



Building trust in government

Exploring the potential of blockchains

IBM Institute for Business Value
survey conducted by
The Economist Intelligence Unit

Executive Report

Government and Blockchain

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Built to trust

Government organizations the world over are eager to dismantle the bureaucracy that's held them back. Budgetary pressures arising from economic stagnation and aging populations have severely constrained resources, including the ability to access and analyze data to create greater economic value. By facilitating the secure sharing of data between institutions and individuals, blockchain technology could help relieve those pressures. Our recent blockchain study revealed a group of government organizations that are embracing blockchain technology to reduce frictions to innovation and information and facilitate more extensive collaboration.

Executive summary

According to our recent blockchain research, government organizations across the globe are exploring use cases for blockchains that can impact their jurisdictions. With the support of the Economist Intelligence Unit, the IBM Institute for Business Value surveyed 200 government leaders in 16 countries on their experiences and expectations with blockchains.

Our research revealed that government organizations are looking at how blockchain technology can positively impact operations in a number of areas. For example, nine in ten government organizations plan to invest in blockchain for use in financial transaction management, asset management, contract management and regulatory compliance by 2018. And seven in ten government executives predict blockchain will significantly disrupt the area of contract management, which is often the intersection of the public and private sectors.

While virtually all government organizations surveyed intend to invest in blockchain by 2018, we discovered a small group of pioneers that are setting a fast pace and new direction with blockchains today. These Trailblazers, 14 percent of our survey, expect to have blockchains in production and at scale in 2017. They are prioritizing blockchains to help reduce innovation roadblocks and inaccurate or incomplete information across their organizations.

Trailblazers are focusing on blockchains to help reduce time, cost and risk in four areas: regulatory compliance, contract management, identity management and citizen services. Additionally, they expect blockchains will enable new business models, particularly in contract management, financial transaction management and identity management. These findings reveal that blockchain adoption is accelerating faster than originally anticipated, with government executives identifying key areas and benefits to explore.

In this report, we share key insights on market adoption of blockchain solutions. We also explore what differentiates early adopters – the Trailblazers – and how other government organizations can benefit from their blockchain explorations.



14% of government institutions

– the Trailblazers – expect to have blockchains in production and at scale by 2017.



7 in 10 government executives

expect blockchain will deliver the greatest cost, time and risk reduction benefits in regulatory compliance.



9 in 10 government executives

plan to make blockchain investments in financial transaction, asset management, contract management and regulatory compliance by 2018.

First movers: Trailblazers set a fast pace and new direction

Organizations in every industry pay a steep price when trust is diminished. Like other institutions, government entities function more effectively when trust is strong. But government organizations also are uniquely tasked with establishing the laws, regulations and services that sustain an environment of trust in which their citizens can flourish and economies grow.

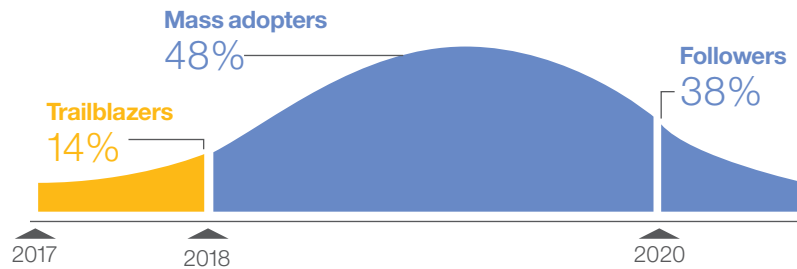
To build trust, most government organizations strive to be as open, transparent and collaborative as possible. Too often, they fall short of their own ambitions. Blockchain, the technology underlying distributed ledgers, offers a new approach to transparency and collaboration.

When assets are registered or transactions are recorded on blockchains, the quest for transparency and right to privacy needn't be at odds. On blockchains, data can be shared widely, seamlessly and, when needed, anonymously. Time-stamped transactions can be verified in something close to real time instead of long after the fact, helping deter fraudulent behaviors. As transparency is amplified, trust becomes more likely.

Commercial applications of blockchains are few in number today. To our surprise, 14 percent of government organizations surveyed expect to have blockchains in production and at scale in 2017 (see Figure 1). We call this group the Trailblazers.

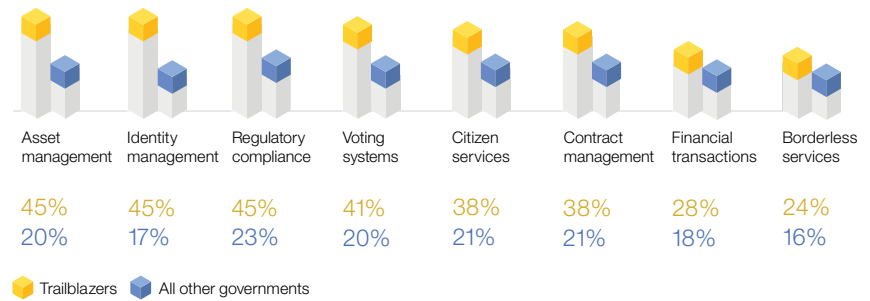
Figure 1

First to finish: Respondents' expectations of when they will have blockchains in production and at scale



The government agencies we surveyed in Asia Pacific and Western Europe are setting the pace of adoption. They make up a considerably larger share of the Trailblazers than organizations from other regions. North America lags behind all regions, a reflection perhaps of the complexity of coordinating blockchain applications across federal and state jurisdictions in the United States.

Trailblazers' early investments indicate which applications might be first to market. Nearly half of the Trailblazers are already investing – or will have invested by the end of 2016 – in three areas: *asset management*, *identity management* and *regulatory compliance* (see Figure 2). Each of these applications is foundational in its own way: Identity management establishes who is transacting on the blockchain and who has permission to access it. Asset management records what is being transacted or transferred and is the basis for a broad array of enhanced citizen services. Regulatory compliance bridges the efforts of both the public and private sectors to embed rules in blockchains that automate legal and statutory requirements.

Figure 2*Expected Trailblazers' investments in 2016*

For government organizations, early collaboration with the private sector on regulatory compliance – and any proposed changes to regulations – will ultimately be the determining factor that sets the pace of blockchain adoption in *all* industries.

Opportunity seekers: Trailblazers prioritize key business areas

We asked government executives to weigh the time, cost and risk benefits in nine areas core to their institutions and analyzed their answers to calculate a blended score for each business area. Nine in ten Trailblazers identified four areas they believe will yield the highest blend of benefits: *citizen services*, *regulatory compliance*, *identity management* and *contract management* (see Figure 3). Seven in ten of all government respondents are focused on these same areas.

The nine areas included in the survey can be segmented into two categories: 1) Processes that improve efficiency in operations and substantially reduce risk and 2) areas that support more seamless and personalized public services.

Figure 3

High impact: Blockchains can trim time, costs and risks



Reducing risk

Contract management, financial transaction management, regulatory compliance

Despite modernization efforts, routine processes such as *contract management, financial transaction management* and *regulatory compliance* remain largely paper-based, costly and complex, with significant risks arising from errors and fraud. Trailblazers expect blockchains to introduce significant benefits in these areas, especially in the reduction of risk to *contract management* and *regulatory compliance* (see Figure 3).

Nine in ten Trailblazers believe blockchains can reduce the time, cost and risks of enforcing *regulatory compliance*. Government organizations in North America are particularly focused on these applications; they ranked *regulatory compliance* number one in terms of blockchain benefits. Blockchains establish an immutable and transparent audit trail that assures timeliness and curbs the costs of managing contracts and enforcing regulations. They also make possible a new approach to risk.

Today, regulators depend on visibility but achieve it mostly through spot inspections. Vendors that fail to meet the terms of a contract go undetected until it's too late. With access to more complete and trusted data, government organizations can make better decisions about where to focus their attention. Over time, blockchains could become reputation systems. Because they can capture the lifetime history of an organization, they could help establish how trustworthy it is. Moreover, because fraudulent activity can be quickly detected, it's possible blockchains could deter a significant amount of fraud altogether.

Working with the private sector, government institutions are reviewing applications that span regulations in many areas. Coupled with digital identity applications, blockchains could facilitate compliance with Know Your Customer (KYC) and anti-money laundering (AML) regulations in the financial industry. Blockchain-based supply chains could help assure compliance with import and export rules and tariffs, as well as safety and counterfeit measures.

Organizations are already employing blockchains to track the provenance of foods from farm to fork. For example, Australia is tracking the supply of grain on blockchains, and a pilot program in Indonesia has successfully tracked legally harvested fish.¹

Consumers, business partners and government groups alike could know with certainty how things are made – whether those assurances relate to child labor or the environment.

Secure and seamless services

Identity management, access management, citizen services, borderless services, e-voting

An estimated 1.5 billion persons worldwide have no legal identity or proof of birth.² Unable to open a bank account, own property or access government services, many are shut out of full participation in the economy and the creation of wealth.³ Blockchains that securely compile, cross-reference and verify multiple data sources, events and transactions could establish and validate an individual's identity when traditional proofs of identity are missing.

Illinois forms initiative to explore blockchain innovation⁸

In Illinois, a consortium of state and county agencies has established the Illinois Blockchain Initiative. Its objectives include creating a welcoming regulatory environment in which businesses can operate, as well as a public/private collaborative platform to develop prototypes of blockchain applications that could be used by the government. Sharing the consortium's eagerness to embrace blockchain, the Cook County Recorder of Deeds expects to become the first land records office in the United States to register property transfers on blockchain technology.

In the United States, the U.S. Postal Service and the Department of Homeland Security are researching the potential for blockchains to establish secure identity management.⁴ According to the Trailblazers, blockchain technology is expected to yield significant benefits in identity management (see Figure 3). Trailblazers also identified *citizen services* as a high-yielding area for blockchain applications. In fact, many *citizen services*, from voting to tax collection to land registration, are likely to be highly dependent on identity management and unlikely to scale significantly without it. Likewise, the scope for new seamless and secure services expands dramatically when blockchain-enabled *asset management* is introduced.

Because participants in a transaction on blockchains have access to the same records, there is no need for third-party intermediaries to validate transactions or verify identities or ownership. Business licenses, property titles, vehicle registrations and other records could all be shifted to blockchains, freeing citizens from the need for lawyers, notaries and trips to government offices to certify that transactions are legal.

In the state of Delaware, the government now plans to test the feasibility of registering companies, tracking shares and managing shareholder communications, including proxy voting, on blockchains.⁵ Others groups are exploring how blockchains could facilitate *borderless services* such as registering a company across national borders or facilitating cross-province or state tax collection.⁶

The feasibility of blockchain-based voting is one of the first areas some government organizations began to explore. In 2014, a political party in Denmark, the Liberty Alliance, tested it for internal voting. Australia Post, the government-owned postal service, has put forth a plan for citizen voting that involves starting small, with corporate and community elections serving as first steps – and proving ground – before tackling parliamentary elections.⁷

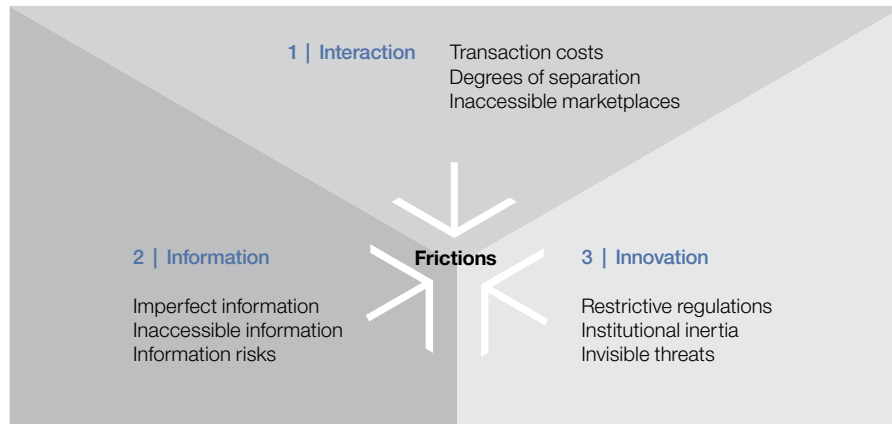
Early adopters: Dismantling barriers to innovation

In a prior IBV report on blockchains (“Fast forward: Rethinking enterprises, ecosystems and economies with blockchains”), we examined the potential for blockchains to eradicate the frictions that limit growth and constrain innovation for organizations.⁹ We identified nine frictions that challenge enterprises today and analyzed the impact blockchains might have (see Figure 4). As part of our survey for this report, we sought the views of government executives on these same frictions.

We found that all government organizations expect blockchains to substantially reduce each of the frictions identified. Trailblazers’ expectations, however, set them apart. The Trailblazers believe that blockchains will have the greatest impact on those frictions classified as innovation frictions.

Figure 4

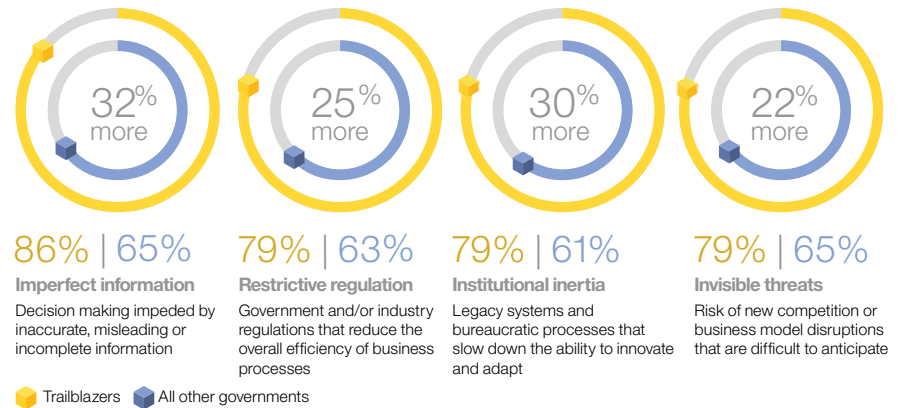
Frictions framework: Blockchains are expected to greatly reduce nine frictions



These are *restrictive regulations*, which governments must coordinate across departments as well as national borders; *institutional inertia*, a function of excessive bureaucracy; and *invisible threats*, which include not just new dangers such as cybersecurity but the advent of new business models that are hard to predict. *Imperfect information*, defined as inaccurate or incomplete information and cited in previous studies as a significant barrier to innovation, also tops their list of frictions that could fall as blockchains are more widely adopted (see Figure 5).

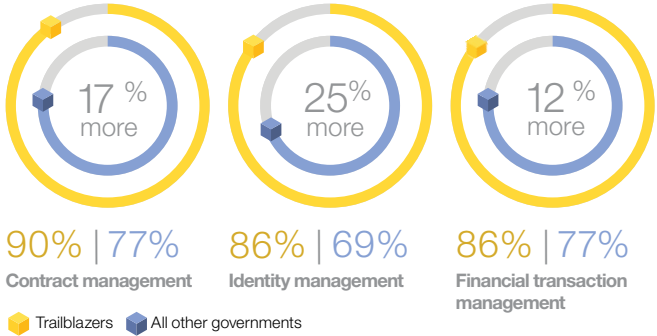
Figure 5

Top frictions that Trailblazers expect to reduce using blockchains



Trailblazers also ranked the top three areas where blockchains should enable entirely new business models. These are *contract management*, *financial transaction management* and *identity management* (see Figure 6). However, there was significant variation across geographies. Western Europe ranked *financial transaction management* as the top area for new business models. North America saw the greatest potential to transform business models in *borderless services*, and Asia Pacific expected *citizen services* to deliver the greatest innovation.

Figure 6
Trailblazers rank areas in which blockchains can enable new business models



Contract management: Mastering performance

Blockchain-enabled contract management could usher in an entirely new approach to performance management. Issues such as the failure of any party to meet a deadline or complete a task, for example, could be more immediately visible. Over time, a vendor’s history captured on blockchains could be used to validate its reputation and trustworthiness.

Transparency derived from contract management on blockchains could improve performance management. For example, in the area of waste management, citizens and companies could register problems – such as garbage that has not been picked up – on a blockchain platform, automatically notifying the garbage collector instead of making a request that would be routed through the local council. In addition to enabling a more timely and efficient response to problems, this process could establish a reputation system that reliably tracks the performance of vendors. Smart contracts could automatically penalize subcontractors with a history of repeat offenses.¹⁰

Financial transaction management: Full accountability

As more government entities encounter budget shortfalls, maximizing revenue collection and reducing fraud become priorities. Perhaps counterintuitively, financial transaction management didn't make the Trailblazers' top three areas for blended business benefits. But it did rank among the top three for blockchain-enabled new business models. Trailblazers were 30 percent more likely than all others to envision new possibilities from transparency.

Recognizing the importance of transparency, a 2015 mayoral candidate in London promised that, if elected, he would manage the city's finances on blockchains, allowing citizens to see and audit each expenditure in real time.¹¹ Assurance to citizens – or for that matter, to other departments – that money is being spent responsibly could go a long way toward restoring trust and accountability in government.

Identity management: A springboard for services

The government of Estonia could arguably claim the title as the leading blockchain nation. It jumpstarted its revolution with secure identity-based blockchain services. Citizens from any country can apply for a government-issued digital identity secured on blockchains.

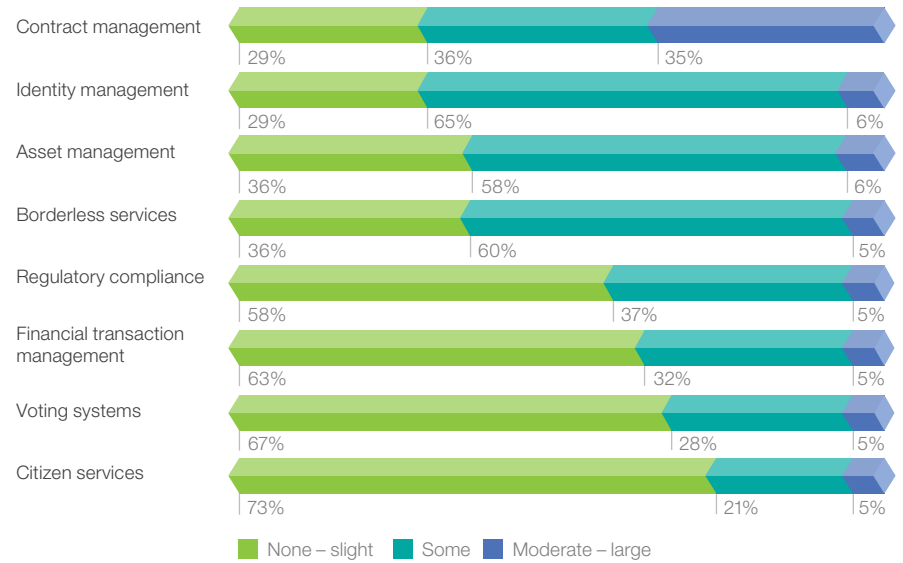
In effect, they can claim virtual e-Residency of Estonia. As e-Residents, they have access to a wide range of online services, including banking as well as registering and managing their business in accordance with Estonian law and regulations.¹²

On blockchains, citizens can both easily verify the integrity of the records held on them in government databases and control who has access to them. That sense of security has made possible new digital services, like filing taxes electronically. Other organizations from both the public and private sectors are looking at Estonia for inspiration.¹³ Soon, Estonia's e-Residents will be among the first to participate in Nasdaq's pilot involving shareholder voting on blockchains.¹⁴

To date, about 10,000 Estonia e-Residents are taking advantage of the kinds of digital identity-based services that their own countries don't offer.¹⁵ Transnational blockchain services like these could be a new basis for competition between countries that seek to boost their economy with greater inclusion.

As quoted in Bitcoin Magazine, e-Residency Program Director Kaspar Korjus explains, "In Estonia we believe that people should be able to freely choose their digital/public services best fit to them, regardless of the geographical area where they were arbitrarily born. We're truly living in exciting times when nation states and virtual nations compete and collaborate with each other on an international market, to provide better governance services."¹⁶

Despite their focus on innovation, government executives – including those from the Trailblazer organizations – aren't particularly concerned that blockchains will be disruptive. Just 35 percent of respondents anticipate significant disruption and only in one area – *contract management* (see Figure 7). Additionally, six in ten expect at least some disruption in *borderless services*, *asset management* and *identity management*.

Figure 7*Unconcerned: Government executives don't expect significant disruption***Anticipated disruption**

Are government organizations complacent – or pragmatic? Disruption, especially in bureaucratic institutions is rare. Decades later, even the Internet hasn't drastically changed how governments operate. And for the most part, it's failed to make them compete. Some regions do better at attracting entrepreneurs and startups, but rarely do they compete in personalized citizen services. That could change as blockchains evolve to bring closer collaboration among citizens and government institutions.

Blockchains yield the most value when they are fully interoperable and can cut across processes to make possible entirely new ones. As that happens, truly seamless and personalized services become possible. The data from all those interlocked blockchains becomes more secure, scalable and updatable. It can also be aggregated as an additional source of "open data," which many governments offer to their citizens.

Open data – the data provided by government entities to their constituents to do things such as evaluate crime in a neighborhood before they buy a house, pinpoint the optimal location for a new retailer or record soil conditions for farmers – is typically published just once a year. On blockchains, open data could be continuously updatable and include insights directly submitted by citizens.

Open data is arguably among a government's greatest assets. As the societal value from that data grows, government organizations will need to ensure that their data is easily accessible, free to use and available in a consumable format. Likewise, institutions will need to take greater safeguards to protect that data from cyber-attacks. Open data on blockchains meets these imperatives. Government can better perform its dual role of facilitating the business innovation of citizens and, at the same time, co-creating better services for citizens.

What's next? Open government

Ultimately, blockchains could unleash and amplify the power of open government. As part of a collaborative ecosystem enabled by blockchains, government could become a trusted partner and reinvent existing processes to enable more collaboration across agencies and with citizens. Blockchains could provide a consistent, transparent and open view of activities, information and decisions, fueling the open innovation and reinvention of government services. These include:

- *Co-created services*: Disparate, top-down service delivery processes could be replaced by a seamless process that empowers citizens and government to co-create the types of services citizens want and need.
- *Integrated services*: Centralized systems and disparate data silos could be replaced by a single replicated database that provides a secure and immutable version of the truth, open to use by all ecosystems stakeholders.
- *Self-governed services*: Centralized government control could be replaced by self-regulated service delivery ecosystems.

Government organizations, like those in any industry, are wise to take the long view on blockchains. But unlike other industries, because they shape the regulatory and legal environment, they can't afford to stay on the sidelines. Government organizations don't just stand to benefit from the greater trust promised by blockchains; they are uniquely charged to create it for the benefit of all.

Recommendations

To extract the most value from blockchains, government organizations should answer the following three questions:

How fast should we move?

Governments across the globe have begun to explore blockchains to improve existing practices. Trailblazers – 14 percent of government organizations – expect to implement solutions at commercial scale in 2017. Mass adopters can look to these pioneering organizations for lessons learned while recognizing that significant barriers still exist.

The State of Vermont found in early 2016 that the “costs and challenges associated with the use of blockchain technology for Vermont’s public recordkeeping outweigh the identifiable benefits.”¹⁷ As other government entities weigh their own pros and cons, all eyes are likely to be on the Trailblazers in 2017.

How can we scale across networks?

Once blockchains have scaled across multiple parties, they can begin to achieve the kind of network effects that drastically reduce frictions that erode efficiencies and stifle innovation. Trailblazers are already working on the new business and technology standards required to scale. Mass adopters should join them and begin building strong partnerships with other groups that have begun establishing business and technology standards.

Six in ten governments recognize regulatory constraints as the greatest barrier to the adoption of blockchains, followed closely by what they perceive as immature technology and lack of executive buy-in (see Figure 8).

Figure 8

Stalled at the gate: Barriers to government adoption of blockchains



For more information

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Government executives will need to collaborate across regions and with trading partners to coordinate regulatory issues across jurisdictional borders. They also should be prepared for political obstacles and other potential challenges that can surface when government organizations partner with private companies. For example, a land title proof of concept in Honduras stalled as it tried to scale.¹⁸ However, this hasn’t dissuaded other governments, including Sweden and the Republic of Georgia, from launching their own land title initiatives.¹⁹

In addition, technology challenges must be addressed, particularly those relating to privacy and security. Seven in ten government executives from our survey cite the need for robust mechanisms to establish identity and a high degree of control over access. Security and privacy standards will bring more participants into blockchain networks and drive scale. The Linux Foundation’s open-source technology initiative, Hyperledger, has focused on identity and permissions as core. Institutions are working together on Hyperledger to set the technology standards that advance interoperability across blockchains and help ensure blockchain platforms can evolve as conditions change.²⁰

How can we enable new service delivery models?

Nine in ten Trailblazers expect blockchains will enable new business models that enhance citizen services. Governments can leverage blockchains to explore new ways to provide citizen services that extend the limits of current technology. They can explore models that help improve the efficiencies of current services, as well as expand their ability to access new markets.

Governments can focus first on projects that target specific use-cases. When developed as part of a consortium such as the one in Illinois, such projects can provide insights into how to develop large-scale implementations of new service delivery models.

Forming a consortium can lay the groundwork for a better understanding of blockchains' benefits. However, many organizations already recognize that more focused collaboration with a few key partners is also necessary to innovate business models. New business models must anticipate the potential for disruption in areas core to how you operate.

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