



PUBLIC SECTOR AND THE **DIGITAL VORTEX**

How Government Organizations Can Harness
Digital Disruption for Positive Change

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Executive Summary

- Digital disruption impacts all organizations – even those outside the private sector. Inaction is not an option.
- Digital disruption isn't just about technology. It's also about new business models – and the ability to deliver value to constituents in entirely new ways.
- Platform-based business models are the most disruptive, especially when used to deliver cost value and experience value.
- To thrive in the “Digital Vortex,” a new approach is required to operate and serve constituents. This involves a core set of meta-capabilities – hyperawareness, informed decision-making, and fast execution – that we call *digital business agility*.
- Government has the power to shape disruption's path – its actions are critically important to how digital disruption plays out, and the extent to which it serves growth and value creation. Governments should focus on four areas:
 1. Investing in innovators
 2. Building a talent pipeline
 3. Promoting disruptor-friendly regulation
 4. Using public assets to drive innovation

Governments and nonprofits

are perennially strapped for resources: they must be creative in how they staff, budget, connect, serve, and plan. While those challenges are not new, public sector organizations increasingly face something that is: *digital disruption*.

A source of intense focus in the private sector, digital disruption is the effect of digital technologies and business models on an organization's current value proposition and resulting market position.

The impacts of digital disruption are profound because they upset both the speed and the stakes of traditional competitive dynamics. Digital disruptors innovate continuously and follow growth opportunities with great agility, often across multiple sectors, threatening the very existence of market incumbents.

In response to the new competitive landscape shaped by disruption, IMD and Cisco jointly established the **Global Center for Digital Business Transformation** (DBT Center) in 2015. A year later, the DBT Center published its first book, *Digital Vortex: How Today's Market Leaders Can Beat Disruptive Competitors at Their Own Game* (see sidebar, “**Digital Vortex: Threat and Opportunity**,” on next page).

While our focus in *Digital Vortex* was the private sector, we realized that digital disruption's implications for the public sector are no less significant. Just as the private sector must transform to thrive in the Digital Vortex, so must public sector organizations. In truth, governments have been pursuing transformation for decades. In the Digital Vortex, the question becomes “how can digital disruption transform this transformation?”

Just as the private sector must transform to thrive in the Digital Vortex, so must public sector organizations.

The most direct way is to use digital business practices to improve and augment government services. Digitization offers significant cost and experience benefits because of the way that it can deliver customization, ease of use, and pay-as-you-go pricing, among other benefits. In healthcare, for example, one innovative company, Cohealo, is disrupting traditional purchasing of medical equipment. Its platform for on-demand access to medical equipment, in which hospitals track and loan equipment to one another, allows health systems to optimize spending, accelerate cash flow, and improve

access to care. The company's mission is to double the average utilization of medical equipment – from its current rate of just 42 percent to something closer to 75 or 80 percent.¹

Examples of digital start-ups like Cohealo abound across public sector functions, from education to transportation. Still, many public sector organizations have been reluctant (or too inflexible) to adopt new digital tools and business practices that haven't been fully road-tested elsewhere.

Government agencies that believe they have a monopoly on their service, and are thus buffered from disruption, are in for a rude awakening. Critically, digital disruptors do not confine themselves to any industry or supply chain – even public sector services are fair game. For example, the price of city-rationed taxi medallions have plummeted since the advent of Uber and Lyft²; Bitcoin competes with sovereign currencies; and state-run media contends with smart-phone-wielding citizen reporters. Clearly, governments do not have the luxury of ignoring digital disruption.

For public sector agencies, digital disruption challenges not just industry boundaries, but geographical ones as well. Khan Academy, for example, aims “to provide a free, world-class education to anyone, anywhere.”³ From its humble beginnings as a creative way for founder Salmar Khan to tutor his cousins, the nonprofit now serves millions of online learners daily, for free, with just 80 employees. With its ever-expanding roster of subjects, lessons, and languages, Khan Academy is disrupting the way education is accessed and organized. In short, when public sector resources are inaccessible or insufficient, digital alternatives and providers fill the void.

However, digital disruption in the public sector does not mean that Apple, Uber, and Facebook could replace public sector organizations. But these companies are set to deliver value in a completely different way, impacting all sectors and consumer expectations. Governments and other public sector entities must reflect on how they fit into this emerging landscape of disruption and pursuit of value – and be willing to evolve their services accordingly.

While digital disruption is often viewed negatively, as we explained in *Digital Vortex*, it can also yield important benefits and contribute to healthy economies and societies. For example, India's Aadhaar digital national ID system now serves 9 out of 10 Indians (roughly 1.2 billion people), enabling the government to serve them more equitably and efficiently than ever before. Aadhaar cards are used to collect on food and agricultural subsidies, as well as for voting and tax collection. The system captures and verifies identities through fingerprints and iris scans more than 20 million times a day, improving record-keeping for illiterate populations, and removing opportunities for waste and fraud.⁴ While Aadhaar cost India \$1 billion to implement (a little less than \$1 per person), the program has already saved \$8 billion in fraudulent subsidy payments in just two years.⁵

Digital Vortex: Threat and Opportunity

In the Digital Vortex, business models and value chains become digitized to their maximum extent. The force of this Vortex separates physical and digital sources of value, yielding “components” that can be readily combined to create new disruptions and blur the lines between industries.

Industries closest to the center of the Vortex are most impacted by digital disruption, while those around the edges are affected the least. However, we have observed that any industry, regardless of its starting position in the Vortex, can be quickly pulled into the center by new digital technologies and business model innovations. (While our initial “Digital Vortex” study involved just the private sector, public sector organizations are also feeling the pull of the Vortex.)

Although digital disruption is often viewed negatively, it can also present opportunities as well as threats. In fact, in a 2016 DBT Center survey, 63 percent of respondents said that digital disruption was good for society, and 75 percent viewed it as a form of progress.⁶

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As the pace of change in the world continues to accelerate, the success of nations will be measured by their capacity to renew themselves – their capacity to look far into the future, while acting and making decisions here and now.

– Sitra,
Finnish Innovation Fund

There is a risk of public sector organizations becoming less relevant to their constituents as digital disruptors identify and capitalize on opportunities to create user value. If citizens obtain public goods by circumventing the government, the already strong voices calling for less government in our lives become louder. As leaders across the world know very well, citizens who feel neglected or unheard can readily utilize social media like Facebook to connect and organize. Public sector organizations must take action to hear their constituents and remain relevant to their needs.

The risk of inaction is already greater than that of taking action. As columnist Thomas Friedman has noted, the pace of change in technology and other global trends has “started to outrun the ability of our political systems to build the social, educational, community, workplace, and political innovations needed for some citizens to keep up.”⁷ In other words, government is falling behind digital change – and in doing so, is becoming less able to discharge its responsibilities to the public. Many political scientists cite the economic and social dislocations associated with technological change as a source of political fragmentation and extremism.

Ultimately, the public sector’s role in digital transformation extends beyond organizational boundaries. Public sector organizations must evolve to become digital platforms upon which legislation, regulation, services, and a renewed vision of government create the right competitive environment for constituents to realize the benefits of digital transformation.

This paper will examine digital disruption through two lenses:

- *Transforming government itself – how it runs, operates, functions, and governs:* Like the private sector, governments must become more agile and adaptable. We describe how disruptors are combining digital business models to deliver new sources of value – and the agile capabilities required to make this happen.
- *Creating the conditions for disruption to impact constituents in a positive way:* Unlike the private sector, governments cannot just do what is best for them; they have a broader mission. We explore four ways public sector organizations can create the conditions for disruption – particularly by leveraging their unique status as platforms for value creation and delivery.

Based on the DBT Center’s research and engagement with public sector organizations around the world, we will also provide actionable frameworks and real-world examples that enable governments to harness disruption to transform and create new value for citizens.

Driving New Sources of Value in the Public Sector

Digital technologies – cloud, mobility, social media, the Internet of Things (IoT), and analytics – are powerful drivers of disruption. But these technological advances alone do not explain how disruptors like Uber, Airbnb, WeChat, Facebook, and others have redefined industries.

What’s “different this time” is that digital technologies are doing two things: 1) enabling new business models and 2) delivering customer-focused value in new ways.

Do public sector organizations have “business” models? The answer is yes. According to Alexander Osterwalder and Yves Pigneur in their book *Business Model Generation*, “A business model describes the rationale of how an organization creates, delivers, and captures value.”⁸ Although public sector organizations normally have no profit motive, all have business models.

Disruptive business models, enabled by digital technologies, can be categorized by the primary type of value they provide. The DBT Center’s research reveals that digital disruptors deliver three main types of customer value⁹: (1) cost value, (2) experience value, and (3) platform value (see Figure 1).

(Figure 1) Three Forms of Value and Their Business Models



Source: Global Center for Digital Business Transformation, 2015–2017

- **Cost value** is about making things cheaper, or creating some sort of economic gain for the customer. It is the area in which the competitive effects of digital disruption are also probably most acute. Here, disruptors lower the cost of a product or service (or offer it free) through virtualization / dematerialization, disintermediation in (or decoupling of) the value chain, amortization of costs over large user bases, and consumption-based costs. Well-known examples include Coursera, Skype, Fon, Groupon, and Salesforce.com.
- **Experience value** – offering customers more convenience, context, and control – has been central to the rapid ascent of many of today’s most disruptive companies. As with cost value, experience value increases as offerings are digitized: customers

Key Takeaway

Digital disruptors deliver three main kinds of customer value:

1. Cost value
2. Experience value
3. Platform value

Key Takeaway

Rather than trying to replicate the value chains of traditional companies, disruptors use digital business models to deliver end-customer value through lower costs, better customer (constituent) experiences, and scale.

receive and pay only for the product features and services they want, delivered instantly to any device or location. Well-known examples include PayPal, Instacart, Tesco Click+Connect, Bitcoin, Nest, and UpWork.

- **Platform value** is created from new or improved connections among people, or between people and objects. Platforms produce network effects: the more users that are connected, the more valuable it is to be connected, which then drives more users to the platform in a virtuous cycle of value. Platforms create the conditions for scale, speed, efficiency gains, repeatability, and learning. Well-known examples of start-ups creating platform value are the Apple iOS ecosystem, Facebook, Twitter, Airbnb, and Palantir.

Digitization of products, services, and business processes allows disruptive players to deliver the same value as a traditional competitor, and even augment it, without having to reproduce the conventional value chain. In fact, this is the fundamental objective of digital disruptors: to provide superior value to the end customer while avoiding the capital investments, regulatory requirements, and other such impediments of “encumbered incumbents.”

Digitization of products, services, and business processes allows disruptive players to deliver the same value ... without having to reproduce the traditional value chain.

Tesla, the luxury electric vehicle manufacturer, is a good example. It challenged the automotive sector in several innovative ways. First, Tesla uses a direct-to-customer sales model, foregoing the standard dealership network model. It also provides automatic updates to the car’s “operating system,” creating a stream of new experience value for owners. Finally, Tesla owners pay thousands each year for tune-ups at Tesla-branded service stations, virtually eliminating non-OEM aftersale markets.

For disruptors like Tesla, it’s the new and improved *value created for the end customer* that matters, not the value chain that produces products or services. Rather than trying to replicate the value chains of traditional companies, disruptors use digital business models to lower costs, build better customer experiences, and create scale. This customer-centric view is what allows disruptors to jump from industry to industry in seemingly non-linear ways (see “Value-Driven Business Models” table on page 11).

In May 2015, Tesla revealed its intentions to disrupt a second sector when it unveiled batteries for the home and business markets – bat-

teries that could pull and store energy during off-peak-rate times or, ideally, directly from Tesla-compatible solar panels.¹⁰ The car batteries that have made Tesla such a formidable threat to automakers are highly transferable to a public utility: power generation and storage.

Like the private sector, the public sector needs to emphasize value creation – cost value, experience value, and platform value – for its “customers,” rather than focusing on digital “tweaks” to its value chain. This value chain mind-set has been central to digital transformation efforts in the public sector for decades and has acted, in important ways, as the biggest brake on successful transformation. These efforts have tended to consume a great deal of time, financial resources, and managerial mindshare, often with sparse results.

In other words, most public sector “transformation” efforts to date have been almost wholly focused on incremental evolution of the service delivery value chain. Governments must take a new tack in the era of the Digital Vortex – by harnessing digital disruption to innovate their business models to deliver cost value, experience value, and platform value.

Value opportunities pursued by the public sector can accrue to many different kinds of constituents: citizens, businesses, society at large, and even other government organizations. Because the nature of public sector value is so varied, measuring it can seem impossible or fruitless, but at the same time especially necessary given the risk involved in instituting radically new approaches. Keep in mind that in the private sector, digital disruptors have turned traditional success metrics upside down. Many valuations are based on a company’s platform size and growth potential, not its product market or profitability level. Usership is key, and as we will discuss later, governments are extremely well-positioned to leverage their true nature as platforms to create constituent value.

Here are examples of how some public sector organizations are embracing disruptive models to change the way value is delivered:

Cost Value

The government of Australia is estimated to have saved private businesses over AU\$1 billion in compliance costs through its standard business reporting system (SBR). An initiative of the Australian Tax Office, SBR allows business owners and reporting professionals to submit tax and other business reports electronically, even automatically, directly through their accounting software or through their accounting or tax professional.

Since the initiative has gained traction, the ATO has also begun preparations for a national e-invoicing standard, estimated to save the public AU\$10 billion, as well as a central online business registry, which would streamline and simplify the registration process. This would allow data to flow internally to potentially 500 relevant government agencies, removing duplication and silos.¹¹ All of these improvements have significant cost value for Australian businesses, but

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The most important thing in effecting change in government is to expose the people who run the country to innovative ideas. When they’re making decisions, they realize that there are other, more innovative options to employ.

– David Yeh,
*Former Senior Policy Advisor,
The White House*

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We don't care about politics. We care about making government work better.

– Haley van Dyck,
Co-founder, USDS

also improve the accuracy and functionality of government records and record sharing.

Experience Value

“What would it look like if it was actually as easy to get student loans or veterans’ benefits as it is to order cat food from my house?”¹² Those are the words of Haley van Dyck, who co-founded the U.S. Digital Service (USDS) in August 2014. The USDS’s mission is to “build a more awesome government through technology” by using lessons learned from Silicon Valley and the private sector to improve federal services. “We don’t care about politics,” van Dyck explained. “We care about making government work better.”

Situated under the Executive Office of the President, the USDS acts as a consulting team that identifies the worst digital citizen experiences and advises on remedies. Most memorably, in 2014 it fixed the disastrous Healthcare.gov (Affordable Care Act) website, improving uptime, processing speed, and application experience for a fraction of the original website’s cost. Another spectacularly successful, if less-well-known, win was the Vets.gov website. Before Vets.gov, the Department of Veterans Affairs had come under fire for its slow service and mountains of paper so heavy that they bowed floors in the department’s offices. While many veterans’ services were accessible online, each had its own website and process, resulting in hundreds or thousands of pathways to navigate. The USDS started the Vets.gov portal with the two services that matter most to veterans – education and disability benefits – and then expanded the project to cover needs such as healthcare benefits, careers and employment, and burials and memorials. By bringing these services to a single portal with a unified user experience, the USDS has significantly improved service levels for veterans’ benefits.

Platform Value

The defense industry has always played an important role researching and developing technologies with commercial value, such as global positioning systems (GPS) and even the internet itself. In recent years, however, that narrative has been overshadowed by Silicon Valley and other start-up hubs, which now exert a strong gravitational pull on all kinds of technology ventures, including those that have national security value.

MD5, the United States’ national security technology accelerator, operates as a public-private partnership between the Department of Defense (DoD) and a network of U.S. universities. It seeks to connect the DoD with the best ideas and entrepreneurs where they are, even as founders set their sights on more commercial markets. MD5’s approach is unique among technology accelerators: it develops, in the words of MD5 Director Adam (Jay) Harrison, “human capital innovation and human-centered networks that uncover new opportunities for technology-related value.” In other words: people.¹³

“Ideas are tied up to people,” Harrison elaborated. “We need people who are bringing in new perspectives and new thoughts around how

Value-Driven Business Models: Cost, Experience, and Platform

Type of Value	Business Model	Customer Value	Private Sector Disruptors	Public Sector Disruptors
Cost	Free / Ultra-low-cost: Providing something for free; rebates, rewards; no or low markup; "freemiums"	Outright elimination of cost; incremental value for loyalty or participation	Coursera, Skype, iBotta, Shopkick, Dropbox, Spotify, Amazon, Jet.com	Khan Academy (free education)
	Buyer aggregation: Spreading costs over people or time	Amortize costs over time; group discounts, buying economies of scale	Fon, Groupon	Citizeninvestor, Neighborly (public works crowdfunding)
	Price transparency: Extracting better bargains through price comparisons	Greater supplier choice, comparison shopping	Priceline, Shopzilla, NexTag	U.K. G-Cloud, Periscope Holdings (public sector procurement)
	Reverse auctions: Reverse-auction-style sales; competitive bidding	Downward pricing pressure; strategic sourcing	LendingTree, SAP Ariba	Procurex (public sector procurement)
	Consumption-based pricing: Paying only for what is used; subscription services; "X as a service"	Variable cost, lower risk, decreased vendor overhead	Metromile, Salesforce.com, LiquidSpace, ShareDesk, Rolls-Royce Holdings	Amazon Web Services (computer processing power)
Experience	Customer empowerment: Self-service disintermediation of middlemen; do-it-yourself	Greater independence, control, convenience	PayPal, Netflix	Aunt Bertha (public assistance finder), BlueLine Grid (secure field communications)
	Customization: Personalization of products, services, experiences	Increased customization, contextualization; aesthetic / design improvements	Nordstrom/Trunk Club, New Balance	Beta.phila.gov (UX-first city portal)
	Instant gratification: Delivering goods, services, or value-added services in real time, or via new devices	Relevance, immediacy	Instacart, Shyp, Google Express, Amazon Prime Now/Echo, Tesco Click + Collect	Drop Counter (water usage app)
	Reduced friction: Greater simplification and efficiency, information aggregation	Removing latency or bottlenecks in business processes	Mint.com, Liquidnet, Bitcoin	GovSense (open budgeting), ScreenDoor (collaborative decision-making)
	Automation: Automation of processes using analytics or low-cost labor	Time savings, improved execution quality, wage arbitrage	Wealthfront, TaskRabbit	ArchiveSocial (social media records mgt.), Captricity (document recognition)
Platform	Ecosystem: Standardized toolkit / building blocks / environment / "sandbox" that others can use to create their own value	Co-creation with ecosystem participants, repeatability and resource leverage, monetize offerings via ecosystem	Apple iOS, Google Android, Minecraft, Raspberry Pi, GrabCAD, Docker	Etherium (blockchain platform)
	Crowdsourcing: Inputs from ecosystem of contributors	Larger volume and greater diversity of ideas; new labor sources; capture scarce / unique information	Quora, Huffington Post, Kaggle, Innocentive, WikiLeaks	SeeClickFix (public property feedback), Citymart (open challenges), GitHub (code)
	Communities: Information dissemination through network or community of recipients; viral	Optimization of communications, distribution, execution	Nextdoor, Twitter, Reddit	Nextdoor (neighborhood bulletin app); FiscalNotes (legislative tracker)
	Digital marketplace: Connecting individuals and groups; sharing economy and P2P dynamics	Revenue from buying, selling, transacting; socialization / mobilization of resources; education of users	Etsy, Airbnb, Cargomatic, Transfix	Cohealo (shared medical equipment), Munirent (shared municipal vehicles)
	Data orchestrator: Combination of sensor / machine data and analytics to create new insights	Real-time data, new data sources, recognize patterns amid extreme complexity, optimize decisions	ABB, Cisco, GE, IBM, Intel, Palantir, SAP, Splunk, John Deere	Double (traffic monitoring), Enevo (waste mgt.), Pondera (fraud detection)

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Ideas are tied up to people. We need people who are bringing in new perspectives and new thoughts around how to tackle some wicked problems. We want people who are exposed to orthogonal ideas and orthogonal ways of doing business.

– Adam (Jay) Harrison,
Director, MD5

to tackle some wicked problems. We want people who are exposed to orthogonal ideas and orthogonal ways of doing business.” The tiny MD5 team realized that a bottom-up approach was much more effective in identifying the next national security technologies than a top-down method, in which the bureaucracy or they themselves set the direction. Additionally, tapping a broad network of innovators and entrepreneurs – from students to soldiers – helps the department identify commercial value in the early-stage technologies it typically underwrites.

MD5 serves to welcome entrepreneurs to the DoD, marketing the significant infrastructure and capital assets of the DoD as a development resource. It helps these entrepreneurs, many of whom put forth only a “shower thought” idea, to flesh out the value proposition and actionable concept. In so doing, it raises innovations to the level where they are much better positioned for market launch or corporate acquisition. Most recently, MD5 has conducted a college course at Stanford in which DoD officials presented real military technology problems to students, who across the course of the semester developed solutions. Two of the eight teams were so successful in formulating solutions that they received seed funding to implement them.

The most disruptive organizations create what we refer to as “combinatorial disruption,” blending all three forms of value for customers.

Merging All Three Forms of Value to Create “Combinatorial Disruption”

The most disruptive organizations create what we refer to as “combinatorial disruption,” blending all three forms of value (cost value, experience value, and platform value) for customers, yielding a competitive advantage others struggle to match. M-PESA is a prime example of a disruptor that combines cost value, experience value, and platform value in the public sector.

Launched in 2007 in Kenya, M-PESA is a mobile payments system that operates over the popular Safaricom telecom network, using text messages to transfer cash. To initiate a transaction, a sender goes to a nearby M-PESA agent with cash to remit. These agents are ubiquitous across the country, about as common as lottery vendors in the United States (experience value). Once the remittance is processed for a low fee (cost value), the recipient receives a text message that she can collect her cash by visiting her local agent. Before M-PESA, unbanked Kenyans had to hand-deliver cash, often entailing a long, unsafe bus ride from cities to remote villages.

Hundreds of government technology start-ups and firms worldwide like M-PESA provide value to public sector organizations and citizens through cost, experience, and/or platform value.

Safaricom has an agreement with the government to keep fees low, which it readily does because the value to the telco is not in the banking fees, but in the “stickiness” of its customer base, which continues to use the service provider to access M-PESA (platform value). M-PESA’s success is in the statistics: the service now has 25 million users in Kenya, more than half of the national population. Some 25 percent of Kenya’s GDP flows through the system annually.¹⁴ It has become an engine of economic growth, being credited with bringing hundreds of thousands of households out of extreme poverty and providing the means for millions more to securely run small businesses.¹⁵

Hundreds of government technology start-ups and firms worldwide like M-PESA benefit public sector organizations and citizens through cost value, experience value, and / or platform value. M-PESA is worth highlighting additionally as an example of an organization that filled a gap in the local economy, essentially delivering a public good without requiring government resources, other than regulatory oversight.¹⁶

Building the Capabilities to Thrive

Digital transformation is more than a collection of tools, products, or managed services. It is ultimately an approach to an ever-shifting landscape in which the ability to understand the environment, react quickly in an informed manner, and mobilize the required resources will determine success. Tools alone are insufficient. Organizations that do not build for agility will never keep pace or retain relevance compared with those that do.

To move with the speed, fluidity, and effectiveness of disruptors, a new approach is required for building organizations. This involves a core set of capabilities we call *digital business agility*. Digital business agility is best thought of as a kind of meta-capability that rests upon three underlying competencies: hyperawareness, informed decision-making, and fast execution (see Figure 2, next page). With digital business agility, organizations can deliver superior cost value, experience value, and platform value by:

- Sensing the changes in their environment that matter most by collecting relevant data and insights (includes the ability to detect potential cybersecurity attacks¹⁷)

Key Takeaway

Tools alone are insufficient. Organizations that do not build for agility will never keep pace or retain relevance compared with those that do.

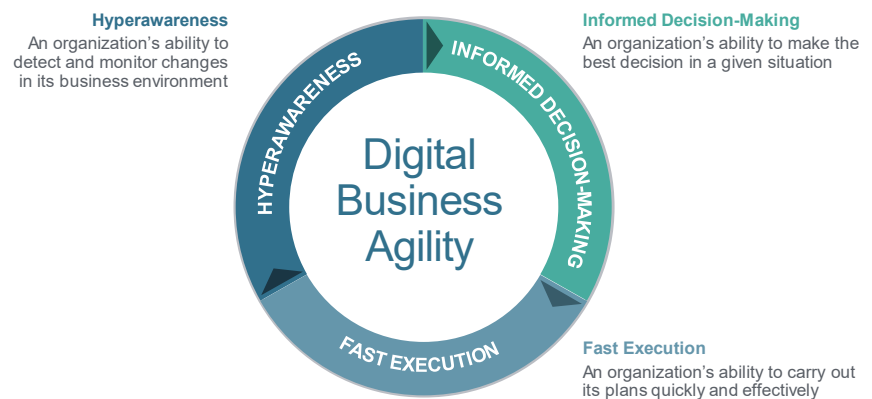
Key Takeaway

Digital business agility comprises three essential capabilities: hyperawareness, informed decision-making, and fast execution.

- Analyzing data, absorbing learnings, and involving the right people to make good decisions consistently
- Executing quickly and scaling rapidly, while shedding unsuccessful or outdated approaches

Public sector organizations that possess strong digital business agility react quickly and effectively to changing economic and social challenges. They can sense real-time information about constituents and their environment (hyperawareness). They then process this information to determine how they can best meet the needs of their citizens (informed decision-making). And they move quickly to change course and apply resources (people and technology) where they're needed most (fast execution).

(Figure 2) Three Forms of Value and Their Business Models



Source: Global Center for Digital Business Transformation, 2015-2017

Already, some jurisdictions are fostering the capabilities to increase their digital business agility:

Hyperawareness

Each day, the Port of Rotterdam receives more than 8000 containers. A small number of these are singled out for X-rays to check for illicit contents, including weapons. Inspections of the X-rays by human operators are time-consuming, typically requiring 10 minutes for each examination. However, computer scientists at University College London are employing artificial intelligence to speed up the process dramatically. They've created software that uses machine-learning techniques to scan the X-ray images. The system can perform each scan in just 3.5 seconds.¹⁸ Officials also have a more complete picture of goods passing through the port.

Informed Decision-Making

Boston has a small contingent of restaurant inspectors, who ensure that restaurants are up to code. However, the team had a low suc-

cess rate in finding violations, while being incredibly stretched to inspect all of the city's restaurants regularly. The city turned to data analytics for a solution. With only two data sets on hand – historical inspection data and Yelp! reviews – the city announced a citywide contest to develop an algorithm that would predict which restaurants were most likely to fail inspection. The winning algorithm, for which the city paid only \$3000 in prize money, uncovered 25 percent more code violations, improving inspection outcomes and prioritizing inspectors' time. Using only a narrow data set, data analytics drove smarter decision-making for the city, with positive outcomes for citizen health and safety.¹⁹

In addition to augmenting the ability of people to make informed decisions, digital capabilities can also improve automated decision-making. Georgia State University (GSU) had a serious problem: students were not graduating at expected rates, and the school did not know why. The institution decided to adopt data analytics to understand the risk factors for dropping out, and then use automated emails to give students relevant support at the exact time of need. Tracking over 800 data points per student, the school's algorithm learned to identify the risk factors, such as missing the deadline for the next semester's class registration. Students who were identified as at risk of missing the deadline would receive an email reminder to register. As a result of the targeted, automated email program, GSU has seen the graduation rate rise by 6 percent. Furthermore, for the first time, students of color achieved graduation rates on par with those of the overall student body.²⁰ In this example, the solution did not compete with a human resource at the university, or even prioritize "high-touch" cases for a person to handle. Instead, it delivered a complete solution that achieved a better outcome for the school.

Fast Execution

Lahore, Pakistan, had seen increasingly worse outbreaks of dengue fever for several years, culminating in an epidemic in 2011. Because dengue is a mosquito-borne affliction that comes and goes with the rainy season, any attempt to stanch its spread needed both scale and speed to be effective while the virus was active. In 2012, the Punjab government decided to try a completely different approach to typical health and information campaigns: it gave health workers mobile devices to geotag all their various efforts in the field. Mapping the geotags in real time, and cross-referencing other data sets, the government ultimately learned the root causes that drove the disease's spread. It then directed preventive measures according to real-time reports from health workers in the field. The initiative worked: cases of dengue fever dropped precipitously, from 21,000 in 2011 to only 258 the following year.²¹

In terms of fast execution, one lesson to be drawn from the private sector's most disruptive companies is their comfort level with engaging other disruptors who can make them move faster. It may not always make sense for an incumbent – in this case, a government agency – to

Key Takeaway

Informed decision-making (through analytics) helped the city of Boston significantly improve the health and safety of its citizens.

LAPOR! Blends All Three Components of Digital Business Agility

In Indonesia, the LAPOR! program gives citizens direct participation in informing government services at the exact point of need: when those services fail.

First, citizens can report about anything, from potholes to corruption, by contacting LAPOR! through text message, app, Facebook, or Twitter (hyperawareness). Once the message is received, a dedicated team routes the report to the correct department (informed decision-making), which has five days to respond (fast execution).

Accountability is built into the system. Citizens can track the status of their report through a ticket number. LAPOR! staff have the power to escalate cases that miss their deadline all the way up to the national ombudsman, who can place a binding order on the agency to address the problem. Lastly, dashboards for city and national leaders summarize key performance metrics, pressuring agencies to resolve citizens' complaints on a timely basis.

Through digital tools – from social media to analytics software and dashboards – the LAPOR! program brings continuous improvement to the public services experience.²⁴

try to replicate the capabilities of a disruptor. Oftentimes, partnering with or hiring the disruptor creates the fastest execution. This is something companies like Uber, Spotify, and Netflix understand well. While government outsourcing has increased dramatically in recent decades, this trend has brought with it high costs and complexity, risk, and cynicism. Harnessing digital disruption means being more open and more creative in how services are designed, built, and delivered.

Dūcō is one such disruptor for hire. An online, on-demand platform, it allows anyone needing expertise in a variety of public sector fields (countries and regions, policy, elections, terrorism, diplomacy, and national security) to quickly schedule and pay for a phone consultation, political risk assessment, delegation visit, or even an op-ed article. “Government does a great job of recruiting high-level talent on the policy side,” said Sidney Olinyk, co-founder of Dūcō. “Still, if policy-makers could quickly collect multiple diverse expert perspectives on a certain topic, they could develop more accurate assessments. Companies in the private sector already work with Dūcō to collate a spectrum of expert opinions. This is a major competitive advantage that can affect a company’s bottom line. More than ever, government needs to borrow lessons from the private sector to move quickly and compete globally.”²²

BlueLine Grid is another such disruptive start-up. It seeks to bring secure collaboration to highly mobile public sector workforces – from SWAT teams, intelligence units, and police to probation officers and public works staff. Users can communicate securely by text, voice, and conference calls, as well as via broadcast emergency alerts. BlueLine Grid also displays each team member’s location in the field, allowing individuals to coordinate directly instead of needing to return to central dispatch to receive the next assignment. When public sector employees can easily collaborate and coordinate their own work directly, they can make informed decisions whenever and wherever they are.²³

Government as a Platform

While technologies and business models drive the Digital Vortex, governments play a role in how fast it “spins.” In fact, government has the power to shape disruption’s path; its actions are vitally important to how digital disruption plays out, and the extent to which it serves growth and value creation. Public sector organizations cannot afford to stick with “business as usual” when the foundation of their jurisdiction’s prosperity – profitable companies and gainfully employed workers – is threatened by the Digital Vortex.

Innovation thrives on freedom: freedom of ideas, talent, and capital. But the situation is more complex than that. An innovation economy, in turn, depends on a supportive public sector. Look no further than the world’s innovation capital, Silicon Valley. The region flourishes in part due to public higher education such as the California Institute of Technology, as well as government-funded initiatives like the Defense Advanced Research Projects Agency (DARPA) and Small Business

Enterprise (SBE) loans. In China, without the national government’s decision to block access to disruptive foreign giants like Facebook, Google, and Netflix, domestic moguls Tencent and Baidu would not have had the space to reach their full potential. And Israel’s success as the “start-up nation” is credited to the military’s foundational role in facilitating a dense network of social capital and exposure to cutting-edge technology.

That is not to say that governments need to have a heavy hand in the actual work of innovation. The DBT Center’s research suggests the public sector best serves constituents as a platform for them to create value directly. Economic strength (and especially growth) comes from enabling private sector health – facilitating a competitive economic environment. Government’s role in creating this environment means leveraging its platform value – pulling on the strings that connect businesses and resources – to provide the incentives for the private sector (and, more broadly, the public) to do the heavy lifting.

To understand the role that public sector organizations should take in striking the delicate balance between encouraging disruption (or reining it in) and channeling it for economic growth, we have examined case studies globally of digital business incentives and jurisdictions that are blossoming through government digital initiatives. Our findings are summarized in four categories (see Figure 3):

1. Investing in innovators
2. Building a talent pipeline
3. Promoting “disruptor-friendly” regulation
4. Using public assets to drive innovation

(Figure 3) Government as a Platform: 4 Key Focus Areas



Source: Global Center for Digital Business Transformation, 2015–2017

Naturally, organizations in different sectors and of different sizes will find some of these levers more practical than others: not all organizations have tax authority, and not all can regulate. However, the hope is that in building awareness of the range of creative uses of these

Key Takeaway

Governments can strike the delicate balance between encouraging disruption and channeling it for economic growth by:

1. Investing in innovators
2. Building a talent pipeline
3. Promoting “disruptor-friendly” regulation
4. Using public assets to drive innovation

Israel: Creating a Talent Market for the Private Sector

While Israel is best known as the start-up nation, its success in attracting multinational corporations (MNCs) with its advanced talent market is equally important. In a world where increasingly every company is a tech company, Israel has used available resources, along with crafting policy to acquire what it lacked, to become a matchmaker for innovation demand to meet its innovation supply.

Israel's decision to become an innovation economy began with the realization that Silicon Valley's success, built on an interlocking ecosystem of talent, money, culture, and infrastructure, could be replicated.

Israel already had several of the building blocks, most notably talent, a "go-for-broke" culture, and the geographical qualities of small scale and isolation perfectly suited to trialing innovations. However, it lacked other fundamental building blocks, such as role models, access to global markets, and venture capital.

Israel convinced major MNCs to invest in the country by offering incentives such as low taxes and matching employee wages for three years.

The incentives worked, and Silicon Wadi, as it's called, was born. Intel, one of the earliest MNCs to invest in the country, built fab labs in the desert. Other MNCs, from 3M, to Facebook, to China's Xiaomi, followed suit over the years. At present, 300 MNCs have research and development offices in Israel²⁹, and for many of them, Israel is their largest R&D base outside their home country.

Israel created a unique system in which talent is not exported – instead, employers are imported.

levers, all organizations can begin to see options for playing their position to foster a healthy digital economy.

Investing in Innovators

Part of creating a competitive local economic environment is incentivizing target firms through strategic financial investments such as tax abatements, grants, and loans. These incentives should be reserved not only for start-ups and new ventures: large incumbent firms that are struggling to compete with nimble digital rivals arguably need equal attention and support in navigating disruption. Given the role of these large companies in providing jobs, paying corporate taxes, and contributing culturally to their regions, their success should be an equal priority for local governments. Here are some examples:

- **START-UP NY** allows businesses in target advanced industries such as biomedicine, manufacturing, software, imaging, and aviation to pay no taxes for 10 years, as long as they create net-new jobs in one of 600 "Tax Free Areas" close to the colleges and universities that sponsor them. Since its inception, the program has attracted 202 businesses, generated over \$250 million in investment in the state, and received commitments for nearly 4500 jobs.²⁵
- **China** takes national innovation funding to a whole new level. In the past few years, it has created over \$200 billion in venture funds to spur innovation in transformative technologies. A fund targeting transformation of stagnant state-owned enterprises alone was given a budget of \$15 billion, set to rise to \$30 billion in the future. The China Development Bank, which has provided funding for some of China's largest tech companies, is larger than The World Bank and is tracking projects globally valued at nearly \$900 billion.²⁶

Building a Talent Pipeline

Another way that jurisdictions can support enterprises transitioning to digital business models is to foster the talent they need.

Many developed economies must attract talent from abroad to acquire needed skills. For example, the United States' skilled foreign professionals visa (the H-1B visa) program brings 85,000 new employees to the country each year from among more than 200,000 applicants. Over a quarter of new U.S. tech start-ups are founded by immigrants, and more than half of American "unicorn" firms (private companies valued at \$1 billion or more) were founded by one or more immigrants.²⁷ In the United Kingdom, half of open positions in 2016 were filled by EU citizens.²⁸ Clearly, the talent market is global, and those with in-demand skill sets have the option to travel to cities and countries where they can flourish professionally.

Being open to talent from abroad is one strategy. However, due to increased pressure on politicians to bring jobs to their own citizens first, one of the ways to nurture the talent that firms of the future will need is through education reform. It is difficult (perhaps impossible) to know which skills will be needed 10 or 15 years in the future. However, STEM (science, technology, engineering, and math) skills will definitively play a role.

Following are examples of innovative programs geared to building the talent pipeline:

- France set up an ambitious plan for digital-era education, beginning with the 2016 school year. The government pledged 1 billion euros between 2015 and 2018 to incorporate digital technologies for training, equipment, resources, and innovation. In France, the digital education plan also includes teaching pupils programming and coding starting in elementary (primary) school. Teacher training is a core focus of the plan, including training on digital literacy, as well as online training programs and classroom resources. The country also budgeted 30 million euros for continuous education innovation to identify and scientifically evaluate new teaching tools and methods, and to create local-level education incubators across the country to bring those methods into practice.³⁰
- The talent pipeline can extend beyond formal education and the education department. Founded by the mayor of Boston in 2010, MassChallenge awards up to \$2 million annually in equity-free cash prizes to help selected start-ups succeed. Since its founding, MassChallenge has accelerated over 800 start-ups in Boston, which went on to create more than 6000 jobs in the state of Massachusetts.³¹

In the digital era, new products are developed in radically different ways

Promoting 'Disruptor-Friendly' Regulation

In the digital era, new products are developed in radically different ways – through iterative user testing, as well as through feedback loops in which consumer input shapes design before mass-market launch. Regulators need to rethink how they regulate product development in live markets – both during the early experimental (“beta”) phase, as well as for ongoing product updates. This role is vastly different from the traditional one, in which the regulator more or less defined the boundaries of growth for a well-defined industry sector and value chain. Now, a regulator can be equally involved in encouraging experimentation, albeit still within a well-cordoned “sandbox.”

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Start-ups are our resource for net-new job creation. They have the highest multiplier effect in a local economy. They produce a tangible economic benefit – maybe up to as much as a 5x multiplier.

– Kara Shurmatine,
*Senior Director,
Global Partnerships,
MassChallenge*

Key Takeaway

Public assets are low-hanging fruit, but often overlooked for their value in innovation and experimentation. Here, the role of government as a platform comes to the fore.

The financial sector is one area in which regulators have begun to make changes to keep pace with the market and fast-evolving fin-tech disruptors. Larger financial centers are all scrambling to create innovation test beds in a competition to attract fin-tech innovators to their markets. Others are using their financial regulatory powers to level the playing field for traditional banks, which are struggling to keep pace with disruptors.

Here are some prime examples of disruption-friendly regulation in the public sector:

- Singapore and Hong Kong have removed regulations that previously prevented major banks from introducing risky products to the market, allowing them to test those products in live but contained customer sandboxes before a full rollout.³²
- The Isle of Man, long an outpost for offshore accounting, has evolved to a strategy of fostering blockchain innovation, with an important change: it has regulated for only specific kinds of blockchain development to prevent money-laundering and the other unsavory business practices synonymous with Bitcoin, the best-known blockchain. In so doing, it hopes to attract upstanding start-ups that are innovating in the area of blockchain payments. So far, the island has become home to 25 firms specializing in distributed ledger and digital currency technology.³³

Using Public Assets to Drive Innovation

Public assets are low-hanging fruit, but are often overlooked for their value in innovation and experimentation. Here, the role of government as a platform comes to the fore. One of the characteristics of agile digital innovators is their use of experimentation and trials (such as pilots, alpha and beta versions, and rapid prototyping) to evolve their product as technology and market needs change. These firms require assets on which to conduct small-scale experimentation before rolling out to larger markets. Naturally, public sector assets are the right test bed for government technology experiments. But many public sector assets are equally valuable for solutions targeting commercial and consumer markets. As such, leveraging one's organizational assets for experimentation and trials is an option for nearly every jurisdiction, big and small, cash-positive or negative, to encourage a digital economic environment.

While "assets" are most typically thought of as physical or infrastructure assets, in the digital era, public sector organizations in fact have three types of assets at their disposal: physical, digital, and data.

Physical assets: Public sector agencies, especially at the local level, own a significant amount of physical infrastructure: municipal buildings, schools, seaports and airports, parks, sidewalks, roads and bridges, water treatment facilities, warehouses, and fleets of vehicles like snowplows and police cars. Many of these assets have low utilization or predictable downtime: think of schools that close during the summer, or roads that are quiet during nighttime hours.

Virtually all of these assets can be offered as innovation test beds – living labs for experimentation. In so doing, public sector organizations can get more from assets they maintain by “loaning” them to firms that can use them to develop and test their products.

One city that has famously marketed its infrastructure to attract innovative businesses is Pittsburgh, Pennsylvania. Still shaking off its association with post-industrial blight, Pittsburgh has made a foray into the digital economy as the testing ground for Uber’s maiden fleet of autonomous taxis. Uber was attracted to Pittsburgh’s *laissez-faire* “greenlight governing” and the robotics expertise at Carnegie Mellon, a local university. (Pittsburgh’s diverse terrain and wide-ranging roadway and weather conditions were also perks.) The city first leased a large tract of unused land for testing, then worked with Uber to prepare for live road testing.³⁴ “It’s not our role to throw up regulations or limit companies like Uber,” Mayor Bill Peduto told *The New York Times*. “You can either put up red tape or roll out the red carpet. If you want to be a 21st-century laboratory for technology, you roll out the carpet.”³⁵ While the Pittsburgh-Uber relationship has had its challenges recently³⁶, this initiative effectively illustrates how cities can leverage physical assets to deliver new value to citizens.

Digital Assets: One of the most important sources of value to the public sector in the future will be its digital infrastructure, such as fiber-optic cable and servers. It is easy to overlook the value (and potential value) of digital infrastructure because it is not as visible as physical assets like buildings and bridges. However, digital infrastructure is equally important in wooing digitally savvy private sector innovators.

It is easy to overlook the value (and potential value) of digital infrastructure because it is not as visible as physical assets like buildings and bridges.

- Chattanooga, Tennessee, knew that digital assets were the answer even before it knew the question. In 2015, this midsized American city, with an aging, industrial-age downtown, decided to switch its energy grid to a fiber-optic backbone, bringing one of the fastest internet speeds in the world to every home and business in the electric utility’s 600-square-mile service area. Because the city’s grid was a public utility, Chattanooga tapped into federal stimulus funding and city bonds to build the network, hoping that “the Gig,” as it’s called, would attract businesses that required high-speed internet. While the city does not yet have data on the success of the Gig in revitalizing the city center, the momentum is already driving further efforts and investment to create a modern and attractive downtown for businesses.³⁷

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You can either put up red tape or roll out the red carpet. If you want to be a 21st-century laboratory for technology, you roll out the carpet.

– Bill Peduto,
Mayor, Pittsburgh

“

The benefit of open data is that it increases the number of actors who can analyze the information. That increases the opportunities for better decision-making around data in ways that weren't possible before.

– Daniel Castro,
Director,
Center for Data Innovation

Data Assets: The terabytes of data generated and maintained by the public sector have real, tangible value for businesses. Consulting firm McKinsey & Company estimated that the global economic potential of government open data exceeds \$3 trillion in net-new value – equivalent to the fifth-largest GDP in the world.³⁸ Although many national governments have expressed concerns about making data available to the population at large due to concerns about information security or fear of exposure to scrutiny or criticism, the reality is that the benefits greatly outweigh the risks. Only through data transparency can the public sector capture the latent talent of its citizens and businesses, who collectively have the skills and motivation to create value with the data.

- Copenhagen, Denmark's City Data Exchange is a platform for sharing and selling public and private data among the city, private firms, academia, and individuals. By creating a single platform for data sets relevant to the city's goal of improving sustainability and quality of life, it has a secondary effect of offering an attractive meeting place for buyers and sellers of city data who previously may not have found one another.³⁹
- The Open Data 500 was compiled by the New York University GovLab initiative to demonstrate the impact of public sector data on business value. It lists close to 500 private sector firms using openly available U.S. data sets for business value (i.e., for product development and in products). Among them are data-driven companies like GitHub, Redfin, Socrata, and Wolfram Research, along with major industry brands like Bloomberg, Boston Consulting, Gallup, Rand McNally, State Farm Insurance, TransUnion, and Vanguard. Since the original U.S. Open Data 500, GovLab has also begun compiling parallel lists of companies in Australia, Canada, Italy, Korea, and Mexico.⁴⁰

Conclusion

As in the private sector, digital disruption poses both a threat and an opportunity for the public sector. To harness digital disruption for good in their organizations and for those they serve, governments must change their approach to transformation.

This starts with recognizing the characteristics of digital disruption and digital disruptors. Digital disruption is the combined effect of digital technologies and digital business models on markets – illustrated as a chaotic, fast-moving Vortex in which objects speed toward a digital center where digitization and disruption are most intense. Digital disruptors focus on their customers – not their competitors – through digital business models that deliver cost value, experience value, and platform value.

Digital disruptors do not confine themselves to specific industries; instead, they follow growth opportunities wherever they might appear – including public sector services. By the same token, many digital

disruptors now serve public sector agencies and jurisdictions with innovative approaches that improve operational efficiency and the constituent experience. Savvy public sector organizations will recognize the potential of partnering with disruptors that can help them develop the organizational agility required to engage them at the point of need. Digital business agility – composed of hyperawareness, informed decision-making, and fast execution – is a meta-capability that replaces traditional skills and competencies in determining an organization’s fitness for the digital era.

The public sector has a unique and powerful opportunity as a platform to influence the shape and speed of the Digital Vortex by creating a strong, competitive environment for constituent businesses through investment, talent development, regulation, and access to public assets. For their own viability as well as that of constituents, public sector organizations must take the lead to turn digital disruption into a force for good.

Key Takeaway

For their own viability as well as that of constituents, public sector organizations must take the lead to turn digital disruption into a force for good.

Endnotes

1. "Hospitals Are Learning How to Share and It's Saving Them Millions," *Fortune*, Dec. 16, 2014, <http://fortune.com/2014/12/16/hospitals-are-learning-how-to-share-and-its-saving-them-millions/>
2. "Taxi Medallions Reach Their Lowest Value of the 21st Century," *New York Post*, April 5, 2017, <http://nypost.com/2017/04/05/taxi-medallions-reach-lowest-value-of-21st-century/>
3. Source: <https://www.khanacademy.org/about>
4. "India's ID System is Reshaping Ties Between State and Citizens," *The Economist*, April 1, 2017, <http://www.economist.com/news/asia/21720609-long-they-have-mobile-signal-indias-id-system-reshaping-ties-between-state-and-citizens>
5. "Aadhaar Addenda," Vital Wave Philanthropy Edition, May 3, 2017
6. "Digital Vortex: How Disruption Is Redefining Industries," Global Center for Digital Business Transformation, June 2015, <http://www.imd.org/globalassets/dbt/docs/digital-vortex>
7. "You Break It, You Own It," Thomas L. Friedman, *The New York Times*, June 29, 2016, https://www.nytimes.com/2016/06/29/opinion/you-break-it-you-own-it.html?_r=0
8. Alexander Osterwalder and Yves Pigneur, *Business Model Generation*, 2010, p. 14
9. Note: customer value is not synonymous with consumer value. Disruptors use cost value, experience value, and platform value to create compelling offerings for businesses as well as for consumers. In fact, many preeminent disruptors have significant B2B revenues. Google's primary business is B2B, collecting one-third of digital ad revenue globally (\$67 billion); Apple's enterprise business hit \$25 billion in 2015. There are also numerous disruptors that are targeting specific B2B industries, such as logistics, manufacturing, and energy. See Kris Carlon, "Google Makes One-Third of All Global Online Ad Revenue, but There's Trouble Ahead," *Android Authority*, March 18, 2016, androidauthority.com/google-makes-one-third-global-online-ad-revenue-680883/ and Daisuke Wakabayashi, "Apple's Business-Related Revenue Hits \$25 Billion" *The Wall Street Journal*, September 29, 2015, wsj.com/articles/apples-business-related-revenue-hits-25-billion-1443548280
10. "Elon Musk's Grand Plan to Power the World with Batteries," Alex Davies, *Wired*, May 1, 2015, <http://www.wired.com/2015/05/tesla-batteries>
11. "ATO Sees Data Opportunity in Consolidated ABR Platform," *ZDNet*, August 3, 2016, <http://www.zdnet.com/article/ato-sees-data-opportunity-in-consolidated-abr-platform/>; "Australia Now Has a National Standard for E-Invoicing," *iTnews*, August 1, 2016, <https://www.itnews.com.au/news/australia-now-has-a-national-standard-for-e-invoicing-431943>
12. "How a Start-up in the White House Is Changing Business as Usual," TED, February 2016, https://www.ted.com/talks/haley_van_dyck_how_a_start_up_in_the_white_house_is_changing_business_as_usual
13. Source: telephone interview conducted on Nov. 14, 2016 with Adam (Jay) Harrison and Justin Dunicliff of MD5.
14. "M-PESA Case Study," *Managing Innovation*, <http://johnbessant.net/resources/case-studies/m-pesa-case-study/>
15. "Study: Mobile-Money Services Lift Kenyans Out of Poverty," *MIT News*, Dec. 8, 2016, <http://news.mit.edu/2016/mobile-money-kenyans-out-poverty-1208>

16. Source: "Digital Business Transformation in Silicon Savannah: How M-PESA Changed Safaricom (Kenya)," Tawfik Jelassi and Stephanie Ludwig, IMD case study, December 2016
17. Recorded Future is a digital disruptor that has raised nearly \$30 million from investors, including Google Ventures and In-Q-Tel, the venture arm of the U.S. Central Intelligence Agency. The company has built a platform that constantly mines online public data to identify potential cybersecurity attacks. Sources of data include news, blogs, company filings, social media, and even conversations between hackers on "underground" forums. Recorded Future applies sophisticated analytics including natural language processing (NLP) and machine learning to this data to isolate signals that may indicate potential security threats. The firm's clients, which include some of the world's largest companies, can append these alerts with security data collected from their own systems (e.g., firewalls) so they can take proactive steps to prevent future attacks. In the case of Recorded Future, hyperawareness plays an important role not just in sensing and understanding competitive change, but in detecting physical or financial danger. (Sources: "Diving Deeper into Cybersecurity, Recorded Future Reels in \$12M," Gregory T. Huang, Xconomy, April 16, 2015, xconomy.com/boston/2015/04/16/diving-deeper-into-cybersecurity-recorded-future-reels-in-12m/#; *Digital Vortex: How Today's Market Leaders Can Beat Disruptive Competitors at Their Own Game*, Global Center for Digital Business Transformation, 2016.
18. Machines Are Learning to Find Concealed Weapons in X-ray Scans," *The Economist*, Dec. 3, 2016, <http://www.economist.com/news/science-and-technology/21711016-artificial-intelligence-moves-security-scanning-machines-are-learning-find>
19. "The Power of Learning," *The Economist*, Aug. 18, 2016, <http://www.economist.com/news/leaders/21705318-clever-computers-could-transform-government-power-learning>
20. "Thinking Outside the Black Box," Ekistic Ventures, Sept. 30, 2016, <https://medium.com/ekistic-ventures/thinking-outside-the-black-box-e24c9ff6e48b>
21. Logged On: Smart Government Solutions from South Asia, World Bank Group, 2015, <https://openknowledge.worldbank.org/handle/10986/20487>
22. Source: telephone interview conducted on Nov. 11, 2016 with Sidney Olinyk, co-founder of Dūcō.
23. Source: telephone interview conducted on Nov. 18, 2016 with David Riker and Jack Weiss, co-founders of BlueLine Grid.
24. "Technology Key to Preventing Corruption, Says Legal Expert," *The Jakarta Post*, Sept. 2, 2016, <http://www.thejakartapost.com/news/2016/09/02/technology-key-to-preventing-corruption-says-legal-expert.html>; "Citizens Going Online to Fight Corruption," *The Jakarta Post*, Sept. 11, 2016, <http://www.thejakartapost.com/news/2016/09/11/citizens-going-online-to-fight-corruption.html>; "Inside Lapor, Indonesia's Complaints Unit," GovInsider, Nov. 5, 2015, <https://govinsider.asia/innovation/inside-lapor-indonesias-complaints-unit/>
25. "Governor Cuomo Announces 39 More Companies Join START-UP NY and Commit to 817 New Jobs," New York State START-UP NY website, October 28, 2016, <https://startup.ny.gov/news>
26. "China's New State-Backed Venture Capital Fund to Boost Innovation," Global Risk Insights, <http://globalriskinsights.com/2016/09/innovation-chinas-state-backed-venture-capital-fund/>

27. "One Belt, One Road, One Giant Opportunity," *The Australian*, <http://www.theaustralian.com.au/business/opinion/one-belt-one-road-one-giant-opportunity/news-story/c965b51be2c65329bb9968f94514a1b3>
28. "High-Skilled Visa Applications Hit Record High – Again," CNN Tech, April 12, 2016, <http://money.cnn.com/2016/04/12/technology/h1b-cap-visa-fy-2017/>
29. "Execs from Facebook, Google, and Microsoft Explain Why They Use Israel for Their R&D," *Business Insider*, Oct. 6, 2016, <http://www.businessinsider.com/facebook-google-microsoft-israel-rd-2016-10>
30. "The French Digital Plan for Education," Ministère de l'Education Nationale, http://cache.media.education.gouv.fr/file/01__janvier/88/1/The_French_Digital_Plan_For_Education_527881.pdf
31. Source: MassChallenge, <http://boston.masschallenge.org/>
32. *Financial Times*, <https://www.ft.com/content/38a662ee-740f-11e6-bf48-b372cdb1043a>
33. "Bitcoin: How the Isle of Man Is Leading a Cryptocurrency Revolution," *Independent*, Jan. 3, 2016, <http://www.independent.co.uk/news/uk/home-news/bitcoin-how-the-isle-of-man-is-sparking-a-cryptocurrency-revolution-a6794756.html>; "Greetings from Bitcoin Island," Bloomberg, Sept. 7, 2015, <https://www.bloomberg.com/news/features/2015-09-07/isle-of-man-tax-haven-with-tailless-cats-becomes-bitcoin-hub>
34. While the 300,000 residents of Pittsburgh are technically not "assets" the city owns, in many cases, the ability to test a product in a small, defined market is important to digital product development. Other jurisdictions, such as Israel, consider their population an important factor in their attractiveness as a test market.
35. "No Driver? Bring It On. How Pittsburgh Became Uber's Testing Ground," *The New York Times*, Sept. 10, 2016, <https://www.nytimes.com/2016/09/11/technology/no-driver-bring-it-on-how-pittsburgh-became-ubers-testing-ground.html?>; "What It's Like to Ride in a (Nearly) Self-Driving Uber," NPR, Sept. 14, 2016, <http://www.npr.org/sections/alltechconsidered/2016/09/14/493823483/self-driving-cars-take-to-the-streets-of-pittsburgh-courtesy-of-uber>
36. "Pittsburgh Welcomed Uber's Driverless Car Experiment. Not Anymore," *The New York Times*, May 21, 2017, https://www.nytimes.com/2017/05/21/technology/pittsburgh-ubers-driverless-car-experiment.html?_r=0
37. "Innovation Districts: the Chattanooga Story," National League of Cities, [http://www.nlc.org/sites/default/files/2016-12/Innovation Districts Report.pdf](http://www.nlc.org/sites/default/files/2016-12/Innovation%20Districts%20Report.pdf)
38. "How Government Can Unlock Economic Benefits from Open Data," *Government Technology*, Dec. 16, 2014, <http://www.govtech.com/data/How-Government-Can-Unlock-Economic-Benefits-from-Open-Data-Part-I.html>; "List of Countries by GDP (Nominal)," Wikipedia, [https://en.wikipedia.org/wiki/List_of_countries_by_GDP_\(nominal\)](https://en.wikipedia.org/wiki/List_of_countries_by_GDP_(nominal))
39. "Taking Cities to the Next Level: The City Data Exchange," Hitachi, <https://www.hitachiinsightgroup.com/en-us/pdf/solution-profile/hitachi-solution-profile-city-data-exchange.pdf>
40. Source: <http://www.opendata500.com/>

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