

# From e-Government to digital Government: Stakes and Evolution Models

*Du e-gouvernement au gouvernement digital: enjeux et modèles d'évolution*

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## Résumé

L'objectif de ce cet article consiste à décrire comment est opérée la transition d'un gouvernement électronique ciblant principalement l'efficacité organisationnelle d'une administration publique, vers une approche orientée gouvernement digital, induite par les grandes tendances des technologies digitales (big data, mobile, médias sociaux, Internet des objets et Cloud), et résultant sur une transformation en profondeur des services et des processus publics. Les principales questions d'une telle mutation sont ainsi abordées: l'adoption d'un modèle dirigé par les besoins des citoyens, l'ouverture des données gouvernementales, l'impératif "digital par défaut" et les défis liés à la sécurité numérique.

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## Abstract

*Major digital technology trends such as big data, mobility, social media, Internet of Things (IoT) and cloud, lead profound reform of public services, via the Digital Government new paradigm. The contribution of this paper consists in describing how we can make a fundamental shift from e-Government path, targeting greater organizational efficiency, to a digital based approach, while driving profound transformation of public services and processes. Key transformational issues are therefore addressed: adoption of citizen-driven model, Governmental Data Potential Unlocking, the "digital by default" imperative, and the digital security challenges.*

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## Mots-clés

*e-Gouvernement, Gouvernement digital, Transformation digitale, Modèle dirigé par le Citoyen, Stratégie digitale.*

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## Keywords

*e-Government, e-gov, Digital Government, Digital transformation, Citizen-driven Model, Open Data, Digital Strategy.*

## 1. Introduction

The globalizing world changes have been initiated and boosted by virtually interconnected networks of participants, markets and information systems. The resulting knowledge revolution induces governments to implement electronic Government (e-Government) systems to deal efficiently with increasing citizens and businesses requirements in a more and more dynamic environment. Such use of Information Technology was inspired by e-Business accomplishments, which proved that putting business online could help hugely improve the efficiency of business processes inside and between companies (Rombach et Steffens, 2009).

Therefore, performance based objectives are assigned to e-Government systems: to generate social and economic benefits, to narrow the digital divide, to drive public sector reforms, to promote effective natural resource management, and also to provide citizens with greater choice and influence in how they interact and collaborate with government, in the development of public services (OECD, 2008b).

To attain these objectives, e-Government development has to deal with various challenges driven by the increasing needs for innovation, interoperability, service delivery quality, and new major digital technology trends (big data, mobility, social media, Internet of Things (IoT), cloud and Artificial Intelligence), with possibilities of profound reform of public services. This led to a new paradigm known as Digital Government.

The contribution of this paper consists in describing how we can make a fundamental shift from e-Government path, targeting greater organizational efficiency, to a digital based approach, while driving profound transformation of public services and processes. Key transformational issues are therefore addressed: adoption of citizen-driven model, Data Potential Unlocking, the “digital by default” imperative, and the digital security challenges.

The rest of this article is structured as follows. First, the question of e-government foundations is examined through an effort of classification of its customers’ identification (G2G, G2B, G2E, G2G), its declinations, mainly in terms of e-Governance and local e-Government, and its interaction types (from informational government to connected Government). Second, new trends determinant for e-Government development are introduced, mainly those induced by the needs for innovation, interoperability, integrated and multi-channel services delivery, and digitalization. Thirdly, the concept of digital Government is explored, and its key issues as its technical prerequisites discussed. Finally, this paper terminates by some conclusions and recommendations for future work.

## 2. Electronic Government Foundations

e-Government is largely seen as the use of Information Technologies (IT), and increasingly digital technologies, to support and improve public services. Nevertheless, this definition has to be completed by specifying how e-Government services are classified: who is these services’ customer (Citizen, Business, and Administration)? What is the interaction level of the implemented service (Informational, interactivational, etc.)? Which type is the targeted agency (local, central)? Which type of impact, in terms of governance, is targeted by the e-Government process (efficiency, transparency, openness, etc.)?

### 2.1. e-Government Definition

Electronic government or “e-Government” in its most generic form is defined as the use of IT in the public sector:

- to ensure access to and delivery of government information and user-centric services (Silcock, 2001) (UNDPEPA et ASPA, 2002),
- to enable and improve the efficiency with which these services are provided (Lemuria et Bélanger, 2005),
- to cover a broad range of managerial issues: from the technicalities of data flows and process mapping to the politics of e-government (Heeks, 2005), and/or
- to transform government (Spirakis, Spiraki *et al.*, 2010).

e-Government systems and services generally consists in handling the vast majority of administrative transactions through electronic integration and provision of services and information. The accessibility and rapidity of such online modes represent a real opportunity to improve hugely the internal administrative performance (Rombach et Steffens, 2009), to enhance coordination between different agencies, and to ensure faster delivered services for citizens.

e-Government systems are built on a large choice of Information Technologies including Internet, web sites, fixed or mobile phones, biometric identification, smart cards, RFID chips, and SMS or MMS. Government 2.0 is a more communicative and interactive version of e-Government, re-shifting the focus to citizens as active contributors to public affairs’ management mainly through the use of Web 2.0 social tools (e.g. social web, social software, social media, participative web and user-generated web, etc.) (Meijer, Koops *et al.*, 2012)

More recently, the incorporation of new services supported by public sector “open data” (Davies, 2015) and other digital technologies (IoT, Cloud and Big data), leads to the extension of the e-Government model by the Digital Government concept, and the adoption by several governments of a “digital by default” based strategy (GOV-UK, 2012).

## 2.2. e-Government Systems Customers

Analogous to the concept of e-commerce, one way of classifying e-government application is the categories of the targeted clients. It is based on distinction between e-services aiming to bring closer administrations to citizens and businesses, enabling them to deal with each other friendly and more efficiently, or empowering civil servants. Four types of e-Government are usually identified (Wirtz et Daiser, 2017) (Davies, 2015) (Bhatnagar, 2009) :

- Government-to-Citizens or G2C, relationships between public administrations and a citizen, such as income tax declarations, issuing certificates and licenses, registering vehicles, and exchanging information in any life situation ;
- Government-to-Business or G2B, online non-commercial transactions between government bodies and business, such as delivering permits, Tax collection, customs, e-procurement, electronic marketplace for government purchases ;
- Government-to-Government or G2G, data sharing and information exchange between governmental information systems with objectives of high impact on efficiency and effectiveness of transverse administrative process, such as crisis management, disaster response, Integrated Financial Management Systems, Elections' Management, International trading, etc. ;
- Government-to-Employee or G2E, focusing on transactions between government bodies and their employees in order to improve performance of agency, reinforce internal communication and reduce delays in processing requests concerning their career and professional promotion, such as e-payroll, pension applications, training information, e-training, etc.

On another hand, public services are extended through local e-Government systems which provide online means for people to get together, intensify demand and choice, increase local competition, reduce the cost of service delivery at the local level, and better functioning of the government system (Nabafu et Maiga, 2012) (Reddick, 2010).

Therefore, the stake of local e-Government is very significant as it is at the local authority level that all recipients (citizens, businesses, NGOs) make their requests concerning administrative procedures (Bounabat, 2009). This leads local governments under influence to provide efficient and effective e-government information and services as a result of increased accountability and performance management (Shackleton, Fisher *et al.*, 2004).

## 2.3. e-Government and e-Governance

The terms “e-governance” and “e-government” are often used identically, and it seems to be impossible to define fully separate borderlines around them. Nevertheless, it is necessary to make some distinction between the two terms. Indeed, the concept of governance is a broader notion than government (Bhatnagar, 2009) (UNESC, 2006). It generally involves :

- tasks of running a government or any appropriate entity for that matter ;
- interactions between local and central administrations, elected bodies and civil society ;
- processes whereby formal authorities define, influence and enact policies and decisions related to public affairs ;
- mechanisms, processes and institutions, through which citizens and groups articulate their interests, exercise their legal rights, meet their obligations and mediate their differences.

Therefore, while e-government can be seen as the use of IT to deliver efficiently public services, e-governance focus is principally on enhancing both administrative efficiency and transparency in a larger networked set of formal and informal institutions. Thus, e-governance encompasses an “e-democracy” dimension, as it increases citizen participation in the public decision-making process by facilitating transactions between concerned groups and the government. Consequently, efficiency and effectiveness, but also accountability and reduction of corruption, are reinforced in all levels of the government (Tan Yigitcanlar et Baum, 2008) (Meijer, 2007).

The most representative tool of e-Democracy is e-Voting which allows to consult the citizen about different issues and according to predefined modalities. Directly involved in the acceptance, change or total abrogation of a policy or a law, citizens are henceforth enabled to put ideas forward and defending them so as to make the right proposals. e-Voting also contributes to speed up the counting and reduce errors as well as costs, which is always important in democracies (Remenyi et Wilson, 2007).

## 2.4. e-Government Interaction models

Being based on e-Government evolution stages, different interaction models have been developed (Nixon, Koutrakou *et al.*, 2010) (Mellouli, 2014). Some models comprise four different steps or forms of interaction, others have five. However, there is a large degree of consensus at least on their incremental orientation, and on their potential use as maturity evaluation approach indicating the level to which IT is utilized to supply electronic public services.

Generally, the majority of e-Government interaction and service delivery models encompasses the five following main phases.

### 2.4.1. Phase 1 – Informational

In its informational phase, e-Government systems enable citizens to easily access to static information, eventually in an archived format, on governmental policy, laws, public services, relevant documentation, through downloading forms, reports, and brochures from official websites. The last increasingly offer multi-lingual, audio and video functionalities. At this level, e-Government services are often restricted to a presence on the web. Hence, there is no need of administrative process reform or re-engineering. The implementing agencies have only to digitize the available information and provide it on-line. Therefore, the informational e-services are not designed to support the rethinking of administrative processes, but only to reflect the structure of governmental agencies.

*Example: Stage 1 – informational:* The agency has a website that publishes information about the good or services to obtain or to buy. Businesses have read-only access and can download documents.

### 2.4.2. Phase 2 - Interactional

This phase includes informational capabilities and permits simple forms of browsing, exploring and interacting with data (information via e-Mail, downloading forms or search government databases), allowing agency's customers to ask questions, make complaints, and/or perform electronic searches and calculations based on specific criteria. At this level, agencies have to determine the access modes or using the available information on its official website, the rules for opening certain information, the relevant target audience for specific information sets, and the means to make information easier to find, and as well to enrich customer's experience.

*Example: Stage 2 - interactional:* The service is informational. Additionally, the agency permits potential tenderers to ask questions about the procurement. They can also access the agency databases for further information.

### 2.4.3. Phase 3 - Transactional

Transactional capabilities conduct complete online transactions by the engagement of secure, and often real-time, two-way communication with customers, such as permits and licenses application, taxes declarations and payment, public tenders responses, and e-voting. To set-up successfully transactional services, agencies have to address technically challenging issues related to online service standards definition and establishment, security and privacy protection, back-office reinforcement, and eventual redesign of administrative processes. Legal issues can be also raised, especially, these related to online deployment of transverse public services.

*Example: Stage 3 - Transactional:* A noticeable evolution from Stage 2, where the agency permits the eligible tenderers to submit their technical and financial offers in a secure and authenticated way, and engage in transactions with them. The authentication system has been set-up, and the agency knows who each tenderer is.

### 2.4.4. Phase 4 - Transformational

In this phase, with integrated-service oriented approach, government appears as a single organization for its customers offering them electronically administrative service packages meeting their needs (Gottschalk et Solli-Sæther, 2009a) (Gouscos, Kalikakis *et al.*, 2007), as it encompasses complete process chains between government and its customers. All kinds of boundaries between different departments and agencies are removed, through the interoperability of their information systems. In this stage, the governmental bodies internal organizations and governance are often revised in order to implement seamless services in an integrated and customer-centric mode. Stronger collaboration between public agencies is also required at numerous levels: sharing information, shared processing, secured data exchange, regulatory harmonization, and Interoperability General Framework implementation (Gottschalk et Solli-Sæther, 2009b). In the past few years, this type of change led to the transformational government (t-Government), which is a mixture of e-Government, business process re-engineering and business-scope re-definition (Bannister et Connolly, 2011).

*Example: Stage 4 - Transformational:* In addition to the level of secured access allowed in stage 3, the agency can proceed to automated checking of the potential suppliers eligibility. This inspection is made through a seamless exchange of information with other governmental systems about each tenderer administrative and fiscal situation, his solvability, etc.

### 2.4.5. Phase 5 - Connected

Both transformational and participatory, e-Services empower citizens to provide input to the formulation of policies, and so as to be more involved in this proactive decision-making process. Definitely citizen-centric, this approach is generally based on the use of interactive tools (such as Web 2.0) (Meijer et Thaens, 2010), and the adoption of life cycle events and the stakeholders' platforms interoperability to develop appropriate public e-services. When it is driven by social media (Gohar Khan, 2015), network technologies lead to the emergence of new social forces, with enhanced self-organization of individuals, and more capabilities of creative thinking. This new balance can constitute a clear rupture in classical modes of distribution of tasks and duties between citizens and public administration (Di Maria et Micelli, 2005).

The term e-government 3.0 denotes current new tendencies in connected government to achieve greater level of integration through the use of semantic web, public information infrastructure, and all the new communication media (Vlahovic et Vracic, 2015). The objective here is an advanced automation and autonomy of pervasive e-services, connecting everything with everyone in order to solve societal problems and ensure resource optimization and citizen well-being, through civic and enterprise collaboration.

*Example: Stage 5 - Connected:* including stage 4, this level contributes to increase the procurement process transparency, by taking into account other criteria than the minimum price, in order to choose the best suppliers. Among these criteria, we mention: tenderers' reputation, their respect of common values as environment protection or privacy. Such information can be obtained through the involvement of other stakeholders: civil society, professional associations, citizens, etc.

### 2.4.6. e-Government maturity assessment

The five evolution phases, from informational web sites to the connected government, provide a systematic framework for carrying out benchmarking and performance improvement of e-Government systems. Such evaluation framework can be applied to build and/or to understand maturity models assessing how different public agencies perform in their development of e-Government services (Lee et Hoon Kwak, 2012) (Gonçalves et Pannetier, 2014) (Rombach et Steffens, 2009).

This assessment is useful to elaborate both "as-is" and "to-be" positions of an administration's e-Government program, and thus perform strategically linked uninterrupted improvement of the achievement's process.

## 3. Trends in e-government

Now, e-government is perceived as a powerful instrument for states to make public administration more performing, and to support broader economic development. Nevertheless, its development still faces various challenges driven by the increasing needs for innovation, interoperability and service delivery quality. New mega-digital trends are determinant for governments to meet all these demands and to lead necessary and adequate reforms in public services and processes.

### 3.1. Modernizing and Innovating Administrations in the digital era

Good customer service targets the improvement of the relationship with end-user. In the context of public context service and thanks to the technology, end-user has become, mobile, more demanding and expecting to benefit from government services digitally and 24/24 and 7/7. In this vein, governments have no other choice but to align services based on citizens, not internal government processes.

Moreover, and due to the fact that government has long been seen as a heavily paper-based system, any service online implementation project has an important boosting impact on the innovation process inside the public sector. Such decision can represent a real opportunity to rethink, redesign and document administrative structures, processes and actions.

Indeed, a successful adoption of development approach based on "customer-centric", "Once only" or "whole-of-government" principles, needs to re-examine and to reorganize the administrative back office, and even re-engineer targeted services, in order to make them more strategically aligned, agile, interoperable, efficient and reliable. The final objective here consists in providing governmental structures with the technical infrastructure and informational capacity to offer electronic public services that deal with customers' needs in a seamless end-to-end way.

### 3.2. Government Systems Interoperability

Government Systems Interoperability (GSI) is the ability of disparate and diverse public administrations to interact towards mutually beneficial and agreed common goals, by sharing information and knowledge and by integrating business processes through means of common standards. In a narrow sense, the term interoperability is often used to describe technical systems. In a broad sense, social, political and organizational factors influencing systems and systems performance are also taken into account (Gottschalk et Solli-Sæther, 2009b) (Bounabat, 2013).

By connecting government agencies both vertically and horizontally, GSI ensures both a seamless access starting from a single window and easily exchanging of secure data through an interoperability platform. This is a real gateway interconnecting all administrations and ensuring single access to public e-services, as well as simplified production of e-forms and e-services for all departments.

On another hand, elaboration and application of Interoperability General Framework are also strongly recommended as “must-have” GSI initiatives. This framework defines norms and standards setting out the technical policies and specifications that all systems need to comply with in order to communicate across or with the public sector (Pratchett, 2004). It is the case of the European Interoperability Framework (EC, 2010).

### 3.3. Integrated Service Delivery

The objective here consists in developing innovative and convivial interfaces focused on providing users with easy and transparent access gate to all government information and services. This access operates generally as a “portal – front-end” to the Government Gateway, facilitating the organization of public services around the “citizen-centric” principles.

It is a concretization of the concept of joined-up Government (OECD, 2008a) (IPA, 2009), which addresses successfully fragmented structures for public service delivery, by:

- Setting-up governmental virtual single entry points that enable citizens and businesses to transact seamlessly and simultaneously with several departments and agencies, and that help governments to transcend traditional “silos”;
- Allowing the customers to develop a personal profile permitting them to:
  - i) interact with public agencies via electronic forms, containing beforehand certain relevant personal data available through secure channels;
  - ii) provide personal information to different administrations simply in one single electronic transaction.

This integrated approach to e-government and online service delivery, has accompanied the growing importance attached to the “Whole-of-Government” (WoG) approaches adopted when public service agencies work together across organizational portfolio boundaries in a shared response to particular issues (UNDESA, 2016).

### 3.4. Multi-channel Service Delivery

e-Government allows the public sector to adapt its front office, by giving its customers a choice of accessing services via multiple online and offline channels, that accommodate their needs. Multi-channel service delivery has been referred as follows: “Multi-platforms must enable users to benefit from new technologies and infrastructure improvements ... Moreover, alternative access platforms will facilitate e-inclusion, also for people with special needs (IDA, 2004).

In this objective, it is important to consider the various channels enabling administrations to offer fully automated services that can be provided on a 24\*7 basis : web portal, email, SMS, mobile apps, social media, public kiosks, Call centre, Counter, Interactive Digital TV, Global Positioning Systems (GPS), Interactive Voice Response systems, Public Internet Access Points websites and intermediaries through public-private partnerships, in selecting the right channel for the right service targeting the specific audience (UNDESA, 2016).

Thanks to the stunning proliferation of mobile devices, multi-channel Innovative initiatives focus on reaching citizens through mobile-Government systems (or m-Gov). It consists in extending e-Government to all kinds of wireless and mobile technology, services, applications, and devices to help governments become more efficient (ITU-OECD, 2011). The adoption of mobility has become an indispensable tool for the public sector, and especially cost-constrained governments, in achieving its objective of proximity to citizens, meeting their demands, and delivering services for the future.

When formulating and implementing a multi-channel strategy in public sector, several aspects have to be taken into account (Giritli Nygren, Axelsson *et al.*, 2014) (Giritli Nygren, 2010) (Pieterse, 2009) : the needs and preferences incentives, interpretations of both customers and employees, the internal organization of agencies, demands, resources and restrictions, and the local norms, potentials and expectations.

Finally, and besides important selection features as directness, speed and security, a multi-channel strategy has, in priority, to bridge e-Government divides by reaching out disadvantaged and vulnerable groups and find smart ways to increase usage of online services. (UNDESA, 2014).

### 3.4.1. Towards Digital Government

Major digital technology trends namely big data, analytics, mobility, social media, Internet of Things (IoT), cloud and Artificial Intelligence allow governments to create value from efficient and cost-effective public services, but also to lead profound reform of these services.

This is a new paradigm known as Digital Transformation of Government, or digital Government. The following section has as objective to demonstrate how a Government can make a fundamental shift in mind-set, to generate value from these major digital trends while driving profound transformation of public services and processes.

## 4. Digital Government

New digital solutions are more and more perceived as real pillars for enterprises strategies to become more performing and to concretize unprecedented business opportunities. Therefore, the new persistent digital citizens' behaviors and expectations become strongly influenced by their experiences with the private sector, and more personalized and demand-driven. Moreover, new digital solutions have tangible benefits on economic competitiveness, business environment, society and quality of life (Accenture, 2014a) (IA-CIO, 2016). This shift addresses key transformational principles as the citizen-driven model, the open government principles, the Data Potential Unlocking, the "digital by default" imperative and the digital security challenges.

### 4.1. What is Digital Transformation?

Today's organizations use the newest digital solutions, explicitly Social, Mobile, Analytics and Cloud (SMAC) to boost operational efficiency and to take full advantage from unprecedented moneymaking business opportunities. Indeed, ubiquitous connectivity, strong mobility, intuitive and user-friendly interfaces and new transactions channels are changing any business services landscape for production, marketing, provision, access and utilization. This change leads to the digital transformation of the organization defined as is the process of re-thinking a business model or processes in order to meet ever-changing market demands and to radically improve enterprises performance. Such transformation is achieved in light of newly acquired knowledge gained via value-added (Schallmo et Williams, 2018) (MIT-Capgemini, 2014).

### 4.2. What is Digital Government ?

Inspired from business sector's experience, and faced with new policy issues, and new security challenges, and demanding fiscal environments, public administration has to set-up digital solutions to transform its customers (citizens and enterprises) experience and service delivery. Such initiatives perimeters and scope look beyond traditional portal-based e-government systems consisting in using technology to make existing governmental services available online and/or through mobile devices.

Big Data, Open Data and analytics foster analysis of huge amount of data collected using a wide range of devices or applications, thus forming future-proof sound decisions. These technologies create foundation for transformational government (Harsh et Ichalkaranje, 2015) (Mickoleit, A. (2014) by creating real-time solutions to challenges in agriculture, health, transportation, ensuring foster collaboration, and ushering in a new era of policy- and decision-making. (Bertot et Choi, 2013).

Moreover, Cloud Computing enables ubiquitous, convenient, secured, on-demand network access to a shared pool of resources, whether they are networks, servers, storage, applications or services. Thus, governmental departments are not any more obliged to house and manage their own IT infrastructure, which implies an increasing agility and huge operating costs reduction.

Increasingly and around the world, new social-media technologies and platforms are recognized by public services as efficient means to enhance the quality of their communications with their customers (Mickoleit, 2014). Citizens and businesses can now and more freely, formulate their needs, critics and opinions to governmental organizations.

Thus, the transition from analog to digital government represents an optimal use of electronic communication channels to (Accenture, 2014a) (NICTA, 2014) (Accenture, 2014b) :

- improve citizens satisfaction in service delivery, with the possibility enabling citizens to commission, co-design and co-produce public services ;

- forge new levels of both institutional engagement and trust, as political communication can be made in two way, with voters and parties speaking to one another dynamically in real time;
- achieve a better functioning of public agencies with a positive impact on economic competitiveness and prosperity, as their organizations become more flexible, networked, and purpose driven.

This end-to-end digitalization process - business models, design development and delivery- of public e-services, makes traditional e-government methods seemed to be “so passé” with an increasing need for agencies to turn their focus from automation and cost-cutting to citizens and businesses experience and innovation (Gardiner, 2015).

### 4.3. Digital Government Strategies

Numerous national and regional Digital Government strategies are developed in order to improve government services, to increase competitiveness, and to open up more opportunities for citizens. These strategies usher in a fundamentally different approach to the design and delivery of public sector services. We can mention among others:

- In USA, the Digital Government Strategy (DGS) (WH, 2012), complementing several other national initiatives, and particularly the 25-Point Implementation Plan to Reform Federal Information Technology Management (IT Reform) (Kundra, 2010). The DGS sets out to achieve three strategic objectives:
  - i) enabling access to high-quality digital government information and services anywhere, anytime, on any device;
  - ii) ensuring opportunity to procure and manage devices, applications and data in smart, secure and affordable ways; and
  - iii) unlocking the power of government data to spur innovation and improve services quality.
- In Great Britain, the Government Digital Strategy proposes 14 actions to transform government in order to become digital by default. This means digital services which are so straightforward and convenient that all those who can use digital services will choose to do so, while those who cannot are not excluded (GOV-UK, 2012).
- The new European eGovernment Action Plan 2016-2020, coming after the Europe 2020 strategy (EC, 2012a) and the Digital Agenda for Europe (DAE) (EC, 2012b), all established to create a smart, sustainable and inclusive Europe able to compete globally, across sectors. Openness, transparency, collaboration, “digital by default” and “crossborder by default” were principles to be observed to go forwards (EC, 2014). The European eGovernment Action Plan 2016-2020 has three policy priorities to: (i) use key Digital Enablers, (ii) increase citizens and businesses mobility by cross-border interoperability, and (iii) facilitate digital interaction between administrations and citizens/businesses for high-quality public services (EC, 2015).
- In Australia, many governments launched their digital government strategies. The Victorian Government’s digital strategy aims to ensure that the Government and all its customers interact effectively and productively online. It is a real transformation towards a new customer-centric state where the digital presence is organized for and around citizens, businesses and communities (KPMG, 2013).

### 4.4. Digital Government Key Issues

The shift from e-Government path, targeting greater organizational efficiency, to a digital Government based approach, addresses key transformational issues: adoption of citizen-driven model, new governance mode based on open government principles, Data Potential Unlocking, “digital by default” imperative and digital security challenges.

#### 4.4.1. Citizen-driven Model for a more Open Government

Today’s focus is on technology as an enabler for a connected government supporting democratization by providing the means for politicians to be better informed about public opinions, empowering citizens’ participation in real-time political consultations, involving them the process of public services’ co-design co-creation and increasing their use of social networking to influence political processes.

Therefore digital transformation of the government is more and more based on a Citizen-driven model, placing citizen participation at the heart of the governmental services design, development and management process (NICTA, 2014) (Gohar Khan, 2015);

The Citizen-driven model means that agencies give priority to customers’ needs by making easier both required information finding and sharing, and important administrative tasks accomplishment. This model targets a high-standard of timely data, informative content, simple transactions, and seamless accessible two-way interactions.



This will ensure citizens to build their own set of public services adapted to their personal needs at different stages of their lives.

Consequently, public agencies role is transformed, as they target not only a high quality service provision, but also stronger collaboration with citizens, businesses, and other administrations, more democratic participation of all the recipients, and better lessening of social preoccupations. Such new governance modes are complementing traditional ones, making them more agile to drive policy-making processes. They also help them to become more transparent, collaborative and participatory, leading to the establishment of an “Open government” (Davies, 2015). As illustrative example, Victorian Government’s digital strategy in Australia is based on a customer-driven principle, with objectives of productivity improvement by reducing customer effort, organizing the information on the basis of citizens and business’s needs, and ensuring better relevance, accessibility and security for the content and the online experience.

On another hand, the USA/DGS adopted a resolute “Customer-Centric” approach, influencing both modes of data creation, management and delivery, and allowing customers to shape, share and consume information, whenever and however they want it. For this strategy, digital services must be designed and delivered with customer service first in mind and reflect the technologies used by today’s customers (WH., 2012). Therefore, absorbing the Government complexity is reached by developing innovative, transparent, customer-facing, value-added products and services efficiently and effectively. In same perspective, measurement of performance and customer satisfaction is institutionalized and applied as unavoidable practice in order to improve public service delivery. Consequently, common analytics and customer satisfaction measurement tools were identified to enable the aggregation of the collected data at the federal level, and governmental agencies were required to use tools on all “.gov” websites within 6 months.

#### 4.4.2. Data Potential Unlocking

The progress towards a more participative governance way is possible thanks to the large quantities of online data provided through e-Government services and which can be analysed by all the stakeholders, to ensure that public actions are really suitable to fit society’s needs and goals. In this perspective, more and more governments decide to open up their data, in order to realize to improve transparency and accountability (Blake Johnson, 2011).

Open Government Data (or Open Data) principles refer to unrestricted access to government information, excluding personal information and security sensitive data from governments. The broader understanding of Open Data perceives it as data that is (Davies, T. *et al.*, 2013) (Davies, 2014) :

- Generally accessible online as evidenced by, for example, its inclusion in a national data portal, or the fact that it is being widely accessed by a range of actors operating independently of one another ;
- Machine readable as evidenced by use of non-proprietary digital formats, and the data being structured in ways that allow it to be filtered, sorted, reshaped and manipulated without copying/pasting or re-typing in data ;
- Practically / legally re-usable which may involve the availability of an open license that grants explicit permissions, or may involve the existence of wider legal or cultural frameworks that enables the practical re-use of the data.

Open Data exploitation contributes to the development of tailored dynamic, responsive, user-friendly governmental e-services, able to anticipate trends, produce forecasts and set priorities through data analytics possibilities. By developing these capabilities, structured and unstructured data analytics is definitely considered as a core competency making government smarter (Deloitte, 2011).

Implementation of data-driven culture in public sector is strongly recommended by International Organizations, while numerous governments have built their digital transformation strategies upon the unlocking of Data potential. Indeed, OECD recommends to develop frameworks to enable, guide, and foster access to, use and re-use of, the increasing amount of data to increase openness and transparency, and to incentivize public engagement in policy making, public value creation, service design and delivery (PGC, 2014).

Another example comes from USA/DGS which has adopted an “Information-Centric” approach moving agencies from managing “documents” to managing discrete pieces of Open Data and content which can be surfaced as the best information and made widely available through a variety of useful formats. On another hand, the economical potential of government data is also a main key driver for Open Data initiatives. Indeed, transparency of government rules and decisions, reduce risks and transaction costs for businesses, while equal access to information contributes to reduce corruption and strengthen competition.

Furthermore, Open Data is perceived as “digital fuel of the 21st century”, a reusable raw material supporting new economic activity and niche markets. New ways of aggregating and analysing data within and across agency boundaries will lead to new opportunities for innovation based on Open Data principles where possible and in full compliance with privacy laws (Van der Meulen, 2016). Such innovation initiatives can transform Open Data in an “anywhere, anytime” meaningful contextualized information, pro-actively pushed to citizens on the basis of

their profiles and via smart technologies and devices. Therefore, Open Data potential can lead to strong creation of employment and new “start-up” firms.

#### 4.4.3. The “Digital by default” imperative

To achieve digital government objectives, numerous states have adopted a “Digital by default” (DbyD) policy (GOV-UK, 2012) (GSA, 2014), making digital services the default channel for public services delivery as well as for internal and external interactions. The digital channel is sometimes even placed as primary mean for delivery of government information and services (KPMG, 2013).

Such movement towards greater digitalization in the public sector is accelerated by expected costs reduction. For example, in United Kingdom, making services Digital by Default, can imply an estimated saving of between £1.7 and £1.8 bn per annum (Cabinet Office, 2013). It is no longer a simple case of channel shift. People expect to be remembered when they return to a website. Therefore, harnessing customer data to make available personalized and relevant digital experiences is an appropriate approach to make people switching to lower cost online channels. In this perspective, use of open standards, mutualized platforms, and increased market choice can boost both DbyD effort and progressive convergence on cheaper and standard public services (Fishenden et Thompson, 2013). It is, for example, the case of USA/DGS “Shared Platform” approach helping to work efficiently and consistently both within and across agencies, as well as making the most use of resources by “innovating with less” and reducing duplication.

#### 4.4.4. Digital Security challenges

Digital government is based on unprecedented open release of government information, coupled to high-volume exchange of highly sensitive and/or personal data information, among government agencies and with their customers. At the same time, digital trends such as cloud computing, mobility, social media, big data, and artificial intelligence give rise to several scary security challenges as well as concern for citizen privacy. The success of digital government program depends on how well it meets these challenges and how good it can deal with numerous potential threats ranging from simple act of hacking to cyber-terrorism.

In the light of these considerations, the OECD recommends strongly ensuring balance between the need to provide timely official data and the need to deliver trustworthy data, as well as managing risks related to increased data availability in open formats, and these related to digital security and privacy issues (PGC, 2014). To ensure this balance, it is often necessary to elaborate and apply special legal arsenal in terms of data protection and vulnerability risks management. Specific certifications of security management systems, as ISO/IEC 27001 (ISO, 2018), are also strongly recommended.

### 4.5. Technical Prerequisites

Any digital Government initiative encompasses specific technical prerequisites related to the IT maturity level of the concerned public entities, especially their readiness to use advanced digital technology, the opening and interoperability of their information systems, and their capabilities to supply integrated multiple channels services. To take up these technical challenges, it is essential to adopt best practices of IT governance and adapt them to governmental context, and especially in dealing with:

- persistent legacy made up of isolated and heterogeneous information systems generally acquired on a case-by-case basis, and then extremely difficult to evolve and to digitize;
- apparent contrast between large modernization and digital projects: with legacy, data takes centre stage – what it is, where it is, how to get to it, and how to integrate with it. With digital, the approach is outcome-based and citizen-centric. In this vein and thanks to its capabilities of connecting and hosting central core databases, cloud technology can remove many digital implementation barriers, and therefore help government to set-up a new delivery model;
- lack of interoperability of governmental systems that harms easy seamless exchange of secured data through public sector, as well as provision of better services at lower costs, and favouring the emergence of digital governmental services small islets, developed without real coordination between technical staffs;
- low level of governmental data quality (Belhiah, Bounabat *et al.*, 2015) due to differences in their standards, formats, codifications and semantics. Moreover, a non-compliant publishing mode of open data can harm all efforts in developing relevant applications unlocking governmental information potential;

The right digital technology choice able to help the public agency to accomplish its mission, and to efficiently respond to changes related to new administrative organization, legal arsenal evolution and adaptation, socio-economic conditions, and ever-demanding customers.

When not treated, these deficiencies can induce dissatisfaction and rejection of users, disturbance of operational functioning, errors of strategy, and increase of costs.

In this perspective, digital government infrastructure has to be reinforced by privileging the principles of common and open standards, secured Integration frameworks, mutualization of digital resources, and strong technological convergence.

## 5. Conclusion

Commencing from a multidimensional introduction of the e-government foundations (types, customers, interaction), we arrived at a set of new trends determinant for integrated and innovative public e-services development, particularly the predominant role played by digital SMAC technologies in this transformation. We then discussed key transformational issues that are therefore addressed: adoption of citizen-driven model, data Potential Unlocking, the “digital by default” imperative, and the digital security challenges.

The identification and discussion of specific technical prerequisites constitute only a first, small step on the road towards digital government. Such transition offers many opportunities but also major challenges. Future research should deal with all barriers encountered when developing digital government inclusive initiatives, mainly related to: (i) required regulatory issues addressing the most sensitive questions of national sovereignty, personal privacy, balancing national security and individual rights and the challenges posed by the “internet of things” (Silverman, 2017); and (ii) the institutional design (decision-making rules, policy design processes, evaluation mechanisms, etc.) affecting the collaboration process and network configuration proper to each government and its bodies (Sandoval-Almazán, R., Luna-Reyes, *et al.*, 2017).

Another axe to explore is identification and modelling of customer code Halo effect [702, 703, 704] in service public case. It can be defined as the digital footprints left by a citizen or an enterprise in his daily online interaction with public administrations. It is a very useful tool for detecting and evaluating the customer behaviours, and thus better targeting his needs in a proactive manner. Complementary and/or improved online public services can therefore be rapidly identified and proposed. Halo Code is the new basis of performance, helping government agencies to become intuitive in providing high quality citizen services, and to transcend from electronic to smart Government (Rubel, 2011).

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