Economic vitality 2.0

Prosperity and public engagement in a data-driven world

Contents

Executive summary

We are currently witnessing a new wave of technological advancement that promises to radically transform how "value" is co-created within the global economy. The convergence of technologies such as cloud, big data, analytics, mobile and social collaboration—along with the Internet of Things—, is being called "The 4th industrial revolution." This revolution is credited with enabling organizations to be more intelligent, more agile, and better able to scale their operations, optimize supply chains, shift to new business models or even create new industries with unprecedented speed.

Leaders in government, education and healthcare should view the transformative potential of new technologies and changing demographics as catalysts for growth, translating them into economic and societal value to improve our cities, regions and nations in the years to come. To realize this opportunity, public sector leaders must continue to address the ongoing challenges of the digital era, creating secure digital networks, safeguarding the privacy of citizens and organizations, setting appropriate standards and establishing a suitable regulatory environment. At the same time, public sector leaders must reconsider how they respond to the impacts of the economic changes; facilitating trade and commerce, managing natural resources and developing the workforce skills needed to enable organizations of all sizes to create new value.

In this new era of the 4th industrial revolution, marked by exponentially increasing sources of data and information, ubiquitous digitization, and new expectations for citizen engagement and personalized services, public sector organizations must challenge and change their traditional organizational mindset. The new economic equation favors transparency and collaboration enabled by growing volumes of available data and a population that is increasingly seeking to shape the services they receive. Government, education and healthcare leaders must embrace opportunities for collaboration with ecosystem partners who can expand the resources, skills and expertise necessary to succeed in the data-driven global economy.

The data-driven economy

In an increasingly competitive global economy, global forces are affecting changes in the supply of and demand for goods and services with very real, very visible impacts on local economies. The adoption of technologies such as social collaboration, mobile applications, analytics, cloud computing, 3D printing, nanotechnology and intelligent robots, is rapidly shifting the competitive landscape in almost every industry.

These changes constitute a dramatic shift towards a new industrial revolution, sometimes referred to as the "4th industrial revolution," which is transforming the way services are delivered and products are manufactured; in fact, they are changing the very nature of "value creation" within economies.

Value creation[1]

- Value creation refers to the act of bringing something of value into existence.
- Participants can create value through innovating products, services, or experiences.
- Ecosystem partners must collaborate to create and deliver something of mutually beneficial value.

Enabled by interconnected devices and the seamless flow of data, the mashup of these emerging and disruptive technologies is creating business and social environments that are connected and open, simple and intelligent, fast and scalable, innovative and reimagined. The results are improved operational efficiencies, optimized supply chains, new business models and the transformation of entire industries. As demonstrated throughout this paper, the results are not limited to industrial firms or even the private sector; innovative leaders in education, healthcare and governments at all levels are seizing the tools of this new industrial revolution to build their "brands," creating an atmosphere of innovation and optimism essential to sustainable economic growth.

Connected and open

Indicated by the proliferation of mobile devices and Internet access, connected and open environments necessitate new levels of trust and accountability with partners and consumers.[2]   Alibaba, the Chinese e-commerce company that provides sales via web portals, is defining "digital dominance" in Asia and around the world. In November 2012, Alibaba turned a retail event of dubious origins into an e-commerce phenomenon. The event—celebrated as Singles Day—set online sales records with $3 billion in one-day; in 2013 Singles Day sales topped $5.7 billion; and in 2014, Alibaba recorded $9.3 billion in sales, with nearly 43 percent of those sales transacted on mobile devices.[3] In March 2013, the group's websites accounted for over 60 percent of the parcels delivered in China and in September 2014, 80 percent of the nation's online sales. Alipay, the company's online payment escrow service, accounts for roughly half of all online payment transactions within China.

Capitalizing on its digital dominance, Alibaba is rapidly leveraging its connectedness and capacity to manage vast quantities of data to expand beyond its original retail industry into the IT industry as a provider of data-centric cloud computing services. Alibaba is also into the the automotive industry, partnering with SAIC Motor Corp. to develop Internet-connected vehicles.[4]

Simple and intelligent

As advances in technology continue to reduce and mask complexity, organizations are leveraging analytics and cognitive computing to facilitate decision making and support discovery and innovation. There are ample opportunities for public sector organizations to leverage technology for optimizing their supply chains, enhancing procurement processes and improving outcomes. In Zambia, for example, a government agency supply chain management system gathers, processes and analyzes drug information from procurement to prescription across 2,190 health facilities. Using mobile phones with bar code scanners, the system ingests inventory and transaction data as drugs move along the supply chain. The data act as input for unique algorithms that not only determine the monthly stock reorder quantity for each drug and health center, but also predict drug demands, helping to improve citizen access to 200 lifesaving medicines.

Agile and scalable

As transactions increase in number and frequency and the cost of collaboration continues to decline, organizations are finding new ways to collaborate, generate new insights, and improve efficiencies.

For example, the United Nations Children's Fund (UNICEF) Uganda launched U-Report, a grassroots information system to survey youth about important issues affecting their lives. The popular service analyzes the content of hundreds of thousands of text messages to identify trending and important issues to improve development and relief efforts.

Similarly, Xiaomi, one of the world's leading smartphone producers, has a sales strategy that is very different from other smartphone makers, relying exclusively on online selling, using social networking to advertise its products. Using social media to help predict demand, and "flash sales" for limited periods to mobilize slow-moving inventory, the company maintains tight control over its stock and is able to place cheaper batch orders in response to increases in demand.

Innovative and re-imagined

In addition to the improvements in efficiencies, supply chains and business models, the 4th industrial revolution is enabling large-scale transformation of entire industries.

Financial services

What began as an international development initiative to address the perils of communities living without access to banks and financial institutions, has evolved into mobile banking and is transforming the way financial services are delivered to customers around the world. M-Pesa, a mobile phone-based money transfer and micro-financing service, was launched in 2007 and allows users with a national ID card or passport to deposit, withdraw, and transfer money easily with a mobile device. Customers can deposit and withdraw money from a network of agents that includes airtime resellers and retail outlets acting as banking agents. Using affordable mobile devices and the real-time transaction data between individuals and institution, M-Pesa bridges physical gaps in the financial infrastructure, giving millions access to the formal financial system and helping to reduce crime in otherwise largely cash-based societies.

Transportation

The transportation of people and goods is also expected to continue its dramatic transformation as smart vehicles capable of communicating with each other and the wider transport network evolve into completely autonomous vehicles. Furthermore, with real-time monitoring of car fleets, car sharing is expected to become a far more prevalent model in urban environments. Coupled with more real-time information on public transport designed to improve the service experience, experts predict a significant shift in the perceived value of different modes of transport, with shared and collective transport modes gaining preference over private vehicle ownership.[5]

Leading cities and regions around the world are already leveraging big data and mobile technologies to support a shift towards greater use of public transport and away from dependence on personal vehicles. Singapore's seamless National Transport Fare System supports just such a shift and exemplifies public sector innovation that combines a user-friendly interface and streamlined processes with data collection and analytics tools. Riders now use a single card of their choice to pay for all modes of travel while the transport authority gleans insights from the 20 million trip-related transactions generated each day, translating these into more convenient and affordable travel experiences.

Natural resources

The management of key natural resources, such as water and energy, can be dramatically improved by the new technologies facilitating the collection and analysis of new sources of data. For example, a large municipal parks system in North America monitors water use by collecting hourly consumption data from smart water meters. When the system detects a consumption spike or irregularity, it issues an alert so that operators investigate causes and dispatch repair crews quickly. By adopting this smarter data-driven approach to water management, this municipal parks system has reduced their annual water budget by 20 percent and reduced lag times for locating leaks by 95 percent.

In agriculture, the collection of real-time data on weather, soil and air quality, crop maturity, and equipment and labor costs are being combined with predictive analytics and used to make smarter decisions. Known as "precision agriculture," the collection and processing of data in real time helps farmers make the best decisions with regard to planting, fertilizing and harvesting crops. While precision agriculture is primarily used today by large agribusinesses, smaller farms and co-ops are exploring the use of mobile devices and crowd sourcing to optimize their own agriculture.

Evident in the changes visible across nearly every sector of the global economy, people and organizations eager to collect and share data, apply analytics and take rapid, insightful action, are using interconnected devices to drive a new industrial revolution—including the "industries" of government, healthcare and education. Using data to blend cyber systems with physical systems, the 4th industrial revolution will increasingly see both private and public sector organizations optimizing supply chains, launching new business models and creating new value in the form of hybrid product, and service offerings increasingly customized to an individual customer or citizen's specific needs, abilities and preferences.

Changing demographics and the Millennial opportunity

While production, retail and other commercial industries are being dramatically transformed by the emergence of the 4th industrial revolution, our societies and economies are also being altered as a result of demographic changes ushering in significant demand-side disruption. While much attention has focused on the 'aging' of societies and its implications for our economies in general, and the public sector, an equally, or possibly more important shift, is the emergence of the 'Millenials' as a dominant force of consumers, employees, and active citizens.

In the US, the millennial generation—born between 1980-2000—is set to be the largest cohort in the nation's history.[6] As this generation comes of age, they will have a marked impact on the economy and wider society. Growing up as "digital natives" during a period of considerable technological and geo-political change, Millennials have priorities and expectations that are very different from previous generations. They are the first generation of digital natives, and have different views on what constitutes fulfilling and enriching lifestyles and careers. Hence, Millennials constitute a new, more demanding and challenging demographic that will be more informed and discerning.

Meeting the expectations and needs of this emerging group of empowered consumers and citizens will challenge the type of services required and the manner in which they are marketed, sold and delivered. For example, Millenials are less focused on ownership and more interested in access to services. This will enhance the shift, for example, in transport, towards greater emphasis on shared assets and resources, potentially leading to a 'sharing economy' for transport services rather than the purchase of owned vehicles.

Moreover, with Millenials being far more rapid adopters and greater users of digital technologies in the way they consume, work and live, there is likely to be an accelerated transformation of companies and public service providers as they respond to the Millennial generation becoming the dominant group of consumers, employees and citizens.

More importantly, Millennials are not expected to be "passive recipients" of services, regardless of whether those services are provided by public or private organizations. Instead, Millennials will increasingly seek to be "active participants," shaping the type of services they receive. This is linked to a desire for more tailored and customized products and services, which are addressing the individual's particular needs and desires. Moreover, as active participants, they will seek to combine service offerings from different organizations, highlighting the need for greater collaboration between relevant stakeholders and breaking down traditional institutional silos.

Paradigm shifts for the public sector

Harnessing the power of data has the potential to transform whole sectors of our global, national and local economies. This enables leaders in the public sector to rethink the business of government, education and healthcare and their strategic approach to helping communities achieve a high quality of life.

To enable this transition towards a new data-driven economy, the public sector has a critical role to play. While the value creation potential of the 4th industrial revolution and associated technologies is tremendous, there are fundamental requirements which must be addressed and for which there are no partial solutions, in particular security and privacy.

Key consideration: security

While regulatory frameworks are fundamental to protecting sensitive information of all types, frameworks alone are not sufficient to address both privacy and security risks at the enterprise level. Government, education and healthcare organizations must move beyond traditional security approaches to adopt intelligence to automatically monitor, analyze and prioritize their risk landscape and address anomalies in real time. Unlike traditional security approaches, security intelligence combines advanced threat analysis and continuous monitoring to proactively highlight risks and help identify, track and address threats throughout the organization.

74% of Europeans think that disclosing personal data is increasingly part of modern life	**Companies that breach protection rules should be***
78% of US citizens think that companies collecting personal information online are invading consumers' privacy	**51%** fined
72% of Internet users are worried about giving away too much personal data	**40%** banned from using each data in the future
88% of Europeans believe that their data would be better protected in large companies that are obliged to name a data protection officer	**39%** compelled to compensate the victims

Sources: USC Domslife/Los Angeles Times 2012; European Commission 2011.
* These data are taken from the Special Eurobarometer poll published in 2011. Respondents were asked to select 4 out of 12 possible responses to the question of what should happen to companies that breach protection rules. We present the top 3 responses here.

Figure 1: Consumers' privacy protection concerns.

Equally as fundamental to this paradigm shift is the ability of leaders at all levels in the public sector to rethink their own roles and the manner in which their institutions deliver on their mandates. Rather than viewing the data-driven economy merely as a challenge, public sector leaders must move quickly to embrace new opportunities for improving the delivery of services, optimizing infrastructure and enhancing the quality of life for citizens. This will require a willingness to explore new ways of operating and adopting innovative solutions. However, the rewards are significant, with many examples emerging of the transformative potential that the technologies have for bringing value to individual public sector organizations and wider society. Evidence ranging from research studies to case studies to articles in the popular press suggests that this is indeed beginning to occur. Leaders are leveraging the new technologies associated with this new era to alter their approach to service delivery and contribute to economic vitality.

Indeed, it is increasingly recognized that the public sector can act as a key accelerator for a shift towards a digital data-driven economy by leading by example. For example, many governments are reviewing their procurement policies in order to align these with their innovation and digital agenda. As such, the public sector can spur demand for innovative solutions by deliberately procuring these before a mature commercial market has been established. A concrete example of this is the HAPPI project (Healthy Ageing — Public Procurement of Innovations). This program works to establish long-term collaboration between healthcare purchasing organizations across Europe to identify "ageing well" and innovative health products, services and solutions, and put in place procurement contracts for the benefit of healthcare organizations. This supports the work of the healthcare organizations and improves the services they can provide, but also stimulates demand for innovative healthcare solutions within Europe.

Key consideration: citizen-centric services

Projects designed to innovate service delivery and user interactions for public sector organizations must be coupled with data capture and analytic tools. It is no longer feasible to separate an organization's "front office" system from its "back office" system. Every front office interaction with a constituent — whether that's a patient, a student or the citizen-customer — can generate data needed to serve the public more effectively, enabling citizen-centric services.
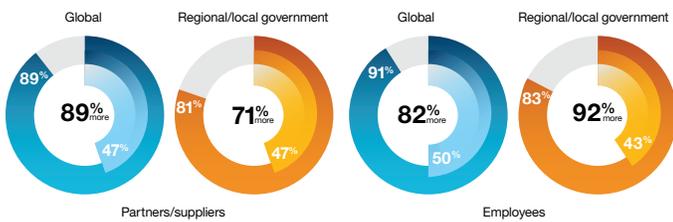
Figure 2: Government CxOs plan to collaborate much more extensively with partner/suppliers and employees within the next 3-5 years.

Source: IBM C-Suite Study, 2013.

Foremost in many policy conversations today is the need to ensure that the growth potential associated with the next industrial revolution does not exacerbate social exclusion, but rather acts as a catalyst for further inclusion and opportunities for all. The public sector must ensure that the required digital and physical infrastructure is accessible to all, and establish appropriate regulatory frameworks and address concerns about privacy. Moreover, governments and the wider public sector must play a key role in ensuring that all citizens are equipped with the skills required for active participation in a digitally enabled data-driven economy. Since the current economic transition is taking place within a context shaped by persistent problems of long-term unemployment or underemployment in several countries, addressing the skills and employment challenge must remain a key priority.

Around the world, government leaders are beginning to adopt innovative new approaches for helping the long-term unemployed or workers at risk of exclusion from the labor market. For example, in the Netherlands, UWV is an autonomous administrative authority commissioned by the NL Ministry of Social Affairs and Employment to support employment, social medical affairs, benefits and data management. As part of its mission, the UWV created The Work Profiler. This is a digital diagnostic tool that evaluates a job seeker's probability of returning to work within a year as well obstacles for them returning to work. The Work Profiler was developed through a three-stage research process (a literature review, a cross-sectional study and a longitudinal study) in order to identify the best predictive factors for work resumption. The Work Profiler continues to evolve. The evaluation tool recently expanded from 20 to 55 items and a digital questionnaire containing these items will be offered online to all clients at 11 unemployment offices scattered throughout the Netherlands.
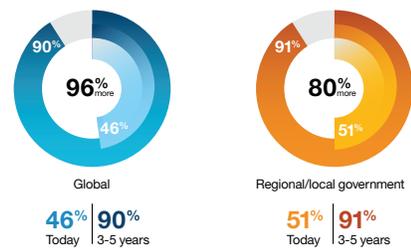

Figure 3: Government CxOs also plan to collaborate much more extensively citizens and residents within the next 3-5 years.

Source: IBM C-Suite Study, 2013.

Similarly, the wider education system is going through a tremendous change, spurred on by growing pressures from key stakeholders and users, and enabled by new technologies and opportunities for improving the learning experiences of students. As was noted in the recent IBM study on Higher Education, there is growing recognition of the need to align education systems with the needs of a more dynamic and data-driven economy. The study revealed that 73 percent of academic leaders believe technology is also disrupting the traditional higher education models. In meeting their objectives, education providers need to engage with other stakeholders in defining learning objectives, shaping curricula and incorporating practical learning experiences into education. This can be through student placements, apprenticeships or engaging company representatives as part of the teaching staff. For example, in Malaysia, the Knowledge Transfer Partnership (KTP) program was introduced to facilitate collaboration between various industries and universities. KTP broadens the industry experience of university faculty members and provides industrial-based training programs to enhance the practical knowledge, business skills, and employability of graduates.

Meanwhile, individual education providers are also adapting their delivery models. Deakin University in Australia has taken the lead as the first university in the world to utilize cognitive computing for enhancing the quality of the student experience. By developing a breakthrough system that will transform the way students receive administrative advice and answers to questions, the solution will help students to find information easily when and where they need it—24/7. By extending the availability of advice to students, Deakin aims to enhance the learning experience offered to students, and improve education outcomes.

The fields of population and community health, along with the delivery of healthcare services, are also being transformed as a result of the new technologies. The growing popularity of personal health monitoring devices, cognitive computing and improved diagnostic capabilities are enabling better, tailored and more pre-emptive health services in the future. For example, a cancer treatment center in the US is leveraging cognitive computing to tap into a centralized patient medical database to build a comprehensive profile for each patient.

"56% of educational service providers believe keeping workforce skills current with rapid advancement of technology is the greatest challenge."

— IBM study on Higher Education, 2015.

It also scours the database, along with previously inaccessible unstructured data and a plethora of medical journals and publications, gathering information to use to answer doctor queries about specific patient variables and cases. After analyzing the data, the cognitive system delivers a list of potential diagnoses and highly personalized treatment options for each patient, and automatically matches cancer patients with the right clinical trials. By comparing groups of patients and their different attributes, clinical care and research teams can identify the patient factors that modulate responses to cancer therapies, plus discover attributes that may account for differences in responses.[7]

The examples above highlight the opportunity of complementing many professions with 'cognitive assistants,' where cognitive computing capabilities are used to mine data and information to support work and decision making. Such cognitive assistants can offer tremendous help across multiple professions, ranging from healthcare and education to legal, finance, media and many more. This will transform the world of work, with improved performance and quality as a result.

Towards partner ecosystems

What characterizes all these examples of transformation within the realm of the public sector, beyond the utilization of new technologies, is recognition of the need to engage a wider ecosystem of stakeholders in the design and delivery of improved and more tailored services to citizens. Accordingly, leaders of government, education and healthcare must embrace the opportunities for collaboration with others in their respective ecosystems to deliver better services for all citizens.

In a business and public sector context, an ecosystem is a complex web of interdependent organizations and relationships aimed at creating and allocating value. There is something mutual and multiplicative about the ecosystems—the whole is greater than the sum of the individual parts. If this was not the case, there would be no incentive to be part of the system. Ecosystems are broad by nature, potentially spanning multiple geographies and industries, including public and private institutions, and consumers.

An ecosystem is...
- a **complex web** of interdependent enterprises and relationships aimed to create and allocate **business value**
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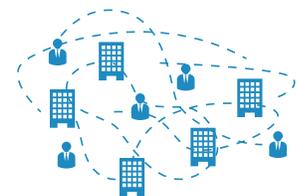

Figure 4: An ecosystem is...

Source: Executive Report, In Pursuit of Relevance, IBM, 2015.

Within the public sector, collaboration in an ecosystem will go beyond the traditional public-private partnership models with their transactional and market driven relationships, and seek a network of partners that act out of mutual shared interest. Those in the new ecosystems, formally or informally, operate together to produce something of greater value for the mutual benefit of the ecosystem as a whole. In addition, ecosystems exist because participants can deliver more value acting together rather than alone. Such ecosystems have already emerged within industries, and are also becoming increasingly prominent for public sector organizations. For example, according to our most recent C-suite study,[8] Government leaders foresee an even greater increase in social and digital interaction than their private sector peers. They recognize that in an era of abundant connectivity and information, and ubiquitous digitization, government organizations must embrace transparency and openness. This means that public sector organizations will be looking to partner with other stakeholders and collaborate with end users as they seek to innovate and improve their service delivery in response to new citizen demands.

However, accepting end users as stakeholders in determining a public sector organization's future has huge cultural and organizational implications. These organizations can't just be citizen-centric. They must be citizen-activated through fully reciprocal relationships with a population that is increasingly seeking to shape the services they receive.

For example, one European city has embarked on a project to collect data in real time from various sectors across their metropolitan region. The aim is to turn the metropolitan area into an urban living laboratory, enabling it to revisit and revamp all aspects of urban management through collaborative innovation. City leaders want to build new relationships with citizens by enabling them to use digital technology to create and submit near-real-time data that will help it improve urban services. The hope is not only that those services will become more efficient, but that the city authorities will become more accountable and open to citizens.[9]

Other examples are emerging of citizens actively improving public services, as public sector organizations open their data to the wider world. In San Francisco, California, a group of students at UC Berkeley developed 'Bay Tripper,' a mobile multi-modal trip planning application, enabling users to get around the city by finding their way through transit and bike routes. The transit planner uses real-time data provided by city transit organizations, which takes into consideration the actual location of buses and delays, and helps users avoid missed transfers.[10]

Principles to create a successful ecosystem

The paradigm shift in the public sector is a journey that organizations of all sizes around the world must undertake in order to improve the well-being for citizens and support economic vitality in the long term. When taking the steps toward the creation of successful ecosystems, public sector leaders must therefore be guided by the following principles.

Re-imagine what's possible

Public sector leaders across the world need to think 'outside the box' in efforts to address the challenges and grasp the opportunities of a data-driven economy. As they do so, they need to seek answers to the following pressing questions:

- Does my organization have the right mandate to support economic growth in a data-driven economy?
- Are we leveraging the complete knowledge and capabilities of our organization? What can we do with what we know?
- Are we prepared to act on what we know? If so, what kind of impact would we have?
- What knowledge, capabilities and insight do we miss to meet our desired mandate? What kinds of organizations can we partner with to fill any gaps?

In answering these questions, public sector leaders have access to various tools and methods that can be used. For example, the city of Philadelphia organized a City Engagement Innovation Summit to explore the role of technology, citizen empowerment, and academia in transforming Philadelphia. Similar consultative approaches to foster new perspectives and engage citizens and stakeholders in defining the future of their communities and public services are used elsewhere in the world. Moreover, public sector organizations must identify the areas where the application of analytics can improve services and performance. As the example of UWV in the Netherlands shows, analytics can be used to improve the way we tackle many of our societies' most pressing challenges, and enable public sector organizations to address problems preemptively rather than reactively.

Create a culture of innovation and experimentation

Fostering new and creative approaches to addressing problems requires an open environment based on mutual trust. An excessive emphasis on short-term targets and individual accountability may hamper the innovative potential of employees and partners across the public sector. Leaders must seek to encourage new thinking and experimentation with alternative approaches,

notwithstanding the potential short-term disruptions this may cause. Aligning incentive structures and people management for a culture of innovation is a critical step in this direction. Accordingly, public sector leaders must answer the following key questions:

- Have we defined our ecosystem?
- How do we engage this wider ecosystem to increase our capacity to promote innovation?
- How can management tools such as accountability mechanisms, budgeting frameworks and performance management systems impact our ability to join forces in the development of innovative solutions to common problems?
- How do we ensure that we have access to the right skills and capabilities to deliver on our mandate?

Looking outside of your own organization and engaging with the wider ecosystem when addressing these questions is critical for success. For example, in Bristol, UK, the Digital+Green City Initiative was set up to improve Bristol's profile at the European level, and address the city's inequalities and social exclusion. It was designed to orchestrate the energies of a range of citywide community, business and public sector actors engaged in, and passionate about, environmental and digital issues and technologies.

The aim was to take the initiative out of council premises and make use of more informal methods to reach a broad range of innovative people. The initiative links businesses, social enterprises, community groups and public services, enabling them to work together to develop actions and projects that promote green and digital innovation.[11]

Move forward boldly, connecting to new networks in new ways

Leveraging the partner ecosystems is a critical factor in determining opportunities to create new value across the economy. As ecosystems continue to evolve, the most successful organizations are likely to be those who evolve with their ecosystems and change their roles appropriately. Key questions to be answered are:

- Who are the stakeholders we need to partner with in order to deliver on our mandate in a data-driven economy?
- How do we engage with our citizens, employees and stakeholders to ensure collaboration across our ecosystems?
- Which types of organizations have not been considered a "partner?" What role do they play in our economy? What role might they play?
- What are the funding options and business models open to us?

In addressing these questions, public sector organizations must adapt their operating model towards a greater emphasis on collaboration and partnership. This effort can be supported by new technology—such as open APIs and cloud computing—which can empower dynamic new business models, user interactions and organizational flexibility.

Moving forward on these points should be a top priority for public sector leaders. With global competition intensifying, and the disruption to global value chains increasing, the time to address the economic vitality challenge for the 21st century is now. 'Opting out' is not an option. Turning the transformative potential of new technologies and changing demographics into economic and societal value should be viewed as a tremendous opportunity for improving our cities, regions and countries in the years to come. To realize this opportunity, public sector organizations must challenge and change their traditional organizational mindset, make the right connections and drive forward to become the standout success story in the data-driven global economy.

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1 Source: Executive Report, The New Age of Ecosystems, IBM, 2015.

2 Mobile penetration
  http://www.itu.int/ITU-D/ict/definitions/regions/index.htm
  http://mobithinking.com/mobile-marketing-tools/
  latest-mobile-stats/a#subscribers

3 http://techcrunch.com/2014/11/10/alibaba-makes-strong-start-to-singles-
  day-shopping-bonanza-with-2b-of-goods-sold-in-first-hour/

4 http://www.forbes.com/sites/ywang/2015/03/12/alibabasaic-motor-to-
  invest-160-million-in-connected-cars/

5 Goldman Sachs, 2014

6 Goldman Sachs, 2014

7 http://www.mdanderson.org/newsroom/news-releases/2013/ibm-watson-
  to-power-moon-shots-.html

8 IBM CxO Study 2013

9 http://www.investincotedazur.com/en/sites/nice-nca/

10 http://www.baytripper.org/

11 http://ec.europa.eu/environment/europeangreencapital/winning-
   cities/2015-bristol/

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