

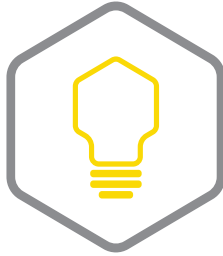
NEW DIRECTIONS FOR GOVERNMENT IN THE SECOND ERA OF THE DIGITAL AGE

**Strategy, Policy, and Action for the
Biden-Harris Administration**

Don Tapscott and Anthony D. Williams, Co-Authors, *Wikinomics*
Kirsten Sandberg, Editor-in-Chief, Blockchain Research Institute
Foreword by Tony Scott, former Federal CIO of the United States

February 2021





Realizing the new promise of the digital economy

In 1994, Don Tapscott coined the phrase, “the digital economy,” with his book of that title. It discussed how the Web and the Internet of information would bring important changes in business and society. Today the Internet of value creates profound new possibilities.

In 2017, Don and Alex Tapscott launched the Blockchain Research Institute to help realize the new promise of the digital economy. We research the strategic implications of blockchain technology and produce practical insights to contribute global blockchain knowledge and help our members navigate this revolution.

Our findings, conclusions, and recommendations are initially proprietary to our members and ultimately released to the public in support of our mission. To find out more, please visit www.blockchainresearchinstitute.org.



Blockchain Research Institute, 2021

Except where otherwise noted, this work is copyrighted 2021 by the Blockchain Research Institute and licensed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International Public License. To view a copy of this license, send a letter to Creative Commons, PO Box 1866, Mountain View, CA 94042, USA, or visit creativecommons.org/licenses/by-nc-nd/4.0/legalcode.

This document represents the views of its author(s), not necessarily those of Blockchain Research Institute or the Tapscott Group. This material is for informational purposes only; it is neither investment advice nor managerial consulting. Use of this material does not create or constitute any kind of business relationship with the Blockchain Research Institute or the Tapscott Group, and neither the Blockchain Research Institute nor the Tapscott Group is liable for the actions of persons or organizations relying on this material.

Users of this material may copy and distribute it as is under the terms of this Creative Commons license and cite it in their work. This document may contain material (photographs, figures, and tables) used with a third party’s permission or under a different Creative Commons license; and users should cite those elements separately. All images downloaded and used under terms in effect on 29 Jan. 2021. Otherwise, we suggest the following citation:

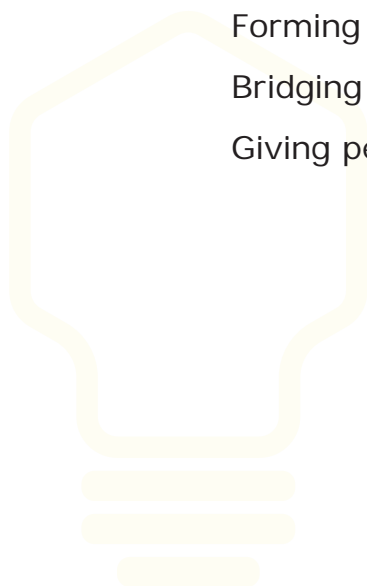
Don Tapscott, Anthony Williams, and Kirsten Sandberg, “New Directions for Government in the Second Era of the Digital Age: Strategy, Policy, and Action for the Biden-Harris Administration,” foreword by Tony Scott, Blockchain Research Institute, 9 Feb. 2021, revised.

To request permission for remixing, transforming, building upon the material, or distributing any derivative of this material for any purpose, please contact the Blockchain Research Institute, www.blockchainresearchinstitute.org/contact-us, and put “Permission request” in subject line. Thank you for your interest!

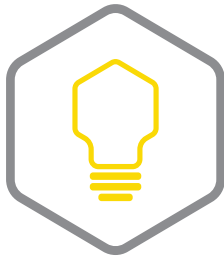


Contents

Foreword	4
Executive summary	6
Creating strategy and policy for the digital age: It's time for a turn in America	6
Five digital priorities	7
High-level commitment to digital transformation	10
Introduction	11
The legacy of the Trump-Pence administration	12
Digital priorities for the Biden-Harris administration	14
1. Entering the second era of the digital age	16
Digital transformation in government	18
The next wave of digital transformation	19
Shining a spotlight on the dark side: A call for regulation	24
2. Ensuring security, equality, and autonomy for all	26
Forming a coalition to secure cyberspace	27
Bridging the digital divide	30
Giving people control over their data and identities	33



3. Embracing the digital dollar and other cryptocurrencies	37
How digital currency differs from digital payments systems	38
Three types of digital currencies	39
The regulatory and market environment	44
A regulatory framework that supports innovation	47
The US dollar as a global digital reserve currency	51
4. Retooling government services	52
A Digital Marshall Plan to upgrade the user experience	53
The payoff of cultural transformation	64
Next steps for digital service transformation	67
5. Engaging citizens, holding officials accountable	69
Participatory democracy: A pathway to genuine citizen engagement	70
Twelve tools for digital engagement	74
Next steps in reinvigorating democracy in the United States	77
6. Rebooting America's innovation economy	80
Building a robust start-up support infrastructure	82
Addressing gaps in venture capital	88
Growing America's entrepreneurial talent pool	92
Next steps for fostering an inclusive digital economy	95
7. The path to digital government	96
About the authors	101
About the Blockchain Research Institute	103
About the Chamber of Digital Commerce	103
Notes	104



Foreword

Every time there is a change of administration, there is a unique opportunity to change the course of action with respect to how the US government conducts its business. It is a time when the leaders of the entire executive branch changes, and the leadership team focuses on new initiatives and priorities. The new team should not waste these transitions. Nor should those who support the US government in various roles—federal contractors, lobbyists, nonprofits, and so forth—take a wait-and-see approach to matters of urgency.

Most urgent is the poor condition of federal government information technology (IT) systems, collectively a patchwork of old technologies with layers of modern ones. The modern technologies represent sincere attempts to improve utility and user interfaces but fall short in overall functionality, effective cybersecurity, cost of ownership, and agility. Most efforts to date have had the effect of putting fresh paint on a crumbling and expensive-to-maintain foundation.

The recently revealed breach of multiple federal government IT systems through a third-party software vendor, SolarWinds, underscores the urgency. While no one fully knows the extent of the harm from this breach, we do know that the breach was widespread (affecting dozens of federal agencies), and that the perpetrators (widely believed to be Russian agents) had plenty of time (several months) to wander around government systems undetected.¹ These details should alarm everyone and create a sense of urgency to act decisively and forcefully.

While recent administrations (Bush, Obama, and Trump) have made some progress in addressing these issues, even the most optimistic viewer would characterize progress as falling far short of the need. As the world digitizes nearly every consumer and business experience, federal systems are increasingly out of step with the expectations of US citizens.

As the world digitizes nearly every consumer and business experience, federal systems are increasingly out of step with the expectations of US citizens.

The US federal government spends more than \$90 billion per year on federal IT, and most of that (> 90%) goes toward “keeping the lights on.”² Not only is this ratio out of line with what we would typically find in any large commercial enterprise, but it hasn’t changed much in the last 30 years. Benchmarking studies have found that the modern large enterprise spends 60 percent to 80 percent of its IT budget on operations and maintenance, with the remainder allocated to development of new and expanded capabilities or even a complete refresh of existing capabilities for improved economics.³ Any enterprise needs both new capabilities and a refresh of existing infrastructure and applications to remain competitive and relevant.



I've worked with Don Tapscott and his team for many years in my role as an executive at General Motors, The Walt Disney Company, Microsoft Corporation, and VMware, and as chief information officer for the US government during the last two years of the Obama administration. I've found Don's writing and research to be thought provoking, timely, prescient, and above all actionable: I could formulate a strategy for mobilizing my team and make progress on critical issues we were facing in my organization.

My hope is that this latest collection of ideas from Don and his co-authors can serve to jump-start a new approach to bringing government IT systems into a more modern, secure, agile, and cost-effective state.

As the author team points out, the opportunity space goes way beyond the technology that runs the federal government. Digital transformation and digital access are much bigger ideas than the underlying technology. Citizen engagement, stakeholder participation, process transparency, and utilization of data are fundamental building blocks (among others) of a truly digitized and transformed enterprise. And so it is also my hope that readers will take a step back and look at the bigger impact that these transformative ideas can have for a better government, a better economy, a healthier world, and a better environment.

It is my hope that readers will take a step back and look at the bigger impact that these transformative ideas can have for a better government, a better economy, a healthier world, and a better environment.

Finally, I want to note that one of the most important themes in the report is the need to prioritize and dramatically grow the numbers and skill levels of people engaged in the gov-tech enterprise—not only people who work directly for the federal government but also those in private sector enterprise and in the small businesses supporting the federal government. In my experience, these are some of the most dedicated, smart, and resourceful people I've encountered in my career, but they are vastly under-resourced for the challenges they face.

Now is the time to make sure that our "people power" is not why anyone or any group tries to take advantage of us as a country or as a leader in the world. Adequate technical people power that represents the multidimensional interests of our citizens will help create a digital government experience that can propel our nation to a better place in terms of citizen participation and engagement and as a model for the world.

As we emerge from the pandemic and various political and economic crises, I do hope that this report can serve as a starting point for modernizing and reinvigorating information technology in the federal government.



TONY SCOTT

*Former Federal Chief Information Officer of the United States
The Obama-Biden Administration
Washington, DC*



Executive summary

We created this report to assist governments in exploiting the next era of technology in their own operations, within their economies and society, and with their allies and global partners. The Blockchain Research Institute produced it in collaboration with the Washington DC based Chamber of Digital

Commerce and a group of experts from several countries. To make the report more concrete, we chose to focus on the opportunities and challenges facing the new administration in the United States as an exemplar of what government could do.

Creating strategy and policy for the digital age: It's time for a turn in America

The Biden-Harris administration arrives at a unique time for government market-making. The pandemic exposed and exacerbated problems at all levels of government, creating a *demand pull* for transformation. The advent of the second era of the digital age, with artificial intelligence, the Internet of Things, and blockchain technologies at the core, are creating a *supply push* for innovation.

America's problems are many: a global pandemic leading to a crushing recession, hardship, disruption to many industries, and unprecedented levels of debt, social injustice, right-wing extremism, and a country divided. The former administration has delayed the battle against climate change by four years and left a crisis of legitimacy in government, the free press, elections, and democracy itself.

At the same time, the pandemic has accelerated the inexorable march of the digital age, as people work, learn, shop, communicate, and entertain themselves online. Technology is also entering a second era. For the last 40 years, we've seen the rise of mainframes, minicomputers, the personal computer, the Internet, the Web, the mobile web, social media, the cloud, and big data.

We're entering a second era where new digital technologies—artificial intelligence, robots, drones, machine learning, autonomous vehicles, and even biological implants—are infusing into everything, and every business process.

Foundational to these innovations is the technology underlying cryptocurrencies called *blockchain*—a new, distributed platform that can reshape business and recast the old order of human affairs for the better. This second era will disrupt financial

services and transform entire industries, animate the physical world, and reshape the nature of government.

These technologies also have a dark side. New media have caused a fragmentation of public discourse. Old industries and jobs could vanish, from truck drivers and cashiers to retailers, travel agents, and data entry keyers. Big Tech companies capture the digital identities of individuals.⁴

As machines become smart, they pose new threats. Trillions of networked devices may open new holes in our security and autonomy. The federal government has had some success addressing the opportunities and challenges of this new digital age over the past few years, but to those in the know, progress seems glacial.

Now's the time for government leaders to acknowledge our new digital realities and develop a comprehensive framework for achieving prosperity, justice, sustainability, social cohesion, and good government. To do this, federal leaders must become knowledgeable about these technologies and make a turn to realize the upside and mitigate the downside.

The current wave of digital innovation presents an historic opportunity for the United States federal government to rethink and redesign how it operates, how and what it provides, and how it interacts and engages with citizens and its partners in state, local, and foreign governments, the private sector, the media (i.e., Fourth Estate), and civil society. It's time for a turn in how it addresses technological innovation in the economy and the country as a whole.



Five digital priorities

This report recommends a series of actions that would position the United States for long-term digital leadership, help fight the COVID-19 pandemic, rebuild the American economy, and engage society in dialogues rather than diatribes for the new digital age. We see five broad areas of change, each of which addresses major priorities

for the new administration: (1) cybersecurity and protecting identity, privacy, and individual autonomy, (2) embracing the digital dollar and other cryptocurrencies, (3) retooling government services, (4) engaging citizens and holding officials accountable, and (5) rebooting America's innovation economy.

1. Ensuring security, privacy, autonomy, and citizen-owned identities

Cybersecurity of US digital infrastructure is paramount. Russian hackers' recent cyberattack on the United States was remarkable and unprecedented in its scope, sophistication, and impact. The intrusion must serve as a call for a global, coordinated effort to secure the technology-based supply chains and information systems upon which democratic societies depend.

Data is the new asset class of the digital age. Citizens primarily create it, large digital conglomerates exploit it, and no one governs or regulates it. America should be the first country where citizens own their data, using it to plan their lives, monetizing it, protecting their privacy and data security, and making it available as appropriate for societal reasons, such as sharing health data in a pandemic.

Every citizen needs a self-sovereign digital identity. To do this, the federal government should take a page from Sir Tim Berners-Lee, the inventor of the Web, and seek viable digital solutions such as Berners-Lee's Solid technology so that consumers can collect, store, and use their own data on the Web. The government should encourage the numerous efforts underway that use blockchain platforms in protecting identity and analyzing user data confidentially.

For example, as individuals recover from COVID-19 and develop verifiable immunity, they could receive a health certification to attach to their digital identity, to prove that they are safe to work in public again. In effect, the digital identity would serve as an immunity passport that expired when their immunity expired.

*Efforts to close the digital divide must accelerate.*⁵ We cannot solve systemic inequality in the economy

if we replicate it in cyberspace. When COVID-19 hit, many Americans could access the Internet to do what they needed to do. Yet, too many people lacked and still lack the devices, Internet services, and know-how to keep up. To close this divide, the Biden-Harris administration must prioritize low-cost services and devices and high-speed broadband, connecting marginalized communities in urban and rural dead zones. Every school should have digital literacy and cyber safety courses.

Lawmakers must recognize people's right to their own data. Companies must stop hoarding user data and return these assets to their owners or migrate the data to distributed storage systems and transfer control to owners. If online sites want to use these data, then they must do so transparently—no decrypting, copying, storing, or associating the data with the user's identity—in exchange for a clear user benefit.



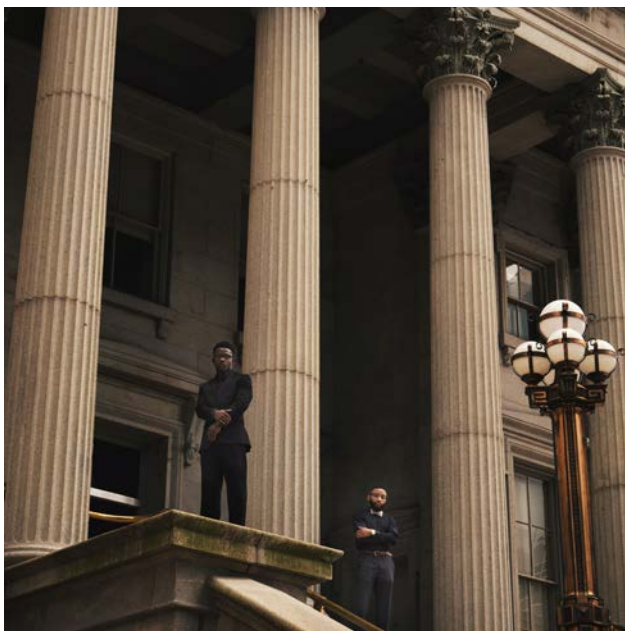
The Oculus and the USA flag, New York, US by Renan Kamikoga, 2019, used under Unsplash license. Cropped.

2. Embracing the digital dollar and other cryptocurrencies

Lawmakers need a sense of urgency around creating a US digital dollar. As China races to launch its own central bank digital currency, its foreign trading partners are already moving to renminbi as a reserve currency.⁶ There are also roles for corporate cryptocurrencies like Facebook's Diem and community-based currencies like bitcoin. The prevalent attitude among many government and regulatory officials of cryptocurrencies is misinformed and misdirected. Digital currencies have many uses that are good for the economy and the country. It is untrue that they are typically used for criminal activity.

A convergence of digital technologies is driving the biggest ever transformation of assets from the physical to the digital—blockchain, artificial intelligence, and the Internet of Things—what we're calling a "trivergence." However, the regulatory environment is a mixed bag of laws that requires rethinking. We suggest a moratorium on new rules until there is a full consultation with stakeholders. The overall approach should be principles-based rather than rules-based.

Innovators need clear guidance on digital tokens, including custody. Many participants in the blockchain industry have developed tokens for using their systems or funding their development or operation.



Life off Screen by JD Mason, 2017, used under Unsplash license. Cropped.

Some tokens such as bitcoin and ether are widely understood not to be securities under federal securities laws. Creating clear definitions and spaces for these tokens would not only benefit US innovation but keep innovators within the United States. Drafting legislation that spells out these criteria, amending securities laws as we suggest herein, and creating safe harbors or other exemptive relief would greatly reduce the legal uncertainty around this nascent set of digital technologies.

America also needs guidance on the tax treatment of digital things of value. How should individuals and organizations treat virtual currencies and digital securities tokens? The Internal Revenue Service should consider the use of virtual currencies as a form of payment and as an investment asset class.

Blockchain use could deter money laundering and improve sanctions compliance. Distributed ledger technologies provide unprecedented ability to track and trace transactions, by token and by wallet or account. Unlike cross-border wire transfers, blockchains perfectly preserve the provenance of financial transactions. They have already helped in detecting and prosecuting criminals and can strengthen real-time auditability of financial transactions and facilitate look-backs, transaction monitoring, tracking, audits, and reporting.

The United States must streamline oversight of the industry. The Financial Crimes Enforcement Network, US Commodity Futures Trading Commission, US Securities Exchange Commission, state regulators, and other regulatory bodies all have jurisdiction over various aspects of virtual currency markets. They must consider how to apply their common requirements to financial institutions engaging in virtual currency-related activities, including complying with sanctions.

The US government must recognize the global economic significance of blockchain. It has a singular opportunity to pioneer what could become international regulations and standards in this technology. The Chinese government understands this. And so lawmakers must establish a framework for boosting and promoting blockchain's development so that digital technologies can lead in this second era as they led in the first era.

3. Retooling services and service delivery to meet world-class digital standards

Leadership must think big across boundaries. Prior administrations had visions for “reinventing government.”⁷ While the federal government has made progress in its use of digital technologies in redesigning and digitally delivering services to individuals and organizations, leadership must work across agency silos in terms of culture and service innovation.

The new administration should develop a kind of domestic Digital Marshall Plan. This plan would coordinate and engage all federal, state, and municipal chief information officers as well as the changemakers among career IT civil servants.

Collaboration across agencies will be critical. We liken this level of coordination to the US military’s Joint Chiefs of Staff with state-level heads of the National Guards.⁸ They should think big but start small with adequate funding for innovative projects

that result in open standards and shared services that are vendor agnostic, interoperable, and scalable nationally. By leveraging digital innovation, the new administration can drive service excellence and begin to reinvent the United States as a digital government for a new era.

Managing the vaccination rollout with speed and utmost care is a case in point. With blockchain technologies, it is no longer an impossible mission in mass coordination. US digital leadership, a service mindset with compliance coded into every point of the supply chain process, and a clear map of the service journey could have the American economy on the road to recovery.

Success will require service transformation and agile methodologies as well as digital architecture and tools, and a longer-term plan for changing organizational culture.

4. Engaging citizens, hold elected officials accountable, and rebuild trust

New technologies can help stakeholders to rebuild trust in democracy. The first two centuries of the American republic featured representative institutions, but there was a weak public mandate, operational opacity, and an inert citizenry. Powerful interest groups held sway over politicians. More recently, the 45th president and his ilk challenged the legitimacy of democracy itself.⁹ We identify many tools to support the next century, characterized by citizen engagement and activism, public deliberation, institutional transparency, and accountability, in turn reestablishing trust and rebuilding social capital.

There are roles for the president and vice president personally. Former President Trump used digital media extensively but reinforced a one-way model of government—you vote, I rule. The Biden-Harris administration has opportunities to include a far more diverse network of citizens in decision-making. It can spotlight people developing grassroots plans for change in their communities—not just to vote or donate but to participate in local politics and hold local representatives accountable throughout their terms in office.

President Biden could become the first truly digital president. His predecessor used media to sow doubt in the political process and the professionals who manage it. The new president can use these same tools to restore confidence in experts and change the relationship between citizens and their government. Otherwise, Trumpism will continue to wreak havoc on democratic processes.

Old ways of governing Americans no longer work. Instead, President Biden must call on citizens to mobilize for change where the most heinous violence occurred—through voter registration campaigns, citizen development projects, and centers for digital re-skilling in coal country and the rust belt, from metals, automotive, and textiles to blockchain, artificial intelligence, and the Internet of Things—and the technology exists for his administration to make this happen.

Americans participate when doing so makes a difference. Dynamic forecasting using open source data, policy hackathons, scenario planning to test policy options, and participatory budgeting to fund them have yielded positive results.



5. Rebooting American's innovation economy to include a diversity of entrepreneurs

The new administration must strengthen the building blocks of innovation and small business creation.

First, it must improve the performance of publicly funded incubators and accelerators. That means promoting specialization, establishing clear sector and stage mandates, funding them appropriately, and setting sector- and stage-appropriate timelines for results, all prior to additional funding.

It also means devoting more funds to incubators with veteran start-up talent. Finally, it means supporting the opportunity to raise capital through digital channels such as initial coin offerings.

Second, it must address the opportunity gaps in start-up infrastructure. That means boosting investment in underserved communities, closing sector-based gaps in access to capital, and creating networks dedicated to serving entrepreneurs of color. Government can fund bold initiatives that engage the private sector as well.

Third, it must streamline and harmonize processes for new businesses across federal agencies and state and local jurisdictions. Officials should not require entrepreneurs to slide and dice their data in multiple ways, then submit it multiple times in multiple data formats because multiple backend government silos cannot communicate with other. This is 2021, not 1970.

Fourth, it must rekindle America's founding entrepreneurial flames. That starts with education. Government at all levels can not only promote entrepreneurial pathways in high schools and technical colleges but also bridge the business curriculum gaps between what universities teach and what their communities require, so that graduates have the skills and knowledge that companies need most.

Fifth, it must reform immigration policies. The federal government can streamline immigration processes for skilled talent, retain the best foreign students upon graduation, and create a start-up visa program so that entrepreneurs want to stay and start their businesses on American soil.

High-level commitment to digital transformation

Across these priorities, the US government's digital journey will entail transforming business and organizational models, processes, and competencies to create a superior value proposition for citizens, businesses, and other stakeholders of government. Digital transformation, after all, is not just about modernizing technology and tools. It is about adopting appropriate digital technologies to change how we work and deliver public value in the digital economy.

It also requires fresh new thinking about the role of the new digital age in the economy, body politique, and society. Only then can we ensure the fulfillment of the new promise of technology and the minimization of the dark side—the dystopian futures imagined by George Orwell, Margaret Atwood, Philip K. Dick, and many others.

Leadership commitment to manage change is vital—leaders must foster an organizational culture that truly puts users first, collaborates across

departmental silos, and modernizes policies and governance structures to support innovation and experimentation.¹⁰ This is hard work—the hardest work of all in transformation. It is not for the thin-skinned, the half-hearted, the short-sighted, or the partisan driven. Leaders in policy, human resources, communications, technology, and the law must come to the table and walk the halls in rolling out the digital agenda.

Federal employees must feel as if they are on the same journey to becoming a high-performing team. It is truly a time when either US federal government plays an active and positive role in its own transformation, or change will happen to it.

The transformation process is both exhilarating and painful, but the price of inaction is a lost opportunity for the United States to redefine its role in the lives of its people and as a force for good in the world.



America's current situation demands fresh thinking about how to rebuild the country for the second era of the digital age. Now is the time for a turn.

Introduction

The United States government faces a set of challenges the likes of which we haven't seen in a century. COVID-19 has hit the country hard. Its costs continue to mount in terms of lives lost, jobs lost, small businesses lost, educations stalled, violent crimes committed, state and local public healthcare systems strained to capacity, and families plunged into food insecurity, homelessness, and extreme poverty.¹¹ The stimulus packages, while necessary to keep the economy from collapse, have piled on to US national debt, potentially impairing future spending.

In the midst of the pandemic came a government systems security breach, waves of protests against systematic racism and police brutality, and a general election, the legitimate and state-certified results of which the sitting president sought to overturn and enlisted political allies and supporters to do the same, regardless of the truth.

Not only is the United States a country divided along political and ideological lines, but a significant part of the population doubts basic tenets of science, medicine, the free press, and democracy itself. Within the general population, skeptics question whether the vaccines are safe and masks, effective in curbing virality. They wonder whether the "fake news media" have exaggerated COVID-19's virulence and contagiousness.

Distrust is impairing universal vaccine uptake, and we must look beyond COVID-19 to the work of rebuilding a socially and economically fractured society. We can think about a new future and the meaningful steps needed to create it. A new administration, led by Joe Biden and Kamala Harris, can breathe new life and hope into the United States. Their priorities and decisions will matter.



Baltimore Convention Center Testing Site: Walk-Up Testing Site at the Baltimore Convention Center. Photo by Maryland GovPics/Patrick Siebert, 2020, used under CC BY 2.0. Cropped.

The pandemic has accelerated the digital transformation of many sectors by years and even decades. Americans all work, shop, meet, learn, amuse themselves, and manage their affairs online more than ever. But government policies and systems have not kept pace with these explosive changes. The pandemic, combined with the crisis of democracy and trust, demands fresh thinking about how to rebuild America for the second era of the digital age. Now is the time for a turn.

The first era of the digital age has led to progress but created many problems in America. The digital divide endures. Social media has helped to fragment public discourse. Global supply chains have failed us. Government agencies are locked in old models of technology that encode bureaucratic models of government. A new species of business we're calling the "digital conglomerate" has captured our data.¹²

As the digital age enters a second era, technology provides new opportunities to rethink and rebuild many of the nation's flailing or failing institutions. Of course, technology doesn't solve problems—people do.

This is no time for complacency. America must continue to make bold investments in its start-up support infrastructure, expand its pool of skilled talent, address gaps in the domestic venture capital system, and encourage American companies to expand globally. At the same time, the Biden-Harris administration must ensure that the digital revolution is more inclusive, and women and entrepreneurs of color can access the capital required to build vibrant businesses in their communities.

Finally, the Biden-Harris administration must play a leadership role in ensuring that technology serves people. This means designing and implementing smart policy frameworks to protect privacy, security, and digital identities and a more balanced model for data ownership.

This is no time for complacency. The Biden-Harris administration must play a leadership role in ensuring that technology serves people.

The legacy of the Trump-Pence administration

Despite the promise of digitally enabled citizen engagement and institutional transformation, the impact of technology on democracy and government is mixed at best. While the US federal government has made some progress in modernization and digitization, most agencies continue to struggle with an abundance of legacy technologies, legacy business processes, and even legacy governance and resourcing processes, each with attendant cybersecurity and cost effectiveness issues. As a consequence, many agencies cannot fully meet citizen expectations for secure government services.

Early on, the Obama administration appointed the first federal chief information officer (CIO) and announced ambitious strategies to move most government services to the cloud.¹³ Unfortunately, the funding, the resources, and a specific actionable plan to accomplish this goal never materialized. Subsequently, the initial troubles with the rollout of the Affordable Care Act (aka Obamacare) exposed the weaknesses



While the US government has made progress in modernizing its systems, most agencies continue to struggle with legacy technologies, governance models, and resourcing processes, each with costs and cybersecurity risks.

in how the federal government developed and managed IT systems.¹⁴ To fix the rollout quickly, the Obama administration recruited an all-star team from Silicon Valley known as the Tech Surge to swarm the issues and eventually get the website *healthcare.gov* and its dependent systems working properly.¹⁵ This emergency exercise fully revealed the spiderweb of interconnected legacy systems necessary to provide the needed capability.

In the last part of the Obama administration, two separate but related breaches of US Office of Personnel Management compromised 4.2 million and 21 million identities respectively, exposing serious cybersecurity gaps in federal systems and China's ability to infiltrate them.¹⁶ The resulting 90-day Cybersecurity Sprint was effective in patching some of the most basic gaps in federal IT architectures, but more importantly led to a series of proposals to both fund and resource major improvements and upgrades of information systems in the federal government.¹⁷ The Information Technology Modernization Fund requested in 2016 was initially pegged at \$3.1 billion dollars in seed funding for fiscal year 2017, which would "address at least \$12 billion in modernization projects over the first 10 years and [would] continue to remain available into the future," but everything proposed as new spending required an offset reduction elsewhere for Republican approval.¹⁸ Very little was funded, and so very little was accomplished.¹⁹

Early in the Trump administration, Congress approved \$200 million, with \$25 million in each of the next two years. The administration continued to support much of the work already underway on federal information systems, emphasized reforming IT policy, and pushed hard on the creation of shared services for common government capabilities.



President Donald Trump and Canadian Prime Minister Justin Trudeau walk along the Colonnade outside the Oval Office. Official White House Photo by Shealah Craighead, 2017, public domain. Cropped.

It's time for a second wave of democracy based on citizen engagement, transparency, a culture of public deliberation, and accountability.

Unfortunately, many senior IT positions in the public service were staffed slowly or not at all. As during the Obama administration, these initiatives did not become part of the larger political polarization, and IT modernization remains a neutral political issue with bipartisan support. However, the issue is not mainstream and has not garnered national attention in Congressional committees and hearings.

In the public arena, we have witnessed an erosion of democratic norms and institutions. Broadcast television may have turned democratic discussions into monologues, but cable news shows have transformed monologues on ideas into attacks on opponents. Donald Trump harnessed not only cable news but social media to congeal the anger, frustration, and economic marginalization of his followers into a mass movement that served his interests. He liked and retweeted their posts, thereby affirming them directly. Even after the Trump administration gave President-elect Joe Biden's transition team the green light, Trump himself continued to fight. That fight culminated on January 6, when his supporters stormed the Capitol building. Five people died.²⁰

Notwithstanding the revoking of Trump's social media access by the major platforms, Trumpism will roll on. To neutralize this movement and win over those who are open to new ideas, Biden's team must use the tools of the digital age better than Trump. Yes, Biden needs to increase his social media presence, speak directly and authentically to the American people, and recognize those who contribute positively to the dialogue.

More important, Biden needs to change the digital game altogether, and this report outlines several ways to do that. With his electoral victory, Biden may be tempted to govern the old hybrid way—mostly analog, with one-way digital communications—but America needs a new model of democracy. Over the last two centuries, a first era of democracy created representative institutions, but there was a weak public mandate, operational opacity, and an inert citizenry. Politicians were beholden to powerful interests. It's time for a second wave of democracy based on engagement, transparency, a culture of public deliberation, accountability, and active citizenship.

Digital priorities for the Biden-Harris administration

An investment in building world-class digital capabilities across the US federal government and the broader economy will have generous payoffs. American entrepreneurs and businesses will benefit from easier access to modern digital services tailored to their needs. It will also enable more convenient online or mobile engagement between the public and their elected officials on key policy issues.

With a few clicks, policymakers will be able to tap the expertise of diverse participants and glean important insights from a growing accumulation of open data. Citizens and businesses will see dividends in digitally enabled government programs, in streamlined administrative processes, and the use of less costly digital channels.



Creating a more innovative, tech-savvy work environment will help federal agencies attract and retain a highly skilled workforce.

A more inclusive venture capital system, world-class business incubators, and a more open immigration system are essential to America's innovation and job creation.

Digital transformation will yield softer benefits that are no less important. By closing the digital innovation gap with the private sector, for example, the US federal government can boost public confidence and rekindle citizen engagement. Creating a more innovative, tech-savvy work environment will help federal agencies attract and retain a highly skilled workforce, remaining one of America's top employers. A more agile and effective public service is also a key differentiator in making the United States an attractive destination for business investment and the creation of jobs and real prosperity.

This report recommends a series of actions that would position the United States for long-term digital leadership. We have divided it into seven sections, each addressing a priority for the new administration:

- » *Section 1. Entering the second era of the digital age:* We overview digital transformation opportunities for the government and take a brief look at some of the technological forces that are reshaping the economy and society.
- » *Section 2. Protecting identity, privacy, and individual autonomy:* We address some of the principal policy challenges of the digital age, with recommendations for how the Biden-Harris administration can implement progressive frameworks for privacy, security, digital identity, and data ownership.
- » *Section 3. Embracing the digital dollar and other cryptocurrencies:* We underscore the urgency of exploring the creation of a US digital dollar as China races to launch its own across the Belt and Road Initiative, potentially becoming the de facto standard for digital currency in global trade.
- » *Section 4. Retooling government services:* We argue for leveraging digital innovation to drive service excellence and show how the Biden-Harris administration can begin to reinvent the United States as a digital government.
- » *Section 5. Engaging citizens, holding officials accountable:* We look at opportunities to include a broader network of citizens in decision-making and to restore faith in democratic processes and institutions through digital tools and platforms.
- » *Section 6. Rebooting America's innovation economy:* We discuss the essential building blocks for a robust and equitable economy of innovators. We focus on creating a more inclusive venture capital system, world-class business incubators, and a more open immigration system, where international entrepreneurs and highly skilled talent come to build sustainable businesses.
- » *Section 7. The path to digital government:* We offer a conclusion and a summary of key recommendations, including the need for a multi-stakeholder approach to policymaking, regulation, and enforcement.



An integral theme of this report is the need for a deep-rooted culture change—mindset, operating models, and capabilities—to embrace and enable digital innovation in service delivery to citizens and businesses. That means thinking outside the federal box, coordinating more than ever with state and local governments as well as with global and private sector partners. Gerard Dache, executive director of the Government Blockchain Association, said it best:

“Federal authorities are conditioned to think within their organizational boundaries. However, some of friction and frustration stems from duplicate and fragmented systems.”

 GERARD DACHE
Executive Director
Government Blockchain
Association

Federal authorities are conditioned to think within their organizational boundaries. However, some of friction and frustration stems from duplicate and fragmented systems. For example, many federal authorities forget that state, local, Tribal, and other jurisdictions are performing many of the same functions. Why do citizens have to fill in the same information on their federal and state tax returns? Can federal systems “integrate” business processes outside of their traditional federal footprint?²¹

He suggested that federal CIOs, chief technology officers, and chief information security officers (CISOs) understand the full scope of governance in and outside of the federal space and focus on how other public and private sector entities collect, process, and use data. The new administration should continue working with its partners in the private sector to fine-tune and implement its vision for an inclusive, dynamic, and prosperous digital economy and society.

In the medium-term, the Biden-Harris administration may expand the scope of digital transformation to include bold new digitally enhanced approaches to tackling other important aspects of the federal portfolio, such as supporting evidence-based policymaking, promoting investment and trade, and pioneering digital technologies to modernize democratic engagement and to strengthen America’s innovation performance and economic foundation.

In other words, the Biden-Harris administration needs a transformation strategy that not only continues long-term investment in key information and communication technology assets but also leverages the power of new technologies such as social media, mobility, big data, and artificial intelligence to bring heightened levels of innovation and productivity to the many functions and permutations of the federal government.

1. Entering the second era of the digital age

With each passing year, the Internet grows richer in content, more diverse in its user base, and more accessible through countless connected devices—from automobiles and household appliances to iPads and urban street kiosks. Its global reach and exceptional versatility make the Internet an increasingly potent and



As we move into a period of anemic growth, digitally enabled companies will be the most reliable engines of economic opportunity.

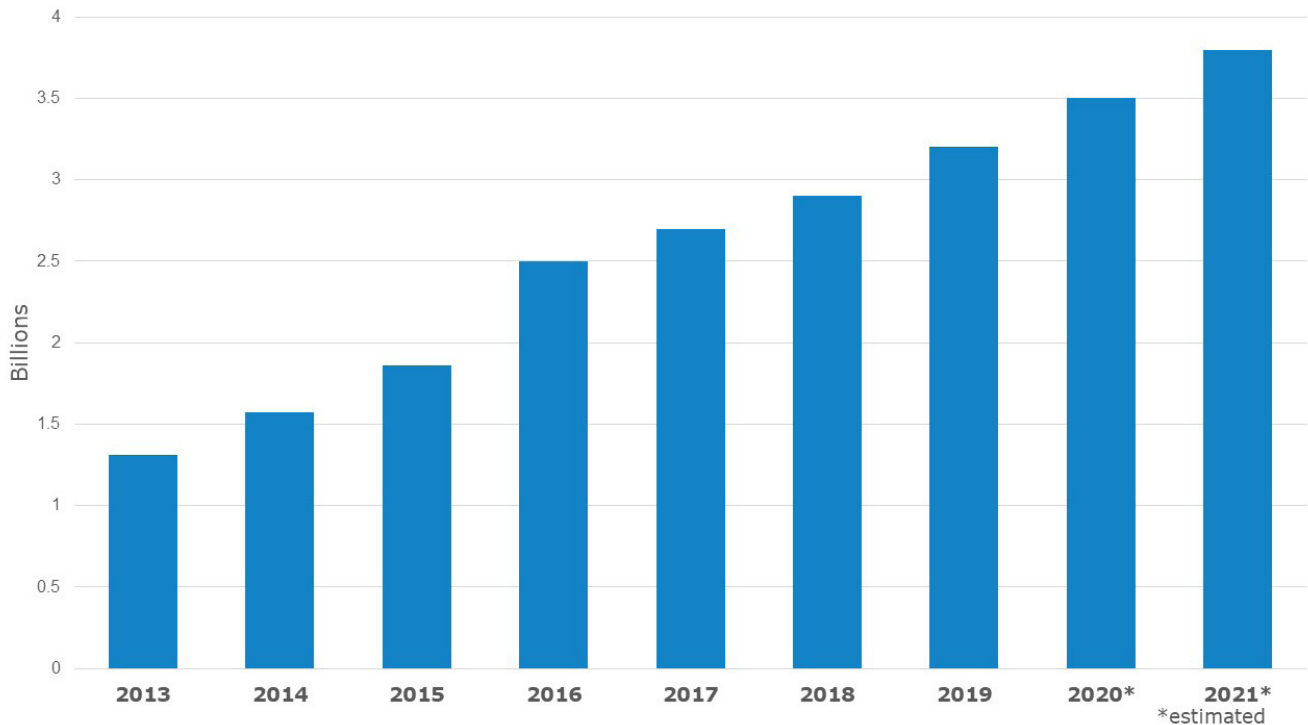
indispensable platform for creativity, commerce, and innovation, not least because the growing accessibility of information technologies puts the tools required to collaborate, create value, and compete at everybody’s fingertips.

As of October 2020, nearly 4.66 billion people (59% of the global population) were using the Internet, 91 percent of them through mobile devices.²² In 2020, there were some 26 billion mobile connected devices around the world (that’s 3.4 devices per person), up from 16 billion in 2015.²³ Equally important, China is far ahead of America in its build out of fifth-generation (5G) wireless infrastructure, with plans to double its capacity this year.²⁴

Entrepreneurs and policymakers cannot ignore the importance of the Internet to individual companies and the economy at large. As we move into a protracted period of anemic growth, digitally enabled companies will be the most reliable engines of economic opportunity that innovate, increase efficiency, lower prices, and invent entirely new products and services. Consider the evidence.

The tech sector is growing twice as fast as the global economy and will constitute about eight percent of global gross domestic product (GDP) within 15 years, up from 4.5 percent today and only two percent in 1992.²⁵ Indeed, technology is one of the few sectors worldwide where the return on equity for public companies has increased. Ten years ago, technology companies accounted for 17 percent of the foreign earnings of American multinationals. Today,

Figure 1: Number of smartphone users worldwide



Source of data: S. O’Dea, “Number of Smartphone Users Worldwide from 2016 to 2021,” Statista, Statista Inc., 10 Dec. 2020.



Digitally transformed companies generate 26 percent more profit, grow nine percent faster, and achieve 12 percent higher market valuations than their average industry peers.

this number is 46 percent. Technology firms also top the rankings of publicly traded companies. Depending on the global stock market's gyrations, Apple, Alphabet, Microsoft, Amazon, and Facebook typically occupy the top five spots in terms of market capitalization.²⁶

For big companies in other industries—manufacturing, insurance, and pharmaceuticals, for instance—digital transformation pays off. In one study, Harvard Business School professors found that these digitally transformed companies generate 26 percent more profit, grow nine percent faster, and achieve 12 percent higher market valuations than their average industry competitors—all because they started using data and other digital technologies to make smarter decisions, create new markets, and realize operational efficiencies.²⁷

Can governments reap comparable results for their constituents, be they taxpayers or consumers of public services? We think so. In the following sections, we explore ideas, case studies, and technology trends that have convinced us of the potential for digital transformation in government. Indeed, public sector organizations around the world are already taking advantage of the tectonic societal shifts unleashed by second era technologies.

Digital transformation in government

Broadly speaking, we can delineate the Internet's impact on government into two phases: e-government and digital transformation. The first wave of Internet-enabled e-government strategies delivered some important benefits. They made government information and services more accessible to citizens while creating administrative and operational efficiencies. But too many of these initiatives focused on automating existing processes and moving existing government services online.

In other words, e-government added a new channel for service delivery and citizen engagement, but it did not fundamentally disrupt or reimagine existing structures, processes, or competencies of government. Nor did it set a high bar for the digital experience. Think static information portals and one-size-fits-all solutions.

As the commercial digital experience improves, the gap widens between what citizens expect online and what government delivers.

Today, those e-government strategies are not good enough. In 2016, 74 percent of individuals in Organisation for Economic Co-operation and Development (OECD) member countries connected to the Internet daily, while 62 percent of the OECD adult population used a mobile or smartphone to connect.²⁸ For most people, the Internet is an inextricable resource of everyday life. The increasing connectivity heightens public expectations and pressures governments to innovate and tune in to digital trends and capabilities. Indeed, as the commercial digital experience improves, it raises the service bar for government. Meanwhile, the gap widens between what citizens expect and what government delivers.

Fortunately, we have considerable cause for optimism. The current wave of digital innovation presents a historic opportunity to redesign how government operates, how and what the public sector provides,



and how governments interact and engage with their constituents and their allies in global crises such as climate change.

The next wave of digital transformation

One of the most notable aspects of the digital revolution is not the extent to which it has changed how we live, but the speed with which the underlying technologies and applications have evolved. In a few short years, massive online communities like Linux and Wikipedia and social networks like Twitter and Facebook transformed the Internet from a space for publishing information to a global platform for computation and collaboration that unites people and organizations around any conceivable shared interest or pursuit.

The first era of the digital age spanned the rise of mainframes, minicomputers, the personal computer, the Internet, mobility, the World Wide Web, social media, the mobile web, the cloud, and big data. We're now entering a second era where digital technologies permeate everything and every business process. Such innovations as machine learning, robotics, drones, software robots or "bots," process automation, additive manufacturing, and new materials are accelerating new types of enterprises.

New business models enabled by this second era of the digital age will disrupt most industries and provide a platform for innovation in the economy for decades ahead. This second era has weighty implications for IT strategy, architecture, and leadership. Every government can finally become a digital entity. But it must rethink technology policy.

Today, the acceleration of digital innovation will unleash wave after wave of creative destruction and open new possibilities that we can barely imagine today. In our view, three technologies will be foundational to the next wave of innovation in government, democracy, and the US economy: blockchain, the Internet of Things (IoT), and artificial intelligence (AI). We call them the *trivergence* (Figure 2, next page). Let's consider how these could enable significant advances in government.

Digital technologies are permeating everything and every organizational process. Governments could become digital entities, but they must first rethink technology policy.

Blockchain innovation

The technology underlying cryptocurrencies—blockchain—is the foundation. We call it the Internet of value because we can use it to store, manage, and exchange anything of value—money, securities, intellectual property, deeds and contracts, music, votes, and our personal data—in a secure, private, and peer-to-peer (P2P) manner. We achieve trust not necessarily through intermediaries like banks, stock exchanges, or credit card companies but through cryptography, mass collaboration, and some clever code.

A blockchain functions as a shared digital ledger running on multiple computers in a public or private network. Blockchain software aggregates transaction records into batches or "blocks" of data,



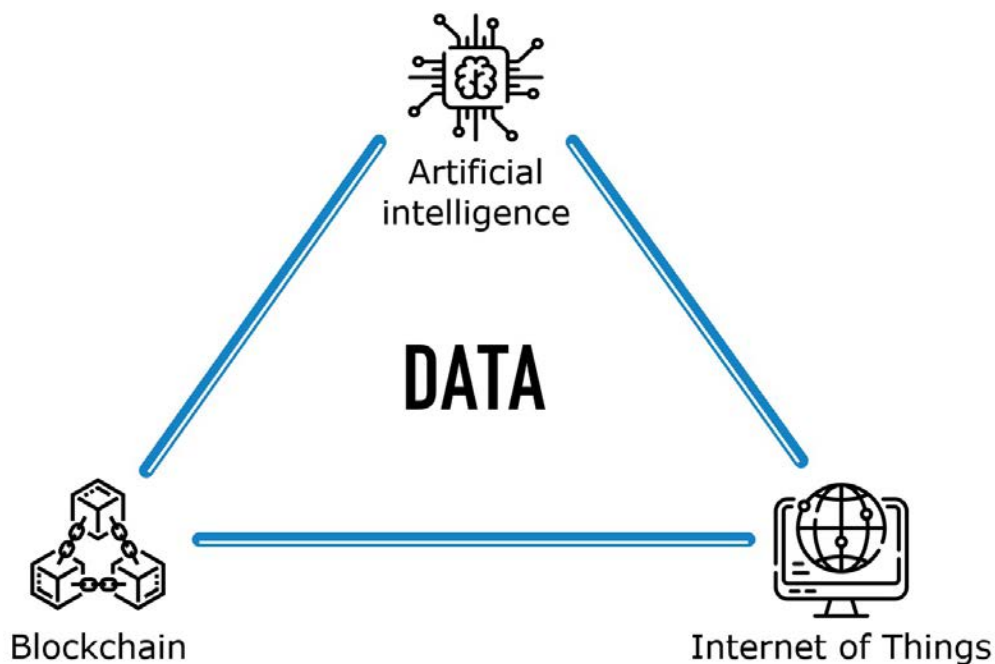
Federal agencies could share a distributed ledger with state and local governments for secure and encrypted transactions of many kinds.

links and time-stamps the blocks into chains that no one can change or delete without the consent of a majority of participants; instead, shared governance protocols verify and record data automatically. As a result, blockchain provides an immutable, transparent record of transactions.

Use cases tend to focus on financial services. Government agencies could also use blockchain not just for conducting financial transactions and collecting taxes, but also for registering voters, identifying recipients of healthcare, financial support, and emergency aid; issuing passports and visas; registering patents and trademarks; recording marriage, birth, and death certificates; and maintaining the integrity of government records.

Governments are already exploring blockchain applications for land registry (Sweden), digitizing all public documents (Dubai), and bolstering cybersecurity for identity management and e-voting (Estonia). The US General Services Administration (GSA) now uses blockchain to automate its public procurement process, and the State of Delaware introduced legislation to allow companies to incorporate using blockchain.²⁹ These and other examples suggest that governments can deploy blockchain to record, enable, and secure huge numbers and varieties of public-sector transactions, incorporating rules, smart contracts (i.e., distributed software applications running across a blockchain), and digital signatures into technology solutions.

Figure 2: The Trivergence: Blockchain, Artificial Intelligence, and the Internet of Things of Things





Joshua Tree National Park: Search and Rescue Canine Team with volunteer. Photo by National Park Service/Emily Hassell, 2020, public domain. Cropped.

The Internet of Things

The proliferation of wireless sensors and smart devices is giving rise to a seamless computational network that connects every living being and inanimate object on the planet into a global Internet of Everything. In the past few years, scientific instruments and pervasive computing have powered quantum leaps in the volume of data available to scientists, public policymakers, and other stakeholders, raising new challenges and opportunities in data-intensive sectors that have had to develop methods, tools, and institutions for managing and exploring massive datasets.

The surfeit of new sensing capabilities will unleash real-time reporting on environments. With the right tools and training, governments can harness vast clouds of data to develop more analytical and timely approaches to policymaking. Scientists, for example, can use distributed sensor networks, graphic information systems, and the data these tools generate, to model the world and all its systems, yielding new insights into social and natural phenomena and tracking trends like climate change with greater accuracy.

With the right tools and training, governments can harness vast clouds of data to develop more analytical and timely approaches to policymaking.

Increasingly timely and granular feedback loops will equip policymakers with the tools to reengineer policies, programs, and services in areas such as transportation, infrastructure management, and international trade. For example, sensors can monitor everything from hospital equipment to international cargo shipments to bridges and buildings, sniff out pesticides and pathogens in food, or even recognize the person using them and adapt accordingly. In doing so, big data will revolutionize the practice of public policy development and even alter the basic skill set required to participate effectively in public policy debates.



Services will improve if agencies use AI systems to augment rather than replace human workers and to serve rather than surveil citizens.

Artificial intelligence

Sped by the exponential rate of technological progress, powerful AI and increasingly versatile robots are combining to create a new era of superintelligence that will reshape the social and economic landscape. From robotic surgery to autonomous vehicles and biotech automation, the applications for ever-smarter machines will span healthcare, legal and financial services, transportation, construction, agriculture, manufacturing, and more. With companies such as Facebook, Google, Amazon, General Electric, and others making multibillion-dollar investments in talent and research, state-of-the-art AI and robotics capabilities will advance more rapidly in the years to come, opening up new possibilities and applications that we can scarcely imagine today.³⁰

AI's immense capacity to process data could easily make onerous information submission and process processing, like tax filing for instance, a thing of the past. Indeed, in Estonia, corporate balance sheets are on a government-hosted cloud where AI files monthly returns and adjusts tax rates accordingly. Administrative bots can radically improve citizen response time, increase availability of services, and reduce workload pressures. Governments can use AI to reduce the red tape for public servants themselves.

Some people worry that chatbots and other automation efforts could depersonalize service and hinder governments' ability to address more nuanced and complex service needs. However, the quality and timeliness of service will improve if agencies use AI systems to augment rather than replace human workers and to serve rather than to surveil citizens.

The need for governance

We have written extensively on the need for the stewardship of emerging and fast-moving networked technologies such as AI, IoT, and blockchains. At a roundtable hosted by the Blockchain Research Institute in March 2020, Hyperledger's Executive Director Brian Behlendorf raised this issue.³¹ He pointed out that, if we hope to fight such global problems as pandemics and climate change, then we need tools and processes that are trustworthy and resilient. For example, centralized systems, which is all we really have to fight these problems today, are often controlled by private organizations without operational transparency and with motives that don't always align with those of system users. Also, centralized systems "are efficient and scale easily but are very, very fragile," said Behlendorf. We must "double down on anti-fragility." To build trust and resilience in digital systems, Behlendorf advocated these principles of governance:

- » Shared code and shared standards, which are critical to interoperability and integration (e.g., no vendor lock-in, no high switching costs, no balkanization)
- » Self-sovereign identities, which are key to speedy and consent-based data sharing, where consent is a core feature

Data sharing and usage must be consent based as well as confidential and secure.



“Many of these networks need a critical mass of industry participants and have faced difficulty achieving their goal. A frequently cited reason is the lack of clear or vendor-neutral governance of the network.”

 BRIAN BEHLENDORF
Executive Director
Hyperledger

- » Confidential computing, which protects civil liberties through secure enclaves, zero-knowledge proofs, and other methods
- » Openable networks, meaning that networks can move from private usage to public utilities, which puts pressure on governance and business model viability
- » Driving digital processes for business formation and incorporation, especially in times of simultaneous public health and economic crises, to bend bureaucracy.

In May 2020, the Linux Foundation announced the formation of a multi-stakeholder coalition, the Trust over Internet Protocol (ToIP) Foundation, to advance digital trust standards. Its founding members—among them Accenture, Mastercard, MITRE, and the Province of British Columbia—represent “governments, nonprofits, and private sectors across finance, healthcare, enterprise software, and more.”³² Their shared mission is “to enhance universal security and privacy protocols for consumers and businesses” in this second era of the digital age. The ToIP Foundation set up four initial working groups: one on the technical stack and one on the governance stack, both dedicated to the technology; one on utility networks and one on digital trust ecosystems, both supporting collaboration on projects in those areas of development.³³

By October, the technical stack working group announced the creation of a ToIP interoperability profile (TIP). It’s a component of “a new model for achieving trust online—a model that breaks away from the thousands of siloed solutions for secure, privacy-enhancing digital identity and trust that do not work with each other.”³⁴ The goal is to drive broad adoption of this new model, one “based on open-standard digital wallets and digital credentials that are every bit as interoperable as the physical wallets and paper or plastic credentials that we use every day.”³⁵

As we saw with the Internet, adoption is an implementation challenge. “Many of these networks need a critical mass of industry participants and have faced difficulty achieving their goal,” Behlendorf wrote in a blog post. “A frequently cited reason is the lack of clear or vendor-neutral governance of the network. No business wants to place its data, or the data it depends upon, in the hands of a competitor; and many are wary even of noncompetitors if it locks down competition or creates a dependency on a market participant.”³⁶


To overcome this challenge, the Linux Foundation has added “open governance networks” to the types of projects it hosts. It will “provide not just that neutrality, but also competent stewarding of the community and commercial ecosystem” so that project leaders can “show how its governance and sustainability are not dependent upon a single vendor, corporate largess, or charity” and are therefore decentralized and trustworthy for mission-critical uses.³⁷ These are the kinds of governance initiatives worth the Biden-Harris administration’s attention as it formulates what we’re calling a much-needed Digital Marshall Plan for America.





More than 5,000 National Guard Soldiers and Airmen from 11 states and DC are manning traffic control points, aid stations and protecting the safety of peaceful protesters in Washington, DC. Photo by Sgt. First Class Jon Soucy, 2020, used under CC BY 2.0. Cropped.

“The incentives created by an advertising business model are essentially to addict people psychologically to your product, and then to cause outrage cycles.”

 **ROGER MCNAMEE**
Co-founder, Elevation Partners
Co-founder, Center for Humane Technology

Shining a spotlight on the dark side: A call for regulation

The Internet has emerged as the most ubiquitous communications network in the history of our species. Unfortunately, each one of the Internet’s powerful capabilities has a dark side. Spam clogs our e-mail arteries. Credit card fraud and identity theft threaten every online user, with “one in 10 American consumers [reporting] being a victim of identity theft or fraud related to government agency services since the start of the COVID-19 pandemic,” according to TransUnion.³⁸ Cyberbullying of children has more than doubled since 2007 in the United States.³⁹ Do-it-yourself pornographers and their fans victimize the young and the vulnerable on social networks.⁴⁰ And in 2019 alone, US law enforcement received reports of “70 million online images and videos of child pornography.”⁴¹

On top of all that, the Trump years may well be remembered as a digital free-for-all of fake news, conspiracy theories, and toxic prejudicial speech. The problem is not simply that social media platforms like Facebook allow neo-Nazis and QAnon supporters to congregate online and promote reckless conspiracies, lawlessness, and division.⁴² The problem is that Facebook’s algorithms perpetuate radicalization by narrowing the information universe and serving up provocative content that leads its users into a land of extremes.⁴³

In other words, the outrage, extremism, and echo chambers are coded into the system. One of Facebook’s original investors, Roger McNamee, explained: “The incentives created by an advertising business model are essentially to addict people psychologically



“The GOP worked for ages to ensure that companies could decide what was best for them. Call it cancel culture, or call it the free market reacting, well, freely to events.”

 BRUCE BARTLETT
Domestic Policy Adviser
President Ronald Reagan

“It’s now clear that they were gatekeepers—what else to call people whose algorithms influenced what billions of people saw, heard, and knew about the world?”

 ANDREW MARANTZ
Staff Writer
The New Yorker

to your product, and then to cause outrage cycles. You want to feed them stuff that either makes them afraid or angry, because when they’re excited by low-level emotions like that, they share more stuff.”⁴⁴ Users sharing more stuff encourages stickiness, and stickiness is rocket fuel for Facebook’s advertising business.⁴⁵

On January 16, Facebook announced that it was temporarily banning ads that promote weapon accessories and protective equipment in the United States. Facebook’s and Twitter’s flurry of account bans, most notably of Trump, have also made headlines. “The right is crying foul,” wrote Bruce Bartlett, a domestic policy adviser to President Ronald Reagan. He had this to say about Trump supporters’ cries of censorship:

They’re ignoring something as they cry foul. Years of Republican rhetoric and policy priorities, leaning heavily on the notion that the free market can determine almost everything, paved the way for this moment: The GOP worked for ages to ensure that companies could decide what was best for them. Call it cancel culture, or call it the free market reacting, well, freely to events.”⁴⁶

Silicon Valley’s libertarian culture has long championed the idea of digital sovereignty, and US policymakers have largely played along, granting Google, Facebook, and others control over their digital domains. There they set and enforced their own terms of use and service without regulatory interference. In more recent years, they have stepped up efforts to self-regulate and govern with greater transparency. Facebook, for example, has published guidance on enforcing its community standards, set up an appeals process, scaled up its cadre of content reviewers, tracked and reported on instances of enforcement. It has expanded controls over news feeds, partnered with fact-checking organizations, and increased transparency of political ads.⁴⁷

Even so, they have largely operated without legal liability for the content they host. Section 230 of the Communication Act defines them as “platforms,” not “publishers,” which means that no one can hold them held legally responsible for their users’ content, even when such content harms others.⁴⁸ The result, as author and journalist Diane Francis put it, is that Facebook, Google, and Twitter have “trafficked in false and hateful content ... for so long, and so profitably, that they have become the free world’s most irresponsible media outlets.”⁴⁹

As Andrew Marantz, staff writer at the *New Yorker*, put it, “It’s now clear that they were gatekeepers—what else to call people whose algorithms influenced what billions of people saw, heard, and knew about the world?—and yet they were surprisingly adept at denying this fact.”⁵⁰ When cycles of algorithm-fueled outrage escalate into violence and insurrection, disrupt democratic norms and institutions, and feed social media users an endless diet of misinformation, isn’t greater regulatory oversight the only responsible answer?



Do we want these digital conglomerates to remain the gatekeepers of content on the Internet, improving self-regulation without accountability for the consequences of their curation decisions?

Not so fast, cautioned Internet industry analyst and author Larry Downes. When it comes to regulating the Internet, the Biden-Harris administration should proceed with great care: “The past two decades of unfettered innovation have been the greatest success in the history of government policy, contributing significantly to profound value creation,” Downes wrote.⁵¹ This unencumbered innovation has given us online education, e-commerce, virtual socializing, streaming entertainment, telemedicine during a pandemic, and access to a good many government services.

The co-authors of *The Business of Platforms: Strategy in the Age of Digital Competition, Innovation and Power* have urged Big Tech to self-regulate more aggressively, explicitly, transparently, and in coalition with each other as other industries have done in the content of music, movies, video games, and even airline reservations.⁵²

So as the Internet’s dark side expands, the time has come for the US government to address this tough question: do we want these digital conglomerates to remain the gatekeepers of content on the Internet, improving their self-regulation without any accountability for the consequences of their curation decisions? Pew Research found that only three percent of Americans trust Big Tech to do what is right, and between 47 and 51 percent think the government should regulate Big Tech more than it does now.⁵³

Throughout this report, we suggest how the Biden-Harris administration can take the lead in setting the agenda and updating the rules for the digital conglomerates born in the first era of the digital age as we make way for more innovation in the second era.⁵⁴

2. Ensuring security, equality, and autonomy for all

The recent cyberattack on federal agencies must serve as a catalyst for a global, coordinated effort to secure the technology-based supply chains and IT systems on which democratic societies depend.

The second era of the digital age has highlighted critical policy challenges and opportunities that should be central to the new administration’s thinking about digital economy. The first is cybersecurity. No doubt, the recent cyberattack on the United States is top of mind for the new administration. As numerous experts have noted, the months-long breach of computer networks by Russian hackers was an act of international espionage designed to siphon confidential information from the US government and other critical institutions in public and private sectors.⁵⁵ Described by observers as remarkable and unprecedented in its scope, sophistication, and impact, the intrusion must serve as a call for a global, coordinated effort to secure the technology-based supply chains and information systems upon which democratic societies depend.

The second urgent issue is the systemic inequality replicated in cyberspace. When COVID-19 hit, many Americans could access the Internet to do what they needed to do. Yet too many people lacked and still lack the devices, Internet services, and know-how



The Biden-Harris administration must take steps to reverse a dangerous trend in data collection and use, a trend that is undermining privacy, self-determination, and personal security.

to keep up. To close this divide, the Biden-Harris administration must prioritize digital literacy and high-speed broadband to connect marginalized communities in urban and rural dead zones.

Finally, the Biden-Harris administration must take steps to reverse a dangerous trend in data collection and use, a trend that is undermining privacy, self-determination, and personal security. In this second era of the digital age, most Internet users leave data trails, generating information at nearly exponential rates of growth, but large companies are stockpiling and monetizing it. Practical obscurity—the basis for privacy norms throughout history—is fast disappearing. More aspects of our lives are becoming observable, linkable, indelible, and identifiable to others.

Combined, these three issues—cyber insecurity, systemic digital inequality, and the erosion of privacy and individual autonomy—present novel risks, from identity fraud, theft, and data ransoms to new forms of mass discrimination and social engineering.

Forming a coalition to secure cyberspace

Labeled a security failure of enormous proportions, the 2020 cyberattack on the United States amounts to nothing less than a critical body blow to trust and reliability of the world's critical infrastructure. Experts are still assessing the damage of this digital espionage. But it reminds us of the serious risks to citizens in virtually every country and the urgent need for governments to offer more robust protection.

The myriad threats posed by new forms of cyberattack are too numerous and complex to explore in detail in this report. We'll highlight a few: the recent attacks on hospitals, public health authorities, and pharmaceutical companies involved in developing new vaccines for COVID-19.⁵⁶ Cyber mercenaries have emerged to aid and abet nation-state attackers, and cybercriminals continue to unleash malware and ransomware to botch systems or extract lucrative sums from governments, universities, and private businesses.

The evolving threat landscape also includes the use of sophisticated AI to weaponize stolen datasets about individuals and spread targeted disinformation through social media and messaging apps. Russian hackers succeeded in exploiting popular social networks to sow divisions among the electorate in the 2016 election campaign, and they did so again around Black Lives Matter and the results of the 2020 election.⁵⁷

The US election itself was one of the most secure in America's history.⁵⁸ Not secure were the systems of the Department of Homeland Security, the National Nuclear Security Administration, the State Department, the Treasury Department, and the National Institutes of Health, to name a few of the institutions breached through SolarWinds' software.⁵⁹ Such tactics will be part of the political landscape for the foreseeable future.



Funding cybersecurity across government

We applaud the Biden-Harris administration's proposed modernization of federal IT systems to protect against future cyberattacks, starting with the Technology Modernization Fund (TMF). The initial \$9 billion budget is a great start for transitioning the Cyber Security and Information Security Agency (CISA) and the GSA to new IT and cybersecurity shared services and for modernizing the systems of 18 federal agencies. It is US Congress' responsibility now to pass this funding and, as the new administration has proposed, change "the TMF's reimbursement structure to fund more innovative projects."⁶⁰ Congress should also fund the CISA for bolstering cybersecurity across federal civilian networks and the GSA for developing the kind of secure shared services that drive transformational digital projects across government.⁶¹



California Military Institute staff impact community through school lunch program by packing school lunches at Pinacate Middle School, Perris, California. Photo by Tech. Sgt. Julianne M. Showalter, 2020, used under CC BY 2.0. Cropped.

"We are simply too vulnerable when we prioritize offense, even if we have to give up the advantage of using those insecurities to spy on others."

 BRUCE SCHNEIER
Chief of Security Architecture
Inrupt Inc.

Uniting against the cyber threat

Noting that the United States does its fair share of offensive cyber espionage, security expert Bruce Schneier called for the US government to shift to a more defensive cybersecurity posture.⁶² "As computers and the Internet become increasingly essential to society, cyberattacks are likely to be the precursor to actual war," Schneier wrote in *The Guardian*. "We are simply too vulnerable when we prioritize offense, even if we have to give up the advantage of using those insecurities to spy on others."⁶³



"We need a more effective national and global strategy to protect against cyberattacks."

 BRAD SMITH
President and Chief Legal
Officer
Microsoft Corporation

Like other experts in the field, Schneier expressed concern for enemies using an attack of similar scope and sophistication not just to snoop but to modify data, degrade network performance, or erase entire networks. "The first might be normal spying," Schneier pointed out, "but the second certainly could be considered an act of war. Russia is almost certainly laying the groundwork for future attack."⁶⁴

Major US tech firms have stepped up. Microsoft, for example, called for a "more effective and collaborative leadership by the government and the tech sector in the United States to spearhead a strong and coordinated global cybersecurity response."⁶⁵ As the tech giant put it, "effective cyber defense requires not just a coalition of the world's democracies, but a coalition with leading tech companies." Amazon, Google, Facebook, and others also have the depth of requisite engineering talent for the job.

We urge US Congress to support the Biden-Harris proposal for hiring cybersecurity technology and engineering expertise and passing \$200 million in funding so that the federal CISO and US Digital Service can swiftly hire the hundreds of experts needed now to keep the country's systems safe.⁶⁶

Leading the coalition of nations

Providing the leadership to coalesce such a group should be among the first priorities for President Biden and Vice President Harris. Here are the two action items for such a coalition in the first years of the new administration:

- » *De-escalate the arms race.* The United States must acknowledge its role in escalating the digital arms race and do its part to dial back its offensive cyber actions. As Schneier put it, "We're not going to be able to secure our networks and systems in this no-rules, free-for-all every-network-for-itself world. The [United States] needs to willingly give up part of its offensive advantage in cyberspace in exchange for a vastly more secure global cyberspace."⁶⁷ That means requiring the National Security Agency and the Department of Justice to reverse their support for insecure standards and systems, including back doors for encryption protocols that have enabled the US government to spy on others.
- » *Forge international norms, agreements, and institutions.* As in other areas of Internet governance, the world needs international norms and agreements around cybersecurity. If democratic nations joined together to secure cyberspace, then they could fend off rogue actors better. For starters, the 2018 Paris Call for Trust and Security in Cyberspace and the Global Commission on the Stability of Cyberspace could serve as forums for sharing threat intelligence and deterring cyberattacks.⁶⁸



Bridging the digital divide

Two decades into the second era of the digital age and the digital divide remains a pressing problem.⁶⁹ Approximately five million rural American households cannot access broadband networks, and roughly 20 million American households cannot afford Internet access.⁷⁰ We can reasonably assume that the number has increased because of the pandemic.

The socioeconomic gap

As the pandemic has forced a shift to digital platforms for social and economic activities, the search for real solutions has become urgent. High-speed information networks are essential utilities, and digital literacy is as critical as reading, writing, and arithmetic. Pushing them beyond reach is an intolerable form of disenfranchisement that the Biden-Harris administration must address. As former US Assistant Secretary of Commerce Larry Irving put it:

“As Congress considers legislation to address the ongoing coronavirus crisis, it is critical they include measures to ensure that every American has affordable access to that lifeline.”

 LARRY IRVING
Chief Executive Officer
The Irving Group
Former US Assistant
Secretary of Commerce

Families are now depending on broadband Internet connections for remote health diagnostics, for telework, for remote learning, to obtain public service announcements from the government, to buy needed goods—even to participate in the census. As Congress considers legislation to address the ongoing coronavirus crisis, it is critical they include measures to ensure that every American has affordable access to that lifeline.⁷¹

Irving pointed out that this marginalization manifests in many ways, but we highlight education to illustrate the challenges. The National Education Association estimated that 15 to 16 million students in America lack high-speed Internet access—roughly one in three.⁷² A disproportionate share of those students is Black or Hispanic, comes from low-income households, or lives in rural areas. As the pandemic forced school closures across the country, disadvantaged communities adopted the term “homework gap” to describe the inadequate infrastructure and unaffordable Internet services preventing their children from keeping up.

According to the Federal Communications Commission (FCC), seven out of ten teachers were assigning homework that required access to the Internet, yet up to one-third of students had no capacity to complete the work at home.⁷³ Disenfranchised students borrowed laptops and accessed the Internet in fast food restaurants. According to Jessica Rosenworcel, the senior Democrat on the FCC, “This homework gap is becoming an education gap—and I worry it can become a long-term opportunity gap if we don’t correct it.”⁷⁴

President Biden has already promised to triple the “Community Connect” offered through the US Department of Agriculture and voiced his support for the Digital Equity Act, which would require the National Telecommunications and Information Administration (NTIA) to establish grant programs for




1. Promoting digital equity
2. Supporting digital inclusion activities
3. Building capacity for state-led efforts to increase adoption of broadband by their residents.⁷⁵

What additional steps can the Biden-Harris administration take to ensure the success of their plan for “expanding broadband, or wireless broadband via 5G, to every American”?⁷⁶



#Plant2020 at Spring Creek Farm, Palmer, Alaska. Photo by Tracy Robillard, Natural Resources Conservation Service, 2020, public domain. Cropped.

“The country that fully deploys 5G will lead the scope and direction of new applications and services, ushering in a period of catch up for other countries.”

 NICOL TURNER LEE
Fellow
Center for Technology
Innovation
Brookings Institution

Building out broadband infrastructure in rural America


While cities take broadband infrastructure for granted, many rural communities still rely on long-range wireless networks, expensive satellite-based services, and even dial-up Internet access. The Biden-Harris administration put it so well: “Just like rural electrification several generations ago, universal broadband is long overdue and critical to broadly shared economic success.” The clock is ticking as the Chinese government pushes forward on 5G. According to the Brookings Institution, “The country that fully deploys 5G will lead the scope and direction of new applications and services, ushering in a period of catch up for other countries.”⁷⁷ At federal, state, and local levels—and across these levels of government—coordination and consensus around spectrum management and the network supply chain are critical so that private companies can keep up with their Chinese competitors.⁷⁸

Offer robust financial support for digitally disconnected families

Several public and private sector initiatives attempt to help low-income families connect to the Internet. For example, the FCC’s Lifeline program offers \$10 a month to assist families that couldn’t



“We are subjecting our most vulnerable populations to what could be labeled ‘trickle-down technology.’”

 LARRY IRVING
Chief Executive Officer
The Irving Group
Former US Assistant
Secretary of Commerce

The cost to taxpayers of non-adoption of technology is high and likely to increase, as non-adopters rely on more costly brick-and-mortar offices for essential public services.

otherwise pay for mobile devices and Internet connectivity.⁷⁹ However, critics argue that the program lacks national standards. Larry Irving summarized the situation:

Too many low-income Americans are forced to rely on the charitable largesse of major Internet providers, who provide bare bones, no-frills connectivity that often doesn't even meet the FCC's often-derided minimum standards for broadband speeds. We are subjecting our most vulnerable populations to what could be labeled “trickle-down technology.”⁸⁰

Irving offered recommendations for strengthening the Lifeline program that we think the Biden-Harris administration should endorse:

- » Define and insist upon a meaningful level of broadband service.
- » Fund the program adequately over time, as with food assistance and social security programs.
- » Fund more than one device per household by separating broadband funding from device funding.
- » Assure transparency by requiring the FCC to publish annual or even monthly reports on program results.
- » Invest in digital literacy and training.⁸¹

The relevance gap

According to NTIA research, those without home Internet service are predominantly poorer, older, and less educated Americans.⁸² A growing proportion of those holdouts do not see the relevance of digital technology in their lives. In fact, the proportion of offline households citing lack of need or interest has increased from 39 percent in 2009 to 58 percent in 2017, while concerns about expense have remained about the same over that time period (~ 22%).

Brookings Institution scholars Blair Levin and Larry Downes argued in their op-ed in the *Washington Post* that the perceived relevance problem is largely an education problem: “If you’re not familiar with computing devices—even smartphones and tablets—it’s likely you don’t know just how much valuable information is available online, much of it for free.”⁸³ Non-adopting parents, for example, may not appreciate how essential the Internet has become for their children, especially as education, learning, and tools for research shift online.

According to Levin and Downes, the cost to taxpayers of non-adoption is high and likely to increase, as non-adopters rely on more costly brick-and-mortar offices for essential public services that the government could deliver more efficiently over the Internet. As Levin and Downes put it, “It’s in our best interests—socially as well as economically—to help make clear to the digitally disconnected the true value of inclusion, and make available the digital skills training that is key to overcoming the adoption barrier.”⁸⁴



The solution to non-adoption, therefore, is not simply to make Internet services cheaper and more accessible. Government must also offer digital literacy training—sort of like drivers’ education—on what users can do, where they can go, whom they can meet, and how they might make a living. Once they appreciate the value of the Internet, some may want to volunteer, upskill, or use e-government services.

Giving people control over their data and identities

The most powerful asset in fighting huge systemic problems—be they medical, economic, or social—is data. For example, if governments, clinicians, and citizens had access to data about a virus and the means to verify it, they could take effective steps against it. We need data about how, where, when, and who—*how* many people are infected, *where* are they located, *when* were they infected (and when did they recover), *how* were they infected, and *who else* did they contact?

But getting good data these days comes at a high cost to privacy and individual rights. Brian Magierski, CEO and founder of Care Chain, observed that the virus spread like wildfire where civil liberties reign supreme, whereas governments that more rigorously controlled the viral contagion did so at the expense of these liberties.⁸⁵ China’s measures were Orwellian: the police showed up at the home of people who had violated curfews.⁸⁶ The US government had similar capabilities at the ready—facial recognition software, surveillance of private chats online, and informants or whistleblowers—to track down those who breached Capitol Hill on January 6 but weren’t bragging about it on social media.⁸⁷

Balancing data privacy and public good

While effective, digital surveillance techniques raise far-reaching questions—who gets to collect data, how, for what use, for how long, with whose knowledge, and with whose consent in the digital age? “We don’t need to see it as a public health versus privacy debate. We can see it as a continuum,” suggested Preeti Gandhi and Hanumantha “Hanu” Rao of Tata Consultancy Services. “The ongoing work at countries like South Korea, Singapore, and others shows that people are willing to give up some their privacy for a common good.”⁸⁸ The trouble is, once the crisis is over, citizens have no way to recapture their data.

Simply put, citizens cannot use their own data to plan their lives—their health, finances, education, and so forth. These data reside in large public and private silos, which citizens cannot access—but third parties like Cambridge Analytica can, often without citizen knowledge.⁸⁹ Nor can they monetize their own data assets, yet they bear most of the risk and responsibility for its cleanup, should those third parties lose or abuse their personal data.⁹⁰ “Imagine if General Motors did not pay for its steel, rubber, or glass—its inputs,” economist Robert J. Shapiro once said. “That’s what it’s like for the big Internet companies. It’s a sweet deal.”⁹¹

Today citizens cannot use their own data to plan their lives. Their data reside in large public and private silos, which they cannot access, yet they bear much of the risk and responsibility, if those silos are breached.



Some governments have attempted to help solve this problem by implementing laws such as the European Union's General Data Protection Regulation, which is a partial measure at best, and hypocritical in light of the new EU common identity repository.⁹² Equally ineffectual is a heads-will-roll type of policy that calls for the breakup of Amazon, Facebook, and Google for violating anti-monopoly laws.⁹³ Apple, Facebook, Google, Microsoft, and Twitter are collaborating in the Digital Transfer Project so that users can port their data across Web platforms.⁹⁴ Portability and interoperability are steps forward. But citizens need more than the ability to transfer their data. They need ownership of it.

Digital technologies open a new set of possibilities that shift data control back to individuals. One approach is to store personal data on a distributed database such as the InterPlanetary File System and manage it through a digital wallet, which is a distributed application that runs across the blockchain.⁹⁵

For example, in Honduras, Civitas—an app developed by the start-up Emerge—associates Hondurans' ID numbers with blockchain records used to track medical appointments and official permits to leave the house. Doctors scan the app to review a patient's symptoms verified and recorded by telemedicine services, and police scan the app to check whether the person holds a government-issued permit to circulate in public at that time. The app shares no personal data with the government or the police, and no party can edit or deny the records—meaning that every record asserts the individual's right to healthcare.⁹⁶

Another approach is Solid, an open-source Web-based protocol that re-architects how data are stored and shared and, as a consequence, how apps are developed. Solid is led by Sir Tim Berners-Lee, inventor of the World Wide Web.⁹⁷ Building on existing Web standards, Solid separates the apps from the data. Whichever app a user runs, it stores the data in the user's personal online data store—or "Pod." Pods are like personal Web servers for a user's data.⁹⁸ With Solid, a user can share anything with anyone, or no one, and each user has a choice of apps to use with the same data. Users are in control of their data and decide which entities and apps can access their data. Developers also benefit from being able to tap into a rich tapestry of data and can focus on the functionality of their app, without having to create a specific back-end for each app, as Solid provides a universal application programming interface (API). Inrupt was co-founded by Berners-Lee and his business partner John Bruce, to fuel the uptake of Solid and provide a commercial force and additional accountability. Inrupt is currently working with Britain's National Health Service, NatWest Bank, and the government of Flanders, among others.⁹⁹

Solid is an open-source Web-based protocol that separates the apps from the data. Users decide which entities and apps can access their data.

Reimagining identity systems: The self-sovereign identity

The other aspect of individual autonomy is identity. To set up Pods, for example, users need only a WebID, a digital "way to uniquely identify a person, company, organization, or other agent using a URI [uniform resource identifier]."¹⁰⁰ With the World Wide Web



What each person needs is a self-sovereign identity, neither bestowed nor revocable by any central administrator and enforceable in any context, in person and online, anywhere in the world.

Consortium's specification, people can create their own WebIDs to use for controlling how they identify themselves online so that they can manage access to their information on the Web.¹⁰¹ They do not need a government-issued identity.

This is good news. State-run identity systems are vulnerable. In the last ten years, at least 48 government databases have been breached, exposing the data of 1.44 billion people—and that number excludes hacks to government-managed healthcare and education records.¹⁰² Again, the burden of cleanups has fallen on the citizens. Moreover, citizens are dependent on system administrators who have the power to freeze access, delete voter registration or other credentials, and use banks, telecoms, and tech firms to surveil them.¹⁰³ Not so with the WebID.

Nothing about institution-centric ID systems is citizen-friendly. In some countries, these systems discriminate against the poor, the rural, the homeless, the imprisoned, and the overworked in society.¹⁰⁴ Syrian refugees in particular put a spotlight on the crisis of state-based IDs.¹⁰⁵ The reality of a government-sourced and sanctioned identity is untenable—both administratively and philosophically.

What each person needs is what software developer Devon Loffreto called "sovereign source authority": identity is not simply endowed at birth; it is endowed *by* birth.¹⁰⁶ Such an identity is neither bestowed nor revocable by any central administrator and is enforceable in any



Black Lives Matter - Sit In - Occupy Bay Street - College Street - Toronto Police Headquarters. Photo by Jason Hargrove, 2020, used under CC BY 2.0. Cropped.



“We think that emerging technologies show promise when it comes to identity in data management, but they require proactive and forward-thinking policymaking to maximize the benefits and mitigate new risks.”

 SHEILA WARREN
Head of Data, Blockchain,
and Digital Assets
Member of the Executive
Committee
World Economic Forum

The self-sovereign identity is one the pillars of a new social contract for the digital economy, critical to a more open, inclusive, and private economy.

context, in person and online, anywhere in the world. That means a wholesale shift in how governments define and assign ownership of data assets and how people establish, manage, and protect their identities in a digital world. Change *those* rules, and we end up changing *everything*, especially for the disenfranchised.

“Over the past few years, we have seen the case for a different way of thinking about data and data ownership, as traditional models appear to be serving the powerful few with limited consideration for vulnerable populations,” said Sheila Warren, the head of data, blockchain, and digital assets and a member of the executive committee of the World Economic Forum. “We think that emerging technologies show promise when it comes to identity in data management, but they require proactive and forward-thinking policymaking to maximize the benefits and mitigate new risks.”¹⁰⁷

Over 50 identity start-ups and firms such as Accenture, Microsoft, and the NEC Corporation as well as British Columbia’s Ministry of Citizens’ Services are collaborating in the Decentralized Identity Foundation, a registered 501(c)(6) membership organization.¹⁰⁸ Its working groups are focusing on the big areas of innovation—identifiers and discovery, storage and computation of data, authentication, claims and credentials, and security—with an eye to developing use cases and standards, with special interest groups in healthcare, banking, and finance.¹⁰⁹

These initiatives, plus those of the Linux Foundation and the World Wide Web Consortium, are a few of the responses from the identity and data governance ecosystem. The new administration could fund the development of such solutions, if not in time to fight our immediate crises, then in preparation for those to come.

Transitioning to a new paradigm for identity and personal data

When it comes to privacy and methods of identification, the Biden-Harris administration must first rebuild the people’s trust. That starts with education, not legislation. It involves policy debates, not executive orders. It means understanding how digital technologies can help to balance privacy and national security. Only then can we look to legislation that adds personal data to the list of individual assets protected from birth and regulation of data as an asset class and standards for its collection, storage, use, and destruction.

These new approaches to security, data privacy, and ID management will give citizens ownership of their information and their identities, the facts of their existence, and the data they create as they live their lives. The self-sovereign identity is one the pillars of a new social contract for the digital economy and will be critical to transforming to a more open, inclusive, and private economy.¹¹⁰

Of course, such changes are massive, and we cannot expect the Biden-Harris administration to implement them fully in time to help



us with COVID-19. We do think that the initiatives of Senators John Kennedy (R-La), Mark Warner (D-Va), and Josh Hawley (R-Mo) are raising important questions about personal data, its use, and the opacity of data governance.¹¹¹ Now is the time to get serious about shifting the paradigm for managing our identities and personal data so that we can predict or prevent crises—from the local to the global—and develop solutions faster and collaboratively.

3. Embracing the digital dollar and other cryptocurrencies

There is a widespread view in the federal government and some of its regulators that digital currencies like bitcoin are dangerous and used primarily for nefarious purposes.¹¹² During her recent confirmation hearing, new Treasury Secretary Janet Yellen said, “Cryptocurrencies are a particular concern. I think many are used—at least in a transaction sense—mainly for illicit financing And I think we really need to examine ways in which we can curtail their use and make sure that money laundering doesn’t occur through those channels.”¹¹³

Informed law enforcement personnel understand that cryptocurrencies leave a trail of metadata useful in tracking criminals, even though their transactions are anonymous.

To be sure, some use cryptocurrencies for criminal, even terrorist activities, and steps to prevent such criminal activity are laudable. However, this view is factually incorrect, and we need a new perspective. As former federal prosecutor Kathryn Haun pointed out, criminals are often the first to use exciting new technologies, and the US federal government is using that very technology—the Bitcoin blockchain—to catch such criminals.¹¹⁴ Informed law enforcement personnel understand that cryptocurrencies are helpful because they leave a trail of metadata that officials can use to track the criminals down, even though their transactions are anonymous. In this sense, digital cash is better than paper money.

Further, of all cryptocurrency transactions, criminal activity accounts for only a tiny fraction—2.1 percent (\$21.4 billion in transaction volume) in 2019 and only 0.34 percent (\$10 billion) in 2020.¹¹⁵ According to the United Nations, between two and five percent of global GDP (\$1.6 to \$4 trillion) annually involves money laundering and illicit activity. So criminal cryptocurrencies pale when compared to fiat currencies for crime. Jake Chervinsky, general counsel of Compound Labs, told *Forbes’* Hailey Lennon, “It’s disappointing to hear Dr. Yellen repeat the mistaken view that crypto is mainly used for illicit activities. Her statement is demonstrably false.”¹¹⁶

In fairness to Secretary Yellen, she has many issues on her plate and likely has not fully considered the matter. However, leaders in the federal government, its agencies, and its regulators must understand that cryptocurrencies have a critical role in our economy and our society. Failure to embrace them fully and regulate them sensibly would seriously impair the US economy, the standing of the dollar as the world’s reserve currency, and America’s economic standing in the world.



The US government's failure to embrace cryptocurrencies fully and regulate them sensibly would seriously impair the US economy, the standing of the US dollar as the world's reserve currency, and America's economic standing in the world.

In fact, now is the time for some fresh thinking. The global pandemic, the rise of bitcoin, the creation of Facebook's Diem (formerly Libra), and China's adoption of a central bank digital currency, among other factors, have raised the urgency of making fundamental changes to our currencies.¹¹⁷ A key challenge for the new administration is to pivot from previous approaches and address this new opportunity (and related dangers) in a sensible and coherent manner.

As for the pandemic, the World Health Organization declared that hard currency could transmit the coronavirus and encouraged people to use contactless payments when possible.¹¹⁸ This came on the heels of China's drastic move to launder its money literally by taking cash out of circulation and either cleaning or destroying it.¹¹⁹

On one hand, payment innovation has increasingly marginalized cash as users turn to credit and debit cards. On the other hand, large denominations of cash make money-laundering easier. So with the drumbeat of credit card payments and Apple Pay growing louder and with cash both a potential carrier of COVID-19 and an accessory to crime, policymakers must understand the concept of a truly digital alternative to cash.

Without knowledge of this exciting new area, lawmakers and regulators have made inappropriate statements and taken inappropriate actions. Fortunately, the Biden-Harris administration is considering crypto-knowledgeable executives to lead key organizations. Among the prospects is Gary Gensler to chair the US Securities Exchange Commission (SEC). Gensler, who chaired the US Commodity Futures Trading Commission (CFTC) during the Obama administration, has been teaching about blockchain and cryptocurrencies at the Massachusetts Institute of Technology (MIT).¹²⁰ Former Ripple Labs adviser Michael S. Barr is under consideration to lead the Office of the Comptroller of the Currency (OCC) within the US Department of Treasury.¹²¹ Barr was an assistant secretary of the Treasury Department under President Obama and is currently the Joan and Sanford Weill Dean of the Gerald R. Ford School of Public Policy at the University of Michigan.¹²²

How digital currency differs from digital payments systems

Digital cash is fundamentally different from what exists today with credit cards, or Venmo, or the CashApp for that matter. Applications like Venmo, a popular payment application that handled around \$12 billion in payments in 2018, are more like digital wallpaper on the old edifice of banking. For example, when Mrs. Jones in Seattle uses Venmo to send money to her son at Stanford to cover his expenses while under quarantine, Venmo is merely moving money between two accounts at Venmo's bank. This works fine for the Joneses but fails when we think globally. Founded over a decade ago, Venmo is still available only to certain merchants and select American consumers who have bank accounts, leaving out billions of unbanked and huge untapped markets like remittances. In the end, Venmo captures valuable data about users that it can monetize but users can't.



Traditional cash is freedom enabling. If we are to eliminate traditional cash, we must develop digital cash that will be foundational to our privacy and independence in the economy.

If we are to eliminate traditional cash, we must develop digital cash that will be foundational to our privacy and independence in the economy. Traditional cash is freedom enabling. It protects the identities of women who want to buy contraceptives in communities that condemn birth control or sex outside marriage, and it allows us to buy goods and services without turning over our personal data to nontransparent organizations. Jerry Brito, executive director of Coin Center, a US-based think tank focused on issues related to cryptocurrencies, had it right: “A cashless economy is a surveillance economy.”¹²³

Digital cash must have these four characteristics. First, like traditional cash, it must be resilient; it should not rely on private banks and payment networks to function. Second, users should not need permission, birth certificates or identity cards, or other pieces of technology to use it. Third, users must be able to use it anonymously to buy goods and services. Finally, digital cash must be ubiquitous and easy to use, not requiring a traditional bank account or high-tech device. With those features in mind, let’s look at the types of proposed digital currencies.

Three types of digital currencies

Currently there are three kinds of digital *money* (but not necessarily digital *cash*) in use or under development, each with its own benefits and limitations. The first are *community-driven currencies* like bitcoin, designed from the outset to be a decentralized P2P payment network—in other words, digital cash. Bitcoin already acts as a type of digital cash: it’s a decentralized, P2P payment system open to anyone with Internet access. Just as cellular technology allowed billions of people to leapfrog landlines, bitcoin could leapfrog legacy financial institutions. Even with sensible regulation, bitcoin is not a panacea. It is not yet widely held; it’s still not all that intuitive to use; and its value is volatile. So, while we can encourage a policy that enables bitcoin to flourish, we need to explore other options.

The second are *corporate currencies* developed by private companies and useable inside and outside their corporate network, such as Facebook’s Diem. These initiatives could make payments easier, especially for the world’s unbanked. As such, the new administration should cautiously support them. They are not, however, substitutes for cash. The private corporations that back them govern them, payments are not anonymous, and users are beholden to companies that can change the terms of use at any moment.

The third are *central bank digital currencies* (CBDC) issued by governments and central banks. As of mid-July 2020, at least 36 central banks have published work on retail or wholesale CBDCs. Ecuador, Ukraine, and Uruguay have each completed a retail CBDC pilot. Six retail CBDC pilots were underway in the Bahamas (Central Bank of the Bahamas’ Sand Dollar pilot), Cambodia, the Eastern Caribbean Currency Union (Eastern Caribbean Central Bank’s DXCD pilot), Korea, China, and Sweden. Specifically, the People’s Bank of China has piloted its Digital Currency Electronic Payment in four cities, coinciding with the country’s phasing out of its pandemic-



related mobility restrictions. Likewise, Sweden's testing of its e-krona continues amid its central bank crisis management measures.¹²⁴

The value of initial coin offerings

Token generation events, also known as *initial coin offerings* (ICOs), have raised billions to fund the development of novel blockchain applications and protocols and have paved the way for a new generation of P2P venture finance. For example, the crowdfunding of the Ethereum project in 2014 raised \$18 million in bitcoin to finance the development of the Ethereum blockchain, which launched in 2015.¹²⁵ Three years later, EOS financed its protocol via a yearlong ICO. The project raised a whopping \$4 billion in cryptocurrency (and holds the record for blockchain-based finance to date).¹²⁶ At last, entrepreneurs had a new way to raise capital without costly intermediaries, and investors had a digital gateway to invest in innovative ventures. It was a disruptive breakthrough for democratizing finance and venture investing for the average "retail" investor, who had been excluded from early-stage projects because of the large minimum investment, high commissions, and accredited investor requirements. On the surface, venture finance seemed to signal the dawn of a new day.

Token generation events, also known as initial coin offerings, have raised billions to fund the development of novel blockchain applications and protocols. They have ushered in a new generation of peer-to-peer venture finance.

Yet numerous problems led to the bursting of the ICO bubble and the attention of regulators the world over. Many ICOs were outright scams.¹²⁷ Some ICO-funded projects burned through their capital with little or no product to show investors, and no 1-800 help line to answer queries about project status. Regulators soon determined that, in some cases, ICOs would require registration with authorities and, in all cases, should provide appropriate disclosures and maintain practices that protected investors, including anti-money-laundering/know-your-customer (AML/KYC) requirements.¹²⁸ Regulators also took action against projects whose crowdfunding activities violated securities laws, including the many ICOs that were unregistered, fraudulent, or otherwise suspect, with long-lasting impact on the cryptoasset industry. Consequently, the list of SEC's Cyber Enforcement Actions is long.¹²⁹

As the technological and regulatory frameworks mature, ICOs are likely here to stay. The Biden-Harris administration should support the opportunity for entrepreneurs to raise capital using digital channels. Governments could become model users of this finance technology, where citizens could directly fund billion-dollar, government-led initiatives with lower minimum investment amounts and higher yields than traditional government-issued securities. In other words, they would participate as citizen stakeholders, funding projects that have an impact on their lives.

Facebook's Diem project

Central bankers must also contend with the reality of corporate and other private sector digital currencies such as Facebook's Diem. The Diem blockchain could grow very quickly, making it one of the



The Diem blockchain could grow very quickly, making it one of the largest central banks in the world, accountable to shareholders but not necessarily to citizens. It could become too big to fail.

"If [Diem] has 100 percent reserves, they are killing the fractional reserve system."

 **BILL BARHYDT**
*Founder and Chief Executive Officer
 Plutus Financial Inc. d/b/a
 Abra*

largest central banks in the world, accountable to shareholders but not necessarily to citizens. It could become too big to fail, making the bailout of the American International Group look like chump change.¹³⁰

This systemic risk, combined with the real risk that individuals opt out of local payment infrastructure and currencies in favor of global corporate coins, should raise concerns for central bankers. In an op-ed for the *New York Times*, Matt Stoller, a fellow at the Open Market Institute, wrote about the threat that such a private currency scheme could present:

What happens if all users want to sell their Diem currency at once, causing the Diem Reserve to hold a fire sale of assets? If the Diem system becomes intertwined in our global economy in the way Facebook hopes, we would need to consider a public bailout of a privately managed system. Sorry, but no thanks.¹³¹

Stoller doesn't think that the government should allow the launch of any private global payments system that taxpayers would have to bail out because it had become too big to fail. During the Congressional hearings on Diem, House Financial Services Committee Rep. Gregory Meeks (D-NY) suggested that a successful Diem "would absolutely make [Diem] a systemically risky financial institution, and we would expect [the Financial Services Oversight Council] to designate [Diem] as such."¹³²

Stoller also raised a concern regarding national sovereignty. To his mind, a public currency scheme dependent on the consensus of a large number of private nodes wasn't a democracy, no matter how decentralized the network or open the protocols: "Today, American bank regulators and central bankers are hired and fired by publicly elected leaders. Diem payments regulators would be hired and fired by a self-selected council of corporations. There are ways to characterize such a system, but democratic is not one of them."¹³³

Another concern is what Diem might do to many economies in the developing world, where more people have a Facebook account than a bank account. They may choose to transact and store value in Diem rather than the local currency. India has been openly hostile to bitcoin, shutting down exchanges and considering jail time for users and bitcoin entrepreneurs.¹³⁴ They may not be able to bully Facebook and other big tech companies so easily, but they could target merchants and users of Diem, if they saw Diem as a threat.

If Diem is successful, it may cause people to rethink fractional reserve banking. Today, commercial banks typically lend up to 10 times as much money as they hold on deposit. This expansion of money in the form of new credit can help fuel economic growth but raises systemic risks when depositors get jittery and demand their money back. In turn, the bank calls its loans leading to a credit crunch and economic crisis. As Bill Barhydt of Abra said, "If [Diem] has 100 percent reserves, they are killing the fractional reserve



system."¹³⁵ Perhaps people would prefer having money “on deposit” with a bank that does not create so much new money.



Members of Boy Scout Troop 133 from Gloucester County, Virginia, are among the first to utilize the work trailer. Photo by Virginia State Parks, 2020, used under CC BY 2.0. Cropped.

“A sovereign digital currency could ... [remove] the need for the public to keep deposits in fractional reserve commercial banks.”

 DAVID YERMACK AND MAX RASKIN
Professors
New York University

Central bank digital currencies

Finally, many central bankers are contemplating what a digital fiat currency could do, and some have already launched projects. In ten more years, we expect the landscape of global currencies to look very different from how it does today. “The blockchain technology behind digital currencies has the potential to improve central banks’ payment and clearing operations, and possibly to serve as a platform from which central banks might launch their own digital currencies,” wrote New York University professors David Yermack and Max Raskin back in 2016. “A sovereign digital currency could have profound implications for the banking system, narrowing the relationship between citizens and central banks and removing the need for the public to keep deposits in fractional reserve commercial banks.”¹³⁶

In other words, money is regulated, governed, and managed differently from information. The new Internet of value will require leadership exquisitely attuned to these challenges and prepared to chart a new course.

By becoming a model user of technology, streamlining laws and regulations, and funding education and training initiatives, a national government could set off a Cambrian Explosion of new business development and lay the foundation for a global innovation economy

centered within its borders. One immediate use case for digital cash is remittances, a key source of income for nations with developing economies. According to Dilip Ratha, a World Bank economist, remittances are projected to shrink by 14 percent this year. Part of the problem is the cash itself: nearly 85 percent of all remittances are cash based. Workers typically take their money to a wire transfer shop and wire it home to their families. But during the pandemic, many of these shops have been closed.¹³⁷ With a digital cash option, these workers could use their phones to transfer funds.

So far, many of the actual government cryptocurrencies have been proposed or poorly implemented by authoritarian regimes such as Venezuela, Iran, and Turkey. As noted, China has taken some bold steps, and the Bahamas, Cambodia, Ecuador, Korea, Sweden, Ukraine, and Uruguay have projects underway.

Digital modernization of the US dollar promises less friction, less cost, more inclusion, and better policy tools.

The Digital Dollar Project

In May 2020, the Digital Dollar Project (*DigitalDollarProject.org*), an organization seeking to advance exploration of a US dollar as a CBDC, published a detailed white paper entitled “Exploring a US CBDC.”¹³⁸ The Digital Dollar Project is a not-for-profit venture between Accenture and the Digital Dollar Foundation headed by former US Commodity Futures Trading Commission Chairman J. Christopher Giancarlo.

With the help of a nonpartisan advisory board of leading experts, the four authors of the white paper posited that for the US dollar to remain the world’s primary reserve currency, it must modernize from an analog to a digital, programmable instrument and unit of account for assets increasingly denominated as digital tokens. They encouraged the United States to prioritize and expand exploration of a US dollar CBDC for the same reason that it must modernize all economic and commercial infrastructure—to keep pace and benefit from advanced, new architectures of technology and innovation. Digital modernization of the US dollar promises less friction, less cost, more inclusion, and better policy tools. It means new digital monetary architecture built alongside an older analog foundation.

Following the white paper’s release, former Chairman Giancarlo testified before three separate Congressional committees calling for the United States to prioritize and expand exploration of a US dollar CBDC.¹³⁹ He noted that the role of the US dollar as the world’s primary reserve currency carries with it American civic values such as rule of law, monetary stability, free enterprise, financial inclusion, and rights of individual privacy, all values that attract aspirational admiration around the globe.

Diminishment of the US dollar’s global role would signal the waning of its inherent values and the replacement with values ingrained in that of other societies and their currencies, such as law subordinate to state policy, planned economies, controlled capital markets, and state surveillance over individual privacy. Maintaining the leading role of the dollar in international markets—and the values it carries with it—must be a national priority.



The Digital Dollar Project maintains that the exploration of a well-architected, durable, and universal US CBDC is in America's national interest and that of the world economy. Considering it properly will be an enormous and complicated undertaking. US policymakers must do so carefully, thoughtfully, deliberately, and in partnership with the private sector—but not in a hurried manner. Something as complex and worthy of the US dollar's global importance will take time and seriousness to get it right.

Nevertheless, now is the time to start. The recent launch of SpaceX reminded us that the United States explored outer space and the lunar surface through a series of pilot programs known as Mercury, Gemini, and Apollo. So, too, should the United States explore a US CBDC in a series of well-conceived and executed pilot programs in thoughtful partnership between the public and private sectors in the best tradition of American innovation.

The regulatory and market environment

The regulatory infrastructure in the United States impacting digital assets is complex. Financial services regulation is highly specialized, spread across distinct regulators of securities, commodities, and currencies, among others. Each regulator approaches activity using blockchain technology from a specific perspective, creating a somewhat disjointed regulatory compliance landscape and ultimately making it difficult for innovators to confidently develop appropriate compliance strategies.

"Policymakers have a role in ensuring that tokenized markets are consistent with regulatory aims of promoting financial stability, protecting financial consumers, and ensuring market integrity," said Greg Medcraft, director of the OECD Directorate for Financial and Enterprise Affairs. "Existing regulation may need to apply to new actors and new products, and new requirements may need to be designed to address emerging risks stemming from the novel nature of some of the business models and processes involved in tokenization."¹⁴⁰

"Policymakers have a role in ensuring that tokenized markets are consistent with regulatory aims of promoting financial stability, protecting financial consumers, and ensuring market integrity."

 GREG MEDCRAFT
Director
Directorate for Financial and
Enterprise Affairs
OECD

Securities

The SEC and its staff have historically interpreted the definition of *security* broadly to include an "investment contract."¹⁴¹ In the seminal 1946 case *SEC v. Howey* on interpreting the scope of the term "investment contract," the Supreme Court held that the term encompassed "a contract, transaction, or scheme whereby a person invests his money in a common enterprise and is led to expect profits solely from the efforts of the promoter or a third party."¹⁴² Under the four-part *Howey* test, an investment contract exists if there is: (1) an investment of money; (2) in a common enterprise; (3) with a reasonable expectation of profits; (4) to be derived from the entrepreneurial or managerial efforts of others.¹⁴³

In July 2017, SEC considered whether so-called ICOs involve, or could involve, the issuance of securities. It issued a "Report of



To date, SEC has not formally determined that virtual currencies are not securities.

Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934” in which it concluded that the digital tokens issued by the Decentralized Autonomous Organization (the DAO) were securities (the “DAO report”).¹⁴⁴ As described in the DAO Report, the DAO (i.e., an unincorporated association) issued tokens (called TheDAO) via a website. Investors purchased TheDAO tokens with ether. The DAO intended to use the funds it raised through the sale of TheDAO tokens to fund “projects.” TheDAO token holders stood to share in the anticipated earnings from these projects as a return on their investment. After the initial issuance of TheDAO tokens, a secondary market for trading TheDAO tokens developed. Using the *Howey* test, SEC concluded that TheDAO tokens were securities issued without registration under the Securities Act.

After publishing its DAO report, SEC brought several enforcement actions related to so-called ICOs—most of them against persons who’d launched Ponzi schemes or other outright frauds.¹⁴⁵ In its *Munchee* order, however, SEC determined that MUN tokens were securities, in part, because of the issuers’ statements on social media and elsewhere that Munchee’s efforts would increase the value of MUN tokens.¹⁴⁶

Despite this activity, former SEC Chair Jay Clayton stated publicly that he did not view virtual currencies to be securities and former SEC Director of Corporation Finance William Hinman stated that bitcoin and ether were not securities; however, to date, SEC has not formally determined that virtual currencies are not securities.¹⁴⁷

Commodities

The CFTC has determined that “bitcoin and other virtual currencies” are a type of commodity.

The CFTC has determined that “bitcoin and other virtual currencies” are a type of commodity, and a federal court has likewise ruled that the term “‘commodity’ encompasses virtual currency both in economic function and in the language of the statute.”¹⁴⁸

Currency

The Financial Crimes Enforcement Network (FinCEN)—the Treasury agency charged with administering and enforcing the Bank Secrecy Act (BSA)—and state Banking regulators have treated certain digital assets as currency. Pursuant to FinCEN’s guidance published on 18 March 2013, “administrators” and “exchangers” of convertible virtual currency are treated as money transmitters under the BSA and are thus subject to its AML requirements.¹⁴⁹

Exchanges that receive for transmission or transmit US dollars in exchange for virtual currency are regulated as money transmitters in many states in which they operate or have customers. Some state regulatory regimes may entail particularly stringent obligations and/or may be geared particularly toward firms engaged in the purchase, sale, generation, or distribution of convertible virtual currencies. For example, a company engaging in a “virtual currency business activity” triggers the New York Department of Financial Services “BitLicense” requirements.¹⁵⁰



Payment mechanism

The OCC published an advance notice of proposed rulemaking to confirm that banks may use blockchain for permissible activities.

Within the Treasury Department, OCC made significant strides toward enabling national banks to adopt digital assets using blockchain technology. Specifically, OCC issued guidance to banks through three interpretive letters, clarifying that banks may hold digital assets in custody, hold reserves for stablecoins backed one US dollar to one coin, and operate as nodes and use stablecoins for payments activities.¹⁵¹ The OCC also published an advance notice of proposed rulemaking to confirm that banks may use blockchain for permissible activities. We encourage the Biden-Harris Administration to support the effect of these actions further.



A tour of the Houston Food Bank warehouse operations that include kitting (boxing and bagging) of food commodities by volunteers and servicemen of the Texas National Guard. Photo by Lance Cheung, 2020, public domain. Cropped.

Property

The Internal Revenue Service (IRS) treats convertible virtual currencies as property for US tax purposes. The guidance in the notice only applies to “convertible virtual currency,” defined as “virtual currency that has an equivalent value in real currency, or that acts as a substitute for real currency.”¹⁵² The notice cited bitcoin as one example of a convertible virtual currency, noting that it “can be digitally traded between users and can be purchased for, or exchanged into, US dollars, euros, and other real or virtual currencies.”

Because the IRS treats cryptocurrencies as property, all cryptocurrency users filing in the United States must track the gains or losses of every one of their cryptocurrency transactions to comply with IRS regulations.



Above all, this vibrant space requires urgent government action that clarifies the regulatory environment and takes bold steps to launch the US digital dollar.

Currently, the US regulatory culture trends toward enforcement, as we saw in the US Department of Justice's "Cryptocurrency: An Enforcement Framework," which acknowledged the importance of the innovation and then catalogued the US government's enforcement actions against it.¹⁵³

The Biden-Harris administration could take a far more balanced perspective of technology to promote its benefits for government, business, and consumers, to encourage investment and adoption, and to protect those investors and consumers where needed. This vibrant space requires urgent government action that, above all, clarifies the regulatory environment and takes bold steps to launch the US digital dollar.

A regulatory framework that supports innovation

The Chamber of Digital Commerce has identified the following areas within the financial services sector that need government attention or clarification to ensure that blockchain innovators and DLT can thrive and responsibly deliver better products and services in the United States.

Coordinated strategy for fostering innovation and development

The United States is currently home to substantial technological innovation, but this does not guarantee its preeminence in the DLT sector. Other major industrialized nations are making significant advances in promoting and adopting this technology, some with government backing. Without clear guidance and support, the United States risks falling behind.

The US needs a national strategy and a coordinated agency approach to promoting the acceptance and use of digital assets through public statements from the highest levels of government.

The United States needs a national strategy and a coordinated agency approach to promoting the acceptance and use of digital assets through public statements from the highest levels of government.¹⁵⁴ The national strategy should encourage development in the private sector and adopt a light-touch regulatory approach as the industry establishes key innovations, while bringing enforcement actions against clear violations of law. Implementing regulations that focus on the function performed rather than the technology in a manner that is clear, predictable, and developed with future innovations in mind are a key component of the strategy. This coordinated approach would prevent regulatory inconsistencies that create confusion for industry and government. A meaningful way to ensure streamlined regulation and growth of the blockchain industry across government agencies is to establish within the Department of Commerce an Office dedicated to promoting blockchain technology.

Guidance on digital tokens

Many participants in the blockchain industry have developed tokens for using their systems or funding their development or operation.



Creating clear definitions and spaces for tokens to exist would not only benefit US innovation and deter fraudulent activities, but keep innovators within the United States.

Some tokens such as bitcoin and ether are widely understood not to be securities under federal securities laws. In other instances, if a token or method of distribution meets certain criteria, the SEC has deemed it a security and brought enforcement actions against its issuer.

To determine whether an investment contract such as a token is a security, SEC uses the *Howey* test derived from a 1946 US Supreme Court case.¹⁵⁵ The *Howey* test predates the digital age. Through speeches, testimony, enforcement actions, and other means, SEC commissioners and staff have attempted to signal to market participants the characteristics of a token that might make it a security. Such guidance is not binding on future agency action. The recent publication of a *Framework for "Investment Contract" Analysis of Digital Assets* is a helpful checklist for companies.¹⁵⁶ However, its numerous criteria, without weighting, hinders its usefulness; and the no-action letter published at the same time of the framework was limited.¹⁵⁷

Companies operating in the United States need a digital token definition that clearly articulates the criteria for when the government deems a token a security or a use-based or "utility" token that serves a fundamental purpose—an integral part of a service offering and not an investment contract under the *Howey* test.¹⁵⁸ Creating clear definitions and spaces for these tokens to exist would not only benefit US innovation and deter fraudulent activities, but keep innovators within the United States.¹⁵⁹ Drafting legislation that spells out these criteria and amends securities laws as appropriate and creating safe harbors or other exemptive relief would greatly reduce the legal uncertainty around this nascent set of digital technologies.

Clarification of custody of digital tokens

With digital tokens, no object is stored physically. The technologies and methods used to maintain ownership and to safeguard these assets continuously evolve.¹⁶⁰ Regulators must be mindful of this evolution as they consider guidance to participants on the application of existing regulatory requirements surrounding custody to innovative technologies.¹⁶¹

This changing technology is moving faster than regulatory infrastructure and decision-making. Regulated broker-dealers and investment advisers, lawyers, independent auditors, and others have spent countless hours trying to apply rules written for physical and book-entry securities to the blockchain environment. The market needs definitive government guidance and asks officials to stay open-minded as to what could constitute possession or control.¹⁶²

Recognition of the power of provenance

Blockchains provide unprecedented ability to track and trace transactions, by token and by wallet or account. Unlike cross-border wire transfers, blockchains perfectly preserve the provenance of



This changing technology is moving faster than regulatory infrastructure and decision-making.

financial transactions. They have already helped in detecting and prosecuting criminals and can strengthen real-time auditability of financial transactions and facilitate look-backs, transaction monitoring, tracking, audits, and reporting.

FinCEN and prudential financial regulators should consider how to apply AML/KYC requirements to financial institutions engaging in virtual currency-related activities, including how to comply with sanctions. Their guidance will have a substantial impact on fungibility in the token market and the adoption of tokens as a means of exchange or as evidence of value or ownership. A forum similar to the BSA Group could help discuss these issues. Finally, technology renders traditional notions of KYC obsolete and ineffective. A KYC utility could enhance compliance and permit financial institutions to elevate potential fraud more swiftly. Conversely, regulators should carefully balance notions of oversight with the need to preserve financial privacy for consumers.



An Election Protection volunteer outside a polling place in Minneapolis, Minnesota. Photo by Lorie Shauli, 2020, used under CC BY 2.0. Cropped.

A KYC utility could enhance compliance and permit financial institutions to elevate potential fraud more swiftly.

In December 2020, the US Department of the Treasury published a notice of proposed rulemaking (NPRM) concerning transactions of *convertible virtual currency* and *legal tender digital asset transactions* that negatively targeted self-managed wallets.¹⁶³ The proposed rule had the effect of allowing FinCEN to track every transaction that self-managed wallet owners make—past, present, or future, whether below or above the reporting and record keeping thresholds. Such a result could easily spell the end of any semblance of financial privacy for blockchain users and is far beyond what is currently available or required for cash transactions. The Treasury Department also provided extraordinarily short response times—15 calendar days spanning several federal holidays—which were insufficient compared to the importance of the compliance and privacy issues implicated and which violated administrative procedure law.



On January 20, shortly after he was sworn in, President Biden froze all regulatory proposals for more careful review.¹⁶⁴ In another positive move the following week, FinCEN extended its NPRM by 60 days to allow for more feedback.¹⁶⁵

Clarification of tax guidance

In 2014, the IRS issued Notice 2014-21 that addressed the tax treatment of “convertible virtual currency” that taxpayers should treat it as property, not currency.¹⁶⁶ Consumers would realize gain or loss upon a sale or exchange of such property. Without issuing further guidance, the IRS sent letters to more than 10,000 taxpayers who may have failed to report income and pay tax resulting from virtual currency transactions to follow unclear guidance.¹⁶⁷

American entrepreneurs, bankers, and citizens need comprehensive guidance addressing the tax treatment of virtual currencies and digital securities tokens. This guidance should consider the use of virtual currencies as a payment mechanism and as an investment asset class. It should also account for the technology’s rapidly evolving nature. Moreover, the IRS should acknowledge that virtual currencies used as a form of payment should not incur capital gain/loss treatment nor trigger income taxes.

American entrepreneurs, bankers, and citizens need comprehensive guidance addressing the tax treatment of virtual currencies and digital securities tokens.

Need for accounting standards

Currently, no authoritative literature exists under Generally Accepted Accounting Principles within the Financial Accounting Standards Board (FASB) in the United States or International Financial Reporting Standards (IFRS) that addresses digital assets, including virtual currencies. The growing number of transactions using virtual currencies requires accounting guidance for the recognition, measurement, presentation, valuation, and disclosure of virtual currencies and related transactions. FASB and IFRS should address accounting standards for virtual currencies, so that companies seeking to invest and innovate in this technology can help to fuel our country’s much-needed economic growth.¹⁶⁸

Need to streamline multifaceted industry oversight

Primary oversight of virtual currency spot market activity—including wallet providers and exchanges—falls primarily under state money transmission laws and federal AML enforcement. Each state has its own licensing requirements, focusing on consumer protection, background checks on company management, and the money transmitter’s solvency.

These companies must also register with FinCEN as money services businesses and comply with the AML program. Compliance with this patchwork of state and federal regulations is costly. For blockchain companies, often start-ups with seasoned industry executives, the inconsistent framework constitutes a high barrier to entry.



Ultimately, the US government must publicly recognize the economic and international significance of blockchain and establish a framework for boosting and promoting its development.

The CFTC has jurisdiction over derivatives of virtual currencies traded in the United States. While it does not directly oversee markets or platforms conducting cash or “spot” transactions in virtual currencies, it does maintain after-the-fact enforcement against fraud and manipulation.¹⁶⁹ The SEC also has jurisdiction over any “platform that offers trading in digital asset securities and operates as an ‘exchange’ (as defined by the federal securities laws), [which] must register with the [SEC] as a national securities exchange or be exempt from registration.”¹⁷⁰ What about an exchange that sells a digital token that is not a security, and one that is?

CFTC, FinCEN, SEC, state regulators, and other regulatory bodies all have jurisdiction to oversee various aspects of virtual currency markets. The United States must streamline oversight of the industry much better.

Ultimately, the US government must publicly recognize the economic and international significance of blockchain and establish a framework for boosting and promoting its development. Without this, the nation will fall behind other countries whose leaders are seizing this singular opportunity to pioneer what could become international regulations and standards in this technology.

The US dollar as a global digital reserve currency

Governments have not always been good stewards of fiat currencies, and the lack of strong stewardship has created an opening for bitcoin or alternatives.¹⁷¹ In the book *Financial Services Revolution*, Alex Tapscott explained how cryptocurrencies required central banks to confront the possible end to government monopolies on money and monetary policy, a key lever that central banks can pull to influence the economy and exert sovereignty over people.¹⁷² The rise of blockchain technology has renewed “debates over the wisdom of these policies [and] led to a revival of interest in classical monetary economics,” according to NYU professors Yermack and Raskin.¹⁷³

A larger debate is brewing over the US dollar’s reserve status in the world.

A larger debate is brewing over the US dollar’s reserve status in the world. In 2013, Russia started “de-dollarizing,” extricating its banks from dealing in greenbacks.¹⁷⁴ That same year, China announced its Belt and Road Initiative, an ambitious economic infrastructure project spanning 65+ countries, with more the 30 bilateral currency swap agreements in place and—as of 2016—inclusion in IMF’s basket of global reserve currencies.¹⁷⁵ According to OCBC Wing Hang Bank economist Carie Li, “countries such as Russia, Iran, Pakistan, Malaysia, Vietnam, and India are increasingly using renminbi for trade settlement.”¹⁷⁶

In 2018, the European Commission began promoting the use of the euro in cross-border transactions, with a goal of securing Europe’s economic autonomy and increasing the euro’s importance in the global economy.¹⁷⁷ In 2019, Mark Carney, then-governor of the Bank of England, suggested replacing the US dollar as the world’s reserve currency with a synthetic global currency backed by a basket of government-issued digital currencies. Carney’s speech was



“The creation of the eurozone and China’s entry into the World Trade Organization heralded the beginning of an era in which the USD’s reserve status may no longer be taken for granted.”

 DANIEL TENENGAUZER
JOHN VELIS
GEOFF YU
*BNY Mellon Markets
Bank of New York Mellon
Corp.*

An investment in building world-class digital capabilities in federal and state government will have generous payoffs.

aspirational in tone and vague on details but provided an intriguing starting point. In theory, “decentralizing” the governance of such a supranational currency across different nation-states would prevent any single government from controlling it or any single authority from surveilling how it’s used.¹⁷⁸

In 2020, Goldman Sachs Group issued a warning: the US dollar’s longevity as the world’s reserve currency was at risk because of US policy, according to *Bloomberg News*.¹⁷⁹ While noted economists do not share that view, the mere discussion should wake up US government officials.¹⁸⁰ BNY Mellon summed it up best: “The creation of the eurozone and China’s entry into the World Trade Organization heralded the beginning of an era in which the USD’s reserve status may no longer be taken for granted.”¹⁸¹ As central bankers come to terms with the threats and opportunities of trivergent technologies, from cryptocurrencies and distributed ledgers to AI, IoT, and the tokenization of assets, now is the time for Bretton Woods 2.0, anchored by a US CBDC.¹⁸²

4. Retooling government services

While the federal government has made improvements, it really must rebuild its technology infrastructure for the new realities and the new possibilities. The technological capabilities described in this report are profound, even mind-boggling in their potential. Indeed, the list of novel applications for these powerful tools seems to increase daily. But how can public servants and political leaders harness these diverse and evolving capabilities? Where does one even start? For example:

- » Could service delivery move from a transactional approach to a “holistic,” client-centered perspective where citizens and small business owners play a more active and ongoing role in defining and even assembling the basket of services they need?
- » Could public agencies use technology to improve decision-making and channel greater ingenuity from citizens and the private sector into efforts to solve major public policy challenges?
- » Could regulatory bodies take advantage of the growing abundance of data to streamline approvals and better target inspections?

In this section, we make the case that an investment in building world-class digital capabilities in federal and state government will have generous payoffs for citizens, policymakers, small businesses, large corporations, and taxpayers.

Among the benefits are better online experiences, greater convenience, engagement with representatives and constituents,



better decisions through data analytics, streamlined licensing and regulatory processes, less reliance on outside vendors and proprietary solutions, and cost savings across the board over time.

A Digital Marshall Plan to upgrade the user experience

America needs a Digital Marshall Plan to retool government infrastructure and transform the leadership ethos and culture within federal agencies.

To achieve these benefits, the Biden-Harris administration must demonstrate significant progress and leadership in upgrading the digital experience for citizens and businesses. What America needs is nothing less than a Digital Marshall Plan of sorts, to retool government infrastructure for the second era of the digital age. This plan goes well beyond simply creating a “frictionless” digital experience for citizens and businesses on mobile and desktop platforms. It also entails creating a digital leadership ethos and culture within federal agencies and building new digital capabilities with a highly skilled workforce and modern tools.

Most Americans today routinely use incredibly powerful digital services at work and in their daily lives—social networking, media streaming, sophisticated enterprise systems, and so forth. Citizens are accustomed to digital applications that are elegant in design, intuitive, and fun to use. The most popular of these support billions of users simultaneously and rarely experience any downtime. In this context, modernizing public service delivery in an innovative and efficient manner is an imperative.

That’s why the 115th Congress passed into law the “21st Century Integrated Digital Experience Act” in 2018.¹⁸³ Commercial services have set a high bar for government. A global survey reveals that citizens want their governments to go beyond simply having an online presence; they expect online services that deliver personalized experiences that are relevant to the user and of similar quality and responsiveness as those experiences already widely delivered by the private sector.¹⁸⁴

In other words, citizens expect online public services to be highly functional, efficient, well-designed, and accessible via mobile devices. Popular requests from citizens included prefilled information to cut down the time required to fill in forms, instant online communication and assistance, and recommendations for additional information.

The rapid acceleration of digital innovation is opening up new possibilities for services that scarcely seemed possible just a decade ago.

As we look forward, the rapid acceleration of digital innovation is opening up new possibilities for services that scarcely seemed possible just a decade ago: clothing embedded with medical sensors that monitor key vital signs and whether a person gets enough sleep; a presence-sensing thermostat in the living room that turns the heat down when nobody is home; a refrigerator that monitors food consumption patterns and automatically orders fresh groceries; a worldwide fleet of autonomous vehicles that reduces the need for car ownership, revolutionizes personal transportation, and alleviates urban congestion. Once the stuff of science fiction, such possibilities



are here today. How can the Biden-Harris administration respond to these new possibilities and expectations? Here are four suggestions adapted from the best practices of the most customer-centric organizations.¹⁸⁵

Vaccinating the world: No longer mission impossible

With the pandemic still raging and lockdowns in effect throughout much of the world, controlling COVID-19 is top of mind. Vaccination is one way to do that, but 77 percent of US citizens are concerned about the safety and efficacy of the vaccines developed for that purpose.¹⁸⁶ For starters, eight in ten people believe they were approved far too quickly to understand their full effects.¹⁸⁷ Moreover, the vaccines approved require highly specialized conditions to ensure their stability.¹⁸⁸ Therefore, the public must trust that the vaccine is safe and that distributors are adhering these conditions.


Blockchain is a technology that can help address both these trust issues. According to Christopher Moose and Mark Treshock in the healthcare and life sciences group at IBM, manufacturers can monitor for adverse events and manage recalls more effectively, distributors can gain real-time visibility and respond far more efficiently to supply chain disruptions, and dispensers can manage inventory and monitor safety more closely than ever—all using blockchain and all with the goals of earning citizens' trust in the vaccines and returning them to their pre-pandemic lives. According to Treshock,

Blockchain is an information sharing utility within the pharmaceutical supply chain. IBM and others have been working in the supply chain space to create transparency. Working with Merck, KPMG, and Walmart, we developed a platform that was focused on meeting the Drug Supply Chain Security Act requirements—a drug track-and-trace regulation for prescription pharmaceuticals. This allows us to access the history of the movement of pharmaceuticals and to ensure that counterfeit or expired products are not in use.¹⁸⁹

Moose walked through the process of identifying a vaccine's authenticity and adding the verification data to the blockchain so that all stakeholders could trust the data about the vaccine's integrity. According to Moose, "You have to get to the trusted source of the information, integrating with the company's manufacturing lines, so that when a unique identifier is applied to a medication, you have a trusted source about that medication's point of origin."¹⁹⁰


Creating trusted supply chains for a task as monumental as global vaccine distribution during a pandemic is a precursor to the supply chains of the second era of the digital age. Treshock envisioned highly personalized supply chains, where healthcare professionals take precise biologic samples from a patient, send it to a lab, convert it into a medicine customized for the patient, and return it to the healthcare provider for administration to the patient. This process differs greatly from the pharmaceutical supply chains today, and the opportunity is clear.

"Blockchain ... allows us to access the history of the movement of pharmaceuticals and to ensure that counterfeit or expired products are not in use."

 MARK TRESHOCK
Healthcare and Life Sciences
Group
IBM Corporation



“The party that creates smooth processes in this area today will have a competitive advantage tomorrow.”

 MARK TRESHOCK
Healthcare and Life Sciences
Group
IBM Corporation

Executive leaders must understand that digital transformation is not just about the technology; it’s about using technology to underpin service excellence, innovation, and efficiency.

For us to realize this future, we must overcome existing challenges. We can use blockchain to identify the source and credibility of information so that people trust it when we share it. Blockchain also enables us to preserve individual privacy as we create credentials that are both verifiable and confidential at important checkpoints. But realizing this future requires leadership, stewardship, and fine-tuning.

As Treshock said, “The party that creates smooth processes in this area today will have a competitive advantage tomorrow.”¹⁹¹ According to Treshock, “When we apply AI and machine learning, we see an exciting future around this utility.” Overcoming the hurdles of vaccine distribution and collaborating around shared utilities such as blockchain will likely bring new meaning to the concept of shared value creation.

Digital leadership: Skin in the game

The first act in reinventing government is to establish a high-level mandate for digital service transformation. This means equipping leaders with a business case for how digital innovation can drive service excellence, establishing a high-ranking digital authority, and encouraging political and executive leadership to champion digital innovation.

Set a mandate for digital service transformation

A mandate for change and innovation starts with clear direction from the president, including specific digital transformation goals for executive leaders overseeing various federal departments, programs, and services. Above all, the new administration must create an explicit connection between digital and public service reform—that is, executive leaders must understand that digital transformation is not just about the technology; it’s about using technology to underpin service excellence, innovation, and efficiency.

Whether improving services or gathering evidence to inform policy decisions, the true promise of digital innovation will only be realized when connected to broader public sector efficiency and reform efforts. Indeed, by linking digital innovation with organizational transformation, federal leaders can help shift the conversation beyond an exclusive focus on technology toward a broader set of public sector performance objectives that all government executives can rally behind.

Establish a high-ranking digital authority with a mandate

Such an official needs a focused organization to oversee digital transformation of public service delivery. A good start is the GSA’s 18F (short for 1800 F Street, the GSA’s address), founded and staffed by Presidential Innovation Fellows.¹⁹² Going forward, the success of digital transformation efforts will depend on the appointment of a high-ranking chief digital officer (CDO) who possesses sufficient authority and resources to play a leadership role in service transformation efforts across the federal government.



Transformation requires leadership. The appointment of a chief digital officer should signal the importance of digital innovation to the broader civil service.

As much as officials encourage bottom-up experimentation and participation, bottom-up initiatives alone won't solidify the organizational and policy changes required to drive digital transformation in government. Transformation requires leadership. The appointment of a CDO should signal the importance of digital innovation to the broader civil service, create a clear accountability structure, and establish the authority to initiate necessary changes in legislation, bureaucratic processes, and organizational structures to ensure the administration's digital agenda succeeds.

Back the digital transformation agenda with sufficient funding

With a meaningful budget, the CDO and 18F can take on transformational "signature projects" that demonstrate visible wins and build momentum and enthusiasm throughout the government. The purpose of these signature projects is to:

- » Demonstrate the value of agile development, interdisciplinary teams, and the approach to public service innovation adopted by the CDO and 18F.
- » Identify implementation lessons and specific barriers to building world-class digital services.
- » Establish trust and collaborative relationships across agencies and departments.
- » Provide more reliable estimates for the value that government can create by investing in digital transformation by carefully measuring project outcomes.

As early digital projects prove their value, the CDO should be equipped to tackle projects with higher levels of complexity, but potentially greater payoffs in efficiency and cost savings.

Service culture over compliance mindset

True citizen-centricity in government means treating the citizen as an active participant rather than an inert recipient with little to contribute in return.

Traditionally, governments have designed and rolled out public services and then expected citizens to comply with the services' terms and conditions. Governments have done so directly or through broader ecosystems of public and not-for-profit partners. In both scenarios, governments have generally asked for one-size-fits-all service designs, usually linear, and then judged the model by outputs—how many checks did we mail, how many calls did we answer, how many students logged on and finished their lessons. Compliance with the rules and regulations of the service is paramount, especially in transactions.

True citizen-centricity in government would mean redefining service provision (e.g., delivering a benefits check) and a shift in focus from the process (i.e., the rules governing the dispersion of public benefits) to the outcomes, such as reducing poverty. It would also mean treating the citizen as an active participant rather than an inert recipient with little to contribute in return.



Rather than an unbending administrative, compliance-based culture of government, public service agencies would adopt a professional service culture where the public receives integrated and seamless services delivered in partnership with other levels of government. This won't be easy. "The stagnant culture is resistant to change for many reasons, including processes that punish efficiency," said Dache of the Government Blockchain Association. "For example, zero-based budgeting demands that any cost savings realized are offset by a spending frenzy at the end of the year to deplete the budget so that the agency's budget is not cut the next year and its political power diminished."¹⁹³

To put all this into practice, US federal departments and agencies need to make progress in three key areas: the digital service journey, agile design and service transformation, and digital architecture.

The digital service journey

Today's citizens do not want digital versions of the same paper-based processes they faced yesterday. Governments such as New Zealand and Estonia are reimagining and digitizing entire "customer journeys," that is, beginning-to-end processes that citizens or business managers experience in getting the answer, product, or service they need, through whichever channels they choose.¹⁹⁴

Let's start with the most basic of improvements: search. Citizens want to find the right information or service portal quickly and easily at all levels of government, yet many administrative bodies have not generally made their services indexable by the major search engines. That means that, when a citizen googles a service, it will likely not show up in the search results. Government must make their digital products and services more discoverable.¹⁹⁵

Service designers have identified a core set of customer journeys that account for the majority of the government's interactions with its constituents. For citizens, these journeys might start with finding and applying for Medicare and Medicaid, social security, and Veterans Administration benefits. For businesses, these interactions might include applying for grants, patents, copyrights, licenses, and certificates. The service designers should streamline, digitize, and integrate these journeys across channels.

At a minimum, public services should make it easy to transact, with less need for lengthy line-ups at public service counters.

At a minimum, public services should make it easy to transact, with less need for lengthy line-ups at public service counters. The online experience should be quick, intuitive, and seamless, regardless of the user's choice of device or access point. Services should enable customization and always invite feedback. In pursuit of excellence, service providers should routinely look for ways to involve users in shaping service design and delivery. Indeed, the Adobe and WPP survey confirms that today's citizens increasingly expect to be active participants, not passive recipients.¹⁹⁶

Modern services should facilitate collaboration and self-organization, recognizing that government needn't always be the primary



solution provider. As citizens increasingly connect around shared interests and goals, the public service may find that the most direct and effective way to facilitate social and economic progress is to encourage citizens in similar situations to co-create their own solutions.

Service transformation and agile design


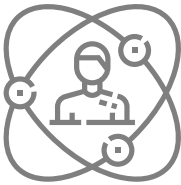




Service transformation starts with the deep cultural, behavioral, and process changes required to co-create amazing digital solutions and experiences for businesses and citizens. To enact these changes, the Biden-Harris administration must bring technology leaders together with those in policy, communications, and business to streamline development, build trust, and maximize the capacity to drive improvements in public service delivery.

Modern services should facilitate collaboration and self-organization, recognizing that government needn't always be the primary solution provider.

Create a playbook for digital services

As a starting point, the administration can leverage 18F's digital playbook to help guide the government's creation of world-class digital solutions. The playbook sets out clear criteria for designing and implementing high quality services. The playbook establishes the performance metrics and capabilities that services must achieve and issues guidelines for design and development practices that will result in services that meet user needs. In this sense, the playbook

Figure 3: What citizens want

 Search	 Experience	 Mobile	 Design	 Relevance	 Relationship
Can citizens easily find the information and service they need? Are agency offerings indexed and optimized for search?	From the user's first click online to service fulfillment, how friction-free and frustration-free is the experience?	Are services optimized, responsive, and accessible, no matter the device or the Internet conditions?	Does the interface and wireframe combine text, visuals, and other cues to guide users through a service?	Have we customized or personalized the user's experience, per the user's preferences?	How does the experience affect the user's relationship with government? Does it encourage more participation?

Source of data: Adobe and WPP, "Delivering Experiences That Count: Global Results and Insights on Digital Citizen Services," Presentation, Government and Public Sector Practice, 2017. Icons #1150575, #1702478, #681662, #1786971 by Freepik, #896530 by smallkeart, and #808497 by mynamepong from Flaticon, used under Flaticon Free License.



Replicating data silos across government services across agencies at local, state, and federal levels would be a hallmark of bad government cooperation and bad design.

Through homomorphic encryption, secure multiparty computation, and other digital innovations, government agencies could use citizen data in decision-making without ever decrypting it.

is more an approach to designing services than a set of prescriptions that could curtail flexibility and innovation. That said, the playbook should be authoritative; no new or redesigned services for federal departments or agencies should go live unless they meet these standards. Indeed, a key ongoing task for digital leaders will be educating their peers across the government about the playbook and ensuring they apply its principles and guidelines consistently to all the government's digital projects.

Design services to access but not hold citizen data

To the extent possible, the government should avoid digitizing each journey separately, where an individual or business must respond to the same set of questions separately. Replicating data silos across government services across agencies at local, state, and federal levels would be a hallmark of bad government cooperation and bad design.

With changes in laws and regulations that give citizens and business owners control over their own data, then they could simply allow local, state, and federal apps to access the necessary data but not copy nor store it in local, state, or federal databases. That means government employees must learn to use digital tools that combine the transparency of algorithms with the privacy of data.

For example, the MIT Enigma project provides a “decentralized computation platform with guaranteed privacy,” through such digital solutions as homomorphic encryption and secure multiparty computation.¹⁹⁷ According to Ann Cavoukian, distinguished expert-in-residence at the Privacy by Design Centre of Excellence and a senior fellow of the Ted Rogers Leadership Centre, both at Ryerson University, “Enigma takes your information—any information—breaks it up, and encrypts it into pieces of data that are randomly distributed to nodes in the network. It doesn't exist in one spot.”¹⁹⁸ Designed at MIT Media Lab by Guy Zyskind and Oz Nathan, “Enigma uses blockchain technology to embed the data and track all the pieces of information,” Cavoukian said. Citizens could share their data with government agencies and those agencies could use it in decision-making without ever decrypting it.

Modernize service design processes

Modernizing processes means agile development, rapid prototyping, and iterative experimentation to scale across the government. “Agile” methods of project management are a best practice for creating digital services that effectively meet user needs. “Waterfall” methodologies assume that planners can anticipate everything, whereas “agile” development allows for the unanticipated. It is an incremental, fast-paced style of software development.¹⁹⁹ Its iterative approach reduces the risk of failure by launching software quickly, watching people use prototypes, adjusting specifications and plans, adding new features, and relaunching, putting the service into production when it is good enough. Using robotic process automation, quality assurance engineers can automatically test and debug (or identify problematic code) to speed the iterations.²⁰⁰



All digital transformation projects should start by pinpointing user requirements so that their needs and preferences inform technical and design decisions.

Design jams and hackathons represent a powerful way to get citizens and business owners engaged in improving how services are designed and delivered.

Implement a rigorous user-testing regime for digital services

All digital transformation projects should start by pinpointing user needs and understanding how services fit into their lives to ensure that technical and design decisions are informed by the needs and preferences of real clients. Once new products and services are launched, the need for user input is ongoing. Service owners should continuously reassess and adapt to the current environment by testing and refining their solutions with the people who are using them. This includes measuring how well a system performs and how people are interacting with the system in real time.

For example, the UK Government Digital Service (GDS) unveiled a user research lab equipped with state-of-the-art technology, allowing researchers to closely monitor how users interact with the new digital services.²⁰¹ The lab includes recording facial expressions to see whether people are distressed or excited, tracking their eye movements on screen and recording where they are moving and clicking. Research sessions also involve interviews or workshops to find out about habits, lifestyle, and thought patterns. With this user testing, GDS can uncover insights for improving service design.

Hold design jams with citizens and business owners

A survey of the world's most successful and transformative digital projects reveals a common attribute: digital innovators don't build products, programs, or services for passive audiences; they build products and services that invite ongoing user participation. Consider a recent Austin Design Jam where tech members of the American Institute of Graphic Arts came together virtually during the pandemic to develop digital tools for restaurant workers "to create financial and career security in a volatile economy," in partnership with the Restaurant Workers' Community Foundation, an advocacy nonprofit for restaurant workers.²⁰²

Design jams and hackathons represent a powerful way to get citizens and business owners engaged in improving how services are designed and delivered.²⁰³ Potential collaborators include citizens who volunteer to test new prototypes, small to medium-sized enterprises (SMEs), freelance coders that participate in hackathons, and university researchers and analysts who lend their expertise to open data projects. For example, New York City has hosted six hackathons, including events organized by NYC BigApps and the Department of Consumer Affairs, and taken part in more than 20 external hackathons, from HackNY to Techcrunch Disrupt.²⁰⁴

Enhance personalization capabilities

When digital leaders like JPMorgan identify the investments in digital transformation that have had the most significant impact on driving digital adoption and improving customer satisfaction, functionality to support personalization always ranks near the top. From retailers like Amazon to media giants like Netflix, personalizing the



When citizens identify the most important attributes of a positive experience using digital public services, their ability to personalize interactions ranks highly.

information and content users see—and enabling users to customize their experience—lies at the heart of what makes them successful. Therefore, when citizens identify the most important attributes of a positive experience using digital public services, their ability to personalize interactions ranks highly.

A survey by Accenture, for example, found that 79 percent of respondents want to “be able to see the status of [their] request or activity,” 69 percent expect “information organized by [their] need or issue,” and 40 percent prefer “to receive recommendation and features tailored to [them].”²⁰⁵ Every government program and service should strive to customize its interactions with clients based on the specific needs of the individual or business, past and ongoing interactions with government, and how each client prefers to engage with government.

None of the above will be easy. Culture is far more difficult to transform than an IT system. “Career public servants ‘lock in’ bureaucratic thought processes. Acquisition processes are slow, painful, and do not support agile development,” said Dache of the Government Blockchain Association. “Even when contracts specify ‘agile’ development, contracting officers do not understand it and demand that contractors with ‘agile’ contracts must perform ‘waterfall’ processes.” He suggested that “rotating government employees with innovative private companies could give public sectors a better understanding of agile methodologies.”²⁰⁶

“We must find ways to reward innovation.”

 GERARD DACHE
Executive Director
Government Blockchain
Association



MTA Mask Force volunteers on the 1 line in Manhattan with MTA Chief Transformation Officer Anthony McCord. Photo by Marc A. Hermann / Metropolitan Transit Authority, 2020, used under CC BY 2.0. Cropped.



Digital architecture and tools

Under the leadership of the US CIO Council, the Biden-Harris administration should also strive to modernize the government's digital architecture and tools. Among other things, a new digital architecture that prioritizes open standards and scalable cloud-based software solutions could reduce dependence on vendor lock-in and outdated technologies. A common data architecture could also increase the government's ability to derive insight from its data and create personalized, relevant, smart, and predictive services.

Equip service design and delivery teams with industry standard development tools

Success in digital transformation will be hard to achieve without access to leading-edge tools. At a minimum, federal departments and agencies must ensure that the appropriate team members have access to industry standard tools, including the same computers, software platforms, and development tools they might use at a private software firm or design agency. This includes modern code editors, design tools, and software libraries, along with browsers such as Chrome and Firefox and Safari so that they can check their work in something other than Internet Explorer. The point is that if the federal government decides to start giving its clients professional-grade products and services, then it must also give its staff professional-grade tools.

Success in digital transformation will be hard to achieve without access to leading-edge tools.

Modernize digital architecture

In addition to equipping staff with cutting-edge tools, the US government must learn to leverage its technology resources more efficiently; relying, where possible, on modern technology stacks that enable development teams to work efficiently and services to scale easily and cost-effectively. Indeed, one way to accelerate digitization and reduce overall costs is to identify horizontal components, such as administrative platforms for client authentication and data computation, or externally facing channels that all federal programs and services can share, potentially with state governments as well.

More broadly, choices for hosting or distributing infrastructure, databases, software frameworks, programming languages, and the rest of the technology stack should seek to avoid vendor lock-in and to ensure interoperability across systems. Leveraging the leadership of the US CIO Council, federal departments and agencies should consider using cloud-based platforms and software solutions (i.e., platform as a service and shared software as a service) across the technology stack, as the most successful private-sector consumer and enterprise software companies have done.

Leverage open standards and APIs in an interoperable architecture

US CIO Council should also prioritize the use of APIs and open standards for data interoperability among vendors, products, and



By creating an “interoperable architecture” to guide its investments, the federal government will get better leverage from its digital investments.

“Some in government see the private sector as adversaries. They engage with them through negotiated contracted processes and litigation.”

 GERARD DACHE
Executive Director
Government Blockchain
Association

services deployed at the federal level. It should also reduce its dependence on outdated technologies and expensive proprietary solutions. By creating an “interoperable architecture” to guide its investments, the federal government will get better leverage from digital investments. For example, an architecture based on open standards can promote enterprise-wide and interjurisdictional collaboration around shared projects and priorities. Using common government platforms will also enable federal departments and their partners to reuse, improve, and share solutions, thus saving time and money. Skills and talent will become more transferable.

Build a common data architecture and make data a public asset

With a common data architecture across federal programs and services, the government could make much better use of the vast amount of performance data gathered across business units and departments. For example, GSA could take the lead in integrating data across departments to develop complete views of service journeys. GSA could then couple this view with advanced analytics capabilities to improve service experience.

The Biden-Harris administration should also commit to transparency and open government.²⁰⁷ Through the US Open Government Initiative and sites like *Data.gov*, open data can simplify the public’s access to government services and information, allow the public to easily provide fixes and contributions, and support entrepreneurs, nonprofits, and other agencies in building new applications and extensions to existing public services.

Make strategic investments in data governance

Every so often, we talk with people who are innovating in data architectures, ontologies, standards, and computational capabilities. They understand how their work advances the creation of a trustworthy data governance and provenance framework. These tools help to extract insight from—and defend against corrupt or biased—data sources, essential to a vibrant data economy. Congressionally directed funds could support the development of next generation data governance technologies at national laboratories along with government agencies and the private sector. The Office of Science Technology and Policy could host dialogues among these groups to advance data governance.

But this won’t be easy either. Leaders who truly believe in open data may find themselves up against culture again. “While there has been much lip service in recent administrations to ‘open government’ and transparency, nothing could be further from the real way that government employees operate. Some in government see the private sector as adversaries. They engage with them through negotiated contracted processes and litigation,” said Dache of the Government Blockchain Association. “The world of digital service delivery has become globally integrated. However, the federal government is not playing in that sandbox. This is still a tough nut to crack and we need to focus on rewarding and incentivizing cooperation.”²⁰⁸



The payoff of cultural transformation

As noted, new digital capabilities in the workplace usually require change in workplace culture. The Boston Consulting Group (BCG) found that leaders who ignore culture increase their risk of failing to transform their organization. After evaluating roughly 40 digital transformations, BCG found that the proportion of companies reporting breakthrough or strong financial performance was five times greater (90%) among those that focused on culture than it was among those that neglected culture (17%).²⁰⁹

The case for fostering a digital culture is even more powerful when BCG looked at sustained performance: “almost 80 percent of the companies that focused on culture were able to sustain strong or breakthrough performance.” Here are the earmarks of a healthy digital culture:

A prime example of external orientation is the focus on the client journey; employees shape product development and improve the client experience by putting themselves in the client's shoes.

- » *Speed.* Digital organizations deliver results faster than traditional ones, and their flatter organizational structures help speed decision-making. A digital culture serves as a code of conduct that gives employees the latitude to make judgment calls.
- » *Excellent talent.* Having a reputation as a digital leader is a magnet for talent. Millennials are generally drawn to digital organizations, with their promise of a collaborative, creative environment and greater autonomy.
- » *User-centric solutions.* A digital culture promotes an external, rather than an internal, orientation by encouraging employees to look outward and engage with citizens and stakeholders to create solutions. A prime example of external orientation is the focus on the client journey; employees shape product development and improve the client experience by putting themselves in the client's shoes.
- » *Delegated responsibility and control.* A digital culture diffuses decision-making deep into the organization. Instead of receiving explicit instructions on how to perform their work, employees follow guiding principles so that leaders trust their judgment.
- » *Controlled experimentation.* In a digital culture, people take calculated risks, fail fast, and learn rather than defend the status quo out of habit or caution.
- » *Continuous improvement.* In the fast-changing digital world, planning and decision-making must shift from the waterfall mindset to the agile. A digital culture promotes continuous iteration rather than perfecting a product or idea before launching it.
- » *Effective collaboration.* Success in a digital culture comes through collective work and sharing information across departments and jurisdictions. The iterative and fast pace of digital work requires a far greater level of transparency and interaction than that found in the traditional organization.²¹⁰



With baby boomers retiring, millennials rising in the ranks, and Gen Z joining the workforce, more employees than ever will embrace collaborative technologies—indeed, they will expect them.

With baby boomers retiring, millennials rising in the ranks, and Gen Z joining the workforce, more employees than ever will embrace collaborative technologies—indeed, they will expect them. They will use Slack channels or Atlassian tools to track progress on a project, internal blogs to express opinions, cloud software for joint document creation and management, and social networks to find like-minded colleagues around the world.

Over time, the tools begin to produce other positive spin-offs—eliminating the need to manage, file, and retrieve e-mail messages, for example, or reducing unproductive meeting time and enabling the organization to tap the accumulated talents of the entire organization rather than just “those in the know.” Indeed, as workers become comfortable with the tools and a more collaborative way of working internally, they will begin to identify applications where collaboration with partners outside the organization would contribute to superior outcomes. Rather than asking frontline staff to relay customer issues, for example, they could invite citizens to present their own views on service delivery via social media.

The changing nature of work and collaboration is certain to raise significant leadership and change management issues. Different agencies and organizations within the broader federal government have different capacities, work habits, and norms. Collaboration means harmonizing different cultures, overcoming concerns about turf, sharing risks, and focusing on a common goal and a common client. Managers and staff have learned to work in their silos, and so working productively with other agencies is a real shift.

Moreover, classic organizational hierarchies and performance management structures can slow down efforts to improve services for citizens and business owners. Layers upon layers of managerial approval processes are no formula for innovation. For organizations to act quickly on good ideas, leadership at all levels must value ideas, and so senior leaders must model and incentivize that behavior. Incentives matter.

For organizations to act quickly on good ideas, leadership at all levels must value ideas, and so senior leaders must model and incentivize that behavior.

Defenders of hierarchy argue that the chain of command sorts out roles and accountabilities, supports due processes (ranging from procurement, financial and HR oversight, to internal appeals mechanisms), and hones the quality of public service advice. Nevertheless, the bureaucracy of a typical government department is no doubt undermining its ability to cut across silos and customize services for citizens and businesses. Also at fault are the processes by which departments design new programs and services; digital is often an afterthought rather than core to service design and delivery.

Government transformations in the United Kingdom underscore the cultural change underpinning service innovation. Following a series of high-profile IT failures, a group of UK political leaders and senior executives launched the GDS in April 2011 and gave it genuine authority to “disrupt and transform” public services.²¹¹ The GDS consists of a small team of the UK’s brightest digital talent who work with agencies to remove barriers to exceptional service delivery.





Batesville Volunteer Fire Department responds to a pile of burning cotton, during the Ernie Schirmer Farms cotton harvest. Photo by US Department of Agriculture/ Lance Cheung, 2020, public domain. Cropped.

The team's mandate is to make all UK services "digital by default," meaning that the digital services are so good that people prefer to interact online rather than by phone, post, or in person. Putting users first, increasing openness, and improving services are some of the hallmarks of the GDS.

Over nearly a decade, GDS has delivered award-winning services and revolutionized how 62 million citizens access more than 2,000 services from 24 government departments and their 331 agencies.²¹² In this era of strained public sector finances, the most compelling results have been the significant costs savings. An analysis of departmental business cases and historical data suggested that "digital by default" could save the government between £1.7 and £1.8 billion each year, with the assumption of an 82 percent take-up rate of digital services.²¹³ To hit these targets, the GDS prioritized some key changes in the structures and processes of government.

In Britain, an analysis of departmental business cases and historical data suggested that "digital by default" could save the government between £1.7 and £1.8 billion each year.

- » *Leadership and authority.* The GDS got what many other aspiring digital government outfits lack: power, staff, and the political authority to leverage both. For example, the GDS controls access to the British government's domain names, and so the 300-person team methodically built better digital services and then shut down whatever existed in those spaces. It also has the backing of a Cabinet Office, which sees the GDS as a lynchpin in the efforts of the government's broader efficiency and reform group.
- » *User-centric design.* The GDS used technology as a means of finding better ways to integrate services around user needs, resulting in a simpler, quicker, easier way to find information and complete transactions for British citizens.



Governments must be careful to build achievable assumptions into their models for estimating potential savings from digitization.

- » *Modern technologies.* Under GDS leadership, open source, open data, and cloud technologies became the new standards, replacing the government's dependence on antiquated technology stacks and proprietary code.
- » *Smarter procurement.* GDS insisted on replacing multiyear, multibillion-pound government IT contracts with shorter procurements, preferably with SMEs.
- » *Agile processes.* GDS also insisted on replacing waterfall methods, with their long and laborious planning cycles, with the agile development methods of Silicon Valley start-ups.
- » *New standards.* A streamlined digital-by-default service standard, which sets clear guidelines for building world-class digital services, supplanted the complex and confusing thicket of rules that inhibited progress.
- » *Data-driven analysis.* The GDS has combined performance data with collaborative tools to make space for collective evaluation, strategizing, and action that leads to continuous improvement in services.²¹⁴

Not everything went to plan for the UK's digital service transformation efforts. For example, in 2017, the UK National Audit Office found that the UK pace of digitization was slower than promised and the take-up rate, lower than anticipated.²¹⁵ Governments must build achievable assumptions into their models for estimating potential savings from digitization. Leadership matters, too. In 2015, GDS founders Francis Maude and Mike Bracken left, disrupting the momentum.²¹⁶ According to Bracken, the operational model and leadership culture of Whitehall were incompatible with the digital ethos that GDS leaders were trying to instill.

Despite these setbacks, the pioneering work of GDS continues. In the past year, GDS led the development of a series of coronavirus response apps, launched a national strategy for using data to drive digital transformation and boost growth across the economy, and created a "Digital Buying Guide" aligned with the UN Sustainable Development Goals to inform procurement of research on gender equality and social inclusion.²¹⁷

Innovation leaders should structure their engagement with the organization in a way that allows the benefits of transformation to manifest themselves and help build further cultural change.

The United Kingdom's experience suggests that, as champions of this kind of change, federal leaders in the United States must be sensitive to the need for sustaining the innovation over time. There are no examples of overnight transformations in government. Rather, innovation leaders should structure their engagement with the organization so that the benefits of transformation manifest themselves and help build further cultural change.

Next steps for digital service transformation

Most governments around the world have made strides in digital services with pockets of excellence and innovation. Few, however, have created an adequate foundation for long-term, enterprise-



wide progress. The strategies for service transformation we outlined above will help the Biden-Harris administration achieve significant efficiencies and cost savings, provided that US Congress passes adequate funding to modernize services. In the United Kingdom, for example, transactions conducted online were up to 20 times cheaper than by phone, 30 times cheaper than by post, and as much as 50 times cheaper than face to face.²¹⁸

Of course, the costs of digital service delivery will depend on who does the digital, how, and for which service. In some instances, answering a phone call will be cheaper than responding to an e-mail. However, if great digital services are costlier to implement but result in greater client satisfaction, then is the cost not justifiable? Cheaper is not always better—or cheaper—if citizens end up calling and e-mailing multiple times in great frustration.

What must the Biden-Harris administration do now to establish its digital leadership, and how can public sector leaders overcome the obstacles to digital innovation? We recommend the following:

- » *Digital mandate and leadership.* Establish a high-level mandate for digital service transformation. Equip leaders with a business case for how digital innovation can drive service excellence, innovation, and efficiency and encourage political and executive leadership to champion digital innovation.
- » *Agile delivery.* Bring department leaders together to revise incentives, performance goals, and procurement processes, streamline development, build trust, and maximize the capacity for improving public service delivery and policymaking.
- » *Digital architecture.* Reduce dependence on vendor lock-in and outdated technologies with a new digital architecture that prioritizes open standards and scalable cloud-based software solutions. Ensure the underlying data architecture increases the department's ability to harness its data to improve client experience.

Finally, across each of these priority areas is the need to invest in talent required to co-create, co-design, and co-build amazing digital solutions and experiences for businesses and citizens. Jurisdictions that are leading in digital government have all recognized the need for talented people and have hired seasoned product managers, engineers, and designers and people with established connections and experience in private industry.

To succeed in reinventing government, the Biden-Harris administration must build a high-performance digital team that puts citizens first, establishes performance measures that focus on relevant outcomes, and rewards innovation and excellence across the public service—not just within the silos. This means encouraging federal departments and agencies to recruit top digital talent with entrepreneurial capabilities and up-to-date technology skills, including people who understand and can manage the interface between technology and public service reform.

Across each of these priority areas is the need to invest in talent required to co-create, co-design, and co-build amazing digital solutions and experiences for businesses and citizens.



More transparent and collaborative models of work, learning, and service delivery will help make the US government more responsive to its citizens and more effective in implementing policies that enhance well-being and prosperity. At the same time, federal departments and agencies will become more attractive to talent and more effective in transferring knowledge from retiring boomers to the upcoming generation of leaders.

Policymakers understand that they must seek out new input to help identify problems and create innovative policy solutions using digital town halls and other consultation tools.

5. Engaging citizens, holding officials accountable

In a representative democracy, the public has traditionally participated in governance through voting. Policymaking has been a top-down broadcast model in which a select group of experts with access to privileged information discussed policy options and communicated decisions to the public via mass media.

Much has changed over the last two decades. Innovators have conducted thousands of experiments in digital engagement around the world in areas such as political campaigning or monitoring



Jennifer Romero, a registered nurse with the Florida Department of Health, explains the process of the specimen collection to a nursing home resident in Northeast Florida. Photo by Florida National Guard/Sgt. Michael Baltz, 2020, used under CC BY 2.0. Cropped.



Governments must design policy through networks in which they are just one of many players.

the commitments and actions of elected officials. A multitude of apps, platforms, and websites have gained significant numbers of users. Online petitions are increasingly common in most countries and can signal public interest in current issues. Citizens have also used participatory budgeting apps to identify spending priorities. Others have enhanced voting through blockchain platforms and supplemented parliamentary question periods with interactive livestreams. This section showcases a few of these tools.

Participatory democracy: A pathway to genuine citizen engagement

Four forces are putting pressure on elected officials to loosen their monopoly on the policymaking process. First are anti-democratic trends such as distrust in scientists, journalists, public institutions, and the people who run them. Second are rising citizen expectations for involvement in and greater ownership of “their democracy.” Third are the citizens and civil society groups harnessing digital technologies to influence policy—or even make their own—outside government. Fourth are economic and political pressures from stakeholders in cities, states, foreign governments, and international bodies. The Biden-Harris administration needs an approach to policymaking that engages multiple stakeholders, and digital technologies can help to support such a multi-stakeholder approach.

Depending on the issue, such an approach would draw participants widely from governments; international organizations, business and industry associations; think tanks; academic institutions; civil society organizations such as nongovernmental organizations, associations, and religious groups; and the general public. In doing so, they would help to bring ordinary citizens into conversations about the policies that will affect their lives. Their participation in the process will help to improve the outcome. Two recent examples of digital democracy help illustrate the potential.

Collaborative forecasting with the Our Urban Future project

The policy development tools available today allow for a much richer dialogue where we can use real data to visualize our futures and then generate, discuss, and evaluate our policy options.

Imagine a scenario-planning exercise where thousands of participants could tap into a vast pool of shared data and adjust decision variables on the fly to see how their choices might affect real people in the future. Stakeholders could forecast, for example, whether investments in preschool education would yield better poverty alleviation outcomes than, say, investments in reducing the digital divide. Or they could measure the CO₂ emission data of all their activities and calculate their impact on climate.

Such possibilities are no longer far-fetched. The policy development tools available today allow for a much richer dialogue: we can use real data to visualize our futures and then generate, discuss, and evaluate our policy options. In 2013, the Toronto based Evergreen Foundation teamed up with the World Bank, World Economic Forum, UN Environment Programme, and hundreds of partners worldwide



to create a policy network called the Our Urban Future project that leveraged a unique form of collaborative forecasting and policy design.²¹⁹

The project used a dynamic forecasting engine built on an open platform that permitted users to adjust key variables—for example, the rate of urbanization in Southeast Asia, or investments in transportation infrastructure in Central America—to examine the impact of alternative urban investment scenarios on urbanization. Participants could access data on historical patterns, trends, and planned expenditures in six key sectors: transportation, energy, water, waste, buildings, and technology. With the platform, users could create straight-line forecasts over a 50-year time horizon and then evaluate their preferred urban investment strategies against various political, social, financial, and physical design variables—a process normally reserved for expert policy modelers.

Complementing the scenario-planning phase was a broad public outreach program that included extensive crowdsourcing and civic engagement. The project team ran other face-to-face scenario-planning exercises in Toronto, New York, London, Singapore, Delhi, Nairobi, and Shanghai. These harvested local innovation and catalyzed communities around reimagining (and rebuilding) cities for sustainability. Participants formed multi-stakeholder teams, each with representatives from municipalities, industry, nonprofits, academia, and government. Their job was to generate visions for the future—visions that were regionally specific, contextual, granular, and connected to local conditions. The shared pool of local visions surfaced larger patterns for potential urban infrastructure. Finally, the project team set up a network of “change labs” to pilot ideas locally, further refine, and then propagate internationally if successful.

“Nation-states are not investing in urban infrastructure strategies such as transportation, water, waste, energy, and information and communications technology.”

 GEOFF CAPE
Executive Director
Evergreen Foundation

Reflecting on one of the early stakeholder meetings, Evergreen Foundation Executive Director Geoff Cape noted that public leaders are recognizing the need for cross-jurisdictional, multi-stakeholder collaboration on the urban agenda:

Two big ideas that emerged quickly in the program were: A profound lack of vision and values guiding leaders influencing the larger urbanization agenda, and a gap in opportunities for cities to come together, like the United Nations, to share strategies and support work between cities. Nation-states are not investing in urban infrastructure strategies such as transportation, water, waste, energy, and information and communications technology.²²⁰

The dearth of leadership comes at a time when most of the world’s population is either living in or migrating to major urban centers. Cape argued that the urgency of the urban challenge requires leaps rather than incremental evolution, and that only multi-stakeholder approaches can deliver the innovative ideas and capabilities that cities require.²²¹





ONTARIO-00344 - The back of the Evergreen Brick Works by Dennis Jarvis, 2014, used under CC BY-SA 2.0. Cropped.

Our Urban Future was an early foray into the realm of large-scale collaborative policymaking. Around the world today, young data scientists are teaching students of all ages to harness these varied ingredients, strategies, and tools and engage other individuals and organizations in designing effective policy responses to societal challenges.²²²

Greater inclusion in the brainstorming and decision-making process, in turn, generates a greater sense of ownership when it comes to implementing the results.

Each year, for example, MIT's Institute for Data, Systems, and Society and MIT's Technology and Policy Program convene a policy hackathon that brings participants together to develop creative policy solutions to interdisciplinary challenges on issues like climate change, energy, AI, and the future of work, health, and cybersecurity. The 2020 policy hackathon was organized around COVID-19, Internet policy, and environmental justice. According to MIT, hackathon participants came from a wide range of backgrounds, from public policy to data science to engineering.²²³

A collaborative digital approach would yield many benefits, for citizens and policymakers alike. First, the broader participation leads to better ideas and perhaps a greater diversity of ideas as well. Greater inclusion in the brainstorming and decision-making process, in turn, generates a greater sense of ownership when it comes to implementing the results.

The digital policymaking process facilitates "organizational memory," leaving a permanent, searchable record of what might otherwise have been watercooler conversations and thus provides a foundation for subsequent discussions. It also dispenses with the old model of atomized input and central processing—think "suggestion box"—



Digital policy brainstorming are conversations that open up a space for deliberation, analysis, and perhaps compromise among multiple stakeholders.

in favor of a more collaborative model with tools that enable the creation, learning, shaping, sharing, and tracking of group knowledge as the process unfolds. Equally important, the process is transparent.

In other words, digital policy brainstorming are conversations that open up a space for deliberation, analysis, and perhaps compromise among multiple stakeholders. Policymaking platforms could include advanced tools that enable citizens to track most decision-making processes and see how their contributions have been (or are being) taken into account.

Participatory budgeting: Designing a bottom-up budget

Digital brainstorming and scenario planning are great for forecasting, building networks, and generating proposals for action. Tools such as participatory budgeting, on the other hand, give citizens meaningful roles in shaping policies and decisions that affect them directly. Participatory budgeting is a process of democratic deliberation and decision-making in which ordinary people decide how to allocate part of a municipal or public budget.²²⁴ It engages citizens in identifying, discussing, and prioritizing public spending and gives them real power to decide how their government spends their tax money. The process involves these steps:

1. Community members identify spending priorities and select budget delegates.
2. Budget delegates develop specific spending proposals with help from experts.
3. Community members vote on which proposals to fund.
4. The city or institution implements the top proposals.

When civic leaders and citizens take participatory budgeting seriously and participate with mutual trust, governments and constituents benefit equally. Citizens have already proven themselves able to make measured, well-reasoned decisions about budgetary issues in cities around the world.

When civic leaders and citizens take participatory budgeting seriously and participate with mutual trust, governments and constituents benefit equally.

For example, in 2013, the Phoenix Union High School District in Arizona started experimenting with participating budgeting in one high school. By 2020, 18 high schools were using the process. Over the last three years, 30,000 high school students have voted on how the school district should spend \$250,000 to improve their campuses. Participating schools have also combined voter registration in their events, thereby registering 3,135 students eligible to vote in state and national elections.²²⁵

Also in 2020, 33 council members in New York City asked residents how to spend at least \$35 million in capital funding on improvements to schools, parks, libraries, public housing, streets, and other public spaces.²²⁶ The Participatory Budgeting Project estimated that the



practice of engaging citizens in setting budget allocations has spread to over 7,000 cities around the world and has been used to decide budgets from states, counties, cities, housing authorities, schools, and other institutions.²²⁷

If asking citizens for ideas on how to allocate spending or improve service quality has proven effective at the local level, why should we not extend such practices to the federal arena? US citizens could have a say on how Congress allocates some of the budget for economic recovery, for example. Or residents of cities that receive federal assistance in shifting to zero-emission transportation options could help prioritize spending for the transportation solutions that work best in their communities.



Papago Park - Phoenix, Arizona by Doug Kerr, 2010, used under CC BY-SA 2.0. Cropped.

Twelve tools for digital engagement

As the above cases show, digital technologies offer policymakers, citizens, and other stakeholders a range of tools to support knowledge creation, community building, and democratic decision-making. Thinking creatively about using technology in policymaking, the Biden-Harris administration could strengthen citizen engagement and restore faith in democratic institutions. Below we list some of the leading tools for digital democracy.

- » *Citizen juries and panels:* Citizens chosen at random or as representatives serve as policy jurors or advisors on an issue. Jurors hear evidence, ask questions, and deliberate to arrive at binding or nonbinding policy recommendations. Citizen panels, on the other hand, could be established as permanent advisory bodies consisting of a cross section of citizens who regularly cycle through.



Incentive challenges are particularly effective at tapping into the creative potential and expertise of individuals across the country and even around the globe.

Participatory budgeting allows citizens to identify, discuss, and prioritize public spending projects and gives them the power to make real decisions about how money is spent.

- » *Deliberative polling:* Citizens are equipped with the resources to learn about and reflect upon a given issue collaboratively and deliberatively. Deliberative polling typically combines small group discussions on the Internet with scientific, random sampling to contribute more than instant polling can provide.
- » *Digital brainstorming:* Policy officials and citizens come together online for real-time, moderated brainstorming sessions to identify new policy issues or needs. They could achieve consensus through one-token, one-vote systems that help make it harder for disrupters, trolls, and saboteurs to cause damage.
- » *Direct democracy:* Elected officials or bureaucrats use online voting and polling to solicit binding and nonbinding input from citizens on referenda questions, to rank policy options, or to assess the public's reaction to the course of a parliamentary debate in real-time.
- » *E-petitions:* Citizens use online petitions to raise awareness of issues or set the agenda for political debate. In many jurisdictions that host them, governments are obligated to formally respond to online petitions reaching a designated number of signatures.
- » *Incentive challenges:* Governments host open competitions, contests, or challenges that invite participants to solve a specific problem and offer them a reward, financial or otherwise. Because they can be fully coordinated online, incentive challenges are particularly effective at tapping into the creative potential and expertise of individuals across the country and around the globe.
- » *Online consultations:* Feedback from citizens is solicited on proposed or recently implemented policies through asynchronous online forums, with a mix of structured (e.g., surveys) or unstructured (e.g., unmoderated discussion groups) options for providing input. Such consultation could enable citizens to develop and amend specific proposals or work collaboratively with state officials to draft legislation.
- » *Open government:* Governments provide information online about policy and legislation implementation, decision-making processes, policy outcomes, the records and expenses of elected officials, and other pertinent information to enable citizen monitoring and evaluation. In most instances, open government makes the underlying data available for citizens to develop data visualizations and third-party apps.
- » *Participatory budgeting:* Citizens decide how to allocate part of a municipal or public budget. Participatory budgeting allows citizens to identify, discuss, and prioritize public spending projects and gives them the power to make real decisions about how money is spent.
- » *Prediction markets:* Prediction markets invite participants to speculate or trade on a given event outcome, like the



outcome of an election or the probability of a terrorist attack. Governments can use them to gain insight into many substantive questions: When will the bridge be built? What will the unemployment level be in twelve months?

- » *Scenario planning:* Policymakers and citizens use simulations and modeling software to build scenarios, forecast future policy needs, or understand the long-term consequences of decisions. Politicians, bureaucrats, and citizens could assess the potential impacts on factors, ranging from health and the environment to the economy.
- » *Virtual town halls:* Political representatives make themselves available online for regular question-and-answer periods with their constituents. During hearings livestreamed on C-SPAN, Congress could also invite citizens to submit questions by e-mail or social media. A neutral moderator or ombudsman could screen these queries.

The tools and approaches for democratic engagement help illustrate the breadth of options available to the Biden-Harris administration. While experiments using these tools are relatively young and small in scale, their potential to reinvigorate democratic institutions is without question. Online communities have already demonstrated their potential to leverage considerable human knowledge, expertise, and capacity to build quickly. We expect online collaborations to trigger and shape significant changes in how societies function.

By 2025, citizen and businesses will have no barriers to participating in decision-making at all levels. Advanced tools—possibly building on gaming and augmented-reality technologies—will enable citizens to track decision-making processes and see how elected officials have taken their contributions into account. Semantic-based cooperation platforms will overcome current linguistic and cultural barriers. Opinion mining, visualization, and modeling tools will allow stakeholders to forecast virtual reality-based outcomes and scenarios that will help to shape public opinion. So long as the processes and tools are robust enough to prevent manipulation, the outcomes of such consultative processes should be faster, more legitimate, and more efficient for revising policy and making decisions.

Technology alone is not enough; governments must begin to evolve new participatory practices that exploit the available tools.

Of course, technology alone is not enough; governments must begin to evolve new participatory practices that exploit the available tools. Present government processes (local, regional, national, and international) develop laws and regulations, interpret and define societal norms, and deliver societal support services. They derive their legitimacy from democratic processes, transparency, and accountability.

The balance of power among governments, societal actors, and the population will have to adapt to these challenging new possibilities. So, too, will the governance models, process flows, and analytical tools with which to properly understand, interpret, visualize, and harness the forces that could be unleashed by a more participatory and interactive model of decision-making.



Next steps in reinvigorating democracy in the United States

Engaging regular people and experts through the Internet is a straightforward way for policymakers to access expertise and fresh ideas.

In the final analysis, engaging regular people and experts through the Internet is a straightforward way for policymakers to access expertise and fresh ideas. Citizens are already crunching numbers to shape policy, scraping online supermarket prices to dispute official inflation estimates in Argentina, or scouring traffic stop data for racial bias in New York City to advocate for changes in police policies and dismissals of court cases.²²⁸

This kind of work transcends the current focus on leadership-driven performance measures, as it involves integrating and analyzing larger and more complex datasets. It increasingly requires machine learning, too: drawing on huge amounts of historical data to “train” new algorithms that sort through and spot anomalies or correlations in past behavior, using them to predict future events, so that policymakers can prepare precise proposals in advance. To do that, policy analysts need domain expertise, statistical skills, the willingness to use powerful computational tools, and the ability to question assumptions, methodological frameworks, and underlying biases embedded in data.

Evidence suggests that creating an open, nonhierarchical space for transformative ideas taps incredible energy. But it also requires a major commitment to action when thousands of minds come together to set an agenda. While some stakeholders may embrace this new culture of deliberation, others may express reticence. For example, governments tend to emphasize hierarchy and debate behind closed doors in a culture skeptical of new ideas.

The promise is that digital engagement will support problem-solving approaches that integrate policy development and implementation across communities, states, and even national borders. As the Biden-Harris administration looks to strengthen democratic participation, its team has a few additional insights and implications to consider.

The promise is that more transparent and collaborative models of work, learning, and service delivery will help make the US government more responsive to the needs of citizens.

Incentives for broader civic engagement

Organized interest groups rarely lack the motivation, time, or resources to participate in policy consultations, especially when these groups have a vested interest in the outcomes. When big issues like climate change are up for debate, the energy industry lobbyists and environmental groups will be out in full force. But how could the Biden-Harris administration motivate the broader American public to participate in policy deliberations? One solution is to localize the issues. Participatory budgeting processes have worked well, for example, because citizens can see tangible benefits in their communities when their input translates into concrete investments in public spaces and institutions.

Another solution is to adopt the “incentive challenge” model by rewarding participants that contribute the best idea or technology to





Justice For Regis - Not Another Black Life rally and March, Toronto. Photo by Jason Hargrove, 2020, used under CC BY 2.0. Cropped.

Policy analysts need domain expertise, statistical skills, the willingness to use powerful computational tools, and the ability to question assumptions, methodological frameworks, and underlying biases embedded in data.

solve a specific problem. The XPRIZE is known for offering generous cash prizes for winning solutions.²²⁹ However, for many participants, the benefits of contributing to an incentive challenge can go well beyond the cash prize and include plugging into a community of like-minded innovators, as well as securing media exposure and credibility. Ashoka Changemaker challenges include rewards such as mentoring or access to resources and in-kind benefits that are otherwise not available publicly.²³⁰ In a citizen engagement process, the government could opt to reward early participants in a consultation process with “privileges” during the later stages of the consultation process. For example, they might be invited back to small group online (or off-line) dialogue sessions when plans or policies are starting to take shape.

Finally, behavioral economists and legal scholars Dan Ariely, Richard Thaler, and Cass Sunstein have studied ways to nudge citizens into doing the right thing for themselves and their communities, even in screen and interface design, where buttons are located and whether people must opt out rather than opt in.²³¹ Building on this work, the UK Government’s Behavioral Insights team came up with a few guidelines for promoting civic participation that they summarized in the acronym EAST: easy, attractive, social, and timely.²³² Making it EAST means plain language, simple registration, intuitive and inclusive interfaces, attractive default options, worthwhile rewards, and compelling images, colors, and personalization.


So why did behavioral economics fail to prevent the spread of COVID-19 in the United Kingdom, which pursued herd immunity over lockdown? Behavioral economists pondered the poor decisions at the

top: did experts frame the problem so that decision-makers chose the worse of two options, or did some experts self-censor in the face of opposing opinions of the powerful? Their conclusion: "Evidenced-based policymaking is exceptionally difficult to deliver when there are precious few data and no time to gather evidence."²³³ Leaders must prepare constituents for swift and seemingly contradictory changes in policy as the experts gather more information in an unfolding crisis. Helping the public to understand the scientific process might be a good start.

Crowdsourcing policy is about assembling insight and capability

Crowdsourcing is not polling. When engaging citizens in policymaking, governments should seek the wisdom and insight that polls cannot capture. Social networks, apps, and platforms are making the process of crowdsourcing ideas and input easier and less costly than ever. With a collaborative process, some of the burden of collecting, sorting, analyzing, and drafting shifts to the public, leaving public officials in a position to steer and referee the process. An opportunity space opens up for deliberation, reflection, and perhaps even compromise among multiple stakeholders. Here's how NYU professor and GovLab founder Beth Noveck put it:

"Collaboration assumes that stakeholders are qualified to make useful contributions to the subject- or industry-specific work of the agency."

 BETH NOVECK
Professor, NYU
Founder, GovLab

In a collaborative government, public participation is not pro forma. Though the recommendations made by private citizens are not binding, they are taken as serious contributions to the decision-making process. At the same time, collaboration assumes that stakeholders are qualified to make useful contributions to the subject- or industry-specific work of the agency.²³⁴

According to Noveck, the government agency sets up a system for evaluating citizens' contributions, typically involving groups of outside experts who volunteer to vet the recommendations. To ensure a diverse group of citizen participants, the agency must select digital tools that are accessible and easy to learn and use; they cannot reinforce the digital divide.

Governments must prepare to cede some control

Many politicians and bureaucrats would genuinely like to reduce the democratic deficit and strengthen representative processes. The reality is that getting to genuine citizen engagement is hard—it entails a truly massive shift in the culture of governmental organizations and the apparatus of decision-making. Giles Gherson, senior civil servant for the Government of Ontario, spoke for all levels of government, when he said, "If we're going to be getting into the wiki world and engaging citizens and having real authentic conversations with them, then it's probably going to have to be a very different culture. We're going to have to cede a lot of control over that conversation."²³⁵



Getting to genuine citizen engagement is hard—it entails a truly massive shift in the culture of governmental organizations and networks and the apparatus of decision-making.

According to the World Intellectual Property Organization, Chinese inventors filed 58,990 patent applications in 2019 compared to the 57,840 filed by US innovators.

Indeed, the promise of participatory policymaking is that of a continuous cycle of policy innovation and adaptation that integrates the knowledge and experience of diverse stakeholders in government, business, and civil society. Governments and elected officials must begin to open up the policy process to participatory models that invite input—and ownership—at all stages of development, from problem definition, to analysis, to identifying strategic options and making decisions.

6. Rebooting America's innovation economy

For the last 100 years, the world has envied the capacity of the United States to churn out game-changing technologies and the start-ups that launched them. But other countries are investing across critical areas of innovation. China, for one, has focused on big data, quantum computing, biotechnology, and surveillance capabilities.²³⁶

Dr. Rush Doshi, former director of the Brookings Institution China Strategy Initiative and now a member of the Biden team, understands the China threat well. In his testimony before the US Senate Committee on Commerce, Science, and Transportation in July 2020, he emphasized the need to realign US economic policies so that America could compete decisively against China. He noted what China believes to be its four core advantages:

- » Greater investment in strategic research and development (R&D)
- » Superior institutions and industrial policies that are coordinating and driving innovation
- » Manufacturing superiority and an anchor in global supply chains
- » A strategy and a deliberate process for setting the global technology standards that could secure its dominance of emerging industries.²³⁷

According to the World Intellectual Property Organization, Chinese inventors filed 58,990 patent applications in 2019 compared to the 57,840 filed by US innovators.²³⁸ That's a 200-fold increase in only two decades! (See Figure 4, next page, for a comparison of patent filings.)

Amid rapid economic and high-tech change, the ongoing success and dynamism of America's entrepreneurs and SMEs should be a top priority for the Biden-Harris administration. Its Digital Marshall Plan for government services should encompass the service needs of these innovators and business owners.



Tech clusters in Austin, Boston, Seattle, Silicon Valley, and other urban areas offer inventors ready access to venture financing and high-quality business services. The United States hosts nine of the top ten business accelerators as measured by the total amount of funding raised by their supported ventures.²³⁹ Two of the top firms, Y Combinator and Techstars alone have launched over 2,000 start-ups that have collectively raised more than \$16 billion in funding.²⁴⁰

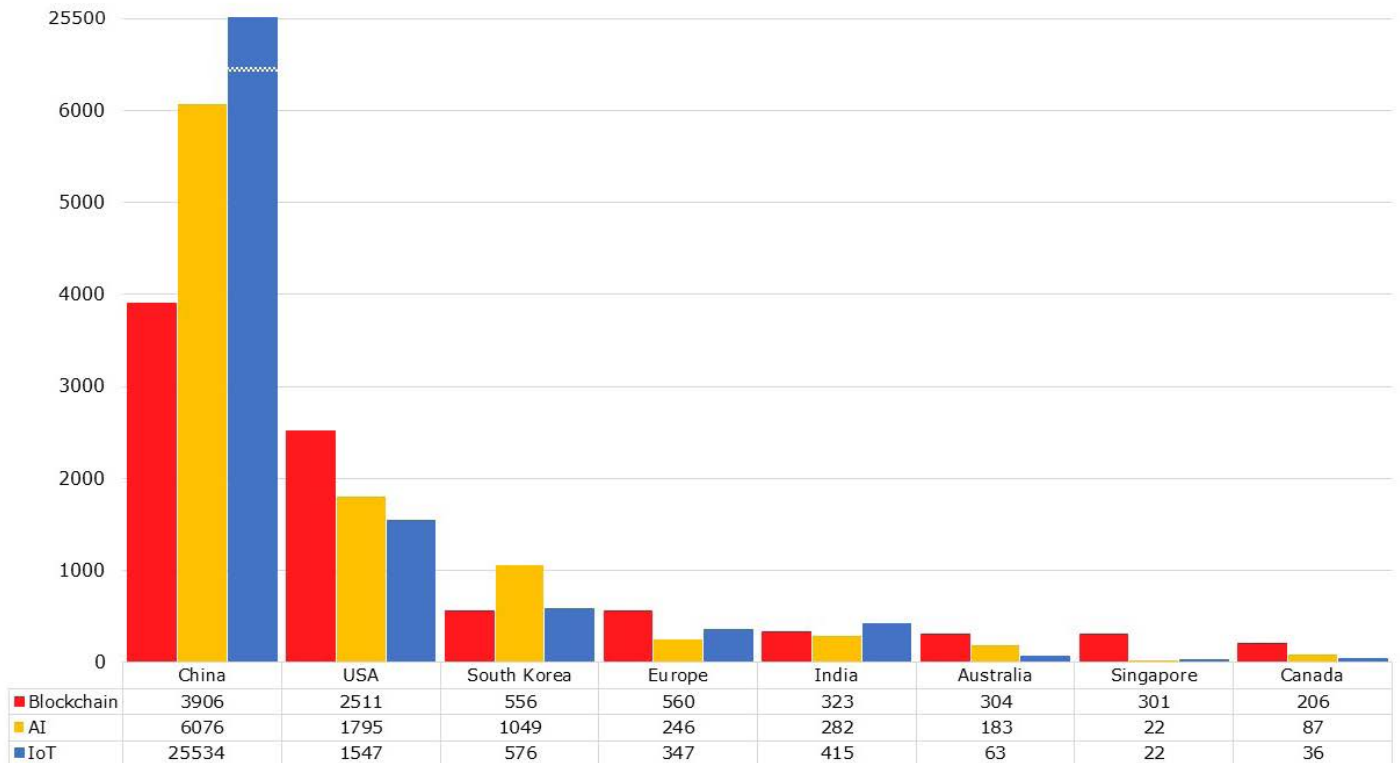
Everyone must have access to strong education in science, technology, engineering, and mathematics for lifelong learning and contributing ideas.

More specifically, the Biden-Harris administration should strengthen six pillars of a robust innovation economy.

- » *Education.* Everyone must have access to strong education in science, technology, engineering, and mathematics, from preschool into the golden years, for lifelong learning and contributing ideas. Look at President Biden—the nation’s oldest commander-in-chief ever in his first term. Surely, Americans can celebrate this new record, engage all generations of knowledge and expertise, and enter an age of post-ageism (as well as post-racism, post-sexism, and post-all-other-hateful-isms).

Figure 4: Comparison of patent filings

To get a general sense of the players in trivergent technologies, we did a simple search for patent applications with “blockchain,” “artificial intelligence,” or “Internet of Things” in their titles.



Source of data: Patentscope, WIPO IP Portal, World Intellectual Property Organization, 28 Jan. 2021.



“Smaller companies ... risk becoming a target of full financial power of one of the giants, who aim to crush or buy possible contenders before they grow beyond a certain size.”

 MAËLLE GAVET
Young Global Leader
World Economic Forum

- » *Services.* Entrepreneurs and business owners need access to streamlined services from government, less onerous processes for interacting with government agencies and complying with regulations, and an overall reduction in red tape. Experts must make themselves available to guide high-potential founders and companies, perhaps through world-class business acceleration programming and mentorship.
- » *Funding.* High-potential companies across sectors and regions of the country need access to the full chain of venture financing so that they have a sufficient financial runway to move through the initial stages of developing a viable product or service and getting it to market.
- » *Talent.* Young companies require not only technical talent but also the sales and product marketing expertise and networks required to reach their potential markets. They also require the wisdom and judgment of seasoned managers who know how to cultivate talent, entrepreneurial pathways in postsecondary education, and a progressive immigration policy to ensure that they can find and hire the right talent.
- » *Global reach.* American innovators need assistance in accessing international markets, including go-global programming and soft-landing support, sophisticated tools for global market intelligence, and financial backing to invest in export readiness and spend more time in-market developing business.
- » *Competition.* Big Tech has amassed such market power that, as incumbents, they are now encumbering start-up innovation. According to Maëlle Gavet, one of the World Economic Forum’s Young Global Leaders, “Smaller companies who compete in one of the markets that Big Tech considers as strategic—an ever-expanding list—risk becoming a target of full financial power of one of the giants, who aim to crush or buy possible contenders before they grow beyond a certain size.”²⁴¹ The EU Digital Markets Act aims to limit this behavior, making the region more attractive to high-tech start-ups.²⁴² With these objectives in mind, we offer these solutions for unleashing the country’s entrepreneurial potential.

Building a robust start-up support infrastructure

In the United States, the Small Business Administration (SBA) serves an estimated 30.2 million small businesses, representing 47.5 percent of the private workforce.²⁴³ Its primary objectives are increasing access to capital, federal contracting opportunities, entrepreneurial development services, and disaster assistance. The Biden-Harris administration can fortify America’s start-up infrastructure by improving the performance of publicly funded business accelerators and incubators (BAIs) and streamlining government support for entrepreneurs and business innovation.



Improve the performance of publicly funded business incubators and accelerators

Incubators and accelerators should help increase the growth and competitiveness of early-stage ventures.

The US government was the first in the world to finance the development of a national network of business incubators. Under the administration of President Ronald Reagan, the SBA, as well as state-level economic development agencies, promoted incubator creation and development to fill a “gap” within the broader innovation ecosystem in the 1980s.²⁴⁴

At the most general level, incubators and accelerators should help increase the growth and competitiveness of early-stage ventures. Indirectly, their work promotes entrepreneurship and investments in innovation, R&D, and job creation. They also reduce start-up costs and search costs for angel investors and venture capitalists (VCs) while accelerating speed to market.²⁴⁵

The federal government is sponsoring new programs. In 2014, the US SBA launched its Growth Accelerator Fund, which provided awards to 50 accelerators of \$50,000 to a group of competitively selected entities across 31 states.²⁴⁶ The 2019 competition focused on accelerators that work with high-tech companies led by women or by entrepreneurs from socially and economically disadvantaged communities. SBA also encouraged applications from BAIs located in states or territories underrepresented by Small Business Innovation Research (SBIR) awardees.

The evidence of their success to date is mixed, with a wide spectrum of performance between the world’s leading BAIs and the rest. BAI programs are finding that the inherent risks and uncertainty of early-stage companies makes financial sustainability difficult for even the best-run organizations. Y Combinator turned a profit after five years of operation. The uncertain return on public investments has led to more robust performance measurement systems, with Canada among the first jurisdictions to commit to a national performance dashboard for BAIs. What can the Biden-Harris administration do to strengthen this vital pillar in the nation’s start-up support infrastructure?

Business accelerator and incubator programs are finding that the inherent risks and uncertainty of early-stage companies makes financial sustainability difficult for even the best-run organizations.

Promote specialization and funding them appropriately

First, the administration could promote specialization by establishing clear sector and stage mandates for BAIs and funding them appropriately. The SBA, for example, could use its central role in BAI to provide clear roles and responsibilities for publicly funded BAIs. Clarity about the division of labor will enable better triaging of clients to the right center of expertise based on sector, technology, or company size and stage of development. Industries such as agri-food, biotech, cleantech, and advanced manufacturing, for example, all have different needs from digital technology start-ups. Greater specialization will also improve performance as entities concentrate on cultivating in-depth sector-specific knowledge and connections to customers, channel partners, and investors who work in those sectors.



The Biden-Harris administration should scale up this work by increasing federal funding for nonprofit incubators and innovation hubs serving Black, Latinx, and Native American entrepreneurs.

Focus on funding clusters, hubs, and accelerators that will achieve something bold and unique that even the largest and most sophisticated firms cannot achieve on their own.

Create a network focused on disadvantaged entrepreneurs

Although many new businesses stand to benefit from the proliferation of business accelerators, these start-up support organizations do not exist in every community and are rarely free. As noted above, the SBA has allocated a small amount of funding to help launch business incubators that work with high-tech companies led by women or by entrepreneurs from socially and economically disadvantaged communities.

The Biden-Harris administration should scale up this work by increasing federal funding for nonprofit incubators and innovation hubs serving Black, Latinx, and Native American entrepreneurs to ensure that *all* Americans, regardless of skin color or wealth, have a fair shot at starting and growing their own business. Such hubs could be co-located with Small Business Development Centers, public libraries, community colleges, historically Black colleges and universities, and Tribal colleges and universities. Like other incubators across the country, these organizations could provide aspiring entrepreneurs with access to shared office and manufacturing space; business mentoring; opportunities to partner with national laboratories and commercialize federally funded research; and a variety of legal, accounting, and regulatory compliance services.

Fund bold, transformative efforts to engage private sector

Government funding agencies have generally reserved their funding for nonprofit entities affiliated with universities and community economic development centers. The problem with this well-intentioned approach is that university and community-based incubators often struggle to provide start-ups with the resources they need most: access to venture capital, world-class mentors, and corporate partners.

VCs and large firms would engage with nonprofit incubators if these entities were tied to long-term investments in game-changing innovation projects.²⁴⁷ These game-changing projects could include investments in cutting-edge technology engineering (e.g., blockchain and AI) and the commercialization of healthcare innovation as well as public funding for large-scale projects for clean technologies in the energy and industrial sectors. In other words, to attract private investors and large anchor firms, incubators should focus on funding clusters, hubs, and accelerators that will achieve something bold and unique that even the largest and most sophisticated firms cannot achieve on their own.

Prioritize funding for BAIs with seasoned entrepreneurial talent

A defining challenge for all start-up ecosystems is the limited availability of repeat entrepreneurs and experienced executives who have seen companies scale, have done it internationally, and can join start-ups to share that experience and provide management



depth. The same holds for BAIs, criticized for their lack of genuine entrepreneurial bench strength. In our conversations, executives routinely talked about the need to “flood the system” with genuine start-up experience, instill sound business judgment, improve access to targeted strategic and operational advice, and help entrepreneurs open the right doors and avoid costly mistakes. In short, there are loud calls for more entrepreneur-led BAIs with an outstanding team of hands-on mentors and leaders with deep entrepreneurial experience.

Establish sector- and stage-appropriate timelines for results

There is a common perception that start-up support organizations do not promote enough fast failures and that too many companies are allowed to linger in incubators for years. Several best practices would help BAIs ensure that they are supporting viable companies and not merely prolonging the life of a walking zombie:

- » *Establish timelines for achieving key milestones.* BAIs should work with each supported company to establish clear objectives for reaching stringent targets that are appropriate for their sector and stage of growth. Milestones should be ambitious and foster a sense of urgency and a hard work ethic. Mentors and program leaders regularly should evaluate progress toward meeting these milestones.
- » *Seek external validation at regular intervals.* BAI clients should be seeking external validation of their ideas and progress from potential customers and investors as early and often as possible to ensure they are building a product or service with the potential to gain traction. A lack of validation, on the other hand, is a clear sign that it is time to pivot or wind down and start afresh.
- » *Keep fingers on the pulse of the top international start-up hubs.* Tracking the rapid evolution of digital technologies and markets in the international start-up hubs is the best way to validate whether American firms are producing products and services that will stand up to global competition. Making regular trips to the global start-up capitals will enable faster pivots by entrepreneurs seeking to tap emerging opportunities.
- » *Implement a greater willingness to cull or divert firms that exhibit less potential.* Several leading accelerators routinely drop companies from their programs when they fail to hit milestones or when mentors lose interest in continuing to coach the participating founders.
- » *Link BAIs funding to economic outcomes.* Economic development agencies should tie funding to economic outcomes that clients achieve rather than the volume of support (i.e., the number of supported companies and activities). Metrics based on volume of support rather than economic outcomes create little incentive to declare failures and show underperforming firms the exit door.

Start-ups should seek external validation of their ideas and their progress from potential customers and investors as early and often as possible.



America's incubators and accelerators should work with mentors, investors, and corporate partners to help the highest-potential start-ups become global competitors.

In summary, the country's incubators and accelerators should be working hand in hand with top mentors, investors, and corporate partners to help the highest-potential companies manage the testing and arduous transition to becoming bona fide global competitors and significant employers of tomorrow.

Streamline government support for entrepreneurs and business innovation

The US government offers several business support services designed to help American businesses find financing, export abroad, invest in R&D, and commercialize university-based research. But using them is difficult; start-ups often lack the time and resources to navigate the bureaucratic complexity. Let's look at the conundrum more closely.

The programs that generally work

One well-regarded initiative includes the SBA's SBIR program, a funding initiative that encourages small businesses to conduct R&D in response to specific US government needs. The objectives of the SBIR program include stimulating technological innovation and encouraging participation in entrepreneurship. Each year, federal agencies with extramural benefits exceeding \$100 million must allocate 3.2 percent of their R&D budget to this program.²⁴⁸ In addition to the SBIR, the Small Business Technology Transfer (STTR) program facilitates the commercialization of theoretical research by funding collaborative industry research partnerships. Federal agencies with extramural R&D budgets over \$1 billion must set aside 0.45 percent of their R&D budgets for STTR funding.²⁴⁹ The program facilitates the transfer of research between the two sectors and, in so doing, moves technology development from theory to practice.



Yellowstone National Park: Canyon Corral volunteer project: tacking posts into place. Photo by National Park Service/Jacob W. Frank, 2020, public domain. Cropped.

What the Biden-Harris administration can improve

While businesses welcome support from various agencies and levels of government, the sheer volume and variety of services and service providers create undue complexity. While the SBA has worked to reduce fragmentation and improve access to services, many obstacles to world-class service delivery remain.

- » *Map out and promote the opportunities.* Many entrepreneurs have noted that they take considerable time and resources to identify the right sources of support and to navigate application processes. “The programs are not well marketed and, in my experience, even the most sophisticated and successful companies are often unaware of many of the opportunities that exist,” said one executive.²⁵⁰ Another stated, “the ecosystem is very fragmented. As a result, we spend a disproportionate amount of time trying to navigate the support landscape.”²⁵¹
- » *Standardize and integrate programs.* The complexity and the lack of standardization and integration across disparate programs frustrate companies enough to forgo valuable resources. “Many of the relevant supports for entrepreneurs are sector or stage specific,” one entrepreneur told us. “There are specialized incentives, but you need to know what’s worth trying to access and when. It’s easy to waste a lot of time and energy thinking through which of 72 government programs to apply for.”²⁵² For example, most federal government programs still maintain data silos, forcing duplications of data management costs and lost opportunities to use data in policy formulation. To date, the US government has made little progress in remedying these issues. Meanwhile, businesses continue to lose time navigating redundant and unintegrated government processes.
- » *Accelerate the process for a fast-moving sector.* An executive in the gaming sector argued that speed and efficiency are key when providing services to business clients. “We operate in a very fast-moving sector,” the executive said. “Many companies are focused on shipping a product. They don’t have much time to sift through government programs. Applications can take months to process and funding may not flow for another couple of months after an application is approved.”²⁵³
- » *Offer guidance in human resources.* Entrepreneurs also preferred personalized support and tailored advisory services when dealing with government and other service providers. “We face a lot of tough challenges in growing our business, especially when we are working with limited resources. One of the hardest is understanding how to prioritize our hiring,” said one entrepreneur. “What type of roles should we fill first? Who should we hire and how should we go about hiring them? Do we give equity to everyone? What are the tax implications for staff? What happens if we go public?”²⁵⁴

The complexity and the lack of standardization across disparate programs frustrate companies enough to forgo valuable resources. The US government must work to simplify, standardize, and integrate its processes.



- » *Improve interfaces and map out regulations.* Fragmented service experiences for clients across federal agencies and state-level jurisdictions impede discovery of services. US business leaders have called for improved interfaces to government for entrepreneurs and small businesses, and for streamlined processes that soak up fewer resources. As William Eggers argued in the *Wall Street Journal*, “Companies must comply with many overlapping regulations at every level of government—and file reports documenting that compliance. While most businesses would welcome fewer regulations, what they really want is to spend less time and effort on compliance.”²⁵⁵ If individual citizens expect modern services on par with the private sector, then why shouldn’t American entrepreneurs and business owners expect the same?

Addressing gaps in venture capital

Building a robust venture capital ecosystem operated by these serial entrepreneurs and experienced investors and fund managers is a difficult, decades-long endeavor. But with trivergent technologies, we don’t have decades to spin up new networks of capital. As Gilles Duruflé, a senior advisor with the Institutional Investors Roundtable, put it:

*Venture capital is a very specialized profession, and the success of VC funds in building successful companies and generating good returns is highly dependent on the experience as well as the industry and operational knowledge of their managers and the depth of their networks. Venture capital is not essentially about money but “smart money,” that is, capital plus expertise.*²⁵⁶

“Venture capital is not essentially about money but ‘smart money,’ that is, capital plus expertise.”

 GILLES DURUFLÉ
Senior Advisor
Institutional Investors
Roundtable

The US venture capital system is the envy of the world. However, there are gaps, most notably for minority and women-led businesses that financial institutions and private investors have historically underserved. We also see sector-based gaps in domains like clean technologies where capital-intensive businesses with long runways for commercialization offer less timely and attractive returns for investors than the quintessential digital technology start-up.

Adding ICOs to the mix

In section three, we discussed the importance of ICOs in raising venture capital in the blockchain space. Serial technology entrepreneurs were among those literally writing the code for this new method of funding start-ups that, at first, were too cutting edge for the typical investor to understand. Some started to distinguish between tokens used to fund the development of a specific blockchain platform and tokens to be used on that platform when it was completed. As we’ve discussed, some innovators fell afoul of the law. Overall, however, ICOs were vital sources of funding for innovation. While regulation is in order, it cannot be so onerous that ICOs are no longer viable for entrepreneurs. Figure 5, next page, plots the sums raised through ICOs over time. It is a considerable amount.



Boosting investment in underserved communities

The importance of angel investors in entrepreneurial ecosystems is well recognized in the United States and internationally. Y Combinator founder Paul Graham explained:

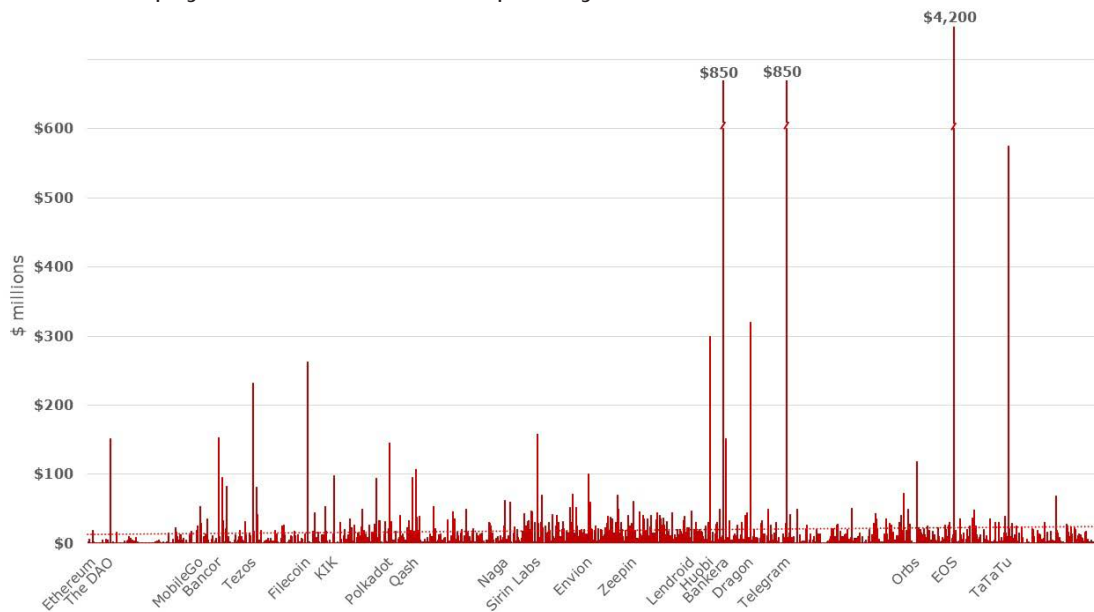
The importance of angel investors in entrepreneurial ecosystems is well recognized in the United States and internationally.

Start-up funding doesn't only come from VC firms. A more important source, because it's more personal and comes earlier in the process, is money from individual angel investors. Google might never have got to the point where [it] could raise millions from VC funds if [it] hadn't first raised a hundred thousand from Andy Bechtolsheim. And he could help them because he was one of the founders of Sun. This pattern is repeated constantly in start-up hubs. It's this pattern that makes them start-up hubs.²⁵⁷

Business angels typically fund businesses at the seed and early-growth stages, while VCs and private equity funds participate in larger, late-stage financing rounds: the former makes at least 16 times the number of investments at these stages than the latter.²⁵⁸ Along with their financial investment, angels often bring experience, credibility, contacts, and connections; their business acumen can help ensure that later-stage VC investors have a healthy pipeline of high-quality investment opportunities.

Figure 5: ICO activity 2014–2018

During this period, ICOs raised ~\$20 billion. This figure does not reflect regulatory enforcement actions. For example, of Telegram's two rounds of \$850 million raised in 2018, it agreed to return \$1.2 billion to funders and pay an \$18.5 million civil penalty.



Source of data: CoinDesk ICO Tracker, last updated 11 April 2019. "Telegram to Return \$1.2 Billion to Investors and Pay \$18.5 Million Penalty to Settle SEC Charges," Press Release 2020-146, SEC.gov, US Securities and Exchange Commission, 26 June 2020.



Start-ups with diverse leadership typically generate better financial performance, stronger innovation, and higher levels of success.

Persistent racial disparities in wealth and access to capital, combined with outright discrimination in the financial sector, have contributed to inequities in small business ownership, growth, and success.

Unfortunately, the angel investment and VC ecosystem in the United States has disproportionately benefited start-up founders who are white and male. As Ilene H. Lang and Reggie Van Lee reported in the *Harvard Business Review*:

Over the last decade, US venture capital investments quadrupled, the number of businesses started by women grew to 40 percent, and we've seen growth in the number of entrepreneurs of color. However, the percentage of venture capital dollars going to women-founded companies has barely budged since 2012, and the numbers are even worse for Black and Latinx founders—only one percent of VC-backed founders are Black, and less than two percent are Latinx.²⁵⁹

Persistent racial disparities in wealth and access to capital, combined with outright discrimination in the financial sector, have contributed to inequities in small business ownership, growth, and success. And yet, Lang and Lee point to research that shows that start-ups with diverse leadership typically generate better financial performance, stronger innovation, and higher levels of success.²⁶⁰ Despite the compelling evidence, angels and VC investors have not picked up on the opportunity.

What can the Biden-Harris administration do to help remedy the imbalance in access to VC? Lang and Lee offer some useful recommendations, and we add two of our own.

- » *Require better disclosure.* The Biden-Harris administration could work with large institutional investors to encourage VC fund managers to report the number of companies with gender and racially diverse leadership that they are investing in, as well as the amount of capital committed to these companies. As Lang and Lee noted, “While 65 percent of limited partners say they care about diversity, only 25 percent ask about it in due diligence. What gets measured gets done.”²⁶¹
- » *Monitor and report on VC fund leadership.* Lang and Lee also made the case that diversity within VC firms impacts how fund managers source and identify entrepreneurial talent, evaluate opportunities, and allocate capital. As they put it, “Who sits at the decision-making table matters.”²⁶² The Biden-Harris administration could encourage greater diversity by collecting and reporting data on the number of women and Black and Latinx people in senior decision-making investment roles at established VC funds. According to Lang and Lee, the current lack of diversity is evident in the numbers: women occupy only 12 percent of decision-makers at US-based VC firms and Black people account for only two percent of senior positions at VC firms.²⁶³
- » *Catalyze the creation of new venture funds led by diverse fund managers.* Recent research by Morgan Stanley found that an overwhelming majority (88%) of the VCs view the lived experiences of underrepresented entrepreneurs as a



Morgan Stanley reported that VCs cited “not the right fit for me” and “market-related issues” as their top reasons for investing less in more diverse founders.

The Biden-Harris administration can use tax credits as incentives to invest in businesses owned by women and people of color. Such credits could dramatically expand the capital available to diverse business owners.

competitive advantage in identifying problems to be solved and markets to be addressed.²⁶⁴ Yet its research suggested that VCs aren’t likely to educate themselves on the product, market segment, or opportunity—particularly when the product or customer isn’t one that the VC is familiar with. Morgan Stanley reported that VCs cited “not the right fit for me” and “market-related issues” as the top reasons that VCs invest less in more diverse founders.

The Biden-Harris administration should commit to a substantial infusion of public investment to seed the creation of new venture funds led by diverse managers. According to the IMF, “Increasing public investment by one percent of GDP could strengthen confidence in the recovery and boost GDP by 2.7 percent, private investment by 10 percent, and employment by 1.2 percent if investments are of high quality and if existing public and private debt burdens do not weaken the response of the private sector to the stimulus.”²⁶⁵ This investment in new venture funds will diversify the VC ecosystem and help ensure that more investment dollars flow to businesses owned by Black and Brown people.

- » *Provide tax credits for equity investments in businesses led by women and people of color.* Finally, the Biden-Harris administration can use tax credits as incentives for angel investors and VCs to invest in businesses owned by women and Black and Brown people. A credit of up to 40 percent for equity investment in small businesses that meet established criteria could dramatically expand the capital available to diverse business owners, spur new business creation, and help close the opportunity gap in economically disadvantaged communities.

Together these measures could go a long way in ensuring that the benefits of an innovation economy are available to *all* Americans, regardless of their skin color or gender. Fortunately, there is already evidence of progress in addressing the inequities in venture financing in the wake of the recent Black Lives Matter protests. Andreessen Horowitz and SoftBank, for example, announced funds to provide seed stage financing to underserved founders and entrepreneurs of color.²⁶⁶ Numerous angel networks, including Golden Seeds, Plum Alley, and Astia, are providing seed capital to women-led ventures.²⁷ Morgan Stanley and Goldman Sachs have also launched business accelerators for women and entrepreneurs of color.²⁶⁸ The Biden-Harris administration can help ensure that these notable efforts become the norm rather than the exception—or, as one Black entrepreneur called it, the difference between “reality and optics.”²⁶⁹

Closing sector-based gaps in access to capital

The availability of venture capital is also spotty for sectors that will be vital for meeting the Biden-Harris administration’s commitments to clean growth. US-based clean technology start-ups, for example, face serious challenges in securing investment. A study by the Brookings Institution found what the authors called a “serious crisis in cleantech innovation”:



Not only has cleantech patenting slowed down, but there are indications that the early-stage financing system critical to helping innovative new energy companies grow is not working well either. A close look at one crucial source of growth finance for cleantech companies—[VC] investment—suggests that early-stage cleantech companies and entrepreneurs are facing increasing challenges in accessing investment and VC dollars.²⁷⁰

The Brookings Institution analysis looked at VC investment data across 15 cleantech categories during the 2000s. The authors documented a 30 percent decline in VC investment in cleantech since 2011, with fewer deals, smaller rounds, and a declining percentage of overall VC investment.²⁷¹ Authors Devashree Saha and Mark Muro concluded that:

VC money has not been reaching many promising technologies, especially the riskiest ones, often with the heaviest financial demands, that are urgently required to address climate change. At the same time, the highly disproportionate concentration of cleantech VC investment in a handful of metro locations may be excessively narrowing the sector while complicating the challenges start-ups in the rest of the country face in raising capital.²⁷²

“VC money has not been reaching many promising technologies, especially the riskiest ones, often with the heaviest financial demands, that are urgently required to address climate change.”

 DEVASHREE SAHA
MARK MURO
*Metropolitan Policy Program
Brookings Institution*

To worsen matters, the Trump administration eliminated or reduced funding for many federal clean energy programs, including the Advanced Research Projects Agency-Energy (ARPA-E) and the US Department of Energy (DoE) loan guarantee program (LGP), which support technologies too risky for bank financing.²⁷³ Since its initiation, ARPA-E has delivered critical seed capital to more than 500 projects in diverse technologies including solar, wind, natural gas, fusion, bioengineered fuels, and batteries.

To further its clean growth agenda, the Biden-Harris administration should help fill the gaps in funding, not just supporting programs like ARPA-E and the DoE LGP, but expanding them to move early-stage cleantech ventures into later stages of commercialization where they could attract private capital. The Biden-Harris administration could also expand support for commercializing breakthrough cleantech through the DoE’s national laboratories.

The National Renewable Energy Lab in Colorado, for example, runs a suite of “technology-to-market” programs that help start-ups to validate and optimize their technologies and connect with investment and adoption partners.²⁷⁴ Doing so would help cleantech firms survive the “valleys of death” in financing and improve the overall competitiveness of the cleantech sector whose growth President Biden has said is a central focus of his administration.

Growing America’s entrepreneurial talent pool

In a recent study, the Center for American Entrepreneurship (CAE) identified access to skilled talent as “the most significant obstacle



to the full productive capacity of the US economy and to our nation's ability to fulfill its sacred promise of providing opportunity for all American citizens."²⁷⁵ The CAE cited findings from a series of roundtables across the country in which executives of start-ups revealed that finding job applicants with appropriate skills was one of the most difficult challenges. Likewise in the United Kingdom, 87 percent of scale-up companies indicated that they would grow faster if they could develop and recruit executive and management talent more easily.²⁷⁶

The challenges in attracting talent get tougher once companies start getting traction in the market and are looking to build out a senior management team to support further growth. Companies across all high-tech sectors and all regions of the United States are having challenges recruiting the specialized management talent required to help America's cadre of brilliant technical founders build large, sophisticated businesses with the enterprise capabilities to serve a truly global market.

What should the Biden-Harris administration do to address the gaps in its domestic market for talent? We focus on two policy priorities: making immigration policies and programs entrepreneurship-friendly and promoting entrepreneurial pathways in the US education system.

Streamline immigration processes for skilled talent

Given the competition for domestic management talent, ambitious growth companies inevitably seek to form their top teams from talent from around the globe. But, with the Trump administration's clampdowns on immigration, entrepreneurs described the current process for obtaining approvals as "cumbersome, time consuming, expensive, and frequently unsuccessful."²⁷⁷ Many have called for the government to streamline the immigration process so that they can more easily hire and bring C-suite level and VP-level talent from elsewhere in the world to the States.

Retain foreign students upon graduation

More than one million foreign-born students—the largest foreign-born student population in the world—study at American colleges and universities each year. Yet, current policy requires most to leave the country after graduation, taking their US-acquired education and training with them. For example, MIT alumni start hundreds of companies each year, 23 percent outside US borders.²⁷⁸ US immigration policy could retain more graduates through, for example, a post-graduation work permit program that awarded green cards and appropriate security clearances upon graduation.

Create a "Start-up Visa" program

Immigrants or children of immigrants founded 43 percent of Fortune 500 companies and 57 percent of the top 35 companies.²⁷⁹ Despite this, the United States is one of only a few advanced economies

MIT alumni start hundreds of companies each year—23 percent outside US borders—yet the United States has no visa category for foreign-born entrepreneurs.



To address the gaps in its domestic market for talent, the Biden-Harris administration could make immigration policies entrepreneurship-friendly.

that do not have a visa category for foreign-born entrepreneurs. Australia, Canada, Chile, China, France, Germany, New Zealand, and the United Kingdom have all created new visas to attract foreign-born entrepreneurs, including American entrepreneurs.²⁸⁰ A recent National Bureau of Economic Research paper cited the Kauffman Foundation's study of such a US entrepreneur visa program, which could create between 500,000 and 1.6 million new American jobs within 10 years.²⁸¹

In Canada, for example, immigrant entrepreneurs can qualify for permanent residence status if they meet one of three key criteria: (1) A designated angel investor group must invest at least ~\$58,896 into the qualifying business. (2) A designated venture capital fund must confirm that it is investing at least ~\$157,058 into the qualifying business. Or (3) a designated business incubator must accept the applicant into its business incubator program to launch a new business.²⁸² Additionally, applicants must be proficient in English or French and have the equivalent of ~\$7,853 in settlement funds.²⁸³

Promoting entrepreneurial pathways in education

Foster a business-education workforce dialogue to modernize curricula

The CAE recommended that the Department of Commerce and the Department of Education establish a working group of business and educational leaders "to examine kindergarten through grade 12, community college, and university curricula to ensure that the nation's education system serves the broader educational needs of American students, as well as the skill requirements of twenty-first century businesses."²⁸⁴



Sailors from NMCB-3 pick up trash at Heshikiya Beach in Okinawa, Japan. Photo by US Navy/Hospitalman Elijah Antor, 2020, used under CC BY 2.0. Cropped.

Everyone needs business skills of some kind. High schools and colleges can help foster entrepreneurial mindsets and raise awareness of entrepreneurship as a potential career path for their students.

Such a working group would help to integrate employers as partners with American educators in producing a highly educated and appropriately trained workforce, ready to work on day one. The CAE also recommended that the business community not only provide input into curricula determinations but also “help set aptitude standards, develop apprenticeship programs and work/study arrangements, and encourage active business professionals and other practitioners to serve as teachers, instructors, assistants, advisers, and mentors.”²⁸⁵

Embed entrepreneurship across curricula

Everyone needs entrepreneurial or business skills of some kind, from managing the household budget to finding work and keeping a job. In addition to hosting incubators, postsecondary institutions can help foster entrepreneurial mindsets and raise awareness of entrepreneurship as a potential career path for their students. For example, faculties of computer science, engineering, and natural and social sciences should be building entrepreneurship programming into their curricula. Faculties should also host events where local start-up founders talk about their experiences. Business schools can also ensure that their graduates receive training in key entrepreneurial competencies.

Fund university-linked incubators and accelerators

America’s competitive advantage in developing large technology firms is deeply rooted in world-class universities (e.g., Stanford University and the Massachusetts Institute for Technology) that excel in technology and regularly spin-off successful ventures, supply regional clusters and national labor markets with highly trained graduates, and create valuable intellectual property.²⁸⁶

Of America’s more than 1,200 incubators and co-working spaces for start-ups in the United States, around one-third are on university campuses.²⁸⁷ Examples include StartX at Stanford, MIT’s delta v, and the Berkeley SkyDeck, to name just a few.²⁸⁸ MIT’s alumni have established approximately 30,200 active companies, employ roughly 4.6 million people, and generate roughly \$1.9 trillion in annual revenues.²⁸⁹

Universities have many advantages in fostering technology start-ups, including access to scientific research with commercial potential, extensive infrastructure (from computing power to fully equipped research labs), and a population of students and faculty that can be enlisted as entrepreneurs. Additional funding from the SBA could enable Tribal and historically Black colleges and universities to launch similar facilities.

Next steps for fostering an inclusive digital economy

For America to promote its future economic prosperity by developing high-tech jobs, policymakers and other stakeholders must offer



“Innovation hubs and regulatory sandboxes are becoming a common feature in financial regulators’ toolkits to help engage with emerging technologies in finance.”

 GREG MEDCRAFT
Director
Directorate for Financial and
Enterprise Affairs
OECD

concrete solutions for unleashing the country’s entrepreneurial potential. Promoting more significant partnerships between tech start-ups and large multinationals could open up access to global value chains.

“Innovation hubs and regulatory sandboxes are becoming a common feature in financial regulators’ toolkits to help engage with emerging technologies in finance—and I’d suggest that blockchain should be a part of sandbox activities—perhaps beyond the financial sector,” said Greg Medcraft, director of the OECD Directorate for Financial and Enterprise Affairs. “These communities also need an opportunity to come together for policymakers to learn about the direction of innovation, and for entrepreneurs to communicate their policy needs on an international scale.”²⁹⁰

The OECD has proposed that Big Tech from the first era of the digital age start paying their fair share of taxes in member states.²⁹¹ Federal and state governments could earmark those tax revenues to fund any of the above programs.

The Biden-Harris administration must engage with venture and angel investors who can unleash the capital and transaction activity required to help firms scale. The administration must encourage high-potential companies to gain international exposure early and ensure the necessary support to tap Asian and European markets. The United States must also attract the world’s top talent (including coders, engineers, scientists, and more) with the specialized skill sets to help America’s cadre of brilliant founders build large, sophisticated businesses with the enterprise capabilities to serve a truly global market.

7. The path to digital government

Societies are facing incredible challenges of complexity on a global scale. Sustaining societies and economies in the face of climate change, energy shortages, poverty, demographic shifts, and security will test the ingenuity of those who wish to see, do, and participate in the public good.

In each of these issue areas, governments face a reality in which they are increasingly dependent for authority on a network of powers and counterinfluences of which they are a node. Whether streamlining government service delivery or resolving complex issues, governments are actively seeking—or can no longer resist—broader participation from citizens and other stakeholders, including their counterparts around the world as well as in state and local governments. This is especially true for the trivergent blockchain, AI, and IoT.

“Our research and country-level work has consistently underlined the need for a common, global approach to the regulation of blockchain-



“Our research and country-level work has consistently underlined the need for a common, global approach to the regulation of blockchain-based assets and processes between markets.”

 GREG MEDCRAFT
Director
Directorate for Financial and
Enterprise Affairs
OECD

based assets and processes between markets,” said Medcraft of the OECD. “[Distributed ledger technology] applications are inherently global and can exist in different jurisdictions at once. Entrepreneurs need international regulatory certainty, while authorities should be looking to work together to avoid opportunities for regulatory arbitrage.”²⁹²

Christine Lagarde, president of the ECB, stressed the need for balance: “I think the role of the disruptors and anything that is using distributed ledger technology, whether you call it crypto, assets, currencies, or whatever. ... [T]hat is clearly shaking the system.” She added, “We don’t want to shake the system so much that we would lose the stability that is needed.”²⁹³

Just as the modern multinational corporation sources ideas, parts, and materials from a vast external network of customers, researchers, and suppliers, federal governments must hone their capacity to integrate skills and knowledge from multiple participants—from very local to very international—to meet their own citizens’ expectations for a more responsive, resourceful, efficient, and accountable form of governance.



Healthcare workers at BLM: Preparing for the event to honor black mothers. Photo by sdttds, 2020, used under CC SA-BY 2.0. Cropped.

Case study: A multi-stakeholder approach to emerging technologies

Sheila Warren, Head of Data, Blockchain, and Digital Assets and Member of the Executive Committee, World Economic Forum

With the rapid evolution surrounding technologies like blockchain and AI—and the significant amount of crossover with highly regulated verticals such as financial services and healthcare—we support a multi-stakeholder approach to crafting and adopting regulation. Beyond government actors, we recommend the involvement of enterprises, start-ups, civil society, and academia. Public discourse can surface risks, challenges, and opportunities that policymakers may not have fully explored in the issuance of a rule or recommendation.

For instance, the “Presidio Principles: Foundational Values for a Decentralized Future” emerged from over a year of consultation and direct feedback with a global community, including international organizations, private sector leaders, and civil society and academia representatives (including contributions from one of the report’s co-authors and many others mentioned in this report).²⁹⁴ It represented an unprecedented agreement and collaboration among actors focused on blockchain technology. Numerous organizations have since adopted these principles as an industry standard for user protection, precisely because experts who truly understood the space crafted them. The community took many iterations to come to a version that covered the full scope of challenges, risks, and opportunities.

Moreover, the regulation of emerging technologies is complex and sits within the jurisdictions of several government agencies and departments. Ideally, such regulation should consider a cross-government strategy or approach to minimize the potential for confusion at best, or conflict at worst, with guidance from entities with related, but separate mandates—or from interpretations at the state level.

Through input from varied perspectives and interests, we will be able to craft regulation that achieves key aims of spurring innovation, as we consider and protect the most vulnerable members of our population.

The investments that governments make today in cybersecurity and digital transformation are essential to protecting their cyber borders and strengthening their digital economies. Done thoughtfully with a multi-stakeholder approach, these investments will have generous payoffs. Citizens—including the most disadvantaged in the world—will benefit from more convenient access to modern digital services and from better online engagement with their elected officials.

With a few clicks, policymakers will be able to tap the expertise of diverse participants and glean insights from open data. Businesses will see dividends in digitally enabled funding programs and streamlined processes for regulatory approvals. Taxpayers will reap the benefits of greater efficiency due to reductions in manual

“The regulation of emerging technologies is complex. ... Ideally, such regulation should consider a cross-government strategy or approach.”

 SHEILA WARREN
*Head of Data, Blockchain, and Digital Assets
Member of the Executive Committee
World Economic Forum*



Government needs a bold, integrated, and sustainable approach that creates a high-level executive mandate, aligns current efforts, invests in talent, and removes key barriers to digital transformation.

data processing, less reliance on external vendors and expensive proprietary solutions, and cost savings from migrating citizens to less costly digital channels.

Digital transformation will yield important social benefits, too. Closing the digital innovation gap with the private sector, for example, will help build public confidence in government. Creating a more innovative, tech-savvy work environment will help the public service attract and retain a highly skilled workforce. A more agile and effective public service also will attract business investment and create jobs and prosperity.

But none of these benefits will materialize without dramatically changing how governments approach digital innovation. Rather than a patchwork of isolated, non-coordinated approaches to digital, jurisdictions need a bold, integrated, and sustainable approach that creates a high-level executive mandate for public service modernization, aligns current efforts across the government, invests in talent, and removes key barriers to enabling digital transformation.

While many jurisdictions have made considerable progress toward digital government, the hard work has only just begun. We have identified for the Biden-Harris administration lessons from experiments in digital government:

- » *Digital leaders make transforming culture a priority.* Digital is less about shiny new technologies than about creating incentives and cultivating an environment in which people can and want to change their processes, their systems, and their attitude toward openness, sharing, and collaboration.
- » *Digital transformation puts users first and designs for their participation.* In so doing, digital leaders foster a customer service ethos where digital projects start by pinpointing user needs and understanding how services fit into their lives. They don't build products, programs, or services for passive audiences; they build products and services that invite participation and collaboration with citizens.
- » *Digital government requires experimentation, fast failure, and agile development.* By developing solutions using quick, iterative cycles that involve close cooperation between end-users and developers, organizations can reduce market risks and sidestep the need for large amounts of project funding, elaborate planning processes, and expensive product launches and product failures.
- » *Digital leaders fuse digital with broader public sector reforms.* By linking digital innovation with organizational transformation, digital leaders shift the conversation beyond an exclusive focus on technology toward a broader set of public sector performance objectives that all politicians and public servants can rally behind.



- » *Digital leaders attract and develop top talent.* In so doing, they lessen their reliance on consultants and external technology contractors and building up their management capacity for digital leadership. By investing in digital literacy across the public service, they nurture the development of talented individuals who understand and can manage the interface between technology and public service reform.
- » *Digital leaders collaborate across jurisdictional boundaries.* By setting up interjurisdictional forums for knowledge sharing, digital leaders can share best practices, avoid costly mistakes, coordinate on policy development, and even share code and other assets at local, state, international, and multinational levels.
- » *Digital innovation requires a strong organizational commitment.* Digital leaders establish positions of digital authority—often cabinet-level positions—to oversee digital transformation of public service delivery. The results are commensurate with the level of leadership commitment dedicated to maximizing the benefits.

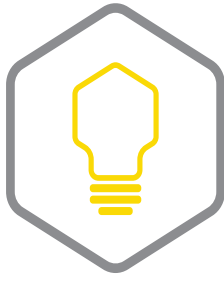
The Biden-Harris administration can and must rise to these challenges. Leaders in policy, human resources, legal, and communications must all come to the table to make the digital agenda successful. The federal civil service needs its employees to believe that they are on a journey to becoming a high-performing team. Indeed, they must be on that journey.

The federal civil service needs its employees to believe that they are on a journey to becoming a high-performing team. Indeed, they must be on that journey.

It is truly a time when either the government plays an active and positive role in its own transformation, or change will happen to it. The transformation process is at the same time exhilarating and painful, but the price of inaction is a lost opportunity for the Biden-Harris administration to redefine its role in economic leadership and help launch a new era of digital government.



NPLD Fort Stanton Snowy River National Conservation Area. Photo by Bureau of Land Management-Mexico, 2020, used under CC BY 2.0. Cropped.



About the authors

Don Tapscott is CEO of the Tapscott Group, executive chairman of the Blockchain Research Institute, and one of the world's leading authorities on the impact of technology on business and society. He has authored more than 16 books, including *Wikinomics: How Mass Collaboration Changes Everything* (with Anthony Williams), which has been translated into more than 25 languages. He coined the term, "The Digital Economy," in his 1994 book of that title, and many of his big ideas are part of the business vernacular today. In 2016, he co-authored *Blockchain Revolution: How the Technology Behind Bitcoin and Other Cryptocurrencies Is Changing the World*. His new book, *Supply Chain Revolution: How Blockchain Technology Is Transforming the Digital Flow of Assets*, debuted as the "#1 New Release" in the commerce category on Amazon.com in June 2020. In 2019, then-ranked as the #2 living business thinker, Don was inducted into the Thinkers50 Hall of Fame. He is an adjunct professor at INSEAD and former two-term chancellor of Trent University in Ontario. He has consulted to the US federal government under Clinton, Bush, and Obama administrations on technology strategy and policy.

Anthony D. Williams is co-founder and president of the DEEP Centre and an internationally recognized authority on the digital revolution, innovation, and creativity in business and society. He is co-author (with Don Tapscott) of the groundbreaking bestseller, *Wikinomics: How Mass Collaboration Changes Everything*, and its sequel, *Macrowikinomics: New Solutions for a Connected Planet*. Among other current appointments, Anthony is an expert advisor to the Markle Foundation's Initiative for America's Economic Future, a senior fellow with the Lisbon Council in Brussels and the Institute on Governance in Ottawa, and chief advisor to Brazil's Free Education Project, a national strategy to equip two million young Brazilians with the skills required for a twenty-first century workforce. His work on technology and innovation has appeared in such publications as the *Huffington Post*, *Harvard Business Review*, and the *Globe and Mail*.

Kirsten Sandberg is editor-in-chief of the Blockchain Research Institute, where she is responsible for the editorial direction and production of briefs, cases, papers, reports, and books. She is an editorial board member of the *Journal of Business Models* and an adjunct faculty member of the graduate publishing program at Pace University, where she serves on the advisory board and teaches courses on academic publishing and the legal aspects of publishing. She has ghostwritten many an article and book proposal. For over a decade, she was an executive editor specializing in strategy and technology at Harvard Business Review Publishing. There she published such best-sellers as Hal Varian and Carl Shapiro's *Information Rules*, Larry Downes and Chunka Mui's *Unleashing the Killer App*, and Joe Pine and Jim Gilmore's *The Experience Economy*.

Disclosures. The authors have no financial or advisory relationship with any of the projects featured in this report.



Acknowledgments

We thank the following people who contributed to the creation of the report. Their input does not imply their endorsement of the report or agreement with its views, recommendations, and conclusions. Responsibility for the contents of this document rests solely with the Blockchain Research Institute.

We want to extend special thanks to Sir Tim Berners-Lee for his feedback on our write-up of Solid and Inrupt. We also greatly appreciate the contributions, advocacy, and ongoing support of Perianne Boring, Founder and President, Chamber of Digital Commerce; Amy Davine Kim, Chief Policy Officer, Chamber of Digital Commerce; the Honorable J. Christopher Giancarlo, Senior Counsel, Willkie Farr & Gallagher, and former Chairman, US Commodity Futures Trading Commission; Sheila Warren, Head of Data, Blockchain, and Digital Assets and Member of the Executive Committee, World Economic Forum; Greg Medcraft, Director, Directorate for Financial and Enterprise Affairs, Organisation for Economic Co-operation and Development; and Gerard Dache, Executive Director, Government Blockchain Association.

Next, we thank Divij Pandya, Associate Director of Policy, Chamber of Digital Commerce; Sumedha Deshmukh, Project Specialist, Blockchain and Distributed Ledger Technology, World Economic Forum; and Oliver Garrett-Jones, Counsellor to the Director, Directorate for Financial and Enterprise Affairs, OECD, for their efforts.

Our heartfelt thanks to the Blockchain Research Institute's Managing Director Hilary Carter and Faculty Member Bill Gillies for drafting sections of the report; Production Manager Mary-Jane Pilgrim, Editors Wendy Klein and Brittany Vincent, Executive Assistant Antoinette Schatz, Project Support Associate Yuliya Samoylova (photography/videography), and Mike Dover, Managing Partner, Socialstruct Advisory Group, for their coordination and swift turnaround of the project and collateral.

Finally, our thanks to the rest of the BRI team for all their efforts around the publication of this work: Alisa Acosta, Director of Education; Wayne Chen, Director of Business Development; Andrew Facciolo, Director of Client Experience; Roya Hussaini, Director of Administration and Executive Assistant to Don Tapscott; Noah Lehman, Director of Communications; and Jody Stevens, Director of Finance.





About the Blockchain Research Institute

Co-founded in 2017 by Don Tapscott and Alex Tapscott, the Blockchain Research Institute is a think tank dedicated to “realizing the new promise of the digital economy.” Its syndicated research program, which is funded by major corporations and government agencies, aims to fill a large gap in the global understanding of blockchain and related technology and its strategic implications for business, governance, and society. Its faculty focuses on informing leaders of the economic opportunities and challenges of this nascent technology. Research areas include the transformation of industries, the enterprise, and government; the regulation of innovation and the use of data, digital currencies, and self-sovereign identities; and the trivergence of blockchain, artificial intelligence, and the Internet of Things. For more information, please visit www.blockchainresearchinstitute.org.



About the Chamber of Digital Commerce

The Chamber of Digital Commerce is the world’s leading trade association representing the digital asset and blockchain industry. Its mission is to promote the acceptance and use of digital assets and blockchain-based technologies. Through education, advocacy and working closely with policymakers, regulatory agencies and industry, its goal is to develop an environment that fosters innovation, jobs, and investment. For more information, please visit digitalchamber.org.



Notes

1. Robert Muggah, "Why the Latest Cyberattack Was Different," *Foreign Policy*, The Slate Group, 11 Jan. 2021. foreignpolicy.com/2021/01/11/cyberattack-hackers-russia-svr-gru-solarwinds-virus-internet, accessed 19 Jan. 2021.
2. "Our Information Technology Investments at Work: The Basics," *ITDashboard.gov*, US Office of Management and Budget, 2021. itdashboard.gov/#learn-basic-stats, accessed 22 Jan. 2021.
3. "Factors Shaking Up IT Budgets," *The 2021 State of IT*, Spiceworks Ziff Davis, J2 Global Inc., Ziff Davis LLC, 16 Sept. 2020. swzd.com/resources/state-of-it/#it-budget; and Khalid Kark, "IT Spending: From Value Preservation to Value Creation," *Wall Street Journal*, Dow Jones & Co. Inc., 12 March 2018. deloitte.wsj.com/cio/2018/03/12/it-spending-from-value-preservation-to-value-creation, accessed 22 Jan. 2021.
4. Don Tapscott, David Ticoll, and Dan Herman, "Digital Conglomerates: Setting the Agenda for Enterprise 2.0," *DonTapscott.com*, New Paradigm Learning Corp., 2 Oct. 2006. dontapscott.com/wp-content/uploads/Don-Tapscott-Digital-Concolmerates.pdf, accessed 27 Jan. 2021.
5. In 1997, Don explained the new danger of "splintering society in a race of information have and have-nots, knowers and know-nots, doers and do-nots—a digital divide." See Don Tapscott, *Growing Up Digital: The Rise of the Net Generation* (New York: McGraw Hill, 1997): 255–279.
6. Abdi Latif Dahir, "There Is Growing Momentum to Adopt China's Yuan as a Reserve Currency in Africa," *OZ.com*, Quartz Africa, 29 May 2018. qz.com/africa/1291372/chinas-yuan-gets-support-from-africa-central-banks-to-replace-us-dollar-reserve, accessed 27 Jan. 2021.
7. Elaine Kamarck, "Lessons for the Future of Government Reform," Testimony before the House Committee on Oversight and Government Reform, 18 June 2013. Brookings Institution, www.brookings.edu/testimonies/lessons-for-the-future-of-government-reform, accessed 27 Jan. 2021.
8. "Defense Primer: Commanding US Military Operations," *In Focus*, Congressional Research Service, last updated 15 Jan. 2021. fas.org/sqp/crs/natsec/IF10542.pdf; Anshu Siripurapu, "A Unique Military Force: The US National Guard," *100, CFR.org*, Council on Foreign Relations, last updated 15 Jan. 2021. www.cfr.org/background/unique-military-force-us-national-guard, accessed 31 Jan. 2021.
9. Dr. Nadia Hilliard, "Why Democratic Legitimacy Remains at Stake in the US Election," Opinion, *UCL News*, University College London, 4 Nov. 2020. www.ucl.ac.uk/news/2020/nov/opinion-why-democratic-legitimacy-remains-stake-us-election, accessed 14 Jan. 2021.
10. David A. Moss, "Fixing What's Wrong with U.S. Politics," *Harvard Business Review*, HBS Publishing Corp., March 2012. hbr.org/2012/03/fixing-whats-wrong-with-us-politics, accessed 25 Jan. 2021.
11. Paul Blake and Divyanshi Wadhwa, "2020 Year in Review: The Impact of COVID-19 in 12 Charts," *World Bank Blogs*, The World Bank Group, 14 Dec. 2020. blogs.worldbank.org/voices/2020-year-review-impact-covid-19-12-charts; "Impact Report: COVID-19 and Crime," Prepared by Richard Rosenfeld and Ernesto Lopez, National Commission on COVID-19 and Criminal Justice, 30 Nov. 2020. covid19.counciloncj.org/2020/11/30/impact-report-covid-19-and-crime-2, both accessed 19 Jan. 2021.
12. Don Tapscott, David Ticoll, and Dan Herman, "Digital Conglomerates: Setting the Agenda for Enterprise 2.0," *DonTapscott.com*, New Paradigm Learning Corp., 2 Oct. 2006. dontapscott.com/wp-content/uploads/Don-Tapscott-Digital-Concolmerates.pdf, accessed 19 Jan. 2021.
13. Patrick Thibodeau, "Obama's CIO Quits: Vivek Kundra Sought to Create a Web 2.0-Type Government with a Heavy Dose of Cloud," *Computerworld*, IDG Communications Inc., 16 June 2011. www.computerworld.com/article/2509067/obama-s-cio-quits.html, accessed 19 Jan. 2021.
14. Office of Inspector General, "An Overview of 60 Contracts That Contributed to the Development and Operation of The Federal Marketplace," Daniel R. Levinson, Inspector General, US Department of Health and Human Services, OEI-03-14-00231. Aug. 2014. oig.hhs.gov/oei/reports/oei-03-14-00231.pdf; Office of Inspector General, "HealthCare.gov: A Case Study of CMS Management of the Federal Marketplace," Daniel R. Levinson, Inspector General, US Department of Health and Human Services, OEI-0-14-00350, Feb. 2016. oig.hhs.gov/oei/reports/oei-06-14-00350.pdf; Katherine McIntire Peters, "Poor Leadership Derailed Obamacare Rollout, Not Technology," *Government Executive*, Government Executive Media Group Inc., 23 Feb. 2016. www.govexec.com/management/2016/02/poor-leadership-derailed-obamacare-rollout-not-technology/126146, all accessed 19 Jan. 2021.
15. Robinson Meyer, "The Secret Start-up That Saved the Worst Website in America," *The Atlantic*, Atlantic Monthly Group LLC, 9 July 2015. www.theatlantic.com/technology/archive/2015/07/the-secret-startup-saved-healthcare-gov-the-worst-website-in-america/397784, accessed 19 Jan. 2021.



16. "Information Technology: Federal Agencies and OMB Need to Continue to Improve Management and Cybersecurity," Statement of Carol C. Harris, Testimony before the Subcommittee on Government Operations, Committee on Oversight and Reform, House of Representatives, United States Government Accountability Office, 3 Aug. 2020. www.gao.gov/assets/710/708577.pdf; Cybersecurity Resource Center, "Cybersecurity Incidents: What Happened," US Office Of Personnel Management, n.d. www.opm.gov/cybersecurity/cybersecurity-incidents; and Eric Chabrow, "OPM's 2nd Breach: 21.5 Million Victims: Members of Congress Intensify Criticism of Agency," *BankInfoSecurity.com*, Information Security Media Group Corp., 9 July 2015. www.bankinfosecurity.com/pii-215-mm-taken-in-second-opm-hack-a-8390; Josh Fruhlinger, "The OPM Hack Explained: Bad Security Practices Meet China's Captain America," *CSO.com*, IDG Communications Inc., 12 Feb. 2020. www.csoonline.com/article/3318238/the-opm-hack-explained-bad-security-practices-meet-chinas-captain-america.html, all accessed 19 Jan. 2021.
17. Executive Office of the President, "Enhancing and Strengthening the Federal Government's Cybersecurity," Fact Sheet, Office of Management and Budget, Washington, DC 20503, 12 June 2015. obamawhitehouse.archives.gov/sites/default/files/omb/budget/fy2016/assets/fact_sheets/enhancing-strengthening-federal-government-cybersecurity.pdf, accessed 19 Jan. 2021.
18. Shaun Donovan, Director, Office of Management and Budget, to Joseph R. Biden, President of the Senate, re: enclosed legislative proposal, "Information Technology Modernization Fund Legislation," 8 April 2016. obamawhitehouse.archives.gov/sites/default/files/omb/legislative/letters/fy17_information_technology_modernization_fund_legislative_proposal.pdf, accessed 19 Jan. 2021. Estimation by Tony Scott, via e-mail to Don Tapscott, Jan. 2021.
19. By one estimate, the US Congress funded approximately \$150 million.
20. Ben Riley-Smith, Rozina Sabur, and Nick Allen, "US Capitol Riots: Everything We Know About What Happened When Trump's Supporters Stormed Washington," *The Telegraph*, Telegraph Media Group Ltd., 23 Jan. 2021. www.telegraph.co.uk/news/0/us-capitol-riot-protest-what-happened-who-died-trump-impeached, accessed 24 Jan. 2021.
21. Gerard Dache, e-mail to Hilary Carter, 20 Jan. 2021.
22. "Global Digital Population as of October 2020," *Statista.com*, Statista Inc., Oct. 2020. www.statista.com/statistics/617136/digital-population-worldwide, accessed 16 Jan. 2021.
23. "Cisco Visual Networking Index Predicts Near-Tripling of IP Traffic by 2020," News Release, The Network, Cisco, 7 June 2016. newsroom.cisco.com/press-release-content?articleId=1771211, accessed 19 Jan. 2021.
24. "China's Record 5G Blueprint for 2021 Electrifies Telecom Stocks," Shirley Zhao and Yuan Gao, *Bloomberg News*, Bloomberg LP, 29 Dec. 2020. www.bloomberg.com/news/articles/2020-12-29/china-s-record-5g-blueprint-for-2021-electrifies-telecom-stocks, accessed 29 Jan. 2021.
25. "The Long View: How Will the Global Economic Order Change by 2050," *PwC.com*, PricewaterhouseCoopers LLP, Feb. 2017. www.pwc.com/gx/en/world-2050/assets/pwc-the-world-in-2050-full-report-feb-2017.pdf, accessed 19 Jan. 2021.
26. Andrea Murphy et al., "Global 2000: The World's Largest Public Companies," *Forbes.com*, Forbes Media LLC, 13 May 2020. www.forbes.com/global2000, accessed 19 Jan. 2021.
27. George Westerman, Didier Bonnet, and Andrew McAfee, *Leading Digital: Turning Technology into Business Transformation* (Cambridge: Harvard Business Press, 2014). hbr.org/resources/pdfs/chapters/leading-digital.pdf, accessed 11 Jan. 2021.
28. OECD, *OECD Science, Technology, and Industry Scoreboard 2017: The Digital Transformation*, OECD Publishing, Paris, 22 Nov 2017. doi.org/10.1787/9789264268821-en. See also "Individuals using the Internet (% of population)," *WorldBank.org*, World Bank Group, n.d. data.worldbank.org/indicator/IT.NET.USER.ZS?end=2019&start=1990&view=chart, both accessed 19 Jan. 2021.
29. Anthony Williams, "Consolidating Multiple Ledgers with Blockchain: A Single Digital Ledger for the Government of Canada Accounts," foreword by Don Tapscott, Blockchain Research Institute and Innovation, Science, and Economic Development Canada, 16 Nov. 2018.
30. James Maguire, "Top 100 Artificial Intelligence Companies 2021," *Datamation*, TechnologyAdvice, 2 July 2020. www.datamation.com/artificial-intelligence/top-artificial-intelligence-companies.html, accessed 16 Jan. 2021.
31. Brian Behlendorf, Blockchain and COVID-19 Roundtable via Zoom, hosted by Blockchain Research Institute, 26 March 2020.
32. "Cross-Industry Coalition Advances Digital Trust Standards," Press Release, The Linux Foundation, 5 May 2020. www.linuxfoundation.org/press-release/2020/05/cross-industry-coalition-advances-digital-trust-standards, accessed 7 Feb. 2021.
33. "Cross-Industry Coalition Advances Digital Trust Standards."
34. "Trust over IP Foundation Introduces a New Tool for Interoperable Digital Trust," *TrustOverIP Blog*, The Linux Foundation, 19 Oct. 2020. trustoverip.org/blog/2020/10/19/trust-over-ip-foundation-introduces-a-new-tool-for-interoperable-digital-trust, accessed 7 Feb. 2021.
35. "Trust over IP Foundation Introduces a New Tool for Interoperable Digital Trust."



36. Brian Behlendorf, "Introducing the Open Governance Network Model," Blog, The Linux Foundation, 15 Oct. 2020. www.linuxfoundation.org/blog/2020/10/introducing-the-open-governance-network-model, accessed 7 Feb. 2021.
37. Brian Behlendorf, "Introducing the Open Governance Network Model."
38. Stuart Levy Sr., "New Survey Finds Identity Theft Reported by 10% of Consumers Since Start of COVID-19 Pandemic," *TransUnion*, TransUnion LLC., 1 Oct. 2020. www.transunion.com/blog/10-percent-of-consumers-victims-of-identity-theft-related-to-government-agency-services, accessed 28 Jan. 2021.
39. Cyberbullying of children ages 12–17 has risen from 18 percent to 37 percent. See Justin W. Patchin, "2019 Cyberbullying Data," *Cyberbullying.org*, Cyberbullying Research Center, n.d. cyberbullying.org/2019-cyberbullying-data, accessed 28 Jan. 2021.
40. Nicholas Kristof, "The Children of Pornhub," *New York Times*, New York Times Co., 4 Dec. 2020. www.nytimes.com/2020/12/04/opinion/sunday/pornhub-rape-trafficking.html, accessed 28 Jan. 2021.
41. New York Society for the Prevention of Cruelty to Children, "Americans Are Acutely Unaware of the Prevalence of Child Sex Exploitation Online, New Study Finds," *GlobeNewswire*, GlobeNewswire Inc., 10 Dec. 2020. www.globenewswire.com/news-release/2020/12/10/2143188/0/en/Americans-Are-Acutely-Unaware-of-the-Prevalence-of-Child-Sex-Exploitation-Online-New-Study-Finds.html, accessed 28 Jan. 2021.
42. Julia Carrie Wong, "How Facebook Groups Bring People Closer Together – Neo-Nazis Included," *The Guardian*, Guardian News & Media Ltd., 31 July 2017. www.theguardian.com/technology/2017/jul/31/extremists-neo-nazis-facebook-groups-social-media-islam, accessed 28 Jan. 2021.
43. Max Fisher and Amanda Taub, "How Everyday Social Media Users Become Real-World Extremists," *New York Times*, New York Times Co., 25 April 2018. www.nytimes.com/2018/04/25/world/asia/facebook-extremism.html, accessed 28 Jan. 2021.
44. Roger McNamee, "Investor Says He Tried to Warn Facebook About 'Bad Actors' Harming Innocent People," Interview by Hari Sreenivasan, 5:30, *PBS NewsHour*, NewsHour Productions LLC, 20 March 2018. www.pbs.org/newshour/show/investor-says-he-tried-to-warn-facebook-about-bad-actors-harming-innocent-people, accessed 28 Jan. 2021.
45. Roger McNamee, "Investor Says He Tried to Warn Facebook."
46. Bruce Bartlett, "The Right Wants a Hands-Off Approach to Business. Until It Hates the Results," Perspective, *Washington Post*, WP Company LLC, 16 Jan. 2021. www.washingtonpost.com/outlook/2021/01/16/trump-twitter-parler-hawley-free-speech, accessed 27 Jan. 2021.
47. Timothy Garton Ash, Robert Forwa, and Danaë Metaxa, "GLASNOST! Nine Ways Facebook Can Make Itself a Better Forum for Free Speech and Democracy," *Oxford-Stanford Report Series*, University of Oxford and Stanford University, Jan. 2019. pacscenter.stanford.edu/wp-content/uploads/2019/01/Garton_Ash_et_al_Facebook_report_FINAL_0.pdf, accessed 28 Jan. 2021.
48. Thomas M. Johnson Jr., "The FCC's Authority to Interpret Section 230 of the Communications Act," *FCC.gov*, Federal Communications Commission, 21 Oct. 2020. www.fcc.gov/news-events/blog/2020/10/21/fccs-authority-interpret-section-230-communications-act, accessed 28 Jan. 2021.
49. Diane Francis, "On Fox and Facebook," *Diane Francis Blog*, Substack Inc., 25 Jan. 2021. dianefrancis.substack.com/p/on-fox-and-facebook, accessed 28 Jan. 2021.
50. Andrew Marantz, "Facebook and the 'Free Speech' Excuse," *New Yorker*, Condé Nast, 31 Oct. 2019. www.newyorker.com/news/daily-comment/facebook-and-the-free-speech-excuse, accessed 28 Jan. 2021.
51. Larry Downes, "How Should the Biden Administration Approach Tech Regulation? With Great Care," *MIT Sloan Management Review*, Massachusetts Institute of Technology, 19 Jan. 2021. sloanreview.mit.edu/article/how-should-the-biden-administration-approach-tech-regulation-with-great-care, accessed 28 Jan. 2021.
52. Michael A. Cusumano, Annabelle Gawer, and David B. Yoffie, "Social Media Companies Should Self-Regulate. Now.," *Harvard Business Review*, HBS Publishing Corp., 15 Jan. 2021. hbr.org/2021/01/social-media-companies-should-self-regulate-now, accessed 28 Jan. 2021.
53. Brooke Auxier, "How Americans See U.S. Tech Companies as Government Scrutiny Increases," *Pew Research Center*, The Pew Charitable Trusts, 27 Oct. 2020. www.pewresearch.org/fact-tank/2020/10/27/how-americans-see-u-s-tech-companies-as-government-scrutiny-increases, accessed 27 Jan. 2021.
54. Bill Curry, "Report Calls for Powerful New Federal Body to Regulate Social Media," *Globe and Mail*, Globe and Mail Inc., 27 Jan. 2021. www.theglobeandmail.com/politics/article-report-calls-for-powerful-new-federal-body-to-regulate-social-media; Richard Stursberg and Kevin Chan, "We Should Regulate Social Media – But in a Way That Makes Sense," *Globe and Mail*, Globe and Mail Inc., 19 Nov. 2020. www.theglobeandmail.com/opinion/article-we-should-regulate-social-media-but-in-a-way-that-makes-sense, both accessed 28 Jan. 2021.



55. Ellen Nakashima and Craig Timberg, "DHS, State and NIH Join List of Federal Agencies—Now Five—Hacked in Major Russian Cyberespionage Campaign," *Washington Post*, WP Company LLC, 14 Dec. 2020. www.washingtonpost.com/national-security/dhs-is-third-federal-agency-hacked-in-major-russian-cyberespionage-campaign/2020/12/14/41f8fc98-3e3c-11eb-8bc0-ae155bee4aff_story.html; Christopher Bing, "Suspected Russian Hackers Spied on US Treasury Emails—Sources," *Reuters.com*, Thomson Reuters Corp., 13 Dec. 2020. www.reuters.com/article/BigStory12/idUSKBN28NOPG; and Natasha Bertrand and Eric Wolff, "Nuclear Weapons Agency Breached Amid Massive Cyber Onslaught," *POLITICO.com*, POLITICO LLC, 17 Dec. 2020. www.politico.com/news/2020/12/17/nuclear-agency-hacked-officials-inform-congress-447855, all accessed 14 Jan. 2021.
56. Tom Burt, "Cyberattacks Targeting Health Care Must Stop," *Microsoft on the Issues Blog*, Microsoft Corp., 13 Nov. 2020. blogs.microsoft.com/on-the-issues/2020/11/13/health-care-cyberattacks-covid-19-paris-peace-forum, accessed 17 Jan. 2021.
57. Mark Scott, "Russia Is Back, Wilier Than Ever—and It's Not Alone," *POLITICO.com*, POLITICO LLC, 14 Sept. 2020. www.politico.com/news/2020/09/14/russia-cyberattacks-election-413757, accessed 19 Jan. 2021.
58. "Joint Statement from Elections Infrastructure Government Coordinating Council & the Election Infrastructure Sector Coordinating Executive Committees," News Release, *CISA.gov*, Cybersecurity and Infrastructure Security Agency, US Government, 12 Nov. 2020. www.cisa.gov/news/2020/11/12/joint-statement-elections-infrastructure-government-coordinating-council-election, accessed 19 Jan. 2021.
59. Robert Muggah, "Why the Latest Cyberattack Was Different," *Foreign Policy*, The Slate Group, 11 Jan. 2021.
60. "President-elect Biden Announces American Rescue Plan," American Rescue Plan Fact Sheet, 14 Jan. 2021. gfoa.org/cdn.prismic.io/gfoaorg/a6a7aad6-8107-4758-9b31-c68c5c81c3f6_COVID_Relief-Package-Fact-Sheet.pdf, accessed 20 Jan. 2020.
61. "President-elect Biden Announces American Rescue Plan," American Rescue Plan Fact Sheet, 14 Jan. 2021.
62. Schneier is chief of security architecture of Tim Berners-Lee's new start-up Inrupt; Inrupt Inc., n.d. inrupt.com/about, accessed 17 Jan. 2021.
63. Bruce Schneier, "The US Has Suffered a Massive Cyberbreach. It's Hard to Overstate How Bad It Is," *The Guardian*, Guardian News & Media Ltd., 23 Dec. 2020. www.theguardian.com/commentisfree/2020/dec/23/cyber-attack-us-security-protocols, accessed 19 Jan. 2021.
64. Bruce Schneier, "The US Has Suffered a Massive Cyberbreach. It's Hard to Overstate How Bad It Is."
65. Brad Smith, "A Moment of Reckoning: The Need for a Strong and Global Cybersecurity Response," *The Official Microsoft Blog*, Microsoft Corp., 17 Dec. 2020. blogs.microsoft.com/on-the-issues/2020/12/17/cyberattacks-cybersecurity-solarwinds-fireeye, accessed 19 Jan. 2021.
66. "President-elect Biden Announces American Rescue Plan," American Rescue Plan Fact Sheet, 14 Jan. 2021.
67. Bruce Schneier, "The US Has Suffered a Massive Cyberbreach. It's Hard to Overstate How Bad It Is," *The Guardian*, Guardian News & Media Ltd., 23 Dec. 2020. www.theguardian.com/commentisfree/2020/dec/23/cyber-attack-us-security-protocols, accessed 19 Jan. 2021.
68. "The 9 Principles," *Paris Call*, Paris Call, n.d. pariscall.international/en/principles; "Mission Statement," Global Commission on the Stability of Cyberspace, n.d. cyberstability.org, both accessed 14 Jan. 2021.
69. See Don Tapscott, *Growing Up Digital: The Rise of the Net Generation* (New York: McGraw Hill, 1997): 255–279. We also want to acknowledge Steve Case's early use of the phrase in a public statement as chair and CEO of AOL, "There's no single solution to bridging the digital divide We must take steps now so that in the Internet Century, no children are left behind," as reported by *US Newswire* (Nexis), 9 Nov. 1994.
70. Larry Irving, "Broadband Is Now Our Lifeline, But 20 Million Still Lack Access," *The Hill*, News Communications Inc., 28 March 2020. thehill.com/opinion/technology/489977-broadband-is-now-our-lifeline-but-20-million-still-lack-access, accessed 19 Jan. 2021.
71. Larry Irving, "Broadband Is Now Our Lifeline, But 20 Million Still Lack Access."
72. Amanda Menas, "Joe Biden's 3 Big Ideas to Close the Digital Divide," *Education Votes*, National Education Association, 23 Aug. 2020. educationvotes.nea.org/2020/08/23/joe-bidens-3-big-ideas-to-close-the-digital-divide, accessed 19 Jan. 2021.
73. Tanya Basu, "Why the 'Homework Gap' Is Key to America's Digital Divide," *MIT Technology Review*, Massachusetts Institute of Technology, 13 Oct. 2020. www.technologyreview.com/2020/10/13/1010243/jessica-rosenworcel-homework-gap-key-to-americas-digital-divide, accessed 19 Jan. 2021.
74. Tanya Basu, "Why the 'Homework Gap' Is Key to America's Digital Divide."
75. "The Biden-Harris Plan to Build Back Better in Rural America," *JoeBiden.com*, Biden for President, BFPCC Inc., n.d. joebiden.com/rural-plan, accessed 20 Dec. 2020.



76. "The Biden Plan to Build a Modern, Sustainable Infrastructure and an Equitable Clean Energy Future," *JoeBiden.com*, Biden for President, BFPCC Inc., n.d. joebiden.com/clean-energy, accessed 20 Jan. 2021.
77. Nicol Turner Lee, "Navigating the US-China 5G Competition," Center for Technology Innovation, Brookings Institution, April 2020. www.brookings.edu/wp-content/uploads/2020/04/FP_20200427_5g_competition_turner_lee_v2.pdf, accessed 20 Jan. 2021.
78. Nicol Turner Lee, "Navigating the US-China 5G Competition."
79. "Lifeline Support for Affordable Communications," *FCC.gov*, Federal Communications Commission, 21 Jan. 2021. www.fcc.gov/lifeline-consumers, accessed 21 Jan. 2021.
80. Larry Irving, "Broadband Is Now Our Lifeline, But 20 Million Still Lack Access," *The Hill*, News Communications Inc., 28 March 2020. thehill.com/opinion/technology/489977-broadband-is-now-our-lifeline-but-20-million-still-lack-access, accessed 19 Jan. 2021.
81. Larry Irving, "Broadband Is Now Our Lifeline, But 20 Million Still Lack Access."
82. Rafi Goldberg, "Unplugged: NTIA Survey Finds Some Americans Still Avoid Home Internet Use," *NTIA.gov*, *National Telecommunications and Information Administration*, US Department of Commerce, 15 April 2019. www.ntia.doc.gov/blog/2019/unplugged-ntia-survey-finds-some-americans-still-avoid-home-internet-use, accessed 18 Dec. 2020.
83. Blair Levin and Larry Downes, "Cities, Not Rural Areas, Are the Real Internet Deserts," *Washington Post*, The Washington Post Co., 13 Sept. 2019. www.washingtonpost.com/technology/2019/09/13/cities-not-rural-areas-are-real-internet-deserts, accessed 18 Dec. 2020.
84. Blair Levin and Larry Downes, "Cities, Not Rural Areas, Are the Real Internet Deserts."
85. Brian Magierski, e-mail to Hilary Carter, 2 April 2020, 7:54 a.m.
86. Shawn Yuan, "How China Is Using AI and Big Data to Fight the Coronavirus," *Al Jazeera News*, Al Jazeera Media Network, 1 March 2020. www.aljazeera.com/news/2020/3/1/how-china-is-using-ai-and-big-data-to-fight-the-coronavirus, accessed 6 April 2020.
87. Danielle Cohen, "All the Stupidest Ways the Capitol Rioters Got Caught," *GQ.com*, Condé Nast, 15 Jan. 2021. www.gq.com/story/all-the-stupidest-ways-the-capitol-rioters-got-caught, accessed 15 Jan. 2021.
88. Preeti Gandhi, attachment to e-mail to Hilary Carter cc: et al., 30 March 2020; edited via e-mail from Gandhi to Carter cc: et al., 6 April 2020.
89. Kevin Granville, "Facebook and Cambridge Analytica: What You Need to Know as Fallout Widens," *New York Times*, New York Times Co., 19 March 2018. www.nytimes.com/2018/03/19/technology/facebook-cambridge-analytica-explained.html, accessed 6 April 2020.
90. Edward C. Baig, Nathan Bomey, and Janna Herron, "Capital One Data Breach: What's the Cost of Data Hacks for Customers and Businesses?" *USA Today*, Gannett Co., 30 July 2019. www.usatoday.com/story/tech/2019/07/30/capital-one-data-breach-2019-what-cost-you/1869724001, accessed 6 April 2020.
91. Steve Lohr, "Calls Mount to Ease Big Tech's Grip on Your Data," *New York Times*, New York Times Co., 25 July 2019. www.nytimes.com/2019/07/25/business/calls-mount-to-ease-big-techs-grip-on-your-data.html, accessed 6 April 2020.
92. Jon Markman, "Governments Using Software, Camera Advances to Spy on Citizens Nonstop," *Forbes.com*, Forbes Media LLC, 30 April 2019. www.forbes.com/sites/jonmarkman/2019/04/30/governments-using-software-camera-advances-to-spy-on-citizens-nonstop/#6e0f566b6061; Danny Palmer, "What is GDPR? Everything You Need to Know About the New General Data Protection Regulations," *ZDNet.com*, CBS Interactive, 17 May 2019. www.zdnet.com/article/gdpr-an-executive-guide-to-what-you-need-to-know, both accessed 6 April 2020.
93. Sen. Elizabeth Warren, "How We Can Break Up Big Tech," *ElizabethWarren.com*, 8 March 2019. elizabethwarren.com/m-break-up-big-tech, accessed 6 April 2020.
94. "About Us," Data Transfer Project, n.d. datatransferproject.dev, accessed 17 Jan. 2021.
95. InterPlanetary File System, Protocol Labs, n.d. ipfs.io, accessed 17 Jan. 2021.
96. Leigh Cuen, "As Governments Rush to Track Coronavirus, Honduras May Offer a Privacy-First Model," *CoinDesk*, Digital Currency Group, 2 April 2020. www.coindesk.com/as-governments-rush-to-track-coronavirus-honduras-may-offer-a-privacy-first-model, accessed 3 April 2020.
97. Solid is an acronym for "socially linked data." Sir Tim Berners-Lee serves as Inrupt's CTO. David Weinberger, "How the Father of the World Wide Web Plans to Reclaim It from Facebook and Google," *Digital Trends*, DesignTechnica Corporation, 10 Aug. 2016. www.digitaltrends.com/web/ways-to-decentralize-the-web; Solid, "Get a Pod and a WebID"; and "About," *Inrupt*, Inrupt Inc., n.d. inrupt.com/about, all accessed 17 Jan. 2021.
98. "About Solid," *Solid*, Solid, n.d. solidproject.org/about; "Get a Pod and a WebID," *Solid*, Solid, n.d. solidproject.org/users/get-a-pod, both accessed 19 Jan. 2021.
99. Steve Lohr, "He Created the Web. Now He's Out to Remake the Digital World," *New York Times*, New York Times Co., 10 Jan. 2021. www.nytimes.com/2021/01/10/technology/tim-berners-lee-privacy-internet.html, accessed 19 Jan. 2021.



100. "WebID," W3C Wiki, *W3.org*, last modified 17 June 2018. www.w3.org/wiki/WebID, accessed 19 Jan. 2021.
101. Andrei Samba and Stéphane Corlosquet, eds., "WebID 1.0: Web Identity and Discovery," W3C Editor's Draft, *W3.org*, World Wide Web Consortium, 5 March 2014. www.w3.org/2005/Incubator/webid/spec/identity, accessed 23 Jan. 2021.
102. Miriam Quick et al., "World's Biggest Data Breaches and Hacks," David McCandless, ed., *Information is Beautiful*, last updated 1 April 2020. www.informationisbeautiful.net/visualizations/worlds-biggest-data-breaches-hacks, accessed 6 April 2020.
103. Sarah D. Wire, "Here's How the Government Shutdown Could Affect You," *Los Angeles Times*, Nant Capital LLC, 21 Dec. 2018. www.latimes.com/politics/la-na-pol-congress-shutdown-20181221-story.html; Joe Davidson, "Almost 16 Million Voters Were Removed from the Rolls. We Should Be Alarmed," *Washington Post*, WP Company LLC, 15 May 2019. beta.washingtonpost.com/politics/almost-16-million-voters-were-removed-from-the-rolls-we-should-be-alarmed/2019/05/15/f3de396a-7682-11e9-bd25-c989555e7766_story.html; and Yasha Levine, "Google's Earth: How the Tech Giant Is Helping the State Spy on Us," *The Guardian*, Guardian News & Media Ltd., 20 Dec. 2018. www.theguardian.com/news/2018/dec/20/googles-earth-how-the-tech-giant-is-helping-the-state-spy-on-us, all accessed 30 March 2020.
104. Corey Dade, "Why Millions of Americans Have No Government ID," *NPR.org*, National Public Radio, 1 Feb. 2012. www.npr.org/2012/02/01/146204308/why-millions-of-americans-have-no-government-id; Teresa Wiltz, "Without ID, Homeless Trapped in Vicious Cycle," *PEW*, The Pew Charitable Trusts, 15 May 2017. www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2017/05/15/without-id-homeless-trapped-in-vicious-cycle; Juleyka Lantigua-Williams, "The Elusiveness of an Official ID After Prison," *The Atlantic*, Atlantic Media Co., 11 Aug. 2016. www.theatlantic.com/politics/archive/2016/08/the-elusiveness-of-an-official-id-after-prison/495197/; and Terry Ahner, "REAL ID Results in Long Waiting Lines at Driver's License Center," *Times News Online*, Times News LLC, 16 March 2019. www.tnonline.com/20190316/real-id-results-in-long-waiting-lines-at-drivers-license-center, all accessed 6 April 2020.
105. Samer Aburass, "Syrian Refugees' Documentation Crisis," *NRC.no*, Norwegian Refugee Council, 26 Jan. 2017. www.nrc.no/news/2017/january/syrian-refugees-documentation-crisis, accessed 22 Feb. 2018.
106. Devon Loffreto, "What Is 'Sovereign Source Authority'?" *The Moxy Tongue*, 15 Feb. 2012. www.moxytongue.com/2012/02/what-is-sovereign-source-authority.html, accessed 30 March 2020.
107. Sumedha Deshmukh, e-mail to Hilary Carter, cc: Sheila Warren, 14 Jan. 2021.
108. DIF [Decentralized Identity Foundation], n.d. identity.foundation, accessed 16 Jan. 2021.
109. Working Groups, Decentralized Identity Foundation, n.d. identity.foundation/#wgs, accessed 6 April 2020.
110. Don Tapscott, "A Declaration of Interdependence: Toward a New Social Contract for the Digital Economy," Blockchain Research Institute, rev. 14 Jan. 2019. See www.blockchainresearchinstitute.org/socialcontract.
111. For a thoughtful review, see Cameron F. Kerry and John B. Morris Jr., "Why Data Ownership Is the Wrong Approach to Protecting Privacy," *Techtank Blog*, Brookings Institution, 26 June 2019. www.brookings.edu/blog/techtank/2019/06/26/why-data-ownership-is-the-wrong-approach-to-protecting-privacy, accessed 27 Jan. 2021.
112. Some of the material in Section 3 is adapted with permission from Alex Tapscott, ed., *Financial Services Revolution: How Blockchain is Transforming Money, Markets, and Banking* (Toronto: Barlow Publishing, 2020).
113. Harry Robertson, "Janet Yellen Suggests 'Curtailed' Cryptocurrency Such as Bitcoin, Saying They Are Mainly Used for Illegal Financing," *Market Insider*, Insider Inc., 20 Jan. 2021. markets.businessinsider.com/currencies/news/bitcoin-price-cryptocurrency-should-be-curtailed-terrorism-concerns-yellen-2021-1-1029985692, accessed 23 Jan. 2021.
114. Kathryn Haun, "How the US Government Is Using Blockchain to Fight Fraud," Video, 22:37, TEDx San Francisco, *YouTube.com*, 26 Oct. 2016. www.youtube.com/watch?v=507wn9VcSAE, accessed 23 Jan. 2021.
115. Chainalysis Team, "Crypto Crime Summarized: Scams and Darknet Markets Dominated 2020 by Revenue, But Ransomware Is the Bigger Story," *Insights*, Chainalysis Inc., 19 Jan. 2021. blog.chainalysis.com/reports/2021-crypto-crime-report-intro-ransomware-scams-darknet-markets, accessed 23 Jan. 2021.
116. Hailey Lennon, "The False Narrative of Bitcoin's Role in Illicit Activity," *Forbes*, Forbes Media LLC., 19 Jan. 2021. www.forbes.com/sites/haileylenon/2021/01/19/the-false-narrative-of-bitcoins-role-in-illicit-activity, accessed 23 Jan. 2021.
117. "How Will a Central Bank Digital Currency Advance China's Interests?" *China Power*, Center for Strategic and International Studies, n.d. chinapower.csis.org/china-digital-currency, accessed 23 Jan. 2021.
118. Roger Huang, "WHO Encourages Use of Contactless Payments Due to COVID-19," *Forbes.com*, Forbes Media LLC, 9 March 2020. www.forbes.com/sites/rogerhuang/2020/03/09/who-encourages-use-of-digital-payments-due-to-covid-19, accessed 14 Jan. 2021.



119. Jessie Yeung, "China Is Disinfecting and Destroying Cash to Contain the Coronavirus," *CNN.com*, Cable News Network, Warner Media Co., 17 Feb. 2020. www.cnn.com/2020/02/17/asia/china-is-disinfecting-cash-coronavirus-intl-hnk-scli, accessed 14 Jan. 2021.
120. Peter Dizikes, "MIT Sloan's Gary Gensler to be Nominated for Chair of Securities and Exchange Commission," *MIT News*, Massachusetts Institute of Technology, 19 Jan. 2021. news.mit.edu/2021/gary-gensler-nominated-chair-sec-0119, accessed 28 Jan. 2021.
121. Andrew Ackerman and Andrew Restuccia, "Biden Is Expected to Tap Michael Barr as Comptroller of the Currency," *Wall Street Journal*, Dow Jones & Co. Inc., last updated 20 Jan. 2021. www.wsj.com/articles/biden-is-expected-to-tap-michael-barr-as-comptroller-of-the-currency-11611196272, accessed 28 Jan. 2021.
122. "Michael S. Barr," Ford School, *UMich.edu*, University of Michigan, n.d. fordschool.umich.edu/faculty/michael-barr, accessed 28 Jan. 2021.
123. Jerry Brito, "The Case for Electronic Cash," Version 1.0, *CoinCenter.org*, Coin Center, Feb. 2019. coincenter.org/entry/the-case-for-electronic-cash, accessed 6 April 2020.
124. Raphael Auer, Giulio Cornelli, and Jon Frost, "Rise of the Central Bank Digital Currencies: Drivers, Approaches and Technologies," BIS Working Papers No 880, Monetary and Economic Department, Bank for International Settlements, Aug. 2020. www.bis.org/publ/work880.pdf, accessed 23 Jan. 2021.
125. Nathaniel Popper, "Ethereum, a Virtual Currency, Enables Transactions That Rival Bitcoin's," *New York Times*, New York Times Co., 27 March 2016. www.nytimes.com/2016/03/28/business/dealbook/ethereum-a-virtual-currency-enables-transactions-that-rival-bitcoins.html, accessed 20 Dec. 2020.
126. Brady Dale, "The First Yearlong ICO for EOS Raised \$4 Billion. The Second? Just \$2.8 Million," *CoinDesk*, Digital Currency Group, 17 Sept. 2019. www.coindesk.com/the-first-yearlong-ico-for-eos-raised-4-billion-the-second-just-2-8-million, accessed 20 Dec. 2020.
127. For a review of the latest scams, see Charlie Osborne, "2020's Worst Cryptocurrency Breaches, Thefts, and Exit Scams," *ZDNet.com*, CBS Interactive, 7 Dec. 2020. www.zdnet.com/article/2020s-worst-cryptocurrency-breaches-thefts-and-exit-scams, accessed 20 Dec. 2020.
128. SEC Strategic Hub for Innovation and Financial Technology, *Framework for "Investment Contract" Analysis of Digital Assets*, 3 April 2019. www.sec.gov/corpfin/framework-investment-contract-analysis-digital-assets
129. "Cyber Enforcement Actions," U.S. Securities and Exchange Commission, last modified 19 Jan. 2021. www.sec.gov/spotlight/cybersecurity-enforcement-actions, accessed 19 Jan. 2021.
130. Kimberly Amadeo, "What Too Big to Fail Means," *The Balance*, Dotdash, last updated 30 May 2019. www.thebalance.com/too-big-to-fail-3305617, accessed 8 Sept. 2019.
131. Matt Stoller, "Launching a Global Currency Is a Bold, Bad Move for Facebook," *New York Times*, New York Times Co., 19 June 2019. www.nytimes.com/2019/06/19/opinion/facebook-currency-libra.html, accessed 8 Sept. 2019.
132. David Z. Morris, "Facebook's Libra Currency Could Threaten the Global Financial System. Here's How," *Fortune*, Fortune Media IP Ltd., 18 July 2019. fortune.com/2019/07/18/facebook-libra-cryptocurrency-washington-hearings-financial-system, accessed 8 Sept. 2019.
133. David Z. Morris, "Facebook's Libra Currency Could Threaten the Global Financial System. Here's How."
134. John Biggs, "Indian Panel Proposes Fines and Jail Time for Cryptocurrency Use," *CoinDesk*, Digital Currency Group, 23 July 2019. www.coindesk.com/indian-panel-proposes-ban-and-jail-time-for-cryptocurrency-use, accessed 8 Sept. 2019.
135. Bill Barhydt, interviewed via telephone by Alex Tapscott, 25 July 2019.
136. Max Raskin and David Yermack, "Digital Currencies, Decentralized Ledgers, and the Future of Central Banking," eds. Peter Conti-Brown and Rosa Lastra, *NBER.org*, National Bureau of Economic Research, 1 May 2016, p. 15. www.nber.org/papers/w22238, accessed 15 Jan. 2021.
137. Dilip Ratha, "Pandemic Hits Global Poor: World Bank Projects Drop in Remittances," interviewed by Michel Martin, *All Things Considered*, National Public Radio, 6 Feb. 2021. www.npr.org/2021/02/06/964893542/pandemic-hits-global-poor-world-bank-projects-drop-in-remittances, accessed 7 Feb. 2021.
138. Charles H. Giancarlo et al., "The Digital Dollar Project: Exploring a US CBDC," Digital Dollar Foundation and Accenture, May 2020. static1.squarespace.com/static/5e16627eb901b656f2c174ca/t/5f0c5d052d6235002637d0f6/1594645769165/Digital-Dollar-Project-Whitepaper_vF_7_13_20.pdf, accessed 15 Jan. 2021. J. Christopher Giancarlo contributed the material in this section.
139. "The Digitization of Money and Payments," Testimony of Hon. J. Christopher Giancarlo, United States Senate Committee on Banking, Housing, and Urban Affairs, 30 June 2020. www.banking.senate.gov/imo/media/doc/Giancarlo%20Testimony%206-30-20.pdf



- “Inclusive Banking During a Pandemic: Using FedAccounts and Digital Tools to Improve Delivery of Stimulus Payments,” Testimony of Hon. J. Christopher Giancarlo, United States House of Representatives Committee on Financial Services Task Force on Financial Technology, 11 June 2020. financialservices.house.gov/uploadedfiles/hhrg-116-ba00-wstate-giancarloj-20200611.pdf, accessed 31 Jan. 2021.
140. Greg Medcraft, “The Tokenization of Assets and Potential Implications for Financial Markets,” *LinkedIn.com Pulse*, Microsoft Corp., 17 Jan. 2020. www.linkedin.com/pulse/tokenisation-assets-potential-implications-financial-markets-greg. See also OECD, *The Tokenization of Assets and Potential Implications for Financial Markets*, foreword by Greg Medcraft, OECD Blockchain Policy Series, 2020. www.oecd.org/finance/The-Tokenisation-of-Assets-and-Potential-Implications-for-Financial-Markets.pdf, both accessed 22 Jan. 2020.
141. Robert H. Rosenblum, “Chapter 2: Definition of a Security,” in *Investment Company Determination under the 1940 Act: Exemptions and Exceptions* (American Bar Association, 2003). apps.americanbar.org/buslaw/newsletter/0014/materials/investmentch2.pdf, accessed 25 Jan. 2021.
142. *SEC v. W.J. Howey Co.*, 328 U.S. 293, 298-299 (1946).
143. *SEC v. W.J. Howey Co.*, 328 U.S. 293, 301 (1946).
144. SEC, “Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934: The DAO,” Securities Act Release No. 81207 (25 July 2017). www.sec.gov/litigation/investreport/34-81207.pdf, accessed 25 Jan. 2021. The DAO was subsequently hacked, in which 3.6 million ether were siphoned out of a smart contract through an exploited vulnerability (i.e., a bug in the software). See David Siegel, “Understanding The DAO Attack,” *CoinDesk*, Digital Currency Group, 25 June 2016, last updated 17 Dec. 2020. www.coindesk.com/understanding-dao-hack-journalists, accessed 25 Jan. 2021.
145. Complaint, *Securities and Exchange Commission v. REcoin Group Foundation et al.*, Civil Action No. 17-cv-05725 (E.D.N.Y., filed 29 Sep. 2017). www.sec.gov/litigation/complaints/2017/comp-pr2017-185.pdf; Complaint, *Securities and Exchange Commission v. PlexCorps et al.*, Civil Action No. 17-cv-07007 (E.D.N.Y., filed 1 Dec. 2017). www.sec.gov/litigation/complaints/2017/comp-pr2017-219.pdf; Order, *Munchee Inc., Securities Act of 1933 Release No.10445, File No. 3-18304* (SEC, filed 11 Dec. 2017). www.sec.gov/litigation/admin/2017/33-10445.pdf; Complaint, *SEC v. AriseBank et al.*, (N.D. Tex., filed 25 Jan. 2018). www.sec.gov/litigation/complaints/2018/comp-pr2018-8.pdf; Complaint, *SEC v. Jon E. Montroll and Bitfunder*, 18-cv-1582 (S.D.N.Y., filed 21 Feb. 2018). www.sec.gov/litigation/complaints/2018/comp24078.pdf; Complaint, *SEC v. Centra Tech. Inc.*, Case 1:18-cv-02909 (S.D.N.Y., filed 2 April 2018). www.sec.gov/litigation/complaints/2018/comp-pr2018-53.pdf; and Complaint, *SEC v. Longfin Corp. et al.*, Case No. 19-cv-5296-DLC (SDNY, filed 6 April 2018). www.sec.gov/divisions/enforce/claims/longfin.htm, all accessed 25 Jan. 2021.
146. Order, *Munchee Inc., Securities Act Release No. 10445, File No. 3-18304* (SEC, filed 11 Dec. 2017). www.sec.gov/litigation/admin/2017/33-10445.pdf, accessed 25 Jan. 2021.
147. Jay Clayton, “SEC Chairman Jay Clayton on Cryptocurrencies and Investing,” interviewed by Bob Pisani, 15:08, CNBC, *YouTube.com*, 6 June 2018. www.youtube.com/watch?v=wFr10oaVPjY; William Hinman, “Digital Asset Transactions: When Howey Met Gary (Plastic),” Remarks at the Yahoo! Finance All Markets Summit: Crypto, San Francisco, CA, *SEC.gov*, 14 June 2018. www.sec.gov/news/speech/speech-hinman-061418, both accessed 25 Jan. 2021.
148. Order, *Coinflip Inc. d/b/a Derivabit, and Francisco Riordan*, CFTC Docket No. 15-29 (CFTC, filed 17 Sept. 2015): 3. www.cftc.gov/sites/default/files/idc/groups/public/@enforcementactions/documents/legalpleading/enfcoinfliprorder09172015.pdf; CFTC v. McDonnell, 287 F. Supp. 3d 213 (EDNY, filed 2018). casetext.com/case/commodity-futures-trading-commn-v-mcdonnell, both accessed 25 Jan. 2021.
149. Financial Crimes Enforcement Network, “Application of FinCEN’s Regulations to Persons Administering, Exchanging, or Using Virtual Currencies,” FIN-2013-G001, US Treasury Dept., 18 March 2013. www.fincen.gov/resources/statutes-regulations/guidance/application-fincens-regulations-persons-administering, accessed 25 Jan. 2021.
150. NY Comp. Codes R. & Regs. tit. 23, § 200 *et seq.*; see also “Regulation and History,” Dept. of Financial Services, New York State, n.d. www.dfs.ny.gov/apps_and_licensing/virtual_currency_businesses/regulation_history, accessed 25 Jan. 2021.
151. “Re: Authority of a National Bank to Provide Cryptocurrency Custody Services for Customers,” Interpretive Letter 1170, *OCC.gov*, Office of the Comptroller of the Currency, 22 July 2020. www.occ.gov/topics/charters-and-licensing/interpretations-and-actions/2020/int1170.pdf; “OCC Chief Counsel’s Interpretation on National Bank and Federal Savings Association Authority to Hold Stablecoin Reserves,” Interpretive Letter 1172, *OCC.gov*, Office of the Comptroller of the Currency, 21 Sept. 2020. www.occ.gov/topics/charters-and-licensing/interpretations-and-actions/2020/int1172.pdf; and “OCC Chief Counsel’s Interpretation on National Bank and Federal Savings Association Authority to Use Independent Node Verification Networks and Stablecoins for Payment Activities,” Interpretive Letter 1174, *OCC.gov*, Office of the Comptroller of the Currency, 4 Jan. 2021. www.occ.gov/news-issuances/news-releases/2021/nr-occ-2021-2a.pdf, all accessed 25 Jan. 2021.
152. “Notice 2014-21,” IRS, 2014. www.irs.gov/pub/irs-drop/n-14-21.pdf, accessed 25 Jan. 2021.



153. "Attorney General William P. Barr Announces Publication of Cryptocurrency Enforcement Framework," News Release, *OPA.gov*, Office of Public Affairs, US Department of Justice, 8 Oct. 2020. www.justice.gov/opa/pr/attorney-general-william-p-barr-announces-publication-cryptocurrency-enforcement-framework, accessed 25 Jan. 2021.
154. See Chamber of Digital Commerce, *National Action Plan for Blockchain*, Feb. 2019. digitalchamber.org/wp-content/uploads/2019/02/National-Action-Plan-for-Blockchain_.pdf.
155. *SEC v. W.J. Howey Co.*, 328 US 293 (1946); see "Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934: The DAO," 25 July 2017. www.sec.gov/litigation/investreport/34-81207.pdf.
156. SEC Strategic Hub for Innovation and Financial Technology, *Framework for "Investment Contract" Analysis of Digital Assets*, 3 April 2019. www.sec.gov/corpfin/framework-investment-contract-analysis-digital-assets.
157. TurnKey Jet Inc., SEC No-Action Letter, 2 April 2019. www.sec.gov/divisions/corpfin/cf-noaction/2019/turnkey-jet-040219-2a1-incoming.pdf, accessed 19 Jan. 2021.
158. For more information on "utility tokens," see "Understanding Digital Tokens: Market Overviews and Proposed Guidelines for Policymakers and Practitioners," Chamber of Digital Commerce, Aug. 2018. digitalchamber.s3.amazonaws.com/Understanding-Digital-Tokens-08_09_2018-Web.pdf, accessed 19 Jan. 2021.
159. Leigh Cuen, "Circle Moves Exchange Operations Offshore with New Bermuda Office," *CoinDesk*, Digital Currency Group, 22 July 2019. www.coindesk.com/circle-moves-non-us-polygon-customers-to-new-bermuda-entity.
160. For example, multisignature, or "multisig" refers to a cryptographic functionality within public key infrastructure that requires more than one private key to complete a transaction. Many companies offer multisig wallets, where, for example, a 2-of-3 multisig wallet would require two out of three private keys, usually held separately, to authorize a transaction.
161. "Reserves and Custody of Securities," 17 CFR § 240.15c3-3 (2018); "Custody of Funds or Securities of Clients by Investment Advisors," 17 CFR § 275.206(4)-2 (2018); and SEC Division of Trading and Markets and FINRA Office of General Counsel, "Broker-Dealer Custody of Digital Asset Securities," Joint Staff Statement, 8 July 2019. www.sec.gov/news/public-statement/joint-staff-statement-broker-dealer-custody-digital-asset-securities.
162. In this regard, the SEC has published a statement for comment: US Securities and Exchange Commission, *Custody of Digital Asset Securities by Special Purpose Broker-Dealers*, 17 CFR Part 240, Release No. 34-90788; File No. S7-25-20, 2020. www.sec.gov/rules/policy/2020/34-90788.pdf.
163. Financial Crimes Enforcement Network, "Requirements for Certain Transactions Involving Convertible Virtual Currency or Digital Assets," *Federal Register*, Office of the Federal Register, 23 Dec. 2020. www.federalregister.gov/documents/2020/12/23/2020-28437/requirements-for-certain-transactions-involving-convertible-virtual-currency-or-digital-assets; Marta Belcher and Aaron Mackey, "The US Government Is Targeting Cryptocurrency to Expand the Reach of Its Financial Surveillance," *EFF.org*, Electronic Frontier Foundation, 21 Dec. 2020. www.eff.org/deeplinks/2020/12/us-government-targeting-cryptocurrency-expand-reach-its-financial-surveillance, both accessed 22 Jan. 2021.
164. "The Financial Crimes Enforcement Network Proposes Rule Aimed at Closing Anti-Money Laundering Regulatory Gaps for Certain Convertible Virtual Currency and Digital Asset Transactions," News Release, *Treasury.gov*, US Department of Treasury, 18 Dec. 2020. home.treasury.gov/news/press-releases/sm1216; Shalini Nagarajan, "Biden Freezes All Federal Regulatory Proposals, Including Mnuchin's Controversial Crypto Wallet Legislation, until His New Administration Can Review Them," *Market Insider*, Insider Inc., 21 Jan. 2021. markets.businessinsider.com/currencies/news/biden-freezes-new-regulatory-proposals-including-proposed-crypto-rule-2021-1-1029989717, both accessed 22 Jan. 2021.
165. Financial Crimes Enforcement Network, "FinCEN Extends Reopened Comment Period for Proposed Rulemaking on Certain CVC and Digital Asset Transactions," News Release, *FinCEN.gov*, 26 Jan. 2021. www.fincen.gov/news/news-releases/fincen-extends-reopened-comment-period-proposed-rulemaking-certain-cvc-and, accessed 26 Jan. 2021. Look for extension notice here: www.federalregister.gov/public-inspection/2021-01918/requirements-for-certain-transactions-involving-convertible-virtual-currency-or-digital-assets.
166. IRS, "IRS Virtual Currency Guidance: Virtual Currency Is Treated as Property for US Federal Tax Purposes; General Rules for Property Transactions Apply," Press Release, *IRS.gov*, Internal Revenue Service, 25 March 2014. www.irs.gov/newsroom/irs-virtual-currency-guidance.
167. IRS, "IRS Has Begun Sending Letters to Virtual Currency Owners Advising Them to Pay Back Taxes, File Amended Returns; Part of Agency's Larger Efforts," Press Release, *IRS.gov*, Internal Revenue Service, 26 July 2019. www.irs.gov/newsroom/irs-has-begun-sending-letters-to-virtual-currency-owners-advising-them-to-pay-back-taxes-file-amended-returns-part-of-agencys-larger-efforts, accessed 20 Jan. 2021.



168. "Agenda Request—Determining the Appropriate Recognition, Measurement, Presentation, and Disclosure for Digital Currencies and Related Transactions," Chamber of Digital Commerce, 8 June 2017. digitalchamber.org/wp-content/uploads/2016/12/Digital-Currency-Agenda-Request_6.7.pdf; and Comments to the IFRS Interpretation Committee Re: Tentative Agenda Decision—Holdings of Cryptocurrencies, Chamber of Dig. Commerce, 15 May 2019. eifrs.ifrs.org/eifrs/comment_letters/528/528_25561_PaulBrignerChamberofDigitalCommerce_0_ChamberofDigitalCommercelettertoIFRSTADonHoldingsofCryptocurrencies.pdf.
169. "Virtual Currencies: The Oversight Role of the US SEC and US CFTC," statement of J. Christopher Giancarlo, Chairman, CFTC, before the Comm. on Banking, Housing, and Urban Affairs, 115th Cong. 4 (2018). See also National Futures Association, "Disclosure Requirements for NFA Members Engaging in Virtual Currency Activities," Interpretive Notice 9073, 17 May 2018. www.nfa.futures.org/rulebook/rules.aspx?Section=9&RuleID=9073, accessed 19 Jan. 2021.
170. SEC Divisions of Corporation Finance, Investment Management, and Trading and Markets, "Digital Asset Securities Issuance and Trading," Statement, US Securities and Exchange Commission, 16 Nov. 2018. www.sec.gov/news/public-statement/digital-asset-securities-issuance-and-trading.
171. Barry Eichengreen, "As Monetary Policy Reaches Its Limits, It's Time for Governments to Spend," *The Guardian*, Guardian News & Media Ltd., 11 March 2016. www.theguardian.com/business/2016/mar/11/as-monetary-policy-reaches-its-limits-its-time-for-governments-to-start-spending, accessed 8 Sept. 2019.
172. Alex Tapscott, ed., *Financial Services Revolution: How Blockchain is Transforming Money, Markets, and Banking* (Toronto: Barlow Publishing, 2020).
173. Max Raskin and David Yermack, "Digital Currencies, Decentralized Ledgers, and the Future of Central Banking," eds. Peter Conti-Brown and Rosa Lastra, *SSRN.com*, 1 May 2016. Elsevier. papers.ssrn.com/sol3/papers.cfm?abstract_id=2773973, accessed 8 Sept. 2019.
174. Elliot Smith, "Russia's Bid to Ditch the US Dollar Is Slowly Working, But Obstacles Remain," *CNBC.com*, CNBC LLC, 27 Sept. 2019. www.cnbc.com/2019/09/27/russias-bid-to-ditch-the-us-dollar-is-slowly-working-but-obstacles-remain.html, accessed 28 Jan. 2021.
175. Colby Smith, "The Belt and Road's Dollar Problem," *Financial Times*, Financial Times Ltd., 18 Dec. 2018. www.ft.com/content/2524222a-b66b-3605-a6f6-bc496787f0bd, accessed 28 Jan. 2021.
176. Joshua Bateman, "One Belt, One Road, One Currency," *GFMag.com*, Global Finance Media Inc., 1 June 2018. www.gfmag.com/magazine/june-2018/one-belt-one-road-one-currency, accessed 28 Jan. 2021.
177. Martin Sandbu, "Trump's Cold Shoulder Motivates Europe to Challenge the Dollar's Dominance," *Los Angeles Times*, Nant Capital LLC, 6 Dec. 2019. www.latimes.com/business/story/2019-12-06/europe-dominance-dollar, accessed 28 Jan. 2021.
178. Mark Carney, "The Growing Challenges for Monetary Policy in the Current International Monetary and Financial System," Speech, Bank of England, Jackson Hole Symposium, Kansas City, MO, 23 Aug. 2019. www.bankofengland.co.uk/-/media/boe/files/speech/2019/the-growing-challenges-for-monetary-policy-speech-by-mark-carney.pdf, accessed 8 Sept. 2019.
179. John Ainger and Liz McCormick, "Goldman Warns the Dollar's Grip on Global Markets Might Be Over," *Bloomberg News*, Bloomberg LP, 28 July 2020. www.bloomberg.com/news/articles/2020-07-28/goldman-warns-dollar-s-role-as-world-reserve-currency-is-at-risk, accessed 28 Jan. 2021.
180. Allison Nathan, Gabriel Lipton Galbraith, and Jenny Grimberg, "What's in Store for the Dollar," *Top of Mind* 94 (29 Oct. 2020), Goldman Sachs Group Inc. www.goldmansachs.com/insights/pages/gs-research/whats-in-store-for-the-dollar/report.pdf, accessed 28 Jan. 2021.
181. Daniel Tenengauzer, John Velis, and Geoff Yu, "An Existential Threat to the US Dollar," *BNY Mellon*, Bank of New York Mellon Corp., Sept 2020. www.bnymellon.com/us/en/insights/aerial-view-magazine/an-existential-threat-to-the-us-dollar.html, accessed 28 Jan. 2021.
182. Kristalina Georgieva, "A New Bretton Woods Moment," Speech, 12:21, *IMF.org*, International Monetary Fund, 15 Oct. 2020. www.imf.org/en/News/Articles/2020/10/15/sp101520-a-new-bretton-woods-moment, accessed 28 Jan. 2021.
183. "21st Century Integrated Digital Experience Act," Public Law 115–336, 20 Dec. 2018. www.congress.gov/115/plaws/publ336/PLAW-115publ336.pdf, accessed 20 Jan. 2021.
184. "Delivering Experiences That Count: Global Survey Results and Insights on Digital Citizen Services," Adobe and the WPP, 24 Jan. 2018. landing.adobe.com/en/na/solutions/government/ctir-2798-wpp-adobe-global-citizen-benchmark.html, accessed 20 Jan. 2021.
185. Adeel Qayum, "How to Build a Customer-Centric Strategy for Your Business," *Oberlo.com*, Shopify Inc., 15 Oct. 2020. www.oberlo.com/blog/customer-centric, accessed 25 Jan. 2021.



186. Alec Tyson, Courtney Johnson, and Cary Funk, "US Public Now Divided Over Whether to Get COVID-19 Vaccine," *Pew Research Center*, Pew Charitable Trusts, 17 Sept. 2020. www.pewresearch.org/science/2020/09/17/u-s-public-now-divided-over-whether-to-get-covid-19-vaccine, accessed 25 Jan. 2021.
187. Alec Tyson, Courtney Johnson, and Cary Funk, "US Public Now Divided Over Whether to Get COVID-19 Vaccine."
188. Mark Treshock and Christopher Moose, "IBM: Trusted Vaccine Distribution: From Inception to Injection," with Christopher Moose, Webinar, Blockchain Research Institute and IBM Corp., 25 Jan. 2021.
189. Mark Treshock, "IBM: Trusted Vaccine Distribution: From Inception to Injection."
190. Christopher Moose, "IBM: Trusted Vaccine Distribution: From Inception to Injection."
191. Mark Treshock, "IBM: Trusted Vaccine Distribution: From Inception to Injection."
192. "About 18F: We Help Other Government Agencies Build, Buy, and Share Technology Products," *GSA.gov*, Technology Transformation Services, US General Services Administration, n.d. 18f.gsa.gov/about, accessed 21 Jan. 2021.
193. Gerard Dache, e-mail to Hilary Carter, 20 Jan. 2021.
194. Driek Desmet, Shahar Markovitch, and Christopher Paquette, "Speed and Scale: Unlocking Digital Value in Customer Journeys," *McKinsey.com*, McKinsey & Co., Nov. 2015. www.mckinsey.com/~/media/McKinsey/Business%20Functions/Operations/Our%20Insights/Speed%20and%20scale%20unlocking%20digital%20value%20in%20customer%20journeys/Speed_and_scale_Unlocking_digital_value_in_customer_journeys.pdf, accessed 12 Dec. 2020.
195. Albinko Hasic, "Tapping Into SEO: How Government Websites Can Improve Content Reach," *Digita.gov*, US General Services Administration, 20 May 2020, updated 9 June 2020. digital.gov/2020/05/20/tapping-into-seo-how-government-websites, accessed 20 Jan. 2021.
196. "Delivering Experiences That Count: Global Survey Results and Insights on Digital Citizen Services," Adobe and the WPP, 24 Jan. 2018. landing.adobe.com/en/na/solutions/government/ctir-2798-wpp-adobe-global-citizen-benchmark.html, accessed 20 Jan. 2021. See also www.adobe.com/content/dam/acom/en/modal-offers/pdfs/0062431-07.gov-redefining-gov-experiences.whitepaper.pdf.
197. Guy Zyskind, Oz Nathan, and Alex "Sandy" Pentland, "Enigma: Decentralized Computation Platform with Guaranteed Privacy," White Paper, Massachusetts Institute of Technology, 10 June 2015. arxiv.org/pdf/1506.03471.pdf, accessed 3 Oct. 2015. For the latest on the Enigma project, visit www.media.mit.edu/projects/enigma/overview.
198. Ann Cavoukian, interviewed via telephone by Don Tapscott and Kirsten Sandberg, 2 Sept. 2015.
199. Jason Fair, "Agile versus Waterfall: [Which] Approach Is Right for My ERP Project?" Paper presented at PMI Global Congress 2012—EMEA, Marseilles, France. (Newtown Square, PA: Project Management Institute, 9 May 2012). www.pmi.org/learning/library/agile-versus-waterfall-approach-erp-project-6300, accessed 21 Jan. 2021.
200. Manjunatha Gurulingaiah Kukuru and Swati Sucharita, "Robotic Process Automation and Quality Assurance: A Perspective," *Infosys.com*, Infosys Ltd., 2018. www.infosys.com/IT-services/validation-solutions/features-opinions/Documents/robotic-process-automation.pdf, accessed 21 Jan. 2020.
201. "Book the GDS User Research Lab," *GOV.UK*, Government Digital Services, The Crown, 16 Aug. 2018. www.gov.uk/guidance/book-the-gds-user-research-lab, accessed 21 Jan. 2021.
202. "Austin Design Jam: Restaurant Workers' Community Foundation," American Institute of Graphic Arts and Restaurant Workers' Community Foundation, *AIGA.org*, 7 May 2020. austin.aiga.org/event-internal/austin-design-jam-restaurant-workers-community-foundation, accessed 21 Jan. 2021.
203. "Design Jam Toolkit," *OPSI.org*, Observatory Public Sector Innovation, OECD, n.d. opsi.org/toolkits/design-jam-toolkit; "Hackathons for Civic Innovators," *Hackathon Guide*, Mayor's Office of Tech + Innovation, n.d. www.nyc.gov/html/hackathon/html/index.html, both accessed 22 Jan. 2021.
204. "Road Map for the Digital City: Achieving New York City's Digital Future," *NYC.gov*, The City of New York, Spring 2011. www.nyc.gov/html/media/media/PDF/90dayreport.pdf, accessed 20 Dec. 2020.
205. Accenture Public Service Insights, "Digital Government: Your Citizens are Ready, Willing ... and Waiting," *Accenture.com*, Accenture Inc., 14 Oct. 2015. www.accenture.com/t20151014T210834_w_us-en/acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Dualpub_16/Accenture-Your-Digital-Citizens-Ready-Willing-Waiting-2.pdf, accessed 14 Jan. 2021.
206. Gerard Dache, e-mail to Hilary Carter, 20 Jan. 2021.
207. "Transparency and Open Government," Memorandum for the Heads of Executive Departments and Agencies, *Obama White House Archives*, Federal Register, 21 Jan. 2009. obamawhitehouse.archives.gov/the-press-office/transparency-and-open-government, accessed 20 Jan. 2021.
208. Gerard Dache, e-mail to Hilary Carter, 20 Jan. 2021.



209. Jim Hemerling et al., "It's Not a Digital Transformation Without a Digital Culture," *BCG.com*, Boston Consulting Group, 13 April 2018. www.bcg.com/en-ca/publications/2018/not-digital-transformation-without-digital-culture, accessed 20 Jan. 2021.
210. Jim Hemerling et al., "It's Not a Digital Transformation Without a Digital Culture."
211. Francis Maude, "GOV.UK – The Start of a New Way of Delivering Public Services," *GOV.UK*, The Crown, 16 Oct. 2012. gds.blog.gov.uk/2012/10/16/gov-uk-the-start, accessed 20 Dec. 2020.
212. "Digital Services," *Whitehall Monitor 2020*, Institute for Government, n.d. www.instituteforgovernment.org.uk/publication/whitehall-monitor-2020/digital, accessed 22 Jan. 2021.
213. "Digital Efficiency Report," *GOV.UK*, Government Digital Services, The Crown, 6 Nov. 2012. www.gov.uk/government/publications/digital-efficiency-report/digital-efficiency-report, accessed 20 Jan. 2021.
214. "Digital Efficiency Report."
215. "Digital Efficiency Report."
216. Clare McDonald, "What Will Happen to Digital Government When GDS Chief Mike Bracken Moves On?" *ComputerWeekly.com*, TechTarget, 6 Aug. 2015. www.computerweekly.com/news/4500251146/What-will-happen-to-digital-government-when-Bracken-moves-on, accessed 20 Jan. 2021.
217. "A GDS Story 2020," *GDS Blog*, *GOV.UK*, Government Digital Service, The Crown, Jan.–Dec. 2020. gds.blog.gov.uk/a-gds-story-2020, accessed 21 Jan. 2021.
218. "Digital Efficiency Report."
219. "Our Urban Future: Forecasting Needs, Designing Solutions," *Evergreen.ca*, 29 Oct. 2013. web.archive.org/web/20131029092328/http://info.evergreen.ca/en/ecw/projects/urban-future, accessed 20 Jan. 2021.
220. Geoff Cape, interviewed by Anthony Williams, 2 Feb. 2016.
221. Geoff Cape, interviewed by Anthony Williams, 2 Feb. 2016.
222. Catherine Gewertz, "Teaching Students to Wrangle 'Big Data,'" *EducationWeek*, 4 Feb. 2020. www.edweek.org/teaching-learning/teaching-students-to-wrangle-big-data/2020/02; Shashank Srikant and Varun Aggarwal, "Introducing Data Science to School Kids," *AspiringMinds.com*, Aspiring Minds, 2016. research.aspiringminds.com/wp-content/uploads/2016/10/sigcse_2016_dskids.pdf, accessed 21 Jan. 2020.
223. Marina Chan, "Virtual Hackathon Unites International Community to Tackle Covid-19," *MIT News*, Massachusetts Institute of Technology, 13 May 2020. news.mit.edu/2020/virtual-hackathon-unites-international-community-tackle-covid-19-0513, accessed 20 Jan. 2021.
224. "What Is PB?" Participatory Budgeting Project, n.d. www.participatorybudgeting.org/what-is-pb, accessed 20 Jan. 2021.
225. Antonnet Johnson, "Participatory Budgeting Transforms Schools, Students, and Communities," *Participatory Budgeting Blog*, Participatory Budgeting Project, 2 April 2020. www.participatorybudgeting.org/participatory-budgeting-transforms-schools-students-and-communities, accessed 21 Jan. 2021.
226. New York City Council, "Participatory Budgeting," *Council.NYC.gov*, n.d. council.nyc.gov/pb. According to the associated Twitter account @PB_NYC, the last vote occurred in April 2019. Jimmy Van Bramer, @JimmyVanBramer, 1 April 2019 (12:40 PM). twitter.com/JimmyVanBramer/status/1112756522562531328, accessed 21 Jan. 2021.
227. "What Is PB?" Participatory Budgeting Project, n.d. www.participatorybudgeting.org/what-is-pb, accessed 20 Jan. 2021.
228. Alberto Cavallo and Roberto Rigobon, "The Billion Prices Project: Using Online Prices for Measurement and Research," *Journal of Economic Perspectives*, Vol. 30, No. 2 (Spring 2016): 151–178. pubs.aeaweb.org/doi/pdf/10.1257/jep.30.2.151; Richard A. Oppel Jr., "Activists Wield Search Data to Challenge and Change Police Policy," *New York Times*, New York Times Co., 20 Nov. 2014. www.nytimes.com/2014/11/21/us/activists-wield-search-data-to-challenge-and-change-police-policy.html, accessed 20 Jan. 2021.
229. XPRIZE, XPRIZE Foundation, n.d. www.xprize.org, accessed 21 Jan. 2021.
230. "Ashoka Changemakers," *Ashoka*, Ashoka United States, n.d. www.ashoka.org/en-us/program/ashoka-changemakers, accessed 21 Jan. 2021.
231. See Dan Ariely's experiments here: danariely.com/research/learn; and Richard Thaler and Cass Sunstein's "nudges" as policy tools" here: Henry Farrell, "This Year's Economics Nobel Winner Invented a Tool That's Both Brilliant and Undemocratic," *Vox.com*, Vox Media LLC, 16 Oct. 2017. www.vox.com/the-big-idea/2017/10/16/16481836/nudges-thaler-nobel-economics-prize-undemocratic-tool, accessed 21 Jan. 2021.
232. Owain Service et al., "EAST: Four Simple Ways to Apply Behavioural Insight," Behavioural Insights Ltd, Cabinet Office, and Nesta, July 2015. www.behaviouralinsights.co.uk/wp-content/uploads/2015/07/BIT-Publication-EAST_FA_WEB.pdf, accessed 20 Jan. 2021.
233. Anne-Lise Sibony, "The UK COVID-19 Response: A Behavioral Irony?" *European Journal of Risk Regulation* 1–8, 2 April 2020. www.ncbi.nlm.nih.gov/pmc/articles/PMC7201134, accessed 21 Jan. 2021.



234. Beth Simone Noveck, *Wiki Government: How Technology Can Make Government Better, Democracy Stronger, and Citizens More Powerful* (Washington: Brookings Institution Press, 2010).
235. Giles Gherson, interviewed by Anthony Williams, 12 Nov. 2014.
236. Rush Doshi, "The United States, China, and the Contest for the Fourth Industrial Revolution," Prepared Statement before the US Senate Committee on Commerce, Science, and Transportation, Subcommittee on Security, for the Hearing, *The China Challenge: Realignment of US Economic Policies to Build Resiliency and Competitiveness*, Washington, DC, 31 July 2020. Brookings Institution, www.brookings.edu/testimonies/the-united-states-china-and-the-contest-for-the-fourth-industrial-revolution; full testimony here: www.brookings.edu/wp-content/uploads/2020/08/Doshi-Commerce-Testimony-7.30.2020-Final.pdf, accessed 29 Jan. 2021.
237. Rush Doshi, "The United States, China, and the Contest for the Fourth Industrial Revolution."
238. Stephanie Nebehay, "In a First, China Knocks US from Top Spot in Global Patent Race," *Reuters.com*, Thomson Reuters Corp., 7 April 2020. www.reuters.com/article/us-usa-china-patents/in-a-first-china-knocks-u-s-from-top-spot-in-global-patent-race-idUSKBN21P1P9, accessed 29 Jan. 2021.
239. "Rankings 2020: Top 30 + Runners-Up," *The Global Startup Ecosystem Report 2020*, Startup Genome, 25 June 2020. startupgenome.com/article/rankings-top-40, accessed 18 Jan. 2021.
240. Two others are Mass Challenge and 500 Start-ups. For more, see "Accelerators: The Basics," Entrepreneurship Issue Brief, no. 1 (Feb. 2020), Ewing Marion Kauffman Foundation. www.kauffman.org/wp-content/uploads/2020/02/Kauffman_Accelerator_Brief_final.pdf, accessed 15 Jan. 2021.
241. Maëlle Gavet, "What's Next for Silicon Valley?" *Harvard Business Review*, HBS Publishing Corp., 30 Sept. 2020. hbr.org/2020/09/whats-next-for-silicon-valley, accessed 29 Jan. 2021.
242. Foo Yun Chee, "Explainer-Tough EU Tech Rules: Here's the What, Why and What Comes Next," *Reuters.com*, Thomson Reuters Corp., 15 Dec. 2020, updated 29 Dec. 2020. www.reuters.com/article/eu-tech-explainer-int/explainer-tough-eu-tech-rules-heres-the-what-why-and-what-comes-next-idUSKBN28P2E0, accessed 29 Jan. 2021.
243. Julija Andjelic, "42 Small Business Statistics: Everything You Need to Know," *SmallBizGenius.net*, SmallBizGenius, last updated 6 Jan. 2021. www.smallbizgenius.net/by-the-numbers/small-business-statistics/#gref, accessed 22 Jan. 2021. Note that we could not easily find this information on SBA's site.
244. Renee A. Berger, "Private-Sector Initiatives in the Reagan Era: New Actors Rework an Old Theme," *Reagan Presidency and the Governing of America*, eds. Lester M. Salamon and Michael S. Lund (Washington, DC: Urban Institute Press, 1985).
245. Margarida Madaleno et al., "Incubators, Accelerators and Regional Economic Development," IZA Discussion Paper No. 11856, 8 Oct. 2018. SSRN, ssrn.com/abstract=3261715, accessed 22 Jan. 2021.
246. "SBA Spurs Economic Growth, Announces 50 Awards to Accelerators Media Release," News Release 14-47, *SBA.gov*, US Small Business Administration, 4 Sept. 2014. www.sba.gov/content/sba-spurs-economic-growth-announces-50-awards-accelerators, accessed 15 Jan. 2021.
247. Karoline Heitmann et al., "The Rise of the Corporate Social Investor," *Stanford Social Innovation Review*, Stanford University, Summer 2020. ssir.org/articles/entry/the_rise_of_the_corporate_social_investor#, accessed 21 Jan. 2021.
248. Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR), "Leveraging America's Seed Fund," US Small Business Administration, March 2020. www.sbir.gov/sites/default/files/SBA_SBIR_Overview_March2020.pdf, accessed 22 Jan. 2021.
249. SBIR and STTR, "Leveraging America's Seed Fund."
250. Interviews conducted May–June 2017 by DEEP Centre, an economic policy think tank led by Anthony Williams. Source anonymized for confidentiality.
251. Interviews conducted by the DEEP Centre, May–June 2017. Source anonymized for confidentiality.
252. Interviews conducted by the DEEP Centre, May–June 2017. Source anonymized for confidentiality.
253. Interviews conducted by the DEEP Centre, May–June 2017. Source anonymized for confidentiality.
254. Interviews conducted by the DEEP Centre, May–June 2017. Source anonymized for confidentiality.
255. William D. Eggers and Greg Pellegrino, "Improving the Government-to-Business Customer Experience," *Wall Street Journal*, Dow Jones & Co. Inc., 23 Jan. 2017. deloitte.wsj.com/cio/2017/01/23/improving-the-government-to-business-customer-experience, accessed 20 Jan. 2021.



256. Gilles Duruflé, "The Context for Government Policies to Support Tech Innovation Ecosystems in Atlantic Canada," *Stimulating the Atlantic Canada Tech Innovation Ecosystem*, Innovation, Science, and Economic Development Canada, 30 June 2017.
257. Paul Graham, "Why Start-ups Condense in America," *PaulGraham.com*, May 2006. www.paulgraham.com/america.html, accessed 20 Jan. 2021.
258. Diane Mulcahy, "Six Myths About Venture Capitalists," *Harvard Business Review*, HBS Publishing Corp., May 2013. hbr.org/2013/05/six-myths-about-venture-capitalists, accessed 16 Dec. 2020.
259. Ilene H. Lang and Reggie Van Lee, "Institutional Investors Must Help Close the Race and Gender Gaps in Venture Capital," *Harvard Business Review*, HBS Publishing Corp., 27 Aug. 2020. hbr.org/2020/08/institutional-investors-must-help-close-the-race-and-gender-gaps-in-venture-capital, accessed 20 Jan. 2021.
260. Wendy DuBow and Allison-Scott Pruitt, "The Comprehensive Case for Investing More VC Money in Women-Led Start-ups," *Harvard Business Review*, HBS Publishing Corp., 18 Sept. 2017. hbr.org/2017/09/the-comprehensive-case-for-investing-more-vc-money-in-women-led-startups, accessed 20 Jan. 2021.
261. Wendy DuBow and Allison-Scott Pruitt, "The Comprehensive Case for Investing More VC Money in Women-Led Start-ups."
262. Wendy DuBow and Allison-Scott Pruitt, "The Comprehensive Case for Investing More VC Money in Women-Led Start-ups."
263. Ilene H. Lang and Reggie Van Lee, "Institutional Investors Must Help Close the Race and Gender Gaps in Venture Capital."
264. "Beyond the VC Funding Gap," foreword by Thomas Nides, Morgan Stanley, 23 Oct. 2019. www.morganstanley.com/content/dam/msdotcom/mcml/Morgan_Stanley_Beyond_the_VC_Funding_Gap_2019_Report.pdf, accessed 20 Jan. 2021.
265. Vitor Gaspar et al., "Public Investment for the Recovery," *IMFBlog*, International Monetary Fund, 5 Oct. 2020. blogs.imf.org/2020/10/05/public-investment-for-the-recovery, accessed 22 Jan. 2021.
266. Nitasha Tiku, "Black Tech Founders Say Venture Capital Needs to Move Past 'Diversity Theater,'" *washingtonpost.com*, The Washington Post Co., 10 June 2020. [washingtonpost.com/technology/2020/06/10/racial-gap-vc-firms/](http://www.washingtonpost.com/technology/2020/06/10/racial-gap-vc-firms/), accessed 22 Jan. 2021.
267. Joshua Henderson, "The Global Support Ecosystem for Women Entrepreneurs and Investors," *Been There Run That Blog*, Medium Corp., 28 April 2020, updated 2 Sept. 2020. medium.com/been-there-run-that/the-global-support-ecosystem-for-women-entrepreneurs-and-investors-961b3abc2c9b, accessed 22 Jan. 2021.
268. Ruth Umoh, "Morgan Stanley Accelerator for Underrepresented Start-up Founders Goes Virtual," *Forbes.com*, Forbes Media LLC, 23 April 2020. www.forbes.com/sites/ruthumoh/2020/04/23/morgan-stanley-accelerator-for-underrepresented-startup-founders-goes-virtual-due-to-pandemic/?sh=3639e5f22b0a; see also Multicultural Innovation Lab, Morgan Stanley, n.d. www.morganstanley.com/about-us/diversity/multicultural-innovation-lab, accessed 22 Jan. 2021.
269. Reggie James, "The Myth of Blackness in Venture," *HipCityReg Blog*, Substack Inc., 4 June 2020. hipcityreg.substack.com/p/the-myth-of-blackness-in-venture, accessed 22 Jan. 2021.
270. Devashree Saha and Mark Muro, "Cleantech Venture Capital: Continued Declines and Narrow Geography Limit Prospects," *Brookings.edu*, The Brookings Institution, 16 May 2017. www.brookings.edu/research/cleantech-venture-capital-continued-declines-and-narrow-geography-limit-prospects, accessed 20 Jan. 2021.
271. Devashree Saha and Mark Muro, "Cleantech Venture Capital: Continued Declines and Narrow Geography Limit Prospects."
272. Devashree Saha and Mark Muro, "Cleantech Venture Capital: Continued Declines and Narrow Geography Limit Prospects."
273. Emma Foehringer Merchant, "Trump Administration Cuts Clean Energy Programs Again in 2020 Budget Request," *gtm*, Greentech Media, 11 March 2019. www.greentechmedia.com/articles/read/trump-budget-cut-clean-energy-programs, accessed 22 Jan. 2021.
274. "NREL Acts as Local Economic Stabilizer while Transforming Energy Around the World," *NREL*, Alliance for Sustainable Energy LLC, 7 July 2020. www.nrel.gov/news/program/2020/nrel-acts-as-local-economic-stabilizer-while-transforming-energy-around-the-world.html, accessed 23 Jan. 2021.
275. New American Economy, "Immigrant Founders of the 2017 Fortune 500," Center for American Entrepreneurship, 2015. startupsusa.org/fortune500/#introduction, accessed 21 Jan. 2021.
276. Sherry Coutu, "The Scale-Up Report on UK Economic Growth," Presentation, LSE Entrepreneurship, London School of Economics, Nov. 2014. www.lse.ac.uk/assets/richmedia/channels/publicLecturesAndEvents/slides/20141118_1800_scaleupManifesto_sl.pdf, accessed 20 Jan. 2021.
277. Canada Cleantech Alliance, n.d. www.canadaclean.tech, accessed 20 Jan. 2021.
278. "Entrepreneurship and Innovation," *2020 MIT Facts*, Massachusetts Institute of Technology, 2020. web.mit.edu/facts/entrepreneurship.html, accessed 28 Jan. 2021.



279. New American Economy, "Immigrant Founders of the 2017 Fortune 500," Center for American Entrepreneurship, *StartupsUSA.org*, 2015. startupsusa.org/fortune500/#introduction, accessed 21 Jan. 2021.
280. John R. Dearie, "An 'Entrepreneur Visa' Can Help Us Keep Our Competitive Edge," *The Hill*, News Communications Inc., 10 April 2019. thehill.com/opinion/immigration/438195-an-entrepreneur-visa-can-help-us-keep-our-competitive-edge, accessed 23 Jan. 2021.
281. Sari Pekkala Kerr and William R. Kerr, "Immigration Policy Levers for US Innovation and Startups," Working Paper, *NBER.org*, National Bureau of Economic Research, April 2020. www.nber.org/system/files/chapters/c14424/revisions/c14424.rev1.pdf, accessed 22 Jan. 2021.
282. "Application for Permanent Residence – Business Immigration Program – Start-up Business Class (IMM 5759)," *Canada.ca*, Government of Canada, last modified 29 July 2020. www.canada.ca/en/immigration-refugees-citizenship/services/application/application-forms-guides/guide-5759-application-permanent-residence-business-immigration-program-start-business-class.html, accessed 22 Jan. 2021, with currency conversions from CAN to USD on same date.
283. "Application for Permanent Residence," accessed 22 Jan. 2021, with currency conversions from CAN to USD on same date.
284. "Policy Agenda to Revitalize American Entrepreneurship," Center for American Entrepreneurship, *StartupsUSA.org*, Oct. 2019. startupsusa.flywheelsites.com/wp-content/uploads/2019/10/Proposed-Policy-Agenda-to-Revitalize-American-Entrepreneurship.pdf, accessed 20 Jan. 2021.
285. "Policy Agenda to Revitalize American Entrepreneurship," Center for American Entrepreneurship, *StartupsUSA.org*, Oct. 2019.
286. Allison Bramwell, Nicola Hepburn, and David A. Wolfe, "Growing Innovation Ecosystems: University-Industry Knowledge Transfer and Regional Economic Development in Canada," Munk School of Global Affairs Knowledge Synthesis Paper, *TSpace, University of Toronto*, 15 May 2012. tspace.library.utoronto.ca/bitstream/1807/80099/2/Bramwell%20et%20al_2012_Growing%20Innovation%20Ecosystems.pdf, accessed 20 Jan. 2021.
287. International Business Innovation Association, *InBIA.org*, as of 21 Jan. 2021. inbia.org.
288. Peter Ester, *Accelerators in Silicon Valley: Building Successful Start-ups* (Amsterdam: Amsterdam UP, 2017). library.oapen.org/bitstream/handle/20.500.12657/45642/1004092.pdf, accessed 22 Jan. 2021.
289. Edward B. Roberts, Fiona Murray, and J. Daniel Kim, "Entrepreneurship and Innovation at MIT: Continuing Global Growth and Impact," MIT Sloan School of Management, Massachusetts Institute of Technology, Dec. 2015. web.mit.edu/innovate/entrepreneurship2015.pdf, accessed 18 Jan. 2021.
290. Greg Medcraft, "Enabling Investments in Blockchain Technologies and Digital Innovations," *LinkedIn.com Pulse*, Microsoft Corp., 13 Nov. 2019. www.linkedin.com/pulse/enabling-investments-blockchain-technologies-digital-greg-medcraft, accessed 22 Jan. 2021.
291. "Cover Statement by the Inclusive Framework on the Reports on the Blueprints of Pillar One and Pillar Two," Inclusive Framework, OECD, 8–9 Oct. 2020. www.oecd.org/tax/beps/cover-statement-by-the-oecd-g20-inclusive-framework-on-beps-on-the-reports-on-the-blueprints-of-pillar-one-and-pillar-two-october-2020.pdf, accessed 27 Jan. 2021.
292. Greg Medcraft, "Enabling Investments in Blockchain Technologies and Digital Innovations," *LinkedIn.com Pulse*, Microsoft Corp., 13 Nov. 2019. www.linkedin.com/pulse/enabling-investments-blockchain-technologies-digital-greg-medcraft, accessed 22 Jan. 2021.
293. Elizabeth Schulze, "Cryptocurrencies Are 'Clearly Shaking the System,' IMF's Lagarde Says," *CNBC.com*, CNBC LLC, 10 April 2019. www.cnbc.com/2019/04/11/cryptocurrencies-fintech-clearly-shaking-the-system-imfs-lagarde.html, accessed 11 Sept. 2019.
294. "Presidio Principles: Foundational Values for a Decentralized Future," World Economic Forum, *WEForum.org*, 2020. www.weforum.org/communities/presidio-principles, accessed 20 Jan. 2021.







blockchainresearchinstitute.org



digitalchamber.org