GBBC Open Source Ideas:
The Future of Urban Living
Part I: The Rise of "Smart Cities"

17 March 2020

Washington DC, United States

Introduction

Urban populations around the world are growing, putting new and unexpected strains on urban environments and governments. The United Nations estimates that 55 percent of the world's population lives in urban areas; this is projected to increase to 68 percent by 2050, adding about 2.5 billion people to urban areas.[i] In the face of this growth and pressing issues surrounding transportation, water management, energy, waste management, government service delivery, and much more, some cities are turning to technology with the goal of becoming "smart cities." According to McKinsey, the smart city industry will be a $400 billion market in 2020.[ii]

If you ask people to define a "smart city," you will likely receive a range of answers: from "I don't know" to "cities where streets expand and contract based on traffic patterns," or "cities where noise and light pollution is eliminated to improve the psychological wellbeing of inhabitants." While there is no set definition of a "smart city," this term generally refers to urban environments in which technologies, especially Internet of Things (IoT) and broadband, are used to improve the lives of citizens. While splashier and more visible smart city innovations, such as applications that identify and alert users to open parking spaces, receive the bulk of media attention, there are many other "background" innovations that can lead to significant quality of life improvements for citizens; this is where blockchain technology fits in.

It should be noted that blockchain and IoT are an effective and popular technology pairing. A recent Gartner survey found that 75 percent of IoT adopters "in the U.S. have already adopted blockchain or are planning to adopt it by the end of 2020. Among the blockchain adopters, 86 percent are implementing the two technologies together in various projects."[iii]

Blockchain technology is distributed, transparent, and highly secure, three traits that can prove invaluable for certain smart city innovations. With blockchain's massive potential in this area in mind, the Global Blockchain Business Council (GBBC) and respective collaborators conducted a survey of individuals in New York City, Los Angeles, Nur-Sultan (formerly Astana), and the United Kingdom regarding opportunities and roadblocks for blockchain implementation.

For this survey, questions were written by the GBBC team with the aim of understanding how individuals in the blockchain space view the implementation of blockchain technology for smart cities. To disseminate the survey, the GBBC partnered with trusted local groups and institutions focused on blockchain technology in each of the target cities. Partner organizations, including NYC Blockchain Center, Los Angeles Blockchain Lab, Citigate Dewe Rogerson, and Astana International Financial Centre (AIFC), then agreed to share the survey with their respective
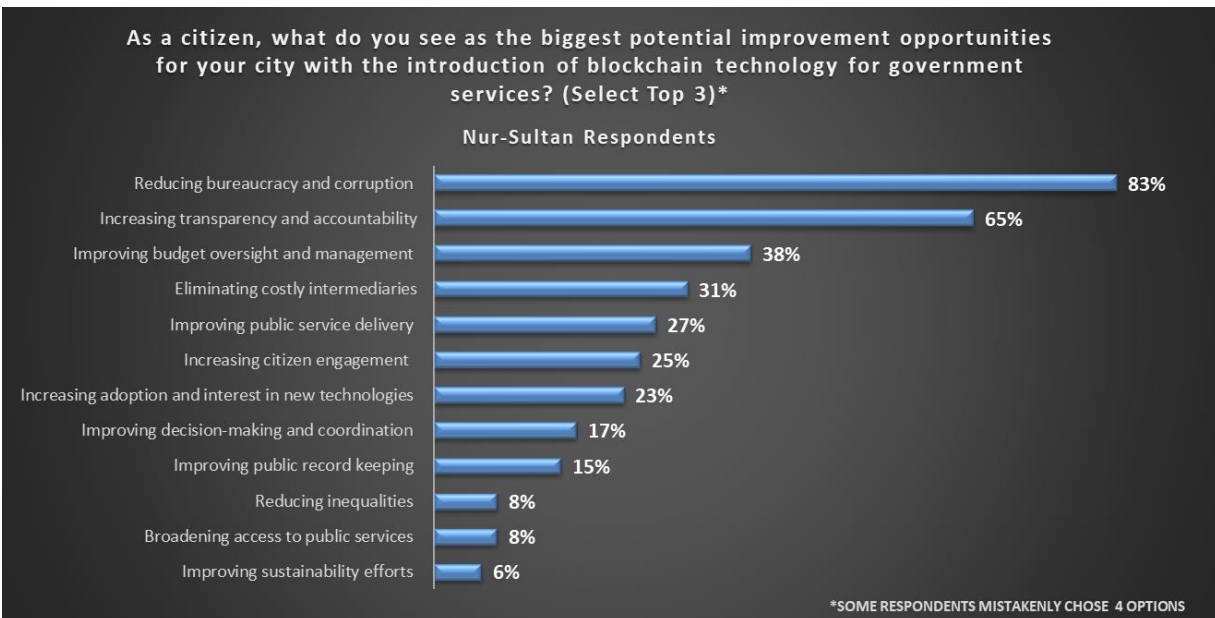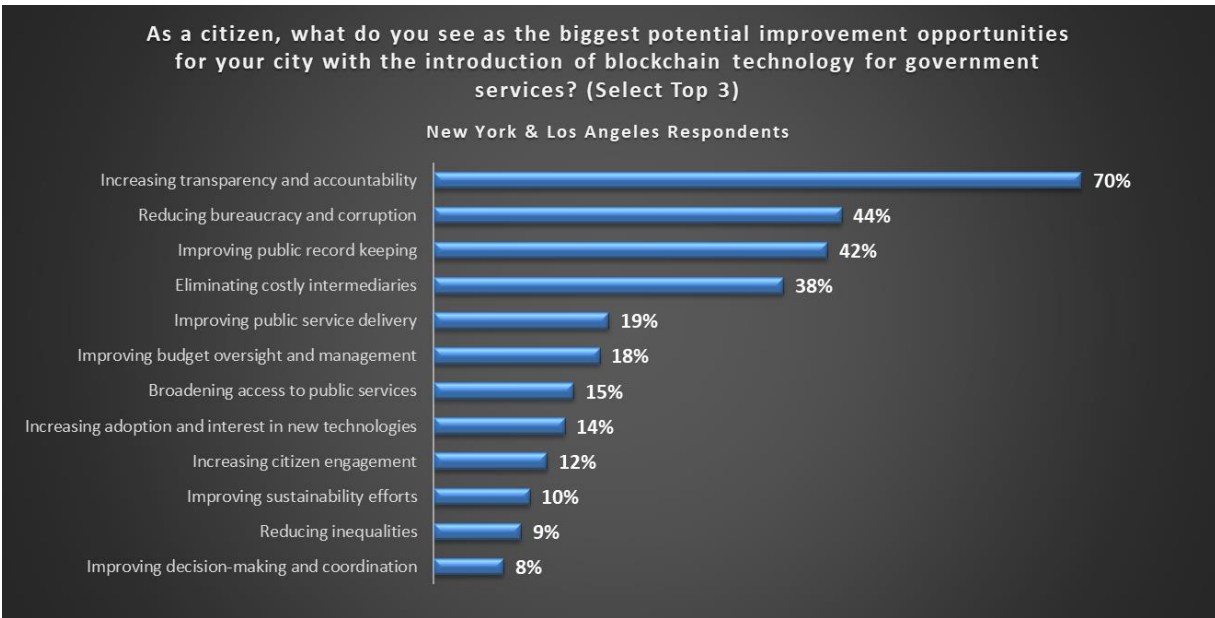
networks. In the case of Nur-Sultan, the survey was translated into Russian to increase the response rate. Survey locations with over 50 responses were included in this report.

Survey Results

Benefits

The most obvious feedback from the surveys point to blockchain technology as a trust building and corruption mitigation tool for cities and governments by increasing transparency and improving information sharing.

As a citizen, what do you see as the biggest potential improvement opportunities for your city with the introduction of blockchain technology for government services? (Select Top 3)
New York & Los Angeles Respondents

Category	%
Increasing transparency and accountability	70%
Reducing bureaucracy and corruption	44%
Improving public record keeping	42%
Eliminating costly intermediaries	38%
Improving public service delivery	19%
Improving budget oversight and management	18%
Broadening access to public services	15%
Increasing adoption and interest in new technologies	14%
Increasing citizen engagement	12%
Improving sustainability efforts	10%
Reducing inequalities	9%
Improving decision-making and coordination	8%

As a citizen, what do you see as the biggest potential improvement opportunities for your city with the introduction of blockchain technology for government services? (Select Top 3)*
Nur-Sultan Respondents

Category	%
Reducing bureaucracy and corruption	83%
Increasing transparency and accountability	65%
Improving budget oversight and management	38%
Eliminating costly intermediaries	31%
Improving public service delivery	27%
Increasing citizen engagement	25%
Increasing adoption and interest in new technologies	23%
Improving decision-making and coordination	17%
Improving public record keeping	15%
Reducing inequalities	8%
Broadening access to public services	8%
Improving sustainability efforts	6%

*SOME RESPONDENTS MISTAKENLY CHOSE 4 OPTIONS

70 percent of New York and Los Angeles respondents believe blockchain can improve transparency and accountability, with 44 percent saying it can reduce bureaucracy and corruption. The results were similar for Nur-Sultan, where 83 percent of respondents believe blockchain technology can reduce bureaucracy and corruption, while 65 percent believe it can also increase transparency and accountability.

Respondents from around the world believe that the application of blockchain for government services will reduce corruption and increase transparency; these results point to blockchain technology becoming a fundamental technology for effective and transparent governance of smart cities. This is more important than ever, as Transparency International's Corruption Perceptions Index 2019 found that only 22 countries significantly reduced corruption in the last year, while the other 158 countries either got worse or remained stagnant.[iv]

Key Opportunities

<u>Public Record Keeping</u>

Public record keeping was one of the most popular use cases for blockchain technology among our survey respondents: 37 percent of New York, 33 percent of Los Angeles, and 17 percent of United Kingdom respondents identified it as the top application. That this is the top application for blockchain technology is not surprising, public record keeping systems are traditionally opaque, slow, and centralized. Many urban (as well as suburban and rural) residents have experienced the problems with public record keeping firsthand, whether it involves tracking down a paper document or having to trek to an obscure government office.
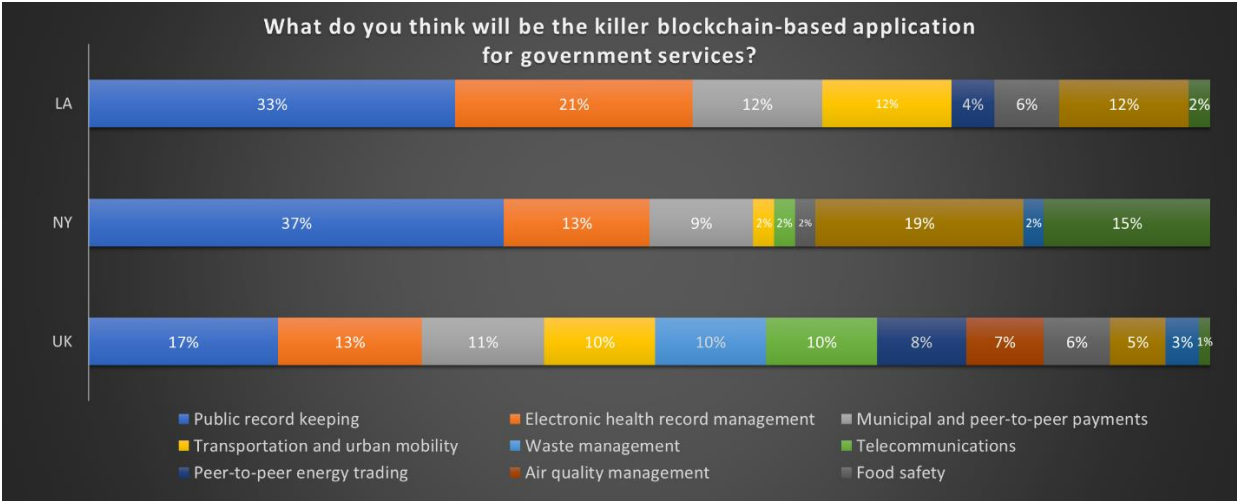
Blockchain technology is already being used to overhaul public records systems, perhaps most notably in the country of Georgia, where the National Agency of Public Registry conducted a project to move land titling systems to the blockchain. This has had a dramatic effect on the ease of registering property; the World Bank rates it the 5th easiest country in which to register property, and notes it only takes one day to register property, compared to an average of 23.6 days in high income countries as defined by the Organisation for Economic Co-operation and Development (OECD), which includes Australia, Finland, Germany, Japan, Switzerland, the UK, the US, and 29 other countries.[v]

In 2016 Sweden's registration authority, the Lantmäteriet, began a pilot project to test blockchain technology for recording and transferring titles during property sales, the third phase of which was successfully completed in 2018.[vi] Mats Snäll, Lantmäteriet's Chief Innovation Officer, noted that while the authority is already highly digitized, "[without blockchain] it can take three to six months from the signing of a purchase contract to the registration of the sale."[vii]

In 2019 in the United Kingdom, as part of its Digital Street research and development project, HM Land Registry successfully used its blockchain prototype to demonstrate the sale of a house. The traditional sale and transfer process had taken 22 weeks, 16 weeks longer than the parties originally anticipated. By using video chat to gather the parties together and blockchain and smart contracts to automate the transfer of funds and update the Land Register, Digital Street completed the demonstration sale of the property in less than 10 minutes. Following the demonstration, HM Land Registry stated that blockchain technology could increase the speed and trust of transactions, with enhanced security and transparency for participants.[viii]

The United Nations (UN) has also recognized the benefits of blockchain technology for public records, with the UN Office of Communication and Information Technologies (UN-OICT) announcing in July 2019 that it was developing blockchain solutions for Afghanistan's cities, specifically regarding land management, urban planning, municipal finance, and citizen engagement.[ix]

<u>Municipal and Peer-to-Peer Payments</u>

Bitcoin, and thus blockchain generally, was first proposed in Satoshi Nakamoto's 2008 whitepaper as a "purely peer-to-peer version of electronic cash [that allows] online payments to be sent directly from one party to another without going through a financial institution." This original use case was reflected in survey responses from Nur-Sultan: municipal and peer-to-peer payments was the most popular use case, at 23 percent. It was also the third-most popular use case in the United Kingdom, at 11 percent. While individuals, companies, and governments may debate bitcoin's utility for peer-to-peer payments, it is impossible to deny blockchain technology's ability to eliminate intermediaries and lower fees for financial transactions.

For example, the World Bank estimates that the global average cost for remittances was 6.82 percent in Q4 2019; regionally, South Asia has the lowest average cost (4.9 percent) and Sub-Saharan Africa has the highest (9.1 percent). The report also notes that mobile money "has been the least costly instrument consistently."[x] These high costs have spurred a number of blockchain-based alternatives. Residents of the Philippines (the fourth-largest remittance market, it receives over $30 billion annually) can choose between blockchain-based services like Coins.ph, which partnered with Western Union in 2019[xi] and GCash, which was developed by Globe Telecom and Alipay, one of the Philippines' largest telecom companies and the world's largest mobile payments platform, respectively.

While municipal payments have not been as popular of a use case, some innovative jurisdictions have taken the lead. In 2019, the town of Innisfil, Canada began accepting cryptocurrency for the payment of property taxes for a one-year pilot project[xii]; Richmond Hill, Canada is also in negotiations with Coinberry to provide cryptocurrency tax payment options.[xiii] More recently, in January 2020, the Swiss municipality of Zermatt announced it had partnered with Bitcoin Suisse

and "will accept bitcoin as a means of payment for local taxes and official transactions with immediate effect. A point-of-sale solution provided by Bitcoin Suisse has been installed in the Zermatt town hall, so that fees for services from local authorities can be paid in bitcoin."[xiv] This follows the Swiss city of Zug's successful bitcoin for public services payments pilot project in 2016.[xv]

<u>Digital Identity</u>

Self-sovereign digital identity was a popular use case among respondents from the U.S.: 19 percent of New York and 12 percent of Los Angeles respondents stated it would be the most significant blockchain use case for smart cities. Americans may be sensitive to issues surrounding identity, as states are struggling to meet the Department of Homeland Security's (DHS) Real ID implementation deadline. As of February 2020, California had issued Real IDs to about 25 percent of its 27 million drivers, who must obtain a Real ID for air travel ahead of DHS's October 1, 2020 deadline.[xvi] Other states around the country are feeling the crunch, with New York's Division of Motor Vehicles hiring 400 additional employees and lengthening hours, while Maryland made significant administrative errors in its Real IDs, forcing more than one million drivers to return to motor vehicle offices.[xvii] A survey conducted in September 2019 found that 72 percent of Americans do not have a Real ID-compliant license, while 57 percent did not know about the upcoming deadline.

This confusion and administrative burden could be significantly reduced with an effective blockchain-based digital identity system. Recognizing the importance of robust digital ID, the World Economic Forum launched the Known Traveller Digital Identity (KTDI) pilot in 2019 in collaboration with the governments of Canada and the Netherlands, as well as Accenture, Toronto Pearson International Airport, Montréal-Trudeau International Airport, Amsterdam Airport Schiphol, Air Canada, and KLM Royal Dutch Airlines. KTDI will allow individuals to control and share attestations issued by trusted entities (border authority, passport agency, etc.). KTDI users will become "more known" when they receive more attestations, allowing border management authorities to focus on higher-risk travelers.[xviii]
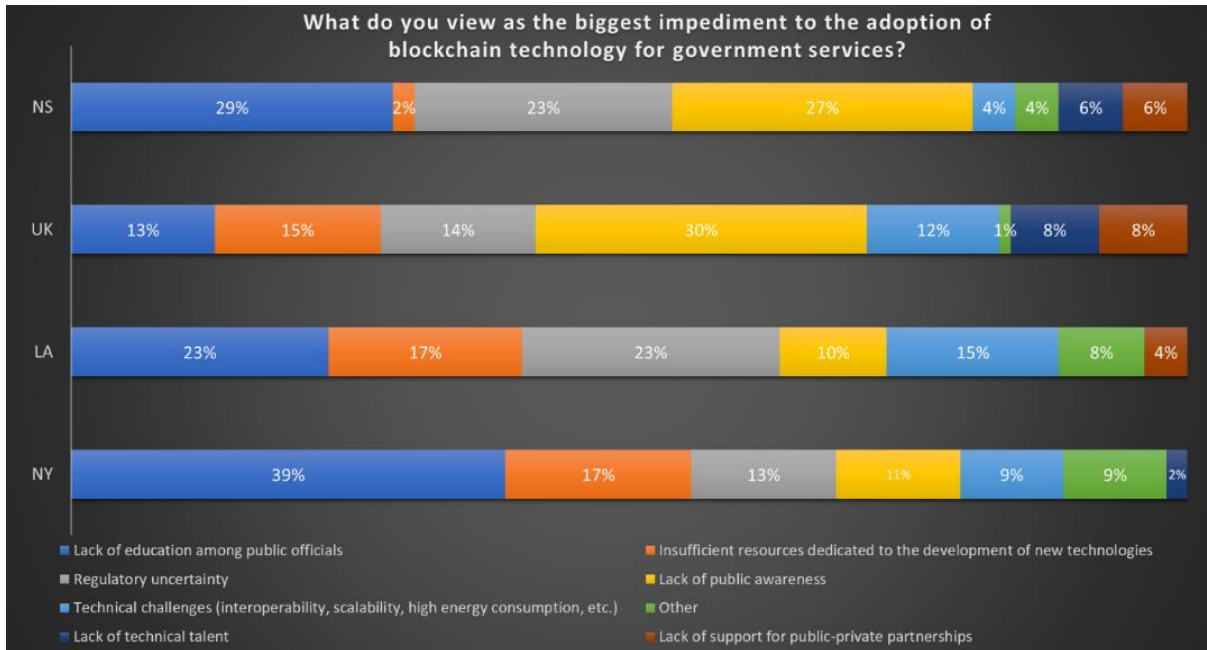
<u>Other</u>

While not as popular in our survey results, there are also significant opportunities for blockchain to improve education credentialing, health care record management, food safety, transportation and mass transit, as well as provide financial services to the unbanked and underbanked.

Roadblocks

39 percent of New York respondents stated that the most significant impediment to the adoption of blockchain for smart cities is the lack of education of public officials, while Los Angeles respondents identified the lack of education among public officials and regulatory uncertainty as the most significant impediments (both 23 percent). 29 percent of Nur-Sultan respondents pointed to lack of education of public officials, while 30 percent of UK respondents said the lack of public awareness is the most significant roadblock. Clearly, there is a need for blockchain education for both public officials and the public as whole; organizations like the GBBC will continue to play an

important role in ensuring government officials are made aware of the potential for and benefits of blockchain technology.

What do you view as the biggest impediment to the adoption of blockchain technology for government services?

	Lack of education among public officials	Insufficient resources	Regulatory uncertainty	Lack of public awareness	Technical challenges	Other	Lack of technical talent	Lack of support for PPP
NS	29%	2%	23%	27%	4%	4%	6%	6%
UK	13%	15%	14%	30%	12%	1%	8%	8%
LA	23%	17%	23%	10%	15%	8%	4%	
NY	39%	17%	13%	11%	9%	9%	2%	

Legend:
- Lack of education among public officials
- Insufficient resources dedicated to the development of new technologies
- Regulatory uncertainty
- Lack of public awareness
- Technical challenges (interoperability, scalability, high energy consumption, etc.)
- Other
- Lack of technical talent
- Lack of support for public-private partnerships

Cities

Across the board, when asked to identify the cities that would lead in using blockchain for government services, respondents pointed to Singapore and Dubai. Singapore's inclusion here is to be expected, as it has frequently been touted as "the smartest city in the world."[xix] Singapore's government last year funded the LongHash Hatch incubation program, which began with five blockchain startups, including a Renewable Energy Certificate trading platform and biometrics-based digital identity company. LongHash aims to incubate 30 blockchain companies in its first two years in operation.

In Dubai, Prime Minister Sheikh Mohammed bin Rashid Al Maktoum declared that "Dubai [will be] the first city fully powered by Blockchain by 2020."[xx] The Dubai Blockchain Strategy has three pillars: government efficiency, industry creation, and leadership. Smart Dubai, the organization leading Dubai's smart city and blockchain push, states that "the new strategy will contribute to increased government efficiency by enabling a paperless digital layer for all city transactions, supporting Smart

Dubai initiatives in the public and private sector… Required documentation, such as visa applications, bill payments and license renewals, which account for over 100 million documents
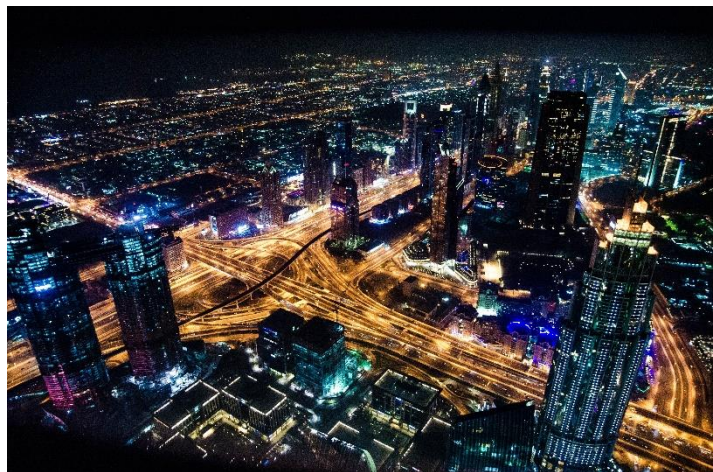
each year, will be transacted digitally under the new strategy."[xxi] Overall, Dubai is leading the world in incorporating blockchain technology into its government services.

While not included in the survey because it is still in development, Chinese automaker Wanxiang announced in 2016 that it would be investing US$30 billion to create Innova City, located on the Qiantang River in Hangzhou, China. Wanxiang intends to use "advanced technologies and innovative infrastructure systems… to function as a Living Lab. The City's 250,000 residents will participate daily in the collection of data used to improve the efficiency of the urban environment and enhance the quality of life."[xxii] In 2019, Wanxiang partnered with blockchain company PlatON, which will assist in the development of Innova City's blockchain infrastructure.[xxiii]

Conclusion

Cities around the world are becoming smarter, and with these developments will come new challenges and opportunities. While smart city innovations involving IoT may be more exciting to the average citizen, blockchain holds massive potential to improve some of the most fundamental services powering urban areas, while also supporting IoT innovations. Our survey results specifically pointed to public records management, peer-to-peer payments, and digital identity as some of the most promising applications for blockchain. But the lack of education on blockchain and its benefits is a clear barrier to blockchain's further adoption, and stakeholders must continue to engage and educate government officials, as well as the general public.

Innovative city, state, and country governments are already deploying the technology to reduce administrative burdens, increase trust, and ensure accountability between governments and citizens. The outbreak of COVID-19 has further demonstrated the importance of transparency and trust between government and citizens. Singapore and Taiwan have been extremely effective in combatting the spread of the virus, with only 266 and 77 infected as of this writing, respectively.[xxiv] Their response has been so effective in large part because of constant communication and information sharing, with Taiwan developing a "an online real-time map that can show where masks are stocked in convenience stores and drugstores across the island,"[xxv] while Singapore's government has been placing "advertisements carried on the front page of Singapore's largest daily newspaper [urging] readers with even mild symptoms to see a doctor and refrain from going to school or work."[xxvi]

Meanwhile, the United States and Iran have shown the danger of secrecy, with the Trump Administration ordering "federal health officials to treat top-level coronavirus meetings as classified, an unusual step that has restricted information and hampered the U.S. government's response to the contagion."[xxvii] In Iran, "Iraj Harirchi, the deputy minister of health, denied [the allegation that there were 50 dead of the disease in Qum] and promised to resign if the death toll proved to be even one fourth of his claim. A day later, Mr. Harirchi himself tested positive for the coronavirus, and is under quarantine."[xxviii] Iran is now constructing massive graveyards that suggest "that the number of people struck down by the virus there is significantly higher than the official figure."[xxix] While blockchain alone cannot solve the problem of opacity in government, it could be an important tool for governments that recognize the benefit of transparency. Our next Open-Source Ideas report, on Coronavirus and Impact on Global Supply Chains, will delve deeper into the current crisis of trust and the role of technology in repairing this global trust deficit.

And, as a continuation of our exploration into the Future of Urban Living, in Part II of this series, the GBBC and a major global consumer products company will focus on water management and conservation, United Nations Sustainable Development Goal 6. As urban centers around the world attract more people, governments will be challenged to serve these growing communities. We will focus on specific examples of how blockchain technology, coupled with other emerging technologies, will help governments provide transparent, efficient services to its citizens, and in turn, increase trust in government. Part II is scheduled for release in Q2 2020.

The GBBC welcomes feedback from the global community on other subtopics in this series. Please reach out to ideas@gbbcouncil.org.

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