Technology Trends

Digital Services
Version 0.1
Date 2019-11-14

Shared Services Canada
Services partagés Canada
Canada

Table of Contents

Executive Summary

Digital Service(s) and Digital Government do not mean the same thing; however, since both have common themes, government organizations often place them together. As a result, Digital Services and Digital Government may be conflated or mistakenly used interchangeably within a public government organization

There is no agreed upon industry or public definition for Digital Services. However, common Digital Services meanings refer to the electronic delivery of information including data and content across multiple platforms and devices like web or mobile that is entirely automated, or involves very little human intervention. Where the service delivery is controlled by the service's customers and is only utilising the online channel for both customer and back-end business processes. For example, as an application for a mobile phone or tablet computer. Information is presented in a way that is easy to use and understand and typically involves transactional services such as submitting forms for processing and receiving benefits (passport renewals, driver license renewals, immigration forms, parking tickets, hotel room reservations, etc.).

Whereas, Digital Government, sometimes referred to as e-Government, can be defined as "the use of digital technologies, as an integrated part of governments' modernization strategies, to create public value. It relies on digital government ecosystem comprised of government actors, non-governmental organizations, businesses, citizens' associations and individuals which support the production of an access to data, services and content through interaction with government. Additionally, terms such as E-Services and E-Business, are also conflated with digital services. E-Services/E-Business are simply umbrella terms for services on the Internet.

There are three main components of a Digital Service: the Service Provider, the Service Receiver, and the channels of Service Delivery. Concerning a public or government Digital Service/E-Service, the Public Agency is the Service Provider, the citizens and businesses are the Service Receivers, and the Public Agency's application or IT platform is the channel of Service Delivery and the Internet is the primary mechanism for the channel. There is a wide technical categorization of Digital Services that outlines the degree to which a service is actually digital, including: a Non-Digital Service, a Digital Service, a Fully Digitalized Service, a Managed Digital Service, and an Optimized Digitalized Service.

The International Data Corporation (IDC) forecasts that worldwide spending on technologies and services that enable Digital Transformation will reach $1.97 trillion in 2022, per the IDC Worldwide Semiannual Digital Transformation Spending Guide. IDC predicts that digital transformation spending will grow steadily, achieving a five-year CAGR of 16.7 percent between 2017 and 2022.

The nominal gross domestic product (GDP) associated with digital economic activities in Canada totalled $109.7 billion in 2017 or 5.5% of the total economy. While the digital economy is not an industry, to give a scale of its importance, in 2015 it was larger than mining, quarrying and oil and gas extraction (4.8%), transportation and warehousing (4.6%) and utilities (2.4%). In Canada, between 2010 and 2017, nominal GDP for the digital economy (+40.2%) grew more than the total economy (+28%). On an annual basis, the digital economy increased more than the total economy every year except 2011 and 2017, which were years of strong growth in the energy sector. Telecommunications and support services, part of the digital-enabling infrastructure domain, were the largest contributors to the digital economy in Canada. 2010-2017.

However, much of the Digital Services work in the GC is driven by improving the interoperability of the GC IT systems. Interoperable platforms are the backbone of data and information sharing, big data analytics, and collaboration. The interoperability of technologies, data, and applications across different GC agencies, tiers, and jurisdictions has been a key marker toward Digital Government.

The business value impact of Digital Services are: Improved Customer Satisfaction and Relationship; Consolidation and Improvement of Services; and Reduced Organizational Costs.

Some challenges that accompany the transformation from Non-Digital Services to Digital Services include: Complexity and Inflexible Technology, Lack of a Clear Vision for Digital Service and Consumer Journey, Data Management and Data Risk, Privacy Security, Social Disconnect and Organizational Reputation Risk, and Employee Digital Skills, Access to Digital Services

The rapid digitalization of the economy is transforming the ways that Canadians buy, consume, and sell goods and services. Today, it is no longer a question of whether a Service Provider should go digital or not; the question is where and how to start. Service drives value, and for organizations to succeed in a digitized world, Digital Services must do more than maintain the status quo.

A serious consideration should be taken by SSC toward establishing a realistic, unambiguous, and forward-looking position on the development and delivery of Digital Services that takes into account the needs of the business consumers while revisiting and revising vendor software and service vendor agreements to assess their digital levels. The mantra which should be adopted is Build Digital Services, Not Websites.

The top Digital Transformation elements often cited are: Customer Experience; Operational Agility; Culture and Leadership; Workforce Enablement; and Digital Technology Integration.

Success factors in customer experience for the Digital Transformation process, including: Design and Digitize Customer Journeys; Increase Speed and Agility in Insights; Achieve

Customer Adoption of Digital Customer Journeys; and Develop Agility in Delivering Journey Transformations.

Lastly, the TUO is a cornerstone in terms of developing GC-wide Digital Services. As such, there are possible implications related to the Privacy Act for TUO in Canada. SSC should consider assessing its different privacy requirements and restrictions regarding its Digital Services that could affect service delivery.

Business Brief

Digitalization and digital technology has transformed business processes and the delivery of goods and services to consumers. This is a phenomenon known as the Digital Revolution, in which digitization permeates not just the goods and services themselves, but also the business processes and procedures involved in transactional events.[1] Goods refer to tangible consumable products, articles, and commodities offered by a company to customers in exchange for money.[2] Whereas services are intangible economic products that are provided by a company on the consumer's demand; it is an activity carried out for someone else.[3] Digitalization has pushed both goods and services online.

More than ever, consumers are exposed to connected smart products and services that are always on and are constantly connected to the internet. This heightens and constantly changes consumer expectations for every industry regarding the delivery channels of goods and services. As computing power improves, more consumers around the world participate in the digital economy, furthering the growth toward online goods and services. This leads to additional organizational pressures to host more diverse online options, greater speeds of delivery, and ease of application use.

Digital Service(s) and Digital Government do not mean the same thing; however, since both have common themes, government organizations often place them together. As a result, Digital Services and Digital Government may be conflated or mistakenly used interchangeably within a public government organization. Additionally, terms such as E-Services and E-Business, are also conflated with digital services. E-Services/E-Business are simply umbrella terms for services on the Internet.[4]

There is no agreed upon industry or public definition for Digital Services. However, common Digital Services meanings refer to the electronic delivery of information including data and content across multiple platforms and devices like web or mobile that is entirely automated, or involves very little human intervention.[5] Where the service delivery is controlled by the service's customers and is only utilizing the online channel for both customer and back-end business processes.[6] For example, as an application for a mobile phone or tablet computer.[7] Information is presented in a way that is easy to use and understand and typically involves transactional services such as submitting forms for processing and receiving benefits (passport renewals, driver license renewals, immigration forms, parking tickets, hotel room reservations, etc.).[8]

Regardless of definitional confusion, it can be argued that all terms revolving around Digital Services agree about the role of technology in facilitating the delivery channel of services and business processes. It is compelling to adopt the approach for defining Digital Services as "deeds, efforts, or performances whose delivery is mediated by Information Technology".[9]

Whereas, Digital Government, sometimes referred to as e-Government, can be defined as "the use of digital technologies, as an integrated part of governments' modernization strategies, to create public value. It relies on digital government ecosystem comprised of government actors, non-governmental organizations, businesses, citizens' associations and individuals which support the production of an access to data, services and content through interaction with government".[10] Digital Government is an open and service-oriented organization that operates and delivers programs and services to people and businesses in simple, modern and effective ways that are optimized for digital and available anytime, anywhere and from any device which operates digitally as one to benefit all Canadians.[11] For governmental organizations, Digital Government can be achieved by leveraging the power and potential of Digital Services to better interact with and respond to citizens. Digital Services are a part of the execution of a Digital Government Strategy. A Digital Service must be interconnected and rely on information from across government departments.

Technical Brief

There are three main components of a Digital Service: the Service Provider, the Service Receiver, and the channels of Service Delivery. Concerning a public or government Digital Service/E-Service, the Public Agency is the Service Provider, the citizens and businesses are the Service Receivers, and the Public Agency's application or IT platform is the channel of Service Delivery and the Internet is the primary mechanism for the channel.[12]

There is a wide technical categorization of Digital Services that outlines the degree to which a service is actually digital, including: a Non-Digital Service, a Digital Service, a Fully Digitalized Service, a Managed Digital Service, and an Optimized Digitalized Service.[13]

A Non-Digital Service is delivered manually from start to finish without an online channel component. A Digitally-Supported Service is where a certain part of a service is delivered through an online channel and the customer may be required to perform some manual process (e.g. print a form, require a wet signature, make a telephone call, attend an office or service counter). A Digitally-Supported Service may not be considered as a digital service by some organizations.[14]

A Digital Service, from the customers' perspective, the service is delivered fully through the online channel. There are some manual (non-digital) processes involved within the Public Agency "back office" to complete the service.[15]

A Fully Digitalized Service as a service provision is fully digitalised including all back office processes. Note: workflow processing where a work item is processed from an electronic work queue and actioned by a human agent only using digital tools is considered a digitalised process.[16]

A Managed Digitalized Service is where the service provision is fully digitised, and the service is monitored and managed.[17]

Lastly, an Optimised Digitalized Service is where the service provision is fully digitized, and the service is monitored and managed with continual business improvement.[18]

Digital Services are becoming a preferred delivery channel of services for citizens. Countries are increasingly turning to Digital Government initiatives in order to make their government more agile, flexible, and efficient with respect to the services it provides to citizens by adopting Digital Service delivery methods. But Digital Government is more than just providing a digital delivery system. It is about putting the user/citizen at the center of the service design process.

Digital Transformation is the authentic integration of digital technology into all areas of a business, fundamentally changing how an organization operates and delivers value

to customers.[19] A Digital Transformation is the method in which many Public Agencies progress from traditional Non-Digital Services to Digital Services, which can then be built upon toward Managed and Optimized Digital Services.

In the context of Public Agencies and Governments utilizing Digital Services toward achieving Digital Government, true Digital Government can be thought of as consisting of four characteristics:[20]

- Government is easy to work with;
- Government is easy to work in;
- Technologies are evergreen and up-to-date; and
- Government information is digitized and searchable.

Industry Use

The Global Digital Transformation Market is expected to exceed more than US$ 462 billion by 2024 and will grow at a CAGR (Compund Annual Growth Rate) of more than 18.5% in the given forecast period.[21] Both private and public organizations have responded by changing the way in which they conduct business with consumers and clients; moving more of their core services on-line. These organizations are rapidly moving the transactional services and the business processes that support them into the digital environment to leverage the Digital Revolution.

The International Data Corporation (IDC) forecasts that worldwide spending on technologies and services that enable Digital Transformation will reach $1.97 trillion in 2022, per the IDC Worldwide Semiannual Digital Transformation Spending Guide. IDC predicts that digital transformation spending will grow steadily, achieving a five-year CAGR of 16.7 percent between 2017 and 2022.[22]

The nominal gross domestic product (GDP) associated with digital economic activities in Canada totalled $109.7 billion in 2017 or 5.5% of the total economy. While the digital economy is not an industry, to give a scale of its importance, in 2015 it was larger than mining, quarrying and oil and gas extraction (4.8%), transportation and warehousing (4.6%) and utilities (2.4%).[23] In Canada, between 2010 and 2017, nominal GDP for the digital economy (+40.2%) grew more than the total economy (+28%). On an annual basis, the digital economy increased more than the total economy every year except 2011 and 2017, which were years of strong growth in the energy sector. Telecommunications and support services, part of the digital-enabling infrastructure domain, were the largest contributors to the digital economy in Canada. 2010-2017.[24]

Canadians (18 years and older), from July 2017 to June 2018 (12 months), 76% use digital payment methods for their personal spending, and digital purchases.[25] These include: 64% used or purchased video downloads/streaming services, 51% used or purchased music/music streaming services, 33% used or purchased e-books/newspapers/magazines/podcasts, and 31% used or purchased online gaming subscriptions/game downloads. The average amount Canadians spent on digital products in this time was $412, however 26% of Canadians sold new or used products online (Kijiji, eBay, etc.) earning an average of $722.[26]

The most typical delivery model for consumer access to Digital Services is a subscription model where households pay a monthly fee in return for continuous access to a range of services, e.g., broadband, smartphone, cable TV, Subscription Video-on-Demand (or SVoD).[27] The household has been an important locus of the ongoing Digital Revolution and arguably the most visible. Hardware innovation has proceeded rapidly as major household platforms—smartphones, tablets, televisions, and gaming consoles, have become extraordinarily connected and cheap. Communication speeds are essential; for example, nearly one-third of all IP traffic was accounted for by Netflix alone in

2016.[28] All this highly visible innovation has raised the question of whether existing Public Agency accounts are missing consequential growth in output and income associated with the rapid uptake of home use of IT devices and platforms.[29]

There are a number of countries taking a leadership role in the digital delivery of government services. The United Kingdom (UK) is considered a leader in Digital Government. The Government Digital Service (GDS) is the UK's center for all things digital. The GDS assists departments with transformation through the utilization of digital technology and data in a collaborative manner. Furthermore, GDS and the UK Digital Service Standards, helps departments develop platforms, standards, and digital services.[30]

In the UK, Tell Us Once (TUO) is a service that lets an individual report a death to most government organisations in one action.[31] Public administrations ensure that citizens and businesses supply the same information only once, who then take action, if permitted, to internally re-use this data, in due respect of data protection rules. The goal is to reuse data so no extra input is required by citizens and/or businesses.[32]

Estonia introduced TUO in 2007, mandating that the state is not allowed to ask citizens for the same information twice.[33] Instead, they must acquire it from their colleagues across government, if necessary, requesting permission to do this from the citizen. This ensures that citizens and businesses supply certain standard information only once, because public administration offices take action to internally share this data, no additional burden falls on citizens and businesses.

Estonia is often seen as the trend setter in digital government. Their X-Road digital infrastructure, which supports Estonia's digital service delivery, allows for seamless information transfers from one departmental database to the other. In Estonia, about 99% of government services are provided through Digital Service delivery channels with over 500 million queries a year.[34]

Other examples of governments adapting to this technological change include:

- United States – elevating a Chief Information Officer (CIO) role that reports to deparment heads, utilizing a technology council to advise the President on IT information and service transformation, and the use of incubator funds to drive internal transformation.
- Mexico – establishment of the Office for Coordination of the National Digital Strategy.
- Australia – establishment of a Digital Transformation Agency that reports to the Prime Minister and Cabinet to improve digital services.
- New Zealand – deployment of a Chief Digital Officer and Digital Partnership Coordinating Secretariat, as well as a Chief Data Steward to support the use of data throughout the government.[35]

In the US, the federal government created the US Digital Services agency to transform how the federal government interacts with the American people. The group is composed of a small team of technology experts that is taking best practices from the private sector and applying them to the federal government.[36]

Canadian Government Use

In the context of the Government of Canada (GC), the provision of Digital Services must be simple to use and trustworthy, where the GC's Digital Standards form the foundation of Digital Services and shifts the GC toward becoming more agile, open, and user-focused.[37] The GC is moving toward Digital Services through a digital-first and digitally enabled government vision that ensures Digital Services are available anytime, anywhere, through any service window. This does not mean "digital only," but it does mean that Digital Service delivery cannot be an afterthought and importantly, in-person, and telephone interactions must be digitally enabled to deliver excellence in service.[38]

The GC's Digital Operations Strategic Plan (DOSP) forms the planning cornerstone toward digitalizing the GC. It is the third iteration in the GC's strategic planning process to manage technology and technological change. It supports the progress to Digital Service delivery and Digital Government as it builds on and expands on the GC's Strategic Plan for Information Management and Information Technology 2017 to 2021 (2017 to 2021 GC IM-IT Strategic Plan), which itself built on and expanded on the GC Information Technology Strategic Plan 2016-2020.[39] Departments and Agencies, Chief Information Officers (CIOs), and officials are to consider it as direction from the CIO of Canada. A detailed list of Strategic Action items, departmental accountabilities, and related direction for GC Digital Services is included as an Appendix in the DOSP.

Additionally, the Digital Transformation Office (DTO) is part of the Treasury Board of Canada Secretariat's (TBS) Strategic Communications and Ministerial Affairs sector. The DTO are communications professionals with expertise in content and interaction design, user research and plain language writing. The DTO ensures that the Canada.ca brand is recognized and trusted by Canadians, makes information and services that are in demand and published on digital channels easier to find and understood based on insight from user research, and help communications teams develop their skills and processes as they make a sustainable shift to digital in their organization.[40]

Also, the Canadian Digital Service (CDS), housed at TBS and created in 2017, is an organization that partners with GC departments and agencies to design and build simple and reliable technology. The CDS is focused first and foremost on delivery: building simple, easy to use services directly with GC departments to design, prototype, and build better digital services.[41]

However, much of the Digital Services work in the GC is driven by improving the interoperability of the GC IT systems. Interoperable platforms are the backbone of data and information sharing, big data analytics, and collaboration. The interoperability of technologies, data, and applications across different GC agencies, tiers, and jurisdictions has been a key marker toward Digital Government. The aim of Digital Government, or any such program, is to achieve seamless integration between

processes and applications, to make the structure of government invisible (or irrelevant) to service delivery, and to set the basis for agile, and truly transformational government.

To help build interoperability and thus Digital Services in the GC, Shared Services Canada (SSC) is supporting the Canadian Digital Exchange Program (CDXP), previously known as GC Interoperability Platform (GCIP), led by the Treasury Board Secretariat of Canada (TBS). The CDXP is a platform to enable GC departments to share their data with each other and the outside world in a modern, secure, and unified way which aims to enhance interoperability for online infrastructure and enable departments to seamlessly share and consume data and information. This platform acts as an information broker, enabling the exchange of data and information between enterprise systems, departments and governments.[42]

In parallel, the Canada Revenue Agency (CRA), and Employment and Social Development Canada (ESDC) established a Direct Deposit Sharing Initiative, the first step in a "Tell Us Once" approach when providing banking information to the GC in November 2017.[43]

The GC is also building on Digital Services through the standardization of the GC's Web presence, which is highly complex. Each department's Web presence offers a wide variety of content to support informational and transactional services for individuals and businesses. Web pages are delivered through various devices and technologies that are constantly evolving. The TBS Standard on Web Usability mandates a basic structure for the design and layout of GC Web pages.[44] This structure makes it easier to find and use information and services on GC websites, thus improving Digital Service. Lastly, the TBS is set to release the Policy on Service and Digital and a Directive on Service and Digital which focuses on the client, ensuring proactive consideration at the design stage of key requirements of these functions in the development of operations and services. It establishes an enterprise-wide, integrated approach to governance, planning and management.[45]

Implications for Shared Services Canada (SSC)

Value Proposition

Making the transition to Digital Services by replacing the reliance on traditional service foundations, such as paper forms, and improving the overall user experience has benefits to both organizations/agencies as well as customers/end users.

The business value impact of Digital Services is: Improved Customer Satisfaction and Relationship; Consolidation and Improvement of Services; and Reduced Organizational Costs.

Improved Customer Satisfaction and Relationship

Increased digital service delivery could benefit customers by offering greater convenience in access to services, saving them both time and money. A Digital Service provides greater speed and greater confidence to the consumer and often leads to improved, rapid, and responsive customer services. An electronic resource is lot quicker to browse or search, to extract information from, and to integrate that information into other material and to cross-search or reference among the different publications.[46]Digital Services can contain vast amounts of information for the consumer, with mixed media i.e. images, video, audio animation which could not be replaced in print; all of which is highly mobile and accessible wherever internet access can be obtained. Additionally, Digital Services provide agency for the consumer in allowing the user to approach services and publications in a way that they can explore and analyze its contents in new ways by a click of the mouse.

Another aspect of Digital Services, improving customer satisfaction, and forming good relationships with an organization is to take into account the increasing preference individuals have for engaging with Digital Services. The experience of customers is at the heart of digital. As a result, the primary focus of digital transformation is to use cutting-edge technology to improve the customer experience.

When consumers interact with a Digital Service, the Service Provider has better access to a multitude of data driven insights from the relationship with the consumer. This highly tangible relationship can be leveraged to improve customer experience and satisfaction. One of the great benefits of going digital is the ability to track metrics and analyze the data that is gained during digital marketing efforts. More to the point, using these insights allows businesses to optimize their strategies and processes for even better results.[47] Further improving the development of a client centric and client-first strategies. With Digital Services, organizations can better understand customers and feed that insight into a business strategy that enables customer hyper-personalization, relevancy, and real-time feedback.

Lastly, Digital Services improves an organization's image or how it is perceived by consumers. Pursuing Digital Services generally has the effect of fostering organizational digital culture. Most issues and complaints against any organization, including governments, is that they are not providing services in a modern way, regardless of their overall service delivery effectiveness. How the external image appears is what matters most to consumers and other organizations doing business with an organization. Transforming services to Digital Services helps this image problem. Additionally, the seemless integration of Digital Services provided from different GC Departments to a single point of interaction (from the customer perspective) is also key. Although some services may not even change their back-end office processes, if the part of the service that is client facing is digital, customer satisfaction will be improved.

Consolidation and Improvement of Services

By going digital, companies can bring more than just their workforce together, but also their entire architecture. This includes business processes, social media, analytics, and project management interfaces. This consolidation of the company processes and operations enables the business to connect with their target audience and satisfy their needs. A company providing services on the Internet can easily be managed, development and the improvement of the service depending on the customers´ requirements. It is possible to adapt to the repertory of the products and services and needs of the field more rapidly.[48] Digital Services can enhance operations because electronic interactions offer greater control over resource management through automatization of processes and handling of information.

Digitizing Services pulls processes together through consolidation of business requirements which helps drive standardization of the business tools and process. Digital Services offer multi-access networked products. A networked product can provide multiple points of access to multiple simultaneous users. Offering multi-access also spurs the organization into innovative and agile ways for offering new types of services to the consumer. In business, agility is the ability to continuously improve and develop quickly, especially regarding digital processes.[49] When companies implement digital transformation in their business, they are able to include improvements in their processes, thus promoting innovation. They also have greater scope to innovate their products and services because the inclusion of new technologies allows them to include significant improvements in their offerings.

Digitizing Services also forces an organization's workforce to update their skillsets and knowledge concerning digital environments and digital workplace. As new technology continues to permeate organizations, the demand for these specialized skills will grow. To name a few skills that are coming into their own, the future of digital business is looking to be heavily built upon the following skillsets: Artificial intelligence, Augmented Reality, Cloud Computing, Machine Learning, and Data Exploration/Analytics.[50]

Consolidating services by digitization helps to reduce the service time to market, improves efficiency with regards to managing resources, and increases transparency with auditability trails. Entering data manually, lack of inter-departmental communication, and delayed processes limits final production. These aspects are conditional for efficiency and can be eliminated with the use of appropriate digital technologies. Replacing manual processes with automated workflows ensures complete control over business activities. Analyzing business data in real time will eliminate delays in the reports and productivity will be greater.

Reduced Organizational Costs

The main concern of managers is always to find ways to reduce business costs. Digital transformation, particularly the use of cloud services, enables companies to significantly reduce their operating costs.

Digital Services often enables one-stop, comprehensive online services for citizens and businesses by linking the diverse services that are offered by different agencies. Furthermore, increasing the ease at which information is shared among individual agencies (up to the point allowed by law) makes for better and/or new services. For instance, the administration of justice would be faster and more cost-effective if the information systems of various agencies under the criminal justice system (police, public prosecutors, public attorneys, courts, prisons) were capable and able to share data.[51]

Using Digital Services allows an organization to reduce or even eliminate local IT infrastructure, decrease the volume of manual administrative costs, and save physical space with regard to paper and asset storage. Digital Services can also provide cost savings by streamlining service. As an example, the TUO (Tell Us Once) principle, can help to reduce administrative burdens, in particular for Public Agencies. The exchange of information that has already been collected is cheaper and less burdensome than collecting and storing it repeatedly. Furthermore, some experts believe that data protection concerns can be better taken into account due to managing less data. Process optimization and potentially higher administrative efficiency are described as main advantages of TUO for public administrations. These include fewer calls to customer service centers, fewer paper-based applications, faster processing of administrative processes, time savings due to reduced data capture requirements and fewer data errors due to data reuse. This could save costs for public administrations and improve the quality of various public services. Cross-border implementation of the TUO principle could also help to ensure equal treatment for domestic and foreign persons and companies in the use of public services, for which they are obliged to provide information to public authorities. Lastly, TUO can help the GC to focus more on core mandates as staff become less occupied with administrative burdens.

Challenges

Although Digital Services provide great benefits for organizations there are some challenges that accompany the transformation from Non-Digital Services to Digital Services.

Complexity and Inflexible Technology

Moving from a Non-Digital Service to a Digital Service and onward to an Optimized Digital Service is no small task. This is further complicated in the public agency sphere where agency cooperation may require legislative changes before sharing information. This is the major challenge for developing Digital Services, the transformation to new processes. Transformation is mostly a grinding iterative process, and part of the iteration process involves the need to tactically and operationally adjust workflows, business rules, content presentations, and (potentially) leverage data in different ways than were originally envisioned when the IT systems were first built. Non-Digital Services and legacy IT systems will need to be assessed for further digitization and organizations trying to build flexible and elegant digital experiences on top of out-dated technology stacks may encounter significant interoperability issues. Lastly, managing a new Digital Service can be a shocking and challenging initiative for an organization who is not mature in that particular business area.

Lack of a Clear Vision for Digital Service and Consumer Journey

A challenge for organizations is the lack of a clear vision and execution for their Digital Services. A clear vision of how an organization will place the consumer at the center of the service, how to meet the consumer's digital needs and expectations, assessing data requirements, data storage, network requirements and setting objectives against that vision is often lacking in maturity. Organizations will often require multiple years in order to figure out their Digital Service Strategy and this longer term mindset is often a challenge for multi-scaled organizations. Service is now a touchstone of end-user experience and staff satisfaction alike, a critical metric that can't be ignored in favor of pure server performance or delicate data analytics.[52]

A lack of or ineffective gathering and leveraging of consumer data can be a major cause of failure in deploying and enhancing a Digital Service. The root of digital success is consumer data. The challenge many organizations have today is the myriad of siloed systems containing various scraps of data about consumer interactions, with no clear way to pull them together. Improving interoperability for data sharing and analyzing in an efficient way can be very challenging.[53]

Data Management and Data Risk

A Digital Service produces a massive amount of data, upwards of millions of transactions per second, and this influx of data can be very difficult and challenging to

manage. High performance processing capacity is needed, which is expensive to purchase and maintain, and proper storage is required. Digital Services only provide convenient access to relevant, reliable, comprehensive, and timely information to consumers if the data in which the services are founded is managed appropriately. Managing the data of Digital Services is also about the maintenance of IT assets such as the network, data centers, and servers. For example, if a server goes offline for even a few seconds, transactions get interrupted and business is lost. A power failure may cause catastrophic problems for ensuring a service is online and performing. Although organizations invest in dual systems with backups, this means higher costs for the platform.[54]

Additionally, many digital or IT resources have an unreliable life span. Paper has a much longer life span than most digital forms of storage. Due to the rapid development of new computer systems it is difficult to judge whether the software or hardware housing and leveraging the data will become outdated or not. As new hardware is developed, structures must be put into place to allow for the migration of existing materials to the new platforms so that they can still be accessed. Methods of preserving data and electronic documents must also be developed. A high degree of reliability of the equipment must be a part of enterprise data management for services that replace printed books.[55]

Privacy Security

When sensitive consumer information and other user data is kept on a database, there always exists a risk that personal information such as addresses, credit card details, email addresses, passwords etc. can be hacked. Protecting the privacy of consumers, is not only a challenge but one of the most important for any organization. Initiatives such as the introduction of a TUO program, requires a sound and consistent legal basis while protecting user information. There are significant legal challenges regarding the approvals required to allow organizations to exchange and use data pertaining to specific persons and businesses as an alternative to resubmission of the same or equivalent data while protecting the rights of data subjects.

Many countries have some form or another of a Privacy Act[56], which could be a challenge for Public Agencies as these laws limit information to be collected only for the expressed purpose it was intended unless an exemption is explicitly expressed. Although some flexibility exists, Public Agencies may have more challenges in this area. While there is some degree of flexibility with exchanging citizen's personal information between Public Agencies, this is the exception rather than the norm. Implementing such programs as a TUO approach may be challenging for services requiring cross-governmental input without serious considerations for the legislative changes necessary.

Social Disconnect and Organizational Reputation Risk

Digital Services are digital, meaning they are delivered via an online channel. Although there is an increasing tendency for individuals to socialize and communicate in the digital environment rather than through real life contact, this can lead to a sense of disconnect and isolation. This disconnect and isolation can occur between the consumer and the organization delivering the Digital Service. For Public Agencies, this can be a hinderance to organizational reputation. Although consumers expect services to be delivered digitally, they still want a human experience with the organizations that they do business with. This can be very challenging for organizations looking to appear modern while saving money by cutting or re-distributing client-facing staff.[57]

Additionally, Digital Services can lead to a sense of hyper-surveillance of the consumer. This is felt more in the Public Agency context where a government begins to develop and become more sophisticated, the citizens will be forced to interact digitally with the government on a larger scale. This interaction could potentially lead to a lack of privacy for civilians as their government obtains more and more information on them.

Employee Digital Skills

Some employees may have large difficulties in increasing their digital literacy. While training can help them in this endeavour it still remains difficult for the organization to define what skills are most needed for digital transformation. Long-term, organizations must forecast farther in order to foster a digital culture that encourages continuous learning while planning for future talent requirements.

Access to Digital Services

There is the event that switching from more traditional manual services to Digital Services may result in some consumers having a decreased opportunity in access to services. For example, a service that provides web based access and support often does not offer the potential to reach many users including those who live in the remote areas, have low literacy levels and exist on poverty line incomes.[58] Digital Services require special devices or personal computers in order to be accessed. This can be a disadvantage for Service Delivery as rural and remote communities could suffer from lack of internet access, or at-risk indviduals such as the homeless cannot access the services provided.

Considerations

The rapid digitalization of the economy is transforming the ways that Canadians buy, consume, and sell goods and services. Today, it is no longer a question of whether a Service Provider should go digital or not; the question is where and how to start. Service drives value, and for organizations to succeed in a digitized world, Digital Services must do more than maintain the status quo. Service is more than the digital technology that is implemented and more than contracted partnerships for reliable outcomes.

A serious consideration should be taken by SSC toward establishing a realistic, unambiguous, and forward-looking position on the development and delivery of Digital Services that takes into account the needs of the business consumers while revisiting and revising vendor software and service vendor agreements to assess their digital levels.

Although Digital Transformation varies widely based on organization's specific challenges and demands, there are common themes among existing case studies and published frameworks that all business and technology leaders should consider as they embark on Digital Transformation. The top Digital Transformation elements often cited are: Customer Experience; Operational Agility; Culture and Leadership; Workforce Enablement; and Digital Technology Integration.[59] Any new service, or existing services being reviewed or modified, must be designed to enable delivery of all suitable components of the service over digital channels, unless there is an approved documented business reason not to do so.[60]

SSC should be cognisant of the success factors in customer experience for the Digital Transformation process, including: Design and Digitize Customer Journeys; Increase Speed and Agility in Insights; Achieve Customer Adoption of Digital Customer Journeys; and Develop Agility in Delivering Journey Transformations. Many companies recognize this, with 92% of leaders developing mature digital transformation strategies, specifically to enhance the consumer experience.[61]

SSC should consider keeping user needs as the centerpiece for Digital Services and build the service that meets those needs. As per the TBS Policy on Service, "Services are designed and delivered considering client needs and feedback, and are progressively e-enabled".[62] The mantra which should be adopted is "Build Digital Services, Not Websites".[63] Although a lot of Digital Services will be channelled through web pages on the internet the mentality should be to produce services that are focussed on fulfilling the needs of the consumer, not dumping information onto a website and expecting consumers to figure it out on their own. The digital world, and Digital Services, has to connect to the real world, all aspects of a service need to be considered, and make sure the Digital Service actually adds up to something that meets consumer needs. The GC's Digital Standards can help provide a foundation of the government's shift to becoming more agile, open, and user-focused. They are living standards and they will continue to evolve over time.[64]

Some service design and delivery considerations for SSC as a Service Provider to the GC include:

- Assessment of Legislative and Regulatory Regimes;
- Legacy Information Systems;
- Digital Transformation Prioritization
- Budgetary Constraints and Resource Allocation;
- Public-Private Provisions;
- Cross-Agency and Cross-Jurisdictional Linkages;
- Delivery of Services through Existing and New Access Channels; and
- Effectiveness and Efficiency.

SSC, being the cloud broker for the GC, must have sufficient knowledge and understanding on its introduction, implementation, and integration with legacy systems. Cloud is becoming one of the major channels for consumers to access Digital Services, it is imperative that SSC staff and management understand its functionality and how to take advantage of digital opportunities in the cloud environment. This will require having the right staff with the right information in order to succeed. SSC should seriously consider the long term requirements for digital talent including addressing barriers to acquiring top talent such as language and requests for flexible work arrangements.

SSC should continue its participation in the GC Interoperability Working Group. SSC should continue its co-chairing (with TBS) of the GC Enterprise Architecture Review Board, which will govern the usage of data and align IT infrastructure initiatives among departments.

SSC should consider evaluating current offerings in the Service Catalogue for how digital these services are and what steps can be taken in order to progress to an Optimized Digital Service state. The evaluation would be to assess processes and business lines in order to improve efficiencies, reduce costs, and reduce administrative burdens of existing services as well as how a new services could be delivered in a more optimized digital way. Any new procurements of devices or platforms should have high market value and can be on-boarded easily onto the GC network. However, SSC should be cognisant of not flooding their ability to conduct business with massive amounts of data without properly planning for its collection, storage and analysis.

SSC should also understand that there is a danger that the speed of digital migration outstrips the implementation of legal, regulatory and information security controls that must be part of any on-line business project. Information and privacy security should be involved at the start of Digital Service projects and is able to clearly articulate the value and risks involved in changing core operational business models.[65]

Lastly, the TUO is a cornerstone in terms of developing GC-wide Digital Services. As such, there are possible implications related to the Privacy Act for TUO in Canada. SSC should consider assessing its different privacy requirements and restrictions regarding its

Digital Services that could impact service delivery, including data sharing privacy restrictions which may exist across services. A running privacy assessment of SSC services would be a valuable tool for SSC to refer to in cases where services are being digitized or other Digital Services are being on-boarded.

References

[1] OECD. (March 2019). *Going Digital.* The Organisation for Economic Co-operation and Development (OECD). 2019. Retrieved 27-May-2019 from: https://www.oecd.org/going-digital/project/

[2] Surbhi, S. (October 27th, 2015). *Difference Between Goods and Services*. Key Differences. 2019. Retrieved 27-May-2019 from: https://keydifferences.com/difference-between-goods-and-services.html

[3] Ibid.

[4] PCMag. (2019). *Definition of: e-services.* The Computer Language Co Inc. PCMag Digital Group. PCMag.com. Retrieved 26-May-2019 from: https://www.pcmag.com/encyclopedia/term/42260/e-services

[5] Taxamo. (2015). *What is the Definition of a Digital Service.* EVAT Solutions LtD. Ireland. Company No: 487204. 1 Library Place, Killorglin, Kerry, Ireland. Retrieved 26-May-2019 from: https://www.taxamo.com/support/regions_eu/digital_services_definition/

[6] Government of Western Australia. (July 2nd, 2018). *Digital Services – Definitions and Examples.* Government of Western Australia. Department of the Premier and Cabinet. Office of Digital Government. Retrieved 23-May-2019 from: https://www.wa.gov.au/government/publications/digital-services-definitions-and-examples

[7] Lea-Cox, Trevor. (2015). *Business Services vs IT Services vs Digital Services.* Lea-Cox and Associates. 2009-2015. Henley-on-Thames, United Kingdom. tlc@esmarchitecture.com. Retrieved 23-May-2019 from: http://esmarchitecture.com/key-concepts/business-it-digital-services.html

[8] Stephan, Fadi. (January 15, 2016). *What is Digital Service Delivery*. 2019 Excella Co. Retrieved 22-May-2019 from: https://www.excella.com/insights/what-is-digital-service-delivery

[9] Definitions.net. (2019). *Definitions for e-services*. STANDS4 Network LLC. 2001-2019. Retrieved 22-May-2019 from: https://www.definitions.net/definition/e-services

[10] OECD Council (July 15, 2014). *Recommendation of the Council on Digital Government Strategies,* Page 6. Retrieved on May 13, 2019, from https://www.oecd.org/gov/digital-government/Recommendation-digital-government-strategies.pdf

[11] Treasury Board of Canada Secretariat. (March 29th, 2019). *Digital Operations Strategic Plan: 2018-2022*. Government of Canada. Treasury Board of Canada Secretariat (TBS). ISBN:: 978-0-660-29075-1. Retrieved 21-May-2019 from: https://www.canada.ca/en/government/system/digital-government/digital-operations-strategic-plan-2018-2022.html#ToC5

[12] Definitions.net. (2019). *Definitions for e-services*. STANDS4 Network LLC. 2001-2019. Retrieved 22-May-2019 from: https://www.definitions.net/definition/e-services

[13] Government of Western Australia. (July 2nd, 2018). *Digital Services – Definitions and Examples.* Government of Western Australia. Department of the Premier and Cabinet. Office of Digital Government. Retrieved 23-May-2019 from: https://www.wa.gov.au/government/publications/digital-services-definitions-and-examples

[14] Ibid.

[15] Ibid.

[16] Ibid.

[17] Ibid.

[18] Ibid.

[19] Enterprisers Project. (2019). *What is digital transformation?*. The Enterprisers Project. Red Hat Inc. 2019. Retrieved 22-May-2019 from: https://enterprisersproject.com/what-is-digital-transformation

[20] ITAC. (October 26, 2016). *ITAC on Digital Government*. Information Technology Association of Canada (ITAC/ACTI). 1998-2019 ITAC. www.itc.ca. Retrieved 27-May-2019 from: https://itac.ca/federal-government/

[21] https://www.marketwatch.com/press-release/digital-transformation-market-size-is-projected-to-be-around-us-462-billion-by-2023-2018-08-23

[22] Enterprisers Project. (2019). *What is digital transformation?*. The Enterprisers Project. Red Hat Inc. 2019. Retrieved 22-May-2019 from: https://enterprisersproject.com/what-is-digital-transformation

[23] The initial estimates of the digital economy presented in this paper are only available in nominal terms. As a result, comparisons of the digital economy to other sectors of the economy can only be done up to 2015 as nominal GDP by industry is not available for later reference periods. https://www150.statcan.gc.ca/n1/pub/13-605-x/2019001/article/00002-eng.htm

[24] The initial estimates of the digital economy presented in this paper are only available in nominal terms. As a result, comparisons of the digital economy to other sectors of the economy can only be done up to 2015 as nominal GDP by industry is not available for later reference periods. https://www150.statcan.gc.ca/n1/pub/13-605-x/2019001/article/00002-eng.htm

[25] Statistics Canada. (August 29th, 2018). *Digital economy, July 2017 to June 2018*. Government of Canada. Statistics Canada. 5265 – Digital Economy Survey. For more information, or to enquire about the concepts, methods or data quality of this release, contact us (toll-free 1-800-263-1136; 514-283-8300; STATCAN.infostats-infostats.STATCAN@canada.ca) or Media Relations (613-951-4636; STATCAN.mediahotline-ligneinfomedias.STATCAN@canada.ca). Retrieved 26-May-2019 from: https://www150.statcan.gc.ca/n1/daily-quotidien/180829/dq180829b-eng.htm

[26] Ibid.

[27] Byrne, David*, and Corrado, Carol†. (November 10, 2017). *Accounting for Innovation in Consumer Digital Services:*

Implications for economic growth and consumer welfare. (Preliminary Draft). *Board of Governors of the Federal Reserve System, Washington, D.C. †The Conference Board, New York, and Center for Business and Public Policy, McDonough School or Business, Georgetown University. Corresponding author: cac289@georgetown.edu.

[28] Ibid.

[29] Ibid.

[30] Government of UK. (2019). *About the Government Digital Service*. Government of United Kingdom. Government Digital Service. Cabinet Office. Retrieved 23-May-2019 from: https://gds.blog.gov.uk/about/

[31] United Kingdom Government. (2019). *Tell Us Once*. United Kingdom Government. Retrieved 04-Jan-2019 from: https://www.gov.uk/after-a-death/organisations-you-need-to-contact-and-tell-us-once

[32] EUR-Lex. (2016). *Communication from the Commission to the European Parliament, the Council. The European Economic and Social Committee and the Committee of the Regions*. European Commission. Retrieved 04-Jan-2019 from: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52016DC0179

[33] The TOOP capabilities, in turn, are based on two key Estonian digital systems: "The Universal Digital ID" – through which people can digitally sign contracts, access public services, order prescriptions, file taxes and vote at elections – and "The X-Road", a set of security and communications protocols that permits safe, rapid transmission of data between a highly distributed set of databases and digital systems. Reference:

Whitehouse, David. (2019). *Enabling e-government: Estonia's National Digital Advisor Marten Kaevats*. Global Government Forum. Retrieved 07-Jan-2019 from: https://www.globalgovernmentforum.com/enabling-e-government-estonias-national-digital-advisor-marten-kaevats/?utm_source=Canada+Public+Service&utm_campaign=2300653a6d-CANW_KaevatsInterview&utm_medium=email&utm_term=0_4eb3df799b-2300653a6d-193679865

[34] Government of Estonia. (2019). *Interoperability Services: X-Road*. Government of Estonia. E-Estonia. Enterprise Estonia. Retrieved 19-May-2019 from: https://e-estonia.com/solutions/interoperability-services/x-road/

[35] Treasury Board of Canada Secretariat (April 18, 2019). *Digital Policy Suite: Integrated Management of Service, Information, Information Technology and Cyber Security – Presentation to the Public Sector Management Advisory Committee*. Page 3.

[36] Stephan, Fadi. (January 15, 2016). *What is Digital Service Delivery*. 2019 Excella Co. Retrieved 22-May-2019 from: https://www.excella.com/insights/what-is-digital-service-delivery

[37] Government of Canada. (March 29th, 2019). *Government of Canada Digital Standards.* Government of Canada. Digital Government. Retrieved 26-May-2019 from: https://www.canada.ca/en/government/system/digital-government/government-canada-digital-standards.html

[38] Treasury Board of Canada Secretariat. (March 29th, 2019). *Digital Operations Strategic Plan: 2018-2022*. Government of Canada. Treasury Board of Canada Secretariat (TBS). ISBN:: 978-0-660-29075-1. Retrieved 21-May-2019 from: https://www.canada.ca/en/government/system/digital-government/digital-operations-strategic-plan-2018-2022.html#ToC5

[39] Ibid.

[40] Digital Transformation Office. (April 11th, 2019). *About the Digital Transformation Office.* Government of Canada. Treasury Board of Canada Secretariat. Retrieved 22-May-2019 from: https://www.canada.ca/en/government/about/about-digital-transformation-office.html

[41] The Canadian Digital Service. (2019). *What We Do.* Government of Canada. Canadian Digital Services. Retrieved 6-May-2019 from: https://digital.canada.ca/what-we-do/

[42] Treasury Board of Canada Secretariat. (2017). *Government of Canada Strategic Plan for Information Management and Information Technology 2017 to 2021*. Government of Canada. ISBN: 978-0-660-24007-7. Retrieved 20-Dec-2018 from:

https://www.canada.ca/en/treasury-board-secretariat/services/information-technology/strategic-plan-2017-2021.html

[43] Canada, Revenue Agency. (November 27, 2017). *Link between My Account and My Service Canada Account*. Government of Canada. Retrieved 09-Jan-2018 from: https://www.canada.ca/en/revenue-agency/services/e-services/e-services-individuals/account-individuals/link-between-account-service-canada-account.html

[44] Treasury Board of Canada Secretariat. (November 27th, 2013). *Standard on Web Usability*. Government of Canada. Treasury Board of Canada Secretariat. ISBN: 978-0-660-20387-4. Retrieved 25-May-2019 from: https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=24227

[45] Treasury Board of Canada Secretariat. (May 27th, 2019). Digital Policy Suite. Treasury Board of Canada Secretariat. Government of Canada. GCDocs. Retrieved 25-June-2019 from: https://gcdocs.gc.ca/ssc-spc/llisapi.dll?func=ll&objId=47700600&objAction=browse

[46] O'Brien, Clodagh. (2019). *What are the Benefits of Digital Transformation?* Digital Marketing Institute SM. 2019. Retrieved 26-May-2019 from: https://digitalmarketinginstitute.com/en-ca/blog/13-03-18-what-are-the-benefits-of-digital-transformation

[47] O'Brien, Clodagh. (2019). *What are the Benefits of Digital Transformation?* Digital Marketing Institute SM. 2019. Retrieved 26-May-2019 from: https://digitalmarketinginstitute.com/en-ca/blog/13-03-18-what-are-the-benefits-of-digital-transformation

[48] Palmgren, Juha. (October 21st, 2014). *Benefits and Disadvantages of the E-Services.* Modern Buyer Behaviour. Retrieved 25-May-2019 from: https://modernbuyerbehaviour.wordpress.com/2014/10/21/benefits-and-disadvantages-of-the-e-services/

[49] O'Brien, Clodagh. (2019). *What are the Benefits of Digital Transformation?* Digital Marketing Institute SM. 2019. Retrieved 26-May-2019 from: https://digitalmarketinginstitute.com/en-ca/blog/13-03-18-what-are-the-benefits-of-digital-transformation

[50] Stephan, Fadi. (January 15, 2016). *What is Digital Service Delivery*. 2019 Excella Co. Retrieved 22-May-2019 from: https://www.excella.com/insights/what-is-digital-service-delivery

[51] Lallana, Emmanuel. (2008). *e-Government Interoperability*. United Nations Development Programme. United Nations. ISBN: 978-974-13-3227-4. Bangkok, Thailand. regionalcentrebangkok@undp.org

[52] Column Technologies. (2019). *Digital Services: Finding Value In A Tech-First World*. Column Technologies Inc. Retrieved 26-May-2019 from: https://www.columnit.com/value-of-service-in-the-digital-world.html

[53] Tiersky, Howard. (March 13th, 2017). *5 top challenges to digital transformation in the enterprise*. CIO from IDG. IDG Contributor Network. 2019. Retrieved 25-May-2019 from: https://www.cio.com/article/3179607/5-top-challenges-to-digital-transformation-in-the-enterprise.html

[54] Palmgren, Juha. (October 21st, 2014). *Benefits and Disadvantages of the E-Services.* Modern Buyer Behaviour. Retrieved 25-May-2019 from: https://modernbuyerbehaviour.wordpress.com/2014/10/21/benefits-and-disadvantages-of-the-e-services/

[55] Ashikuzzaman, Md. (November 16th, 2016). *Advantages & Disadvantages of Electronic Resource (E-Resource).* LIS BD Network. 2013-2019. Retrieved 26-May-2019 from: http://www.lisbdnet.com/advantages-disadvantages-electronic-resource-e-resource/

[56] Justice Canada. (January 8, 2019). *Privacy Act*. Government of Canada. Retrieved 10-Jan-2019 from: https://laws-lois.justice.gc.ca/eng/acts/P-21/page-2.html#docCont

[57] Goodman, Paul. (February 15, 2019). *17 Disadvantages of Digital Technology*. Turbo Future. A Maven Channel. HubPages Inc. Retrieved 25-May-2019 from: https://turbofuture.com/misc/Disadvantages-of-Digital-Technology

[58] E-Spin. (2019). *The Advantages and Disadvantages of E-Government.* E-Spin Group of Companies. 2005-2019. Retrieved 25-May-2019 from: https://www.e-spincorp.com/the-advantages-and-disadvantages-of-e-government/

[59] Enterprisers Project. (2019). *What is digital transformation?*. The Enterprisers Project. Red Hat Inc. 2019. Retrieved 22-May-2019 from: https://enterprisersproject.com/what-is-digital-transformation

[60] Government of Western Australia. (May 1st, 2016). *Digital Services Policy.* Government of Western Australia. Department of the Premier and Cabinet. Office of Digital Government. Retrieved 26-May-2019 from: https://www.wa.gov.au/government/publications/digital-services-policy

[61] O'Brien, Clodagh. (2019). *What are the Benefits of Digital Transformation?* Digital Marketing Institute SM. 2019. Retrieved 26-May-2019 from: https://digitalmarketinginstitute.com/en-ca/blog/13-03-18-what-are-the-benefits-of-digital-transformation

[62] Treasury Board of Canada Secretariat. (October 1st, 2014). *Policy on Service*. Government of Canada. Treasury Board of Canada Secretariat. ISBN: 978-0-660-09949-1. Retrieved 26-May-2019 from: https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=27916

[63] Government of Western Australia. (September 4th, 2017). *Digital Service Design Principles*. Government of Western Australia. Department of the Premier and Cabinet. Office of Digital Government. Retrieved 26-May-2019 from: https://www.wa.gov.au/government/publications/digital-service-design-principles

[64] Government of Canada. (March 29th, 2019). *Government of Canada Digital Standards.* Government of Canada. Digital Government. Retrieved 26-May-2019 from: https://www.canada.ca/en/government/system/digital-government/government-canada-digital-standards.html

[65] Bridewell Consulting. (April 16th, 2014). *The Estimated Size of the Digital Economy*. Bridewell Consulting. (2019). bc@bridewellconsulting.com. Soane Point, 6-8 Market Place, Reading Berkshire, RG1 2EG. Retrieved 26-May-2019 from: https://www.bridewellconsulting.com/the-estimated-size-of-the-digital-economy