] Jakarta's emergency management agency used the data to identify flood locations, expedite its response in managing floods, and communicate and alert citizens about floods.[12]

**Reduce homelessness.** The US Department of Veterans Affairs' National Center on Homelessness Among Veterans is deconstructing big data and developing predictive models to estimate future levels of homelessness. The agency works to identify which veterans are at risk for homelessness so appropriate preventive interventions can be taken.[13]

**Predict cyberattacks.** Predictive analytics can sift through a large set of data to identify malicious code, anomalous patterns, and network threats to help predict cyberattacks. This allows governments to take a proactive approach rather than a reactive

stance.[14] In-Q-Tel, a nonprofit venture capital arm of the US intelligence community, invested in Cylance, a company that uses AI-backed technologies to detect and prevent cyber threats. Cylance uses AI to determine which file is safe, which is malicious, and then works to neutralize malicious files before an attack can be executed.[15]

**Prevent child abuse and fatalities.** Oklahoma uses AI to try to predict which child welfare cases have the highest risk of turning into fatalities. The model considers a number of factors such as past history, mental health status, records of parents, and intergenerational abuse. The high-risk cases are flagged for caseworkers to prioritize.[16]

**Counter terrorism.** Governments are also advancing efforts to tap into a treasure trove of unstructured social media data. The European Union's Horizon 2020 program, for example, launched an initiative called RED (Real-time Early Detection) Alert, aimed at countering terrorism by using NLP to monitor and analyze social media conversations. RED Alert is designed to provide early alerts of potential propaganda and signs of warfare by identifying online content posted by extremists.[17]

**Prevent accidents.** The Behavioural Insights Team (BIT) of the United Kingdom used predictive analytics to reduce traffic accidents in East Sussex. It developed an algorithm based on data collected over a decade which helped the team to predict which type of drivers are at risk of dangerous accidents. The team found that locals who have been previously caught speeding are the ones often getting involved in accidents. In response, the team tweaked the notices sent to offenders caught speeding to persuade them to follow speed limits. The intervention helped reduce reoffending by 20 percent.[18]

Going forward, government's use of AI-based predictive analytics is likely to gain momentum provided agencies can overcome certain challenges. These include closing the skills gap, algorithmic bias, balancing investments in new capabilities vis-à-vis existing operational investments, and organizational inertia of using analytics. However, with strong governance, committed leadership, a focus on talent recruitment and development, and new management practices, governments can continue to scale use of predictive analytics.

## DATA SIGNALS

- **Thirty-four percent** of the chief data officers in the US government use predictive modeling.[19]
- The Ash Center at Harvard University has identified more than **200** success stories related to the use of data and analytics across the city, county, state, and federal levels in the United States.[20]
- **US$1.5 billion** saved in Medicare payments with the use of a predictive analytics tool.[21]
- According to a Gartner survey, **43 percent of government CIOs across 89 countries** are likely to increase technology investment in business intelligence and data analytics in 2019.[22]

## Moving forward

- **Establish data governance processes** on the collection, storage, and use of data for predictive analytics.
- **Don't wait to create big data sets** before performing analysis. Start with whatever data you have.
- **Consider which AI technologies** (machine learning, NLP, computer vision, etc.) are appropriate for your use case.
- **Train users of your predictive models** on how to make decisions based on the results of the model. Provide model results to end users in an intuitive and engaging interface.
- **Consider investing in analytical services** that make it easier for your analytics team to develop machine learning and predictive analytics models.
- **Tackle organizational change management proactively** as some employees might resist the transition to more data-driven, predictive decision-making.

## Potential benefits

- Ensure early intervention and prevention;
- Enable better resource utilization; and
- Increase the efficacy of mission-critical programs.

## Risk factors

- Lack of adequate skills in government;
- Concerns about data privacy;
- Complexity and accessibility of data; and
- Potential of algorithmic bias.

Read more about how governments are using predictive analytics in the **Analytics in government collection.**

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# Cloud as innovation driver

## The foundation for employing emerging technologies in government

For much of the past decade, cloud computing was seen as a less expensive way to store data and run applications. It has been an integral part of most digital transformations in both the private and public sectors. In 2010, then US federal CIO Vivek Kundra unveiled the "Cloud First" policy for federal agencies. The use of cloud in government has been increasing ever since, with federal cloud spending increasing 500 percent in the past eight years.[1]

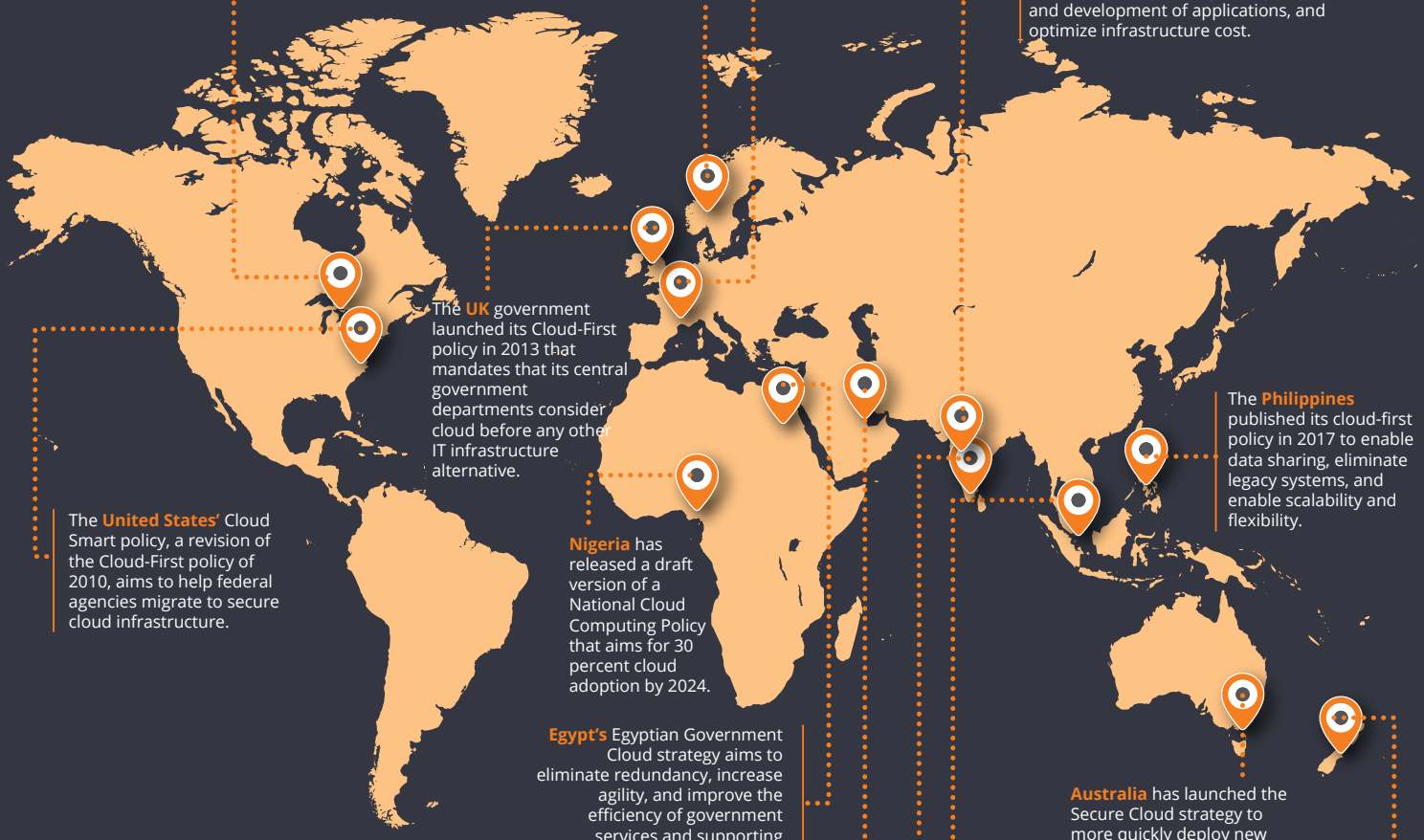
Today, the focus on cloud is becoming even more pressing across the globe. In the United States, the National Association of State CIOs named cloud the No. 1 technology issue facing state CIOs, while the federal government announced a new "Cloud Smart" policy. Both Bahrain and the United Kingdom have adopted cloud-first policies to spur innovation, enhance agility, and improve services for citizens.[2]

Why is such a mature platform receiving so much attention? Increasingly, the value proposition of cloud technologies is shifting from just cost savings to greater value. Cloud is the foundational setting for emerging technologies that governments are increasingly using such as AI, robotic process automation, the Internet of Things, and big data analytics.[3] For example, 83 percent of enterprise AI is expected to be in the cloud by 2020.[4] So while shifting to cloud may or may not reduce costs, investment in cloud can be justified by the greater value that it can deliver. Cloud can help break down data silos, drive AI adoption, and connect various stakeholders. **In short, cloud can enable future innovations.**

**Breaking down data silos.** Government often has data that goes underutilized due to siloed data sets. Breaking down these data silos can create new opportunities for innovation in many government domains: reducing congestion,[5] anticipating crime,[6] analyzing data on the fly for space experiments,[7] and reducing fraud, waste, and abuse.[8] For example, transportation agencies in the state of Nevada deployed a cloud-based AI platform to gather data from connected cars, road cameras, road conditions, weather patterns, and apps such as Waze to predict high-risk corridors where accidents are likely to happen.[9] Results of this pilot program include a 17 percent reduction in crashes along the highway,[10] and, because the agencies were able to clear accident sites faster, a 23 percent reduction in secondary collisions.[11]

But cloud offers more than just a link to different sources of data. One of the key benefits of cloud is the flexibility it offers in setting up complex and innovative environments such as deep learning. That is why the Flemish Public Employment Service, VDAB, deployed a deep learning model to match candidates with job openings. The deep

# GOVERNMENT ADOPTION OF CLOUD STRATEGIES AND POLICIES



**Canada** revised its Right Cloud Adoption policy to a Cloud-First policy that prioritizes public cloud over other cloud deployment options.

**Norway's** cloud computing strategy requires all public sector enterprises to consider cloud as an alternative when procuring information technology infrastructure.

**Switzerland's** Federal IT Steering Unit has drafted its Cloud Computing Strategy to promote cloud services in government departments.

The federal government of **India** has launched a cloud initiative to accelerate the delivery of e-services, speed up deployment and development of applications, and optimize infrastructure cost.

The **UK** government launched its Cloud-First policy in 2013 that mandates that its central government departments consider cloud before any other IT infrastructure alternative.

The **United States'** Cloud Smart policy, a revision of the Cloud-First policy of 2010, aims to help federal agencies migrate to secure cloud infrastructure.

**Nigeria** has released a draft version of a National Cloud Computing Policy that aims for 30 percent cloud adoption by 2024.

The **Philippines** published its cloud-first policy in 2017 to enable data sharing, eliminate legacy systems, and enable scalability and flexibility.

**Egypt's** Egyptian Government Cloud strategy aims to eliminate redundancy, increase agility, and improve the efficiency of government services and supporting technologies.

**Australia** has launched the Secure Cloud strategy to more quickly deploy new platforms, improve services with agility, and reduce the need for maintenance.

In 2017, **Bahrain** implemented a Cloud-First policy to increase agility, improve citizen services, and eliminate fragmented technology environment.

The **New Zealand** government has outlined its Cloud-First policy to speed up deployment, improve security, and optimize cost.

The state of Maharashtra in **India** has unveiled a cloud policy that mandates that all of its departments move their databases to cloud.

**Singapore** has launched a cloud computing strategy to move government applications to public clouds wherever appropriate and implement a central, whole-of-government private cloud for critical operations.

learning system can be considered an intelligent recommender system: It learns from the preferences of job seekers and employers. Embedding deep learning enables the department to take a very broad set of data into account and extend the data set. One of the advantages is that by retraining the model, it automatically takes into account the evolution in the job market. A potential drawback is of course bias in the data, a challenge the agency takes very seriously.[12]

**Offering custom solutions to drive AI adoption.** One area of cloud technology that is driving significant growth is Software-as-a-Service (SaaS).[13] No longer does a government agency have to create its own solutions, when viable solutions are already on the cloud. The use of SaaS applications, where cognitive technologies are built into the software, has the potential to increase the uptake of AI and other emerging technologies in government.[14]

The US Department of Health and Human Services uses a cloud-based, AI-powered SaaS tool to help analyze grant applications. The tool can analyze data to identify patterns that can help predict the likely outcome of a grant, e.g., identifying applications with a high probability of a negative financial audit finding.[15] The tool can also summarize hundreds of pages of information into a paragraph that agency analysts can quickly review and then decide whether or not to award a grant.[16]

**Connecting stakeholders across the ecosystem.** When it comes to innovation, connecting people is as important as connecting data. The heart of cloud's ability to catalyze innovation is its ability to connect a wider ecosystem of partners that includes developers, designers, researchers, and other government agencies. In the past, these stakeholders may have created solutions that benefited just themselves. Now, housed in the cloud, those innovations can be available to all, and participants enjoy new opportunities for collaboration.

Take the example of Caltex Australia. As a fuel company, Caltex has thousands of employees spread out across the country in remote locations. An inability to share key information quickly with colleagues in different cities or divisions was slowing down work. The move to cloud-based productivity tools quickly allowed the sharing of key information, increasing productivity and reducing the need for in-person travel, which, in turn, reduced travel costs by one-third.[17]

Cloud can also connect players outside of a single organization. Organizations ranging from the FBI to the State of Delaware have found that cloud can connect them to a rich environment of external developers. This allows users to find existing solutions to their problems already developed on the cloud rather than having to build their own tools from scratch.[18]

## Organizational changes for cloud

Unlocking cloud's full potential can require significant organizational changes. For example, instead of directly developing and managing software, the IT organization becomes more of a trusted broker between business units and cloud solutions. This organizational transition can be a tremendous advantage because it ensures the entire organization adopts leading practices such as Agile and DevOps, but it can also pose significant challenges, often requiring an entire overhaul of an organization's operating model.

The Australian federal government aims to use the cloud as a foundational platform to leverage emerging technologies such as AI, blockchain, and quantum computing. As part of the initiative, all Australian federal agencies will get access to cloud systems, applications, and software, helping them to automate processes and accelerate digital transformation.[19]

## DATA SIGNALS

- **US$49.2 billion** is the estimated value of the global government cloud market by 2023.[20]
- **Sixty-two percent** of US federal government respondents in a Deloitte survey reported that their organization had moved at least some applications to the cloud.[21]
- More than **50 percent** of all software will be developed in or for the cloud by 2020.[22]
- The UK government is spending more than **£1 billion** each year to transition to cloud.[23]

Government policies and investment dollars can help encourage cloud adoption. But ultimately, using the cloud for innovation requires a mindset shift in government: from solely measuring cost savings from cloud to developing innovative capabilities.

## Moving forward

- **Introduce cloud-focused policies** that go beyond location and vendor details to define and measure how all of the organization's policies will help it better accomplish its mission.
- **Break data silos** by making data more organized, standardized, and accessible across the agency.
- **Focus on innovation capabilities enabled by cloud**, and work with your cloud vendor to gain access to the right types of tools and capabilities.
- **Understand and define the spectrum of identity access management** and ask questions such as "who owns what data?" and "who can access it?" for each application.

- **Understand the organizational changes the shift to cloud might demand** and make a deliberate change management plan.

## Potential benefits

- Enable rapid testing of innovative ideas;
- Evolve a data-driven culture of collaborative decision-making; and
- Provide a platform to leverage emerging technologies.

## Risk factors

- Obtaining funding for cloud migration;
- Growing cybersecurity concerns;
- Lack of strategy, governance structures, and standardized cloud procurement processes; and
- Conflicting state, federal, and international regulations on privacy, data use, security, and other issues.

Read more about how cloud technology can enable innovation in government in **Government cloud: A mission accelerator for future innovation.**

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# Innovation accelerators

## Creating safe spaces for government innovation

A safe, entrepreneurial environment that tolerates and even *celebrates* risk-taking and the process of learning from failure is critical to innovation, especially when those innovation efforts are more transformative in nature. The more potentially disruptive a new approach or solution is to the status quo, the more quickly organizational antibodies will arise to mitigate the threat. And this is especially true in government, where expending tax dollars on unsuccessful endeavors is frowned upon, and failures in areas important to national interests—from health care to taxes to national security—are viewed as unacceptable by both government officials and taxpayers.

To mitigate these risks and allow promising solutions to be developed without succumbing to institutional risk aversion, many public sector organizations have begun creating formal innovation units. But these units vary widely in their activities and functions, and a key factor in the success of these units is whether or not they are actually designed in a manner that supports the activities they are supposed to be executing. Just as in architecture, form should follow function, and the most effective innovation units have carefully considered how to align their goals, activities, and supporting capabilities.

One simple way to begin thinking through how an innovation unit should be designed is to consider whether it is focused on getting its ideas from internal or external sources, and whether it is focused on solution development or driving innovation amongst other stakeholder groups.

**Building solutions in-house (internal orientation, solution-focused).** In the private sector, some of the most common innovation unit models are those focused on developing solutions in-house. From skunkworks, to test stores, to studios, these groups employ individuals with the skills to bring ideas to life as tangible solutions. These can include product designers, coders, social behavioral scientists, often employing agile and design-based techniques such as rapid prototyping, A/B testing, and wire-framing to explore the potential of new solution concepts at minimal expense.

In the public sector, groups such as the Mayor's Office of New Urban Mechanics in Boston fulfill these functions by exploring new approaches for improving the lives of Boston's citizens. By developing, testing, and evaluating new solutions, and subsequently turning effective solutions into sustainable programs, the team is an in-house solution provider for the challenges Boston

# INNOVATION ACCELERATORS IN GOVERNMENT

The federal government of **Canada's** Impact and Innovation Unit works across departments to build and apply improved ways of financing, innovative models of partnership, and new methods to measure impact.

The **United Kingdom's** Cabinet Office set up the Open Innovation Team in 2016, to strengthen ties with academics and tap into their expertise to foster innovation.

**Finland's** prime minister's office created the Experimental Finland team in 2015, to promote a culture of experimentation.

**Denmark's** National Centre for Public Sector Innovation contributes to accelerating innovation across the government by sharing knowledge with other stakeholders.

The **San Francisco** Office of Civic Innovation in the United States works with the city agencies and the community to build solutions for public challenges.

**Mexico's** Laboratorio para la Ciudad has been specially designed to foster civic innovation by leveraging citizen participation to solve public problems.

**Taiwan's** Public Digital Innovation Space fosters an open innovation approach to policymaking by tapping into the collective intelligence of citizens, academics, and civil servants.

The **United Arab Emirates'** Mohammed Bin Rashid Centre was established in 2014 to encourage innovative practices across the government.

The **Australian** Renewable Energy Agency's in-house innovation lab follows a structured method to develop innovative solutions for challenges in the energy sector.

The National Security Innovation Network, housed within the **US** Department of Defense, develops innovative solutions for national security challenges.

**Sri Lanka's** Ministry of Science, Technology, and Research, in collaboration with the UNDP, has launched the country's first social innovation lab to drive citizen engagement, facilitate testing and prototyping, and develop agile solutions.

The **United States'** Food & Drug Administration's Innovation Lab, launched in 2015, follows an iterative approach to develop and test innovative solutions for the health care sector.

**Singapore's** Transformation Office and Innovation Lab, housed within the Public Service Division under the Prime Minister's Office (PMO), aims to spread the culture of innovation across all public entities.

The **US** Department of Homeland Security houses the Procurement Innovation Lab to experiment and test innovative strategies for procurement.

faces.[1] The US Digital Service provides a similar in-house solution development capability for the US federal government by building new digital products for a number of different agencies.[2]

**Spinning in external solutions (external orientation, solution-focused).** Other innovation units focus on identifying external solutions, and then modifying them for internal use. Much like a corporate venture group within a big company, these groups focus on "spinning in" promising solutions and adapting them as needed to a public sector context. These organizations often require horizon scanning and rapid acquisition capabilities to keep abreast of promising new solutions and acquire them for public sector use, as well as human-centered design skill sets to adapt the solutions to the needs of public sector stakeholders.

For example, the World Food Programme's (WFP's) Innovation Accelerator adapts new business models and technology for use in food supply chains and markets. It is not focused on inventing new technologies but rather "scaling up" solutions. The WFP awards US$150,000 to build out proofs of concept for promising ideas and then works directly with the solution originator to develop them for WFP mission needs.[3]

In the United States, the Joint Improvised-Threat Defeat Organization was created to continuously search for the latest commercial capabilities and rapidly acquire promising solutions for the US Department of Defense.[4] And the US Department of Health and Human Services' Biomedical Advanced Research and Development Authority fulfills a similar function for health in its Division of Research, Innovation, and Ventures, focused on identifying promising health security solutions in existing innovation ecosystems and making investments in these companies as part of a public-private partnership.[5]

**Activating the innovation ecosystem (external orientation, enablement-focused).** In the public sector, an organization doesn't actually have to develop solutions itself to drive innovation in line with its operational or programmatic priorities. Because other organizations are often focused on the same or similar areas—from improving public health outcomes, to reducing poverty, to increasing access to educational opportunities—the greatest value can sometimes be derived from enabling others to innovate more effectively.

Some innovation units are designed to fulfill this "ecosystem activator" role by creating new incentives via prize challenges, enabling others to innovate through open data or convening other

groups in activities such as hackathons. These organizations have to be able to quickly assess the other actors in their ecosystem, establish strong innovation partnerships, and identify the right role to play at the right time to create the greatest value. The Danish government supports a GovTech program to help tech startups deliver new solutions to create public sector value.

The Experimental Finland team was created in the Finnish prime minister's office in 2015 to promote a culture of experimentation.[6] The team has launched a digital platform called *Kokeilunpaikka* (meaning "place of experiment") to encourage citizens to learn about experiments and also design their own. In one case, a group of nurses submitted the idea of robotic vests to help them lift ailing patients.[7] And the KidneyX Innovation Accelerator—launched in 2018 as a public-private partnership between the US Department of Health and Human Services and the American Society of Nephrology—uses crowd-sourced prize challenges and other means to help early-stage startups develop innovative drugs and therapies.[8]

**Facilitating innovation from within (internal orientation, enablement-focused).** Finally, some innovation units function as internally focused catalysts, by making it easier for other teams within their organization or immediate network to innovate. These organizations perform functions such as training their organization's staff members, providing mechanisms for staff to communicate their innovative ideas to organizational leadership, and releasing toolkits to help accelerate innovation efforts.

For instance, the Lab at the Office of Personnel Management, is the Federal government's educational hub for building human-centered design capabilities across the public sector workforce, through project-based learning, a comprehensive design curriculum, and thought leadership on design in government.[9] Similarly, the United Nation Development Program's Innovation Facility helps country offices test frontier technologies and new approaches in an effort to deliver better results. Since its establishment, the Innovation Facility has supported over 140 country-level experiments, across 87 countries and territories.[10]

These models are not mutually exclusive, but they can help a government agency begin thinking through the kinds of activities to focus innovation efforts on. Many innovation units are hybrids of the above archetypes. However, thinking through the types of activities an innovation unit engages in is an important first step for identifying the organizational structure, skill sets, and infrastructure that will be required to make the unit successful.

## DATA SIGNALS

- More than **125** government and policy innovation labs are spread across the world.[11]
- As of June 2018, the European Union is home to **78** policy labs to generate innovative ideas and translate them into policy proposals.[12]
- At least **27** cities in the United States, Canada, Israel, and France are part of the Bloomberg Philanthropies' city innovation teams (i-teams) program.[13]
- Over **30** financial regulatory sandboxes have been launched worldwide. [14]

It is also important to note that the existence of one of these innovation units does not preclude broader efforts to systematize innovation across an organization. The most effective and innovative leaders encourage their staff to take strategic risks, provide training and other skill-building opportunities, and create incentives to foster innovation-related activities. However, when faced with particularly challenging organizational bureaucracies or other barriers that may kill innovative efforts before they have had the chance to prove their value, a separate innovation unit can prove beneficial.

## Moving forward

- **Consider whether an innovation unit is right for your organization.** Do the existing structures, systems, and regulatory environment within the organization make it difficult for experimentation to take place? Would protecting these efforts prove beneficial?
- **Identify what goals an innovation unit would focus on achieving through innovation.** Don't fall into the trap of letting innovation do everything for everyone. Start small, defining a clear set of focus areas and aspirations for the new innovation unit.
- **Define the functions of the unit.** What kinds of activities will the innovation unit be focused on to bring its aspirations to life? Will it focus on identifying and implementing solutions for its organization, or on helping others develop solutions? Will it be externally or internally oriented?
- **Design the operating model.** Identify the governance, workforce, evaluation, funding, infrastructure, and process considerations that must be addressed for the new unit to be successful.

## Potential benefits

- Protects innovation efforts—particularly ones with disruptive potential;
- Introduces new skill sets; and
- Increases efficiency and coordination across innovation efforts.

## Risk factors

- Uncoordinated efforts due to misalignment of activity to organizational design;
- Brings forth broader infrastructure challenges at the organizational level; and
- Perception of siloed innovation relative to the rest of the organization.

Read more about how governments are facilitating innovation from the **Innovation in government** collection.

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# Smart government

## Smart city solutions for the public services landscape

Ever wondered what it would be like to live in a place where public services are managed by vast swathes of data, technology, and customer-focused analytics? Imagine a seamless drive to work, a streamlined waste management system, and data-driven energy usage. Yes, technology has the power to transform the places in which we live. What began with the notion of "smart cities"—integrated, connected, and sustainable communities—has expanded to cover a variety of "smart" domains and public spaces, including states, multicity regions, campuses, and military bases. These places use technology to serve citizens in a comprehensive manner and enhance many aspects of public life, including quality of life, mobility, security, education, economy, and the environment.

Three key components enable the "smart government" or "smart enterprise" movement globally:

- **Smart ecosystems.** Governments are increasingly building public-private ecosystems to solve some of the biggest societal issues including health care, mobility, education, and workforce development. These ecosystems are tapping into the collective intelligence of the private sector, academia, technology startups, think tanks, and even citizens.

- **Smart connectivity and data.** The advancements in sensor technology and the growing ubiquity of the Internet of Things (IoT) are blurring the lines between the cyber and physical worlds. The convergence of cyber and physical is enabling government to track, monitor, and manage resources and make data-driven decisions.

- **Smart platform and engagement.** There is a new information-sharing partnership between government entities, residents, and businesses. Governments are using technology to enable civic participation and leverage decentralized expertise to reinvent and overhaul core services. In other words, data + smart citizens = better city decisions.

These core components are causing a tectonic shift in the public service landscape from smart cities to smart airports to smart rural communities.

**Smart regions—coordinating across governments.** The concept of smart regions

# SMART GOVERNMENT INITIATIVES


Note: All currency amounts are given in US dollars.

includes a broad array of places and services. For instance, the Greater Phoenix Smart Region initiative brings together 22 cities and towns in Maricopa County to drive regional technology pilots and provide test beds for researchers to try out new solutions for public services.[1] Smart multicity regions should transcend city boundaries to drive more inclusive and expansive innovation. Moreover, cities also realize the benefits of pooling resources and are able to tap into economies of scale as they seek to use seamless physical-digital experiences to deliver traditional city services to citizens in entirely new ways.

**Smart campuses—improving how we learn.** Moving beyond traditional digital classroom and education initiatives, the campuses of smart universities are acting as test beds for the broader smart city movement. A smart campus uses artificial intelligence, machine learning, blockchain, and other emerging technologies to automate processes, monitor and initiate workflows, and improve data-driven decision-making for various stakeholders.[2]

The University of Washington, for example, is piloting a smart grid project, installing more than 200 smart meters across the campus in an effort to drive down energy consumption on campus.[3] Similarly, the University of Wisconsin-Madison has created a test bed to pilot multiple connected-vehicle and autonomous-vehicle projects on a 6.2-mile corridor adjacent to the campus.[4] The pilot is timely since it is becoming increasingly imperative to enable vehicles interact with each other in the wake of the challenges posed by autonomous vehicles.

**Smart airports—improving how we move.** Many transportation providers are taking smart mobility advances from pilot projects to the real world. For example, some smart airports now use Wi-Fi access points as sensors to measure the location and dwell time of travelers as they move through the terminals. The data currently helps these airports place messaging and advertisements, but it can also lay the foundation for more individualized travel services.

Smart technologies can provide broader benefits to others beyond those directly using them. For example, London's Heathrow airport uses an IoT solution to identify auxiliary power units (APU) running on the tarmac. The data can be used to remind airlines to switch off these units if kept running beyond the required schedule. By cutting down the time these APUs run, Heathrow has been able to reduce nitrogen oxide emissions and improve air quality around the airport.[5]

**Smart bases—improving security.** As with the environment, smart technology in one area can improve government services in others, such as integrating smart cities with nearby military bases. The city of San Diego has signed a memorandum of understanding (MOU) with the Marine Corps Installations Command to collaborate on smart city programs. The MOU will help the city tap into the Marine Corps research on renewable energy and water conservation, while the city will extend some of its existing programs such as smart street lights and a city services mobile app to the base.[6]

**Smart rural communities—improving rural economies.** Smart technology can also be instrumental in bringing government services to areas that have lacked them, helping the local economy. For instance, in the past four years, India has been able to bring each village into the national power grid under the National Rural Electrification initiative,[7] making rural agriculture easier and improving people's living standards. In another example, Purdue University is collecting more than 1.4 petabytes of data daily on its 1,400-acre research farm in an effort to improve the nutritional value of plants.[8]

The smart government movement is not without its own set of challenges, chief among them funding and data governance. Technology costs money, and, for many governments, funding or financing

smart projects can be a thorny issue—which is why some countries are taking a broader national approach to funding these. The India Smart Cities Mission program aims to develop 100 smart cities by 2022.[9] More than 5,000 Smart City projects of different sizes and nature, worth about US$29 billion across these 100 cities, have been approved under the Smart City Mission and are under various stages of implementation.[10]

Further challenges of smart spaces could emerge after these spaces are built. As smart spaces increasingly link the cyber with the physical worlds, cyberattacks and vulnerabilities can have serious real-world effects. For example, thousands of homes lost power in a cyberattack on Ukraine's power grid.[11] Plus, with so much data being used in smart spaces, governments should address the privacy concerns of their citizens. The Quayside project in the city of Toronto has faced resistance from residents over a lack of transparency around privacy and security of citizen data.[12] Going forward, governments will need to create greater awareness about the benefits of their prospective projects. Not only will this help build greater transparency, it will also enable greater constituent buy-in.

It's important to have a North Star for the smart government movement, but the progression should be viewed as a journey. It's also important to emphasize the ROI for any smart initiative, as orienting it toward the larger mission will be critical for the success of any smart investment.

## DATA SIGNALS

- There will be more than **50 billion** connected devices by 2020.[13]
- **US$12 billion** is the estimated market for sensors in security-related applications by 2023, up from **US$6.3 billion** in 2016.[14]
- **US$225.5 billion** is the expected global market size for smart city services in 2026, a steep rise from **US$93.5 billion** in 2017.[15]

## Moving forward

- **Identify the goal.** Identify the North Star of developing smart government. Create a business case based on a robust evaluation of costs and benefits. The business case should clearly reflect the expected ROI.
- **Explore appropriate sources of financing.** In the absence of adequate funding, follow a structured approach to exploring alternate funding and financing options, keeping in mind the ultimate objective and the timeline.
- **Build and manage an ecosystem.** Build ecosystems around key areas such as health care, transportation, and education to drive dynamic and collaborative networks that include the private sector, startups, think tanks, academia, and citizens.
- **Address the skills gap.** Identify if the current pool of talent has the adequate skills to work with big data and predictive analytics. If not, hire the right talent and train the existing staff.
- **Build a robust cybersecurity framework.** An integrated and interoperable system increases the risk of a systemic failure. Thus, make security the foremost priority.

## Potential benefits

- Better quality of life for residents and visitors;
- Economic competitiveness to attract industry and talent; and
- Environmental sustainability.

## Risk factors

- Greater cyber risk;
- Struggling with smart city governance, especially data governance;
- Deficient funding and financing; and
- Lack of strong leadership.

Read more about smart governments in the **Smart cities** collection.

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# Citizen experience in government takes center stage

## Treating citizens like customers to drive triple value impact

What do most successful companies have in common? They provide an exceptional customer experience (Cx). Leading companies know that putting customers at the heart of everything they do plays a critical role in improving overall performance.

In the same way, governments around the globe are recognizing the central importance of the citizen experience—and devoting resources to making it better.

The public sector has long sought to improve customer satisfaction, but raising additional resources or diverting existing resources to achieve this has met with resistance. Thanks to recent advances in digital technologies, however, coupled with new insights from behavioral science, governments worldwide are pursuing Cx more seriously. Government leaders who are looking to make a triple value impact—improving customer satisfaction, increasing efficiency, and enhancing mission-effectiveness—are increasingly focusing on Cx as a core function of government.[1]

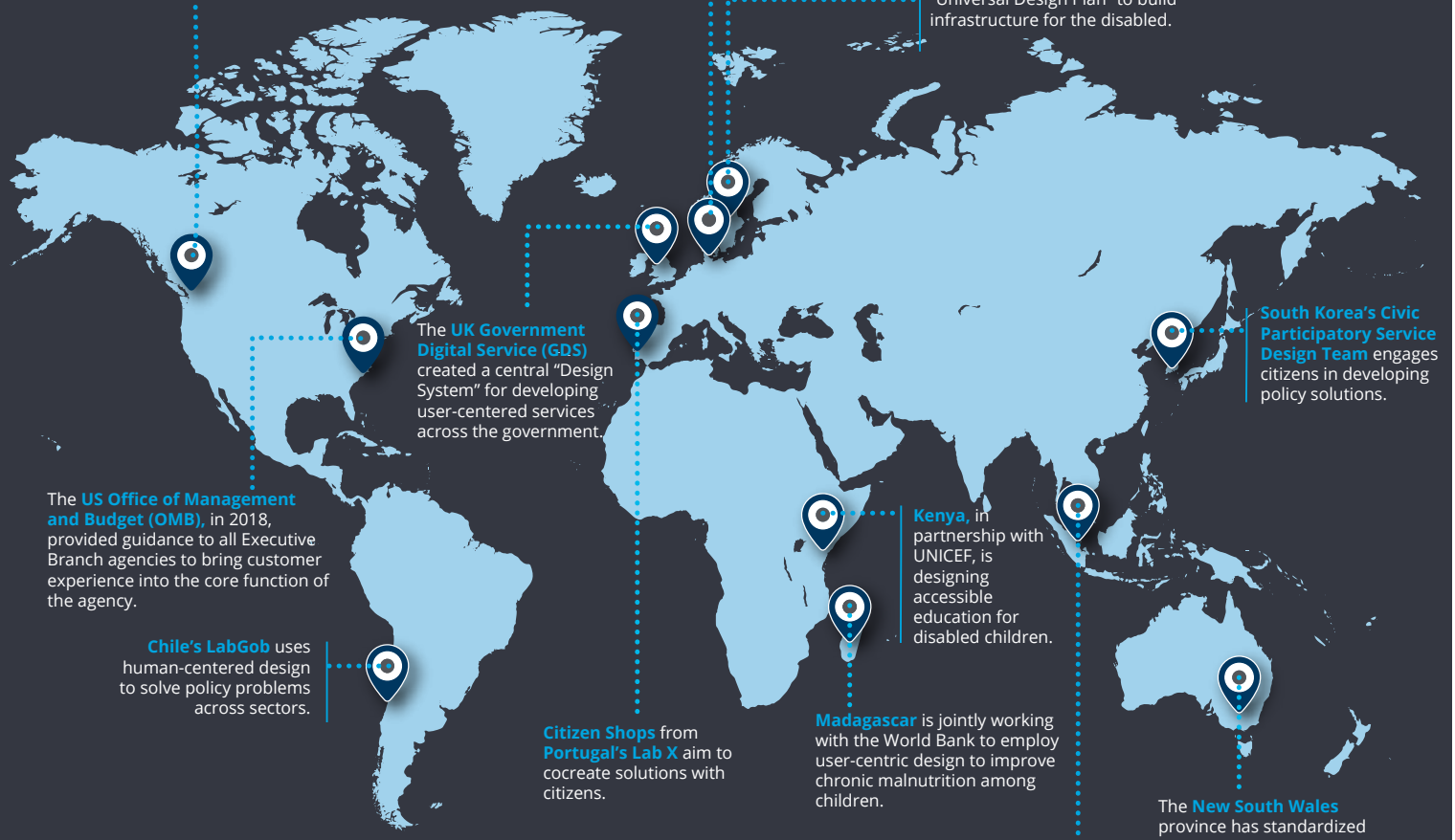
This coincides with the digital wave in government. Worldwide, agencies such as the United Kingdom's Government Digital Services,[2] Singapore's Government Technology Agency,[3] and the Canadian Digital Services[4] are dedicated to using digital technologies to improve the experience of citizens, businesses, and government employees. In the United States, the Office of Management and Budget in 2018 directed all executive branch agencies to incorporate Cx into their strategic decisions, culture, and design of services. Halfway across the globe, Design for Europe, a massive program cosponsored by the European Commission, is working to elevate Cx by promoting design awareness and knowledge exchange.[5]

Government agencies are embracing a number of different but highly complementary approaches in their Cx efforts, reflecting different starting points, missions, and challenges:

**Human-centered design: Ensuring changes are designed outside-in.** Human-centered design views problems from the lens of the user and develops solutions that consider their needs. While human-centered design promises a better Cx, it can also increase program buy-in, improve processes and efficiencies, and lower errors and costs in government programs.

Public-sector agencies across the globe are scaling efforts to develop citizen-centric services. The US Department of Veteran Affairs redesigned its website to create a more personalized experience for its customers and to eliminate the need for multiple logins, while Singapore's Ministry of

# GOVERNMENT-FUNDED DESIGN CENTERS



Health used creative communication strategies that focused on citizen engagement to improve health care outreach.[6] In South America, Chile's government innovation lab has used human-centered design (with cocreation) to tackle problems in health care, emergency housing, and energy.[7]

What's more, many of these initiatives have yielded significant payoffs. The Department of Veteran Affairs website overhaul led to a 50 percent jump in online health care applications by veterans over the previous year.[8] In another example, as part of New Zealand's service innovation initiative, SmartStart helps new parents and caregivers more easily access a range of digital services during pregnancy and the months following birth, and allows them to establish a digital identity for their child.[9] It has saved new parents many thousands of in-person visits to government offices.[10]

**Service design: Integrating "front-stage" and "back-stage" elements.** Service design marries human-centered design with other workflow tools to organize processes, technologies, and infrastructure to improve the quality of interactions between government and its customers. This integrated intervention can improve productivity, efficiency, and mission-effectiveness as well.

Governments are utilizing service design to improve both "back-stage" processes and front-facing interfaces. For example, the US Patent and Trademark Office (USPTO) used service design to improve the experience of small businesses and individual inventors new to pursuing patents and trademarks, many of whom were frustrated by the application process. It started by learning more about every step of new users' experiences. This led the USPTO to create a "New to IP" link on its homepage that redirected new users to FAQs and a complete process path to applying for patents and trademarks, as well as quick and easy fixes, such as a cheat sheet on how to fill out the forms. These changes enabled small businesses and inventors to better navigate the patent process.

**Inclusive design: Extending human-centered design further.** The concept of inclusive design or universal design has also been gaining ground with governments, to help make their programs and services accessible to every citizen. What began with an emphasis on physical infrastructure to accommodate physical handicaps, such as lowering curbs and adding ramps to accommodate wheelchairs, has expanded to foster digital democracy and accommodate different languages as well as mental handicaps.

Examples of such initiatives include the partnership between UNICEF and the Government of Kenya to design accessible education for disabled children, Norway's comprehensive "Universal Design Plan" to build "empathic" infrastructure, and the United Kingdom's Sunderland City Council's design-based approach to tackle long-term unemployment.[11]

Interestingly, innovations in artificial intelligence and the ubiquity of smartphones are enabling a new wave of inclusive design. For example, during 2018, Melbourne's Southern Cross railway station conducted a pilot to help the visually impaired navigate inside the station. The eight-month project brought together national, state, city, and nonprofit resources to create and promote a real-time system that connected beacons installed at various points within the railway station to Blindsquare, a free GPS app that provides spoken directional advice through a smartphone.[12]

**Measuring customer experience: Providing an informed foundation.** Cx measurement platforms track an individual's experience in order to prioritize improvements to the customer journey. For example, the Federal Acquisition Service at the US General Services Administration used feedback from its 2018 Customer Satisfaction Survey to improve services and savings for customers. The agency used fleet category management techniques to bring down the procurement time by 50 percent, reduce installa-

tion time by 26 percent, and realize cost savings of 20 percent.[13] Better data drives better design, and better design drives citizen satisfaction.

**Cocreation: Inviting the public's input to improve services**. Government does not just provide services to citizens; citizens also provide "services" back to the government. The most obvious example of this is when citizens elect leaders, but it can also be extended to solution design and even policy development. For example, Portugal's participatory budget lets citizens present their investment ideas and vote on which projects to fund and implement. The budgeting process has two phases. First, citizens submit proposals via the website or in participatory meetings. They then vote on the regional and national projects they would like to see implemented. Portugal is the first nation to implement participatory budgeting at a national level. The budget's second edition in 2018 received 1,418 proposals, of which 692 were voted on.[14]

Governments are increasingly embracing codesigning solutions with citizens. Some examples include South Korea's Civic Participatory Service Design Team, which engages citizens in developing policy solutions; Denmark's "cocreate" campaign for collectively building environmental solutions; and the US city of Albuquerque's "design days" for codesigning solutions with small immigrant entrepreneurs.[15]

As governments become more digitally mature, Cx will be a cornerstone of government success, offering multiple dimensions of value. Cx tools can also be applied to the employee experience, which will in turn improve Cx. More broadly, as Cx becomes a core capability, it calls attention to not only the customer and employee experiences, but also the values, beliefs, and ambitions that drive behaviors and actions—what Deloitte is calling the *human experience*.[16] However, agencies should also be careful of pitfalls associated with Cx initiatives, such as the failure to coordinate across agencies and delays in decision-making due to user testing fatigue.[17] To help address these and other issues, government agencies have started hiring chief customer or citizen experience officers.[18]

## DATA SIGNALS

- **Eighteen out of 28** EU countries have government-funded national design centers for policy and service design.
- The United Kingdom's cross-government design community that works on human-centered design and user experience has more than **800** people.[19]
- The Lab, housed within the US Office of Personnel Management, **has trained more than 2,000** government employees in human-centered design.[20]

## Moving forward

- **Inventory where you are or where you can collect customer data.** Include qualitative and quantitative data. Go beyond sentiment to incorporate operational and financial data, which might require extending data collection activities.
- **Standardize collection** across channels with a clear architecture to roll up the data.
- **Use analytics to derive insights** from the data and prioritize changes.
- **Infuse a holistic customer perspective** informed by data into your design and decision process at all levels.
- **Continuously improve Cx**, incorporating new approaches and tools and leveraging data.

## Potential benefits

- Increased citizen trust;
- Improved customer satisfaction;
- Improved employee engagement;
- Lower costs;
- Improved efficiency; and
- Better mission focus

## Risk factors

- Failure to keep up with rising expectations;
- Funding IT modernization;
- Coordination across silos and agencies; and
- Delays in deployment due to repeated testing.

Read more about how governments are enhancing customer experience in our **Customer experience in government** collection.

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# Government Trends 2020 report

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