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**SMART GOVERNMENT TRANSFORMATION:  
OPPORTUNITIES, CHALLENGES AND CHANGE  
MANAGEMENT STRATEGIES**

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## **LIST OF ABBREVIATIONS**

**AI** – Artificial intelligence

**G2C** – Government to citizen

**G2B** – government to businesses

**G2G** – government to governments

**ICT** – Information and Communication Technologies

**IoT** – Internet of Things

**RFID** – Radio Frequency Identification System



## INTRODUCTION

As the exponential development of ICT, information systems have been used in every stage of our daily life, from the social (personal) use to the government level. Especially in the 21<sup>st</sup> century, innovation, automation and digital transformation concepts have been involving into not only the private sector but also the public sector. This situation has plenty of rationales behind; one of them is to get clearer recognition of complicated issues raised from the social community and to have better relationships with citizens, private enterprises, non-profit organizations and governments (Mellouli, Luna-Reyes, & Zhang, 2014).

The digitalization trend affects also the public sector in addition to private institutions, and it creates new ways of services, as can be called “Smart Government” (Schedler, Guenduez, & Frischknecht, 2017).

Governments have started using ICT for improving their processes since the mid-1990s (Guenduez, Singler, Tomczak, Schedler, & Oberli, 2018). It should be indicated that private companies lead the way of the use of innovation in the public sector (AL Shamsi, Ameen, Isaac, Al- Shibami, & Khalifa, 2018), and innovation and economic growth of countries have a strong correlation. The developing countries’ primary focus is to successfully implement e-government procedures in all levels of governance.

The extension of e-government brings the new smart government concept with improved use of ICT in all the services provided by the governments (AL Shamsi, Ameen, Isaac, Al-Shibami, & Khalifa, 2018), with the aim of public service modernization (Schedler, Guenduez, & Frischknecht, 2017).

Despite the fact that many developed and developing countries are trying to engage with the need of digital transformation, the application of this transformation to every stage of execution has plenty of challenges in addition to its opportunities. In this research, it is intended to reveal the difficulties and possible benefits of technological development of governments, and to create a strategic point of view with the help of change management processes in the sense of citizen and government relations.

This research aims to focus on citizen and government (administration level) relationships as it can be briefly stated as C2G and G2C. The adaptation and engagement processes of the citizens in this digital transformation may bring many threats as well as possible benefits. These issues are originated from the resistance to change, different education and cultural status, being distant from new technologies such as mobile, social media, IoT, connectivity, cloud, and so on.

Continuous interaction between public authorities and citizens for decision and policy-making mechanisms must be acquired for this transformation. However, in order to create

the idea of “citizen as a partner” and to implement this mindset, governments need to create a clear awareness of the benefit of their engagement to the governmental system.

On the other hand, the challenges which may come from the administration level are needed to be considered as much as citizen engagement issues. The possible fear of release of government mistakes, unwillingness to use the network (technology) and refusal of change are the most possible challenges may occur on the administration level.

In addition, it is crucial that governments must gain the trust of citizens about the benefits of this transformation. Communication plays an essential role as a consequence of that, as well as defining the roles clearly of every participant. With the aim of maximizing the potential benefits of smart government, the suitable combination of technology, leadership, workforce and innovative culture within a proper strategy should be applied by governments.

The main goal of this research is to propose a guideline for C2G / G2C initiatives that is able to take advantage of the technologies (Mobile/IoT/Social media etc.) and to support the strategy for the digital transformation of countries.

For this purpose, the steps that are intended to be accomplished can be stated as follows: Defining C2G and G2C concepts, significant challenges and opportunities of C2G and G2C, characterizing the current situation of C2G and G2C with some best smart government initiatives (such as smart city, open governance, etc.) of the countries, presenting the strategies for improving the current implementations and proposing a guideline/roadmap to better address these challenges.

# 1 LITERATURE REVIEW

The population growth all over the world brings some risks and uncertainties; and for the aim of overcoming these challenges, governments are trying to find “smarter” methods (Nam & Pardo, 2011).

In order to create smarter communities, the government authorities all over the world try to incorporate technological competence with innovation (Clohessy, Acton, & Morgan, 2014). Developed countries deal with improvements in e-government technologies, whereas developing countries deal with system planning and implementation of technologies behind e-government (Zhang & Lan, 2019). Nevertheless, it can be claimed that most of the initiatives for the smart government are still in the preparation or trial stage (Schedler, Guenduez, & Frischknecht, 2017).

It is also stated in the Eurocities Annual Report of 2019 that one of the main focuses would be digital transformation and developing successful city models (which is an important element of the model of smart government) for 2020 (Eurocities, 2019).

## 1.1 Smart Government Concepts

E-government definition by OECD (2003) is “the use of information and communications technologies (ICTs), and particularly the Internet, to achieve better government”. According to Björklund (2016), e-government is “a representation of power that creates knowledge by organizing large amounts of data in specific manners”.

On the other hand, Dzamoska-Zdravkovska, Taskov, Ackovska and Petroska-Angelovska (2014) define e-government as “a way for governments to use the most innovative information and communication technologies, particularly web-based Internet applications, to provide citizens and businesses with more convenient access to government information and services, to improve the quality of the services and to provide greater opportunities to participate in democratic institutions and processes”.

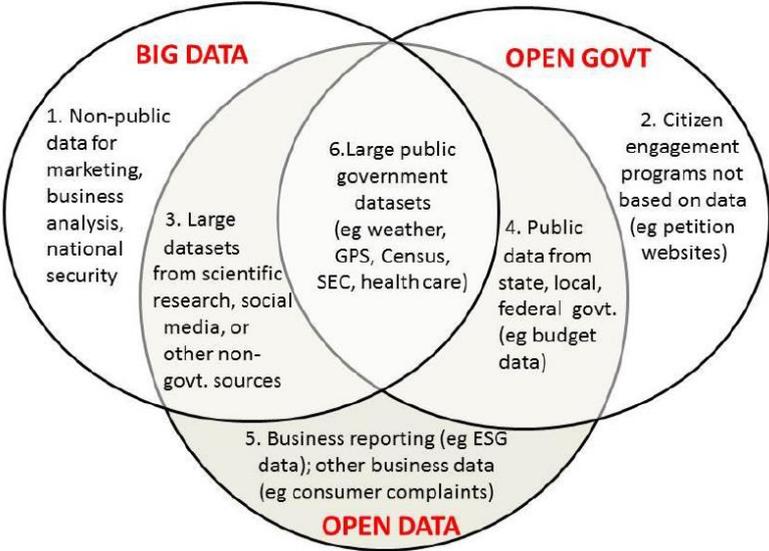
The improved usage of information systems and big data on the governmental level brings us the concept of “smart government” or “intelligent government” (Mellouli, Luna-Reyes, & Zhang, 2014). It can be claimed that smart government is considered as the top degree of e-government (Chen, Miao, & Wu, 2014). Nevertheless, being an intelligent government should not only be considered as integrating new technologies into the governance processes, but also these upgraded services have to serve the citizens better life quality and extensive engagement of citizens (Mellouli, Luna-Reyes, & Zhang, 2014), to help more citizens to reach more public services, efficiently and cost-effectively (AL Shamsi, Ameen, Isaac, Al-Shibami, & Khalifa, 2018).

Additionally, Gil-Garcia, Pardo and Aldama-Nalda (2013) indicate that “A “smart initiative” should be understood as a concrete action deployed by public organizations in order to face public issues derived from the urban growth, where ICT’s play a central role.”.

The occurrence of the smart government concept goes beyond the global financial crisis and economic recession, and the main purpose of this term is to create sustainable and collaborative integration of all governmental stages (AL Shamsi, Ameen, Isaac, Al- Shibami, & Khalifa, 2018). The smart government can be defined as “the implementation of a set of business processes and underlying information technology capabilities that enable information to flow seamlessly across government agencies and programs to become intuitive in providing high quality citizen services across all government programs and activity domains” (Harsh & Ichalkaranje, 2014). The smart government requires employing and harmonizing ICT for public services (from the planning stage to the running stage) to maximize benefits and can be defined as “IT-enabled smart sustainable development” (Chen, Miao, & Wu, 2014). It can be claimed that smart governments apply “smarter” actions into their processes (Gil-Garcia, Helbig, & Ojo, 2014).

Furthermore, in the literature, there is a concept named “Government as a platform (GaaP)”. Margetts and Naumann (2017) define it as “encapsulate the use of digital technologies to support the resolution of collective action problems at various levels (city, county, national, regional) through shared software, data and services - and thereby improve the efficiency and effectiveness of government and governance, doing more for less”. The GaaP concept is based on the information provided by the government, sufficiently skilled citizens, and the innovation comes from the combination of both.

Figure 1: Big Data, Open Data and Open Government Relationship



Source: Petrov (2014).

The superior use of ICT in public sector has caused the transformation through open government, with transparent data share (open data) between all the stakeholders of governments (Jiménez, Solanas, & Falcone, 2014).

Open data is defined as “the foundation of the information provided by the government, sets of data published by government that can be read and interpreted by either humans or machines” (Mellouli, Luna-Reyes, & Zhang, 2014). In the way of transformation from e-government to smart government, open data has an essential contribution to achieve the required outcomes.

Although big data, open data and open government have characteristics in common; it should be noted that they are different concepts by definition. According to a study conducted by Petrov (2014) , the relationship between those concepts is summarized as in Figure 1.

SWOT Analysis of Smart Government can be found in the Table 1. According to that, the main weaknesses of implementing smart government strategy are the need for workforce, time, budget and research. On the other hand, the opportunities are indicated as innovative systems, efficiency, effectiveness and cost reduction. However, it should be taken into consideration that these opportunities occur in the long term and authorities should not expect a quick and agile return.

*Table 1: SWOT-Analysis for Smart Government*

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Integrative IP-based approach</li> <li>• Intensification of networking</li> <li>• Vision: Smart Agencies</li> <li>• Vision: Smart Politics</li> <li>• Vision: Smart Civil Officers</li> <li>• Vision: Smart Citizens</li> </ul>	<ul style="list-style-type: none"> <li>• Development needs effort and time</li> <li>• Required financial expenses</li> <li>• Insufficient scientific foundation</li> <li>• Research &amp; development capacity</li> <li>• Sensor-data enables behavior tracking</li> <li>• Insufficient political prioritization</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>• Innovation potential and impulses</li> <li>• Novel intelligently networked objects</li> <li>• Novel intelligently networked services</li> <li>• Innovative cyber-physical systems</li> <li>• Increases in efficiency &amp; effectiveness</li> <li>• Cost and fee reductions</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of design readiness</li> <li>• Uncertainty vs. winning implementation</li> <li>• Disruptive nature of changes</li> <li>• Lack of permanent funding</li> <li>• Lack of acceptance and participation</li> <li>• Strategic exploitations of fears of transparency</li> </ul>

*Source: Lucke (2016).*

The possible benefits of smart government can be listed as following: Democracy in decision making, transparency, reducing the corruption, social benefit, saving in resources, high economic performance and high ethical standards.

A study conducted by Deloitte Insights (2019) indicates that, the potential benefits of smart government are “better quality life for residents and visitors”, “economic competitiveness to attract industry and talent” and “environmental sustainability”; whereas the potential risks

are “cyberrisk”, “struggling with smart city governance”, “data governance”, “deficient funding and financing” and “lack of strong leadership”.

According to a research, there are specific strategic factors that should be taken into account in order to successfully implement smart government processes (Guenduez, Singler, Tomczak, Schedler, & Oberli, 2018):

Institutional factors:

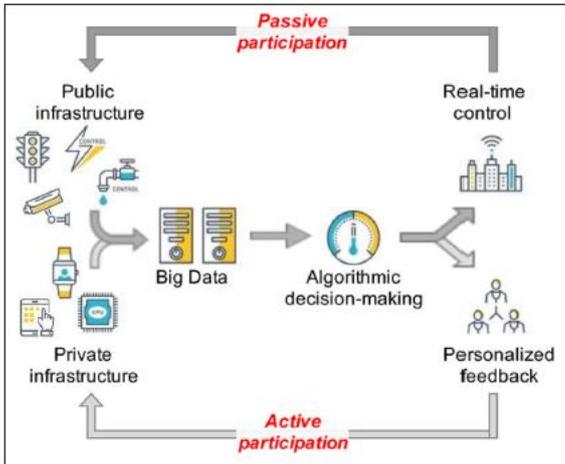
- 1. Political commitment
- 2. Clear governance
- 3. Legal understanding
- 4. Digital awareness
- 5. IT infrastructure and standards

Organizational factors:

- 1. Structure and processes
- 2. Organizational capabilities
- 3. Values
- 4. Human resources

Nonetheless; the implementation of smart government processes is not simple and smooth, plenty of risks and threats should be considered before the initializing the action. In addition to resistance to change; there are legal, technical, organizational, financial, strategic and political difficulties which the organizations have to face with (Lucke, 2016). A broad and well-planned change management strategy has to be considered before starting execution of smart government.

Figure 2: Active and Passive Citizen Participation in Smart Government Initiatives



Source: Guenduez, Singler, Tomczak, Schedler, & Oberli (2018).

Continuous interaction between citizens and between public authorities and citizens for decision and policy making mechanism must be acquired for this transformation. However; in order to create the idea of “citizen as a partner” and to implement this mindset, governments need to create a clear awareness of the benefit of their engagement to the governmental system. In Figure 2, it can be seen how the passive and active citizen participation could be in the smart government practice.

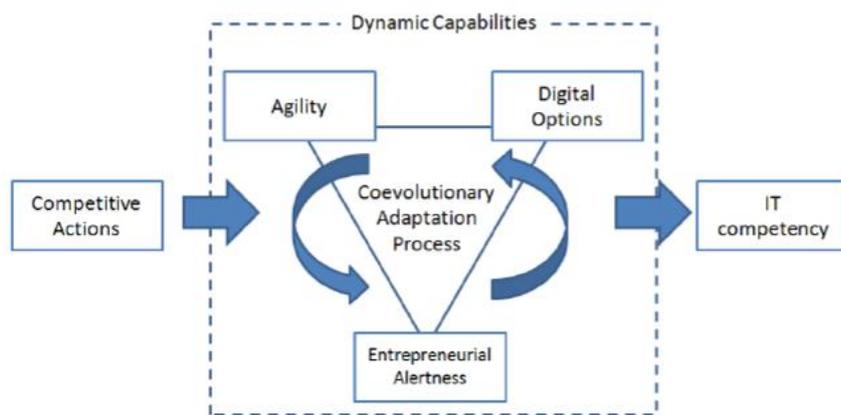
Complete internal and external coordination (government to citizens-G2C, government to businesses-G2B and government to governments-G2G) is a must for this transformation, as well as the readiness (willingness) to change of both citizens and public organizations because of the possible fear of release of government mistakes and unwillingness to use network of citizens. It is crucial that governments must gain the trust of citizens about the benefits of this transformation.

Continuous improvement and optimization need to be applied for all the stages of this transformation.

In addition to these challenges, it should be indicated that every country / region must prepare different implementation strategies in accordance with their political, cultural, economic and social characteristics (Zhang & Lan, 2019).

According to a study in Taiwan, the adaptation process of smart government is summarized as in Figure 3. The main dynamic capabilities are defined as “agility”, “digital options” and “entrepreneurial alertness” in order to success in smart government transformation (Chen, Miao, & Wu, 2014).

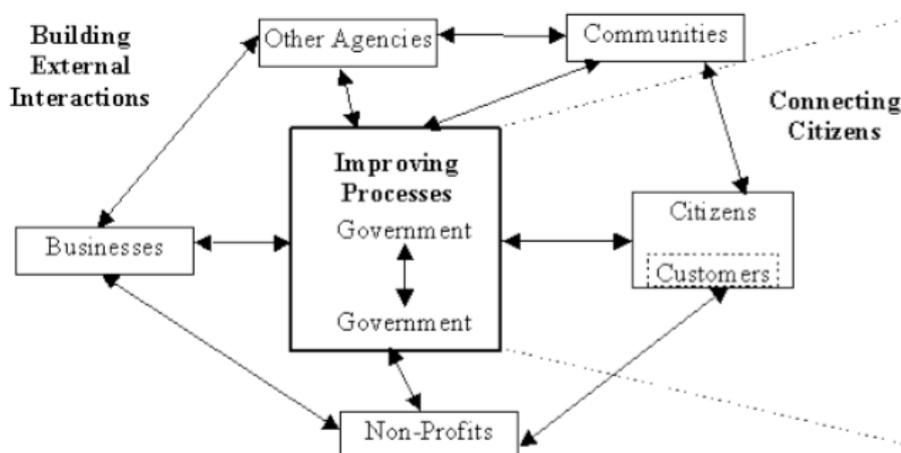
*Figure 3: The coevolutionary adaptation process*



*Source: Chen, Miao, & Wu (2014).*

With the aim of maximizing the potential benefits of smart government, the suitable combination of technology, leadership, workforce and innovative culture should be applied by governments (Harsh & Ichalkaranje, 2014).

Figure 4: The framework of e-government



Source: Glybovets & Alhawawsha (2017).

E-government and smart government concepts are positively related to each other but still address to different processes. E-government refers to reaching an effective, efficient and better service quality towards citizens and the private sector with the use of technology; on the other hand, smart government refers to solving environmental, social, service and financial issues of public sector by using innovative business models, governance policies and technologies (Glybovets & Alhawawsha, 2017).

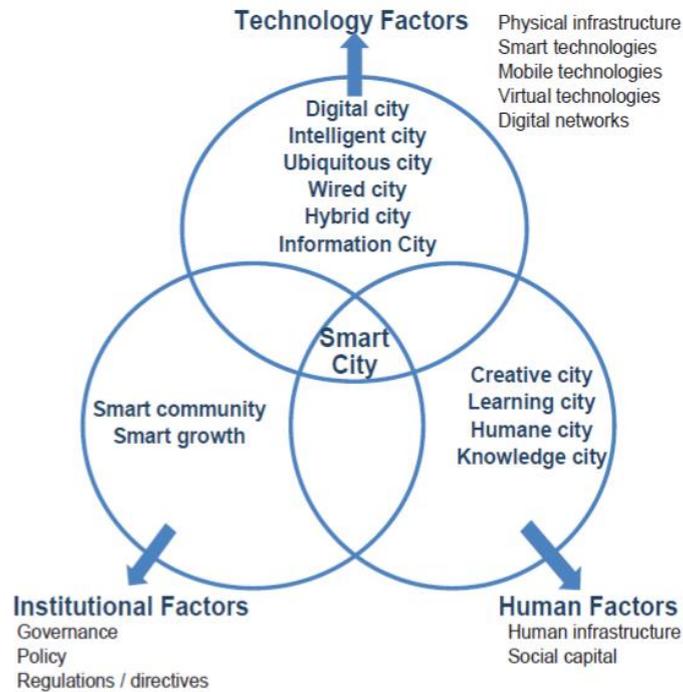
In the literature, smart city is acknowledged as a part of smart government, which refers to wider area (Anthopoulos & Reddick, 2016). A proper ICT infrastructure, automatized communication processes, and common goals between public and private stakeholders are essential for a successful smart city initiative (Foo & Pan, 2016). According to Lee and Lee (2014), smart city is not a brand-new concept, there have been many progresses towards smart city concept such as “intelligent city, information city, knowledge city, digital city and ubiquitous city”.

“A city can be defined as ‘smart’ when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic development and a high quality of life, with a wise management of natural resources, through participatory governance.” (Simonofski, De Smedt, Asensio, & Snoeck, 2017)

Lamsade, Lamsade and Gascó (2017) define smart city as “an urban space that tends to improve the daily life (work, school, ...) of its citizens (broadly defined)”. In addition, smart cities can be defined as “the cities that monitor and integrate status of all their infrastructures, management, governance, people and communities, health, education, and natural environment through information and communication technologies (ICT)” (Ijaz, Shah, Khan, & Ahmed, 2016).

Nam and Pardo (2011) specify the fundamentals of a smart city in three dimensions: Technology factors, Institutional factors and Human factor as can be seen in the Figure 5.

Figure 5: Fundamental Components of Smart City



Source: Nam & Pardo (2011).

## 1.2 Smart Government History

The concept of e-government has been developing over the last 20 years with the aim of maximizing the benefits of relationships between the citizens and other partners via technological applications (Gil-Garcia, Zhang, & Puron-Cid, 2016).

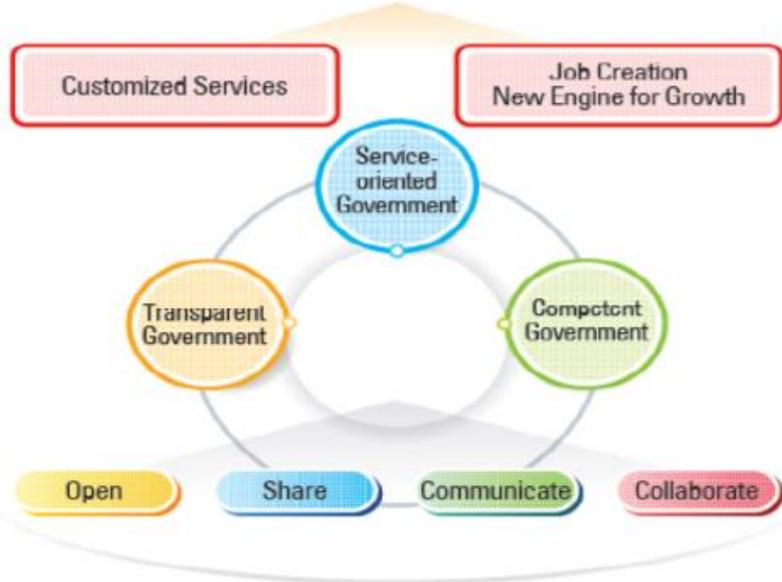
The development of the digital transformation of governments can be analyzed with the levels of government 1.0, government 2.0 and government 3.0.

The traditional model, which occurred between 1980 and 2000, and affected mostly by the Internet, is called Government 1.0, and followed by Government 2.0 model that includes e-government and open government concepts (Petrov, 2014). Government 2.0 model occurs via active citizen participation and going through the way of smartness (Gil-Garcia, Zhang, & Puron-Cid, 2016).

When there is only one-way of communication between government and other parties, such as presenting the services, we would be talking about government 1.0 (Song, 2014). On the other hand, government 2.0 refers to the two-way interaction between government and others (Song, 2014). Governments are becoming smarter with providing personalized services,

open and active information share and collaborative work with other stakeholders, which can be defined as government 3.0 (Song, 2014). As can be seen in the Figure 6, the strategic framework of government 3.0 should include customized services, new job creation with the help of openness, sharing, communication and collaboration (Song, 2014). It is estimated that openly shared information helps to create new jobs, to start new businesses, and as a result, the growth of the economies (Song, 2014).

Figure 6: Government 3.0 Strategy



Source: Song (2014).

Governance models are continuously evolving, bringing new roles to administrations, citizens and other stakeholders like companies and non-profit organizations. All the collaborators are becoming more integrated, connected and coordinated with the use of ICT.

The usual e-government concept is characterized as “the automation of administrative processes towards paper-free offices, data maintenance, information retrieval, inter-departmental communication, and work-flow automation” (AlEnezi, AlMeraj, & Manuel, 2018), which can be concluded as more administrator-centric than citizen-centric.

The following progress from e-government is becoming “smarter”, which brings us to the concept of smart government, or with other words Government 3.0 (Petrov, 2014). Even though the term of being “smart” has increased during the last decade, we have been facing with rapid technological developments, especially under the digital transformation concept. The concept of smart requires being effective, efficient, open, secure, sustainable and rapid (Petrov, 2014).

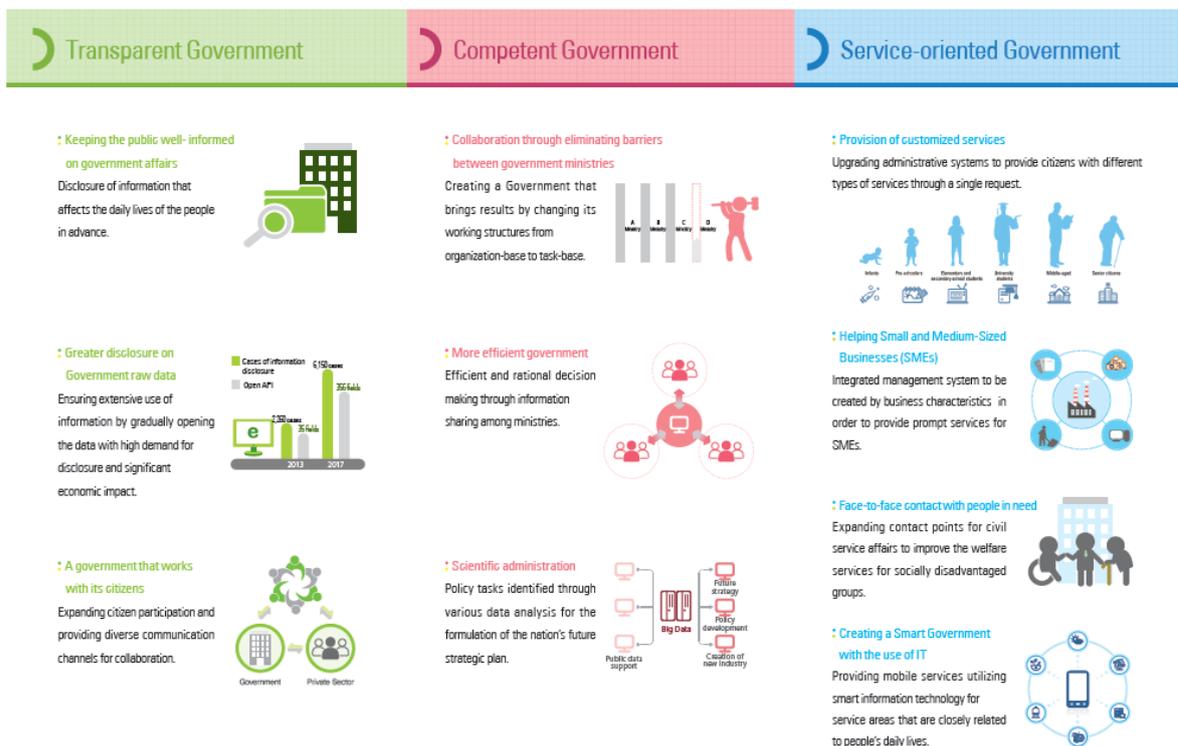
For the aim of becoming a successful government 3.0, governments should be transparent in all the services including finance, competent, efficient, service and people oriented (Song,

2014). It is vital to make sure that every individual can take advantage of the governments' services. In addition, Government 3.0 requires the usage of complex information technologies to merge information, structures, stakeholders for improved services towards citizens (Chatfield & Reddick, 2019).

Petrov (2014) defines the concept of smart as a government model as following:

- **Social** (allowing citizens and civil society to co-create with Government, especially via social media and crowdsourcing tools)
- **Mobile** (using the latest mobile technologies to deliver information and services, and get contributions from citizens, wherever and whenever they want)
- **Analytics** (using big data Analytics, sensors, and context Aware services)
- **Radical openness** (accountability and transparency, and engages citizens in co-creation, as well as enable businesses to use data for innovative new services)
- **Trust** (effective cybersecurity)

Figure 7: Government 3.0 Fundamentals



Source: Song (2014).

In the literature, the concept of “smart government” was used for the first time in the articles in 2012 (Anthopoulos & Reddick, 2016).

The first use of the term “smart city” in the literature was in 1997 and has been growing since then; it is predicted that market size of smart city would be 3 trillion dollars by 2025

(Anthopoulos & Reddick, 2016). The “smart city” term started being used by companies since 2005 with their studies on city infrastructures and the implications of technology (Simonofski, De Smedt, Asensio, & Snoeck, 2017). This movement also is affected by environmental goals, the growing population and the change in citizen behavior and demands.

### **1.3 Smart Government Factors**

This section intends to state and describe the factors that affect smart government transformation in the literature.

#### **1.3.1 Areas**

The services which can be supplied by smart government include health system, education, security and information sharing (Al-Obthani & Ameen, 2018).

The main areas of smart governments can be listed as; communication with citizens, services provided to citizens, democratic processes such as voting and collective decision making, and internal communication in administration level (Al-Obaithani, Ameen, Nusari, & Alrajawy, 2018).

One of the most used components of smart government by countries is e-invoice, which helps to decrease cost (Chen, Miao, & Wu, 2014). Additionally, the other areas of smart government are transportation, energy consumption, education, e-voting, online/mobile payments of public services, smart thermostat, smart umbrella, smart campuses, smart airports and so on.

However; for e-voting area, some claim that it brings more complexity and risks compared to traditional voting system, it is exaggerated that new technology would be a great solution for existing problems and generates security (Moynihan, 2004).

IoT enabled technologies can be used to balance and optimize energy and water consumption, to analyze and plan traffic jam and traffic accidents, to predict epidemics for improving public health (Kankanhalli, Charalabidis, & Mellouli, 2019).

Deloitte Insights (2019) defined the three main elements of smart government as “smart ecosystems”, “smart connectivity and data” and “smart platform and engagement”. Smart ecosystems refer the unified work of public authorities, private companies, startups and citizens.

### 1.3.2 Citizen Engagement

Smart government is an approach with the aim of better service to citizens and making their lives easy and happy by applying ICT in public organization (Yaghi & Al-Jenaibi, 2017).

Some could claim that, “data, governance and participation” are the main themes of smart government concept (Mechant & Walravens, 2018). In order to solve the problem of lack of trust from citizens towards government, it is claimed that the usage of IT can be helpful along citizen satisfaction or citizen participation (Moynihan, 2004).

Despite the fact that ICT is the fundamental of smart governments, citizens should be the main focus of governments in the sense of culture, experiences, knowledge and so on (Lamsade, Lamsade, & Gascó, 2017). With the help of emerging technologies, it is possible to find different ways for cooperation with citizens for political decisions (Schedler, Guenduez, & Frischknecht, 2017).

Being a smart government is highly related with citizen participation within different areas of administration from developing the idea to assessing the project after implementation. Citizen participation is “participation of citizens in the planning and administrative processes of government” (Simonofski, De Smedt, Asensio, & Snoeck, 2017).

As a result of one of the main aims of smart government - to serve best quality services to citizens - the right strategy is to be in collaboration with citizens in every area possible (Simonofski, De Smedt, Asensio, & Snoeck, 2017) and providing citizens a clear awareness in order citizens to feel themselves as the center of this transformation.

Open data is one of the most important elements of being a smart government; encouraging citizens to use open data helps to create innovative and citizen oriented projects and applications (Degbelo, et al., 2016).

However; it is needed to be taken into consideration that open data would be unsuccessful to meet the goals if there are not enough incentives for all the participants of smart government (Degbelo, et al., 2016).

If governments have a clear strategy and guideline for open data, they could benefit in many ways including becoming more transparent, collaborative, efficient and effective. Otherwise, the real situation would not reach the expectations of open data plan. On the other hand, open data execution brings a number of risks regarding privacy and legal issues. Illegal exposure of data or misbehavior usage of private data could cause many negative effects on government and citizens (Degbelo, et al., 2016). Therefore, trustworthiness is vital for citizens to share their data and governments have to provide reliable contracts and statements to gain citizens’ confidence on open data applications.

Degbelo et al. (2016) summarize the challenges of smart and open cities as following: empowering citizens, analytical methods and tools, and citizen-centric services as can be seen in the Figure 8. According to the study, citizen empowerment, including deep participation and data literate citizenry, is an essential element in terms of having fully collaborative structure. Not only the citizen engagement and collaborative work with the community as a whole, but also educated citizens are needed in order to achieve the desired goals of smart and open governance.

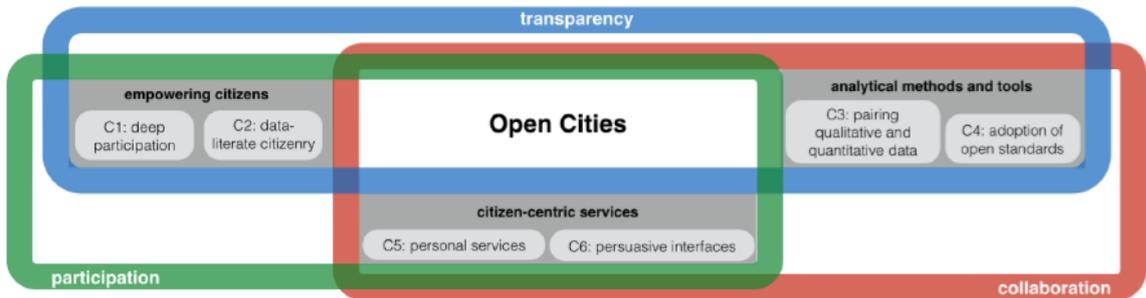
One of the main elements of smart government is creativity, which is strongly related to citizens, the relationship between citizens and authorities, culture, education and knowledge (Nam & Pardo, 2011).

In addition to citizen empowerment, Degbelo et al. (2016) suggest that governments must provide accurate and user-friendly analytical methods and tools for citizens to use and for governments to make the best benefit out of this implication.

In the sense of citizen-centric services, it is important to have personalized services for each individual and accurate data with meeting the legal requirements of privacy (Degbelo, et al., 2016).

With the aim of being smart and open government, there are a number of tools and methods to be used by governments. One of them appears as “The Open City Toolkit” , with the definition of “a collection of tools, processes, specifications and guidelines to empower citizens to participate in and shape the future of their cities, and to deliver services based on open data that are useful for citizens, businesses and governing bodies alike.” (Degbelo, et al., 2016). The OCT can provide “technology-driven” and “citizen-centric” software to maximize citizen engagement in the smart city applications.

Figure 8: Citizen-centric challenges



Source: Degbelo et al. (2016).

Having citizens in the center of smart government initiatives, in other words, creating e-citizenship, consists of four different elements: e-administration, e-governance, e-government and the learning city (Lee & Lee, 2014). According to the study, e-

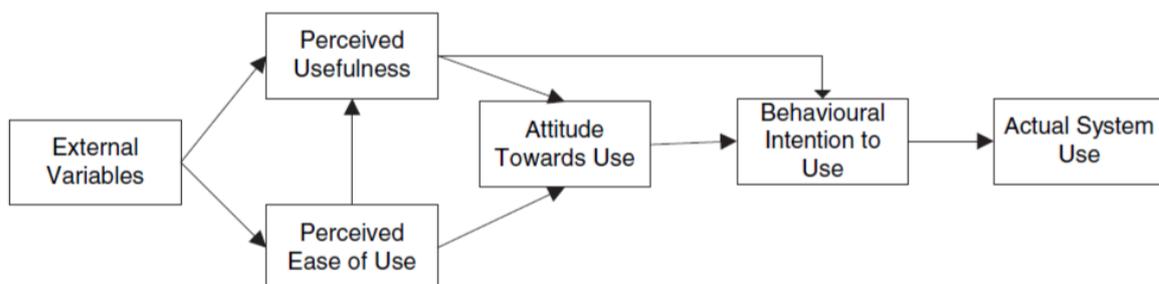
administration can be classified in eleven categories: “transportation, public health, medical care & welfare, environment, crime & disaster prevention, facilities management, education, culture, tourism & sports, distribution, work & employment” (Lee & Lee, 2014).

When it comes to having a standard typology for smart government applications, the literature states that most of the studies have focused on the administration point of view, not the citizen perspective. In the interest of serving citizens the information as clear as possible and helping citizens to be aware of the content, benefits and personalized advantages, all the participants of smart government initiatives should contribute for having citizen-centered approach (Lee & Lee, 2014). For that purpose, Lee and Lee (2014) suggest that governments should have clear definitions on four major dimensions of smart city applications: “Mode of Technology, Service Purpose, Service Authority, Delivery Mode”. Automation, transformations, ICT tools and methods, aims of the service are some of the sub-dimensions under these typology requirements.

Additionally, it should be noted that all the services must be connected and communicated with each other; for example, if an elderly person has an accident at home and calls for an emergency situation using online services, health system, the police, and welfare functions for insurance and for family members should be triggered at once and with real-time data (Lee & Lee, 2014).

Citizen engagement of Smart Government initiatives has become one of the most critical challenges to be examined. In order to identify the factors related to citizen behavior on information systems usage in government services, Carter and Belanger (2005) suggest that some theoretical models can be used, such as Technology Acceptance Model (TAM), Diffusion of Innovation and trustworthiness model. Even though these models are being used for e-commerce, it is logical to develop a strategy according to these models to analyze user acceptance of web-based government services.

Figure 9: Technology Acceptance Model (TAM)



Source: Carter & Bélanger (2005).

According to Davis’ Technology Acceptance Model (TAM) (1989), perceived usefulness and perceived ease of use affect system usage behavior, as can be seen in Figure 9.

The study with using the Technology Readiness and Acceptance Model (TRAM) shows that the more innovativeness the more tendency to use data standards (Mechant & Walravens, 2018).

Carter and Belanger (2005) conducted a research about citizen intentions on e-government services with combining three models (TAM, DOI, Trustworthiness), as can be seen in Table 2.

*Table 2: Theoretical comparison of three models*

	TAM	DOI/PCI	Trustworthiness
Focus	Perceptions and attitudes towards technology	Technology characteristics, market (supply–demand) adopters' characteristics	Citizens' perceptions of the trustworthiness of government and technology
Primary unit of analysis	Individual users/non-users	Organizations, individuals	Individuals
Disciplinary background	Management Information System (MIS)	Sociology, communication, policy, MIS	Political science, public administration

TAM, Technology Acceptance Model; DOI, Diffusion of Innovation; PCI, perceived characteristics of innovating.

*Source: Carter & Bélanger (2005).*

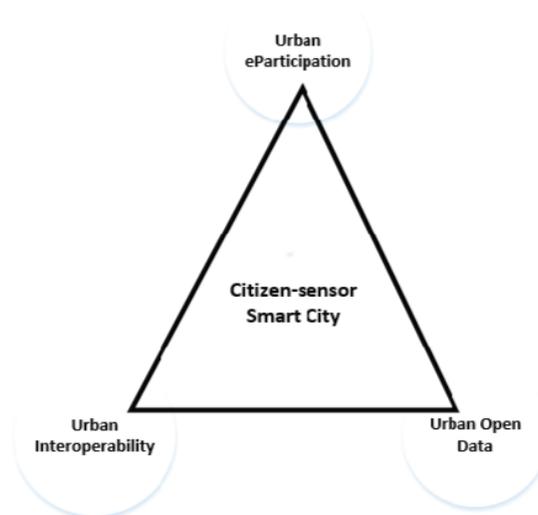
According to the results, three factors directly influence the citizen behavior: perceived ease of use, compatibility and trustworthiness. If the system is easy to use and navigate, citizens are more likely to use e-government services (Carter & Bélanger, 2005). Likewise, if the system is similar to what citizens are used to, in a way that they regularly use on a daily basis (social media, e-commerce web sites, e-mail services etc.), citizens would be more likely to use e-government services (Carter & Bélanger, 2005). Finally, trustworthiness is one of the most impactful factors on citizen behavior. The more the trust towards internet and government, the more tendency on the usage of e-government services (Carter & Bélanger, 2005).

Cano, Jimenez and Zoughbi (2015) proposed a model for smart cities in which citizens are in the center of the strategical design, as shown in Figure 10. Sharing information with citizens and having an effective public-private partnership are crucial for creating a proper strategy on e-participation (Cano, Jimenez, & Zoughbi, 2015).

In the sense of creating a smart city, it is essential to integrate the services with information technology and with advanced analytical tools, to have the citizens on the main focus of this transformation, and to provide necessary consultation to citizens (Ceballos & Larios, 2016).

“Citizen centricity is a key dimension characterizing smartness in government. It implies that governments know what citizens want and use ICTs to fulfill citizens' needs and provide personalized information and services.” (Gil-Garcia, Zhang, & Puron-Cid, 2016)

*Figure 10: Citizen sensor triangle model*



*Source: Cano, Jimenez, & Zoughbi (2015).*

### 1.3.3 Enterprises and Other Stakeholders

Smart government transformation process has complicated structure with different stakeholders like private companies, citizens, universities and associations (Mechant & Walravens, 2018). This situation leads to have a multidisciplinary point of view. Businesses, academic organizations and NGO's have an essential effect on smart government transformation through conducting various studies about smart government and helping the strategic, legal and sociological part of the transformation process. Therefore, it is crucially important to create a collaborative work environment with enterprises and other stakeholders.

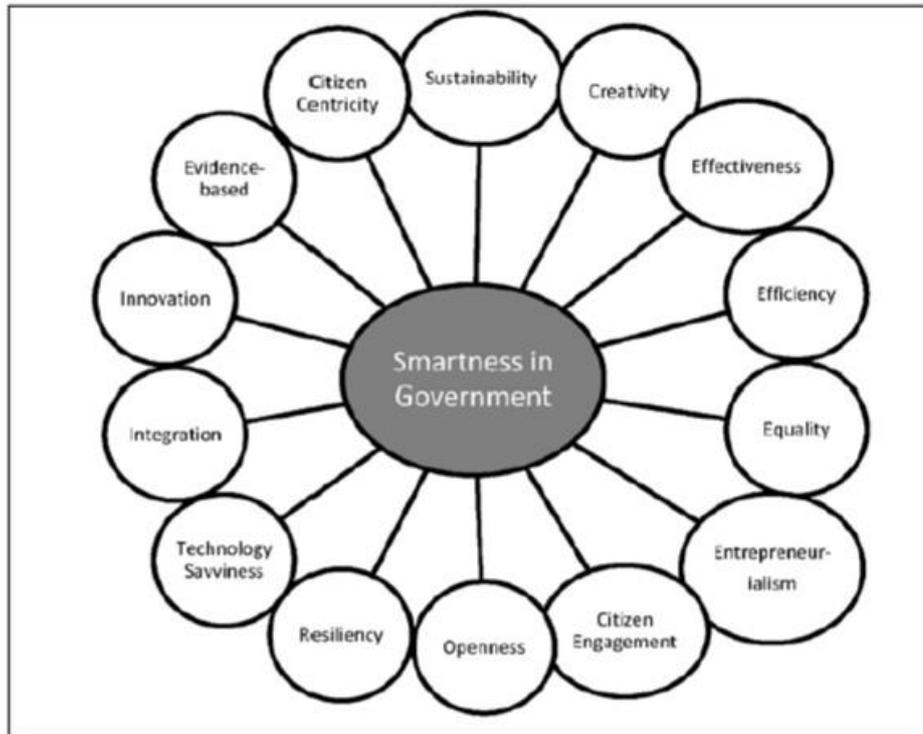
### 1.3.4 Characteristics of Smart Government

According to a study conducted by Gil-Garcia, Zhang and Puron-Cid (2016), there are fourteen characteristics of smart government in the literature as can be seen in the Figure 11: “integration, innovation, evidencebased, citizen-centricity, sustainability, creativity, effectiveness, efficiency, equality, entrepreneurialism, citizen engagement, openness, resiliency, and technology savviness”.

Integration refers to the integration of information among all the participants of smart government, in order to achieve efficient, effective and transparent operation of services.

“Integration is a key dimension characterizing smartness in government. Integration and inter-organizational information sharing in government agencies allow for better communication, response, coordination, and service provisions for citizens, making the government smarter.” (Gil-Garcia, Zhang, & Puron-Cid, 2016)

Figure 11: Characteristics of Smart Government



Source: Gil-Garcia, Zhang, & Puron-Cid (2016).

Innovation is one of the main elements of smart government and it should be applied carefully due to the risks of lack of planning, managerial and organizational skills (Gil-Garcia, Zhang, & Puron-Cid, 2016). Governments have to take benefit from innovation in order to better understand citizens, to determine properly citizens' needs, to resolve issues quickly and react in advance (Anthopoulos & Reddick, 2016).

On the other hand, smart governments must take environmentalism into consideration. Waste management, recycling, green and renewable energy, air and water quality initiatives have to be implied in order to keep sustainability (Gil-Garcia, Zhang, & Puron-Cid, 2016).

In addition, governments should be well organized and sensitive about sustaining social equity towards different communities and groups in the society. Equal services should be provided to every single citizen and participation opportunities should be served equally towards all the individuals.

Transparency is another key element for smart governments in the senses of creating trust, preventing corruption and presenting democratic decision making with all the actors involved (Gil-Garcia, Zhang, & Puron-Cid, 2016).

### 1.3.5 Challenges

Analyzing the challenges of smart government in an early stage of planning is essential for a successful performance (Schedler, Guenduez, & Frischknecht, 2017). It should be noted that there is no one way of becoming smart for governments, and becoming smart does not only involve technology (Gil-Garcia, Zhang, & Puron-Cid, 2016). Besides, the smart government should be considered as an ongoing process, it will not be achieved at a certain time, but it will keep developing with the progress. Smart government needs a “forward-thinking approach” to achieve its potential benefits (Chatfield & Reddick, 2019).

Although most smart government initiatives have been successful, there is a lack of understanding of “why” and “how” by administrators (Yaghi & Al-Jenaibi, 2017). This might lead an unsustainable achievement for public agencies. In order to overcome this challenge, the full awareness of administrators, as well as citizens, should be provided via having an open communication and training.

Furthermore, “the lack of moral motivation of public agencies”, “poor citizen awareness”, “inadequate organizational readiness”, “confusion on implementing the policy in different ways”, “organizational commitment”, “decentralized approach”, “resistance to change”, and “insufficient infrastructure” are the possible challenges for smart government implementation (Yaghi & Al-Jenaibi, 2017).

Another challenge for governments to become smarter is resistance to change of administrative offices regarding openly sharing public information (Song, 2014).

Nonetheless, smart government initiatives deal with many technical, organizational and policy challenges such as interoperability, data privacy and security, sustainability and ethical issues (Kankanhalli, Charalabidis, & Mellouli, 2019). Farahat, Tolba, Elhoseny and Eladrosy (2019) summarize the security challenges as confidentiality, data loss and availability.

The accuracy and reliability of shared information is another issue to be considered by governments (Song, 2014).

According to Kalvet (2012), the main reasons for deficiency of smart government are leadership failures, financial inhibitors, digital divides and choices, poor coordination, workplace and organisational inflexibility, lack of trust and poor technical design.

Schedler, Guenduez, & Frischknecht (2017) point out that the main challenges of smart government are regarding privacy, security, transparency and lack of trust and skills needed. They also mention that management level commitment is crucial for dealing with technological change in addition to capabilities and expertise (2017). According to their study, the most common barriers for smart government adoption are “skills and know-how”,

“legal foundations”, “financial resources”, “management support”, “readiness for innovation” and so on. The full list can be seen in the Table 3.

*Table 3: Barriers for smart government adoption and their operationalization*

Barriers	Operationalization of the barriers <i>Keywords</i>	Frequencies		Unit of analysis	
		Interview <i>present</i>	<i>absent</i>	<i>present</i>	<i>absent</i>
Legal foundations	lacking legal bases strict laws constraints in dealing with data constraining effects of laws	22	10	35	157
Technical infrastructure	insufficient technical infrastructure insufficient IT-infrastructure	20	12	36	156
IT standards	lacking compatibility of IT-infrastructures lacking standardization of information and communication technology	16	16	22	170
Political benefit	lacking political intention, interest or motivation	13	19	20	172
Plurality	plurality of actors democratic system	17	15	29	163
Silo-thinking	lacking willingness for cooperation silo thinking lacking connectedness between relevant actors	20	12	26	166
Swiss political system	federal system inertia of the politico-administrative system autonomy of authorities or political communities	13	19	21	171
Scarce financial resources	high costs shortage of financial resources focus on costs than on benefits	22	10	33	159
Effectiveness	constraints about effectiveness and/or efficiency relationship between costs and benefits	14	18	17	175
Discomfort	emphasized risks fears and concerns insufficient or lacking security	21	11	30	162
Citizens' response	citizens' resonance citizens' acceptance participation of the citizens	12	10	22	170
Skills and know-how	lacking expertise lacking interdisciplinary insufficient understanding lack of specialists	24	8	32	160
Readiness for innovation	resistance to change unwillingness to innovate	20	12	30	162
Risk aversion	insufficient or lacking fault tolerance risk avoidance	13	19	15	177
Long-term thinking	lacking long term orientation lacking general strategy lacking vision	20	12	26	166
Management support	lacking initiative of politico-administrative management lacking support of politico-administrative management	21	11	32	160
Contested benefit	questioned potentials questioned need questioned benefits questioned relevance	10	22	11	181

*Source: Schedler, Guenduez, & Frischknecht (2017).*

Since smart government transformation requires mainly the usage of ICT, security and privacy matters happen to be significant challenges. Web technologies are vulnerable to cyber attacks, viruses and frauds, and any kind of attack or data leakage might cause crucial problems; as a result of that, the necessary information security precautions must be applied (Ijaz, Shah, Khan, & Ahmed, 2016). Some examples of these precautions can be listed as following: Appropriate implementation of these technologies, security testings, contingency plans, secure communication and wireless networks, encryption, data coding, antivirus,

firewalls, secure APIs, authentication, access control filters, etc. (Ijaz, Shah, Khan, & Ahmed, 2016).

One of the best ways to minimize those challenges is to have a collaborative environment with private industry, NGO's and citizens on developing technological policies and infrastructure (Kankanhalli, Charalabidis, & Mellouli, 2019).

In order to be successful in smart government transformation, it is important to have public sector's lead, private sector's cooperation, technological infrastructure, strong legislative basis and knowledge/education of new technologies (Goede, 2019). Additionally, the system should be seen as a whole, should fit different kinds of services and should be flexible to cope with changes (Kütt & Priisalu, 2014).

#### **1.4 Technology for Smart Government**

For the purpose of surviving and dealing with diverse challenges, governments should merge and apply different technological tools and operations (Gil-Garcia, Helbig, & Ojo, 2014). As Gil-Garcia, Helbig and Ojo (2014) mentioned in their study, some governments' main focus is new technologies; on the other hand, some governments target innovation in public services.

The main purpose of smart governments is to manage economic, environmental, public and administrative issues in a smarter way, with the help of advanced technologies (Ijaz, Shah, Khan, & Ahmed, 2016). In order to achieve that, the integration of organizational processes with advanced ICT becomes a must for governments. Such advanced technologies include IoT, smartphone technology, RFID, smart meters, artificial intelligence, cloud computing, collective intelligence, software, biometrics, and so on (Ijaz, Shah, Khan, & Ahmed, 2016).

The most important thing for smart governments is to combine information, technology and innovation with a forward-thinking technique (Gil-Garcia, Helbig, & Ojo, 2014). Smart organizations, including smart government, smart city and smart community, have to operate with the newest technologies and nanotechnologies by nature in order to achieve their innovative goals (Gil-Garcia, Helbig, & Ojo, 2014).

IoT combines items and the system itself in order to provide different services to different partners (Kankanhalli, Charalabidis, & Mellouli, 2019). IoT includes "billions of "smart" objects and devices, from sensors, industrial and utility components to cars, trucks, machines and other ordinary objects using wireless technology to connect to the Internet, that transform the way we work, connect, communicate and consume products and services" (Chatfield & Reddick, 2019). Implications of IoT help providing variety of services to people, enterprises and governments (Kankanhalli, Charalabidis, & Mellouli, 2019). IoT applications can be seen in many areas such as smart homes, smart cities (smart parking, noise maps, smartphone detection, traffic, smart lighting, waste management and smart

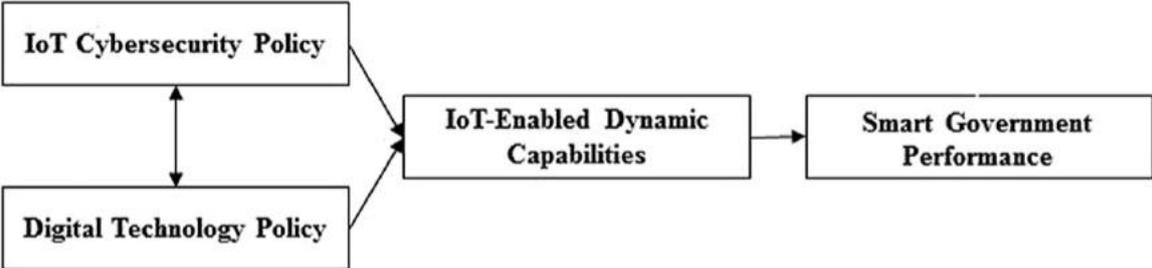
roads), connected cars, healthcare (patient position sensor, blood pressure sensor, body temperature sensor and so on), agriculture and wearables (Farahat, Tolba, Elhoseny, & Eladrosy, 2019).

With the help of AI and big data, IoT can be used for analyzing and learning continuously for building valuable services in different areas such as smart government (Kankanhalli, Charalabidis, & Mellouli, 2019). Big data analytics is beneficial for the improvement of public services if the data is used in an appropriate way and is helpful for the transformation of approaches by establishing new service models (Sarker, Wu, & Hossin, 2018). As the other new technologies, big data also helps public services to be more efficient, effective and better quality. The large amount of data which is used for big data analytics comes from “mobile phone users, social networking sites, various government and private websites, business software, daily household appliances and other smart devices” (Sarker, Wu, & Hossin, 2018).

However; big data is not being used for most of the countries yet. The main obstacle of that is having to require large financing and training to public agencies (Sarker, Wu, & Hossin, 2018). On the other hand, in case of a proper implementation of big data analytics to government system, there would be plenty of opportunities such as finding solutions for big and obscure issues of the community, better decision making, better coordinated agencies and services, and being more transparent. Notwithstanding; big data technology has also some risks in government services as privacy doubts and security of the information stored and collected (Sarker, Wu, & Hossin, 2018).

Since smart government initiatives include IoT enabled skills, there is a crucial need for policy making regarding cybersecurity and digital technology (Chatfield & Reddick, 2019).

Figure 12: A theoretical framework for smart government



Source: Chatfield & Reddick (2019).

Mobile devices are also crucial for smart governments. As a result of increasing daily usage of smartphones or tablets, governments try to adapt that technology into their processes and services to citizens (Al-Obaithani, Ameen, Nusari, & Alrajawy, 2018). Another reason of the importance of mobile devices in smart government is that mobile device usage does not need much IT education, knowledge or skills; they are generally simple and easy to use (Al-

Obaithani, Ameen, Nusari, & Alrajawy, 2018). Therefore, governments can reach most of the citizens through mobile devices.

Digital transformation of governments can be summarized as turning into an information and smart society from an industrial society (Song, 2014). Song (2014) determines this transformation by explaining features, channels, services and technologies as in Table 4. According to his study, the main technologies used in smart society are wireless and sensor network, big data, mobile and cloud computing.

*Table 4: Identification of Emerging Internet Technology & Service*

Type of e-Government	Industrial Society	Information Society	Smart Society
<b>Main Features</b>	- Government 1.0 - World Wide Web - Government-Centric	- Government 2.0 - Web 2.0 - Citizen-Centric	- Government 3.0 - Real-World Web - Individual-Centric
<b>Accessibility</b>	First-Stop-Shop (Simple Portal)	One-Stop-Shop (Service Convergence)	My gov. (Customized Portal)
<b>Service / Policy</b>	- One-way Information Providing - Limited Sharing of Information - Supply-Oriented Service - Digital Service	- Two-way Information Providing - Extended Sharing of Information - Mobile Service - Service for Value Creation	- Information Collaboration - Real-Time Sharing of Information - Seamless Service - Intelligent Service - ICT Policy
<b>Technology</b>	-	- Software Engineering - Energy-efficient Computing & Smart Grid - Internet Application	- Wireless and Sensor Network - Big Data - Mobile Computing - Cloud Computing

*Source: Song (2014).*

Moreover, all the technological requirements for government 3.0 can be identified as follows (Song, 2014):

1. Smart Phone Applications and Service
2. Mobile Internet Computing and Application
3. Wireless and Sensor Network
4. Security & Privacy in Internet
5. Green (Energy-efficient) Computing & Smart Grid
6. Multimedia/Image Processing/HCI/Intelligent Systems

7. Database/Data Mining/Big Data/Mobile Object Database
8. Software Engineering & Architecture
9. Internet Business related Policy, Communication and Services
10. Management of Internet Application /E-Business/E-Commerce

One of the main requirements of being a smart government is to provide a fully communicated system with real time data from various sources, which in other words Internet of Things. When accurate, updated and clean data is analyzed with simulation, complex data analytics, modeling, smart government becomes intelligent (Gil-Garcia, Zhang, & Puron-Cid, 2016).

Smart government transformation is a continuous process which is provided with the help of new technologies such as big data analytics, open data, cloud computing, social networking, mobile applications and so on (Anthopoulos & Reddick, 2016).

In spite of having a successful smart government implication, technology is essential but not an enough requirement (Schedler, Guenduez, & Frischknecht, 2017), there are plenty of challenges and basic conditions to consider in the planning phase. As a result, analysis of real world used cases is beneficial for detecting the strategies in all aspects.

Another technology for smart government initiatives is the blockchain technology. Blockchain is defined as “a digital, public ledger that records online transactions” in order to establish “the integrity of a cryptocurrency by encrypting, validating, and permanently recording transactions” (Bankrate). Blockchain technology is widely useful for smart government initiatives because of not having to need a third party for security, software itself is enough to build a trustable process (Ølnes, 2016). In addition, cost reduction is another benefit of blockchain technology in terms of storage and having a secure operation (Ølnes, 2016).

## **2 SMART GOVERNMENT INITIATIVES - CASE ANALYSIS**

This research aims to focus on smart government initiatives regarding citizen and administration relations, to propose a guideline for governments to be able to take advantage of the technologies (Mobile/IoT/Social media etc.) and to support the strategy for the digital transformation of countries. For this purpose, a qualitative approach will be conducted to this research, the case study method.

### **2.1 Case Study Methodology**

The case study approach has been used widely since the 1980s (Harrison, Birks, Franklin, & Mills, 2017), with the definition of “A case study is a research strategy and an empirical inquiry that investigates a phenomenon within its real-life context.” (Press Academia, 2018).

Case study approach helps to examine topics not only from one point of view but from a wider angle with different and multiple experiences (Baxter & Jack, 2008). It can be stated that when the research question involves “why” and “how”, case study approach fits to the research methodology of the study (Baxter & Jack, 2008). The literature stands insufficient for pointing out an approach for applying and benefiting ICT in public services because of having the main focus mostly on technical parts of smart government (Yaghi & Al-Jenaibi, 2017).

Since smart government concepts can be considered as new trending topics and there is no complete guideline in the literature for the countries, analyzing the best cases regarding this digital transformation and gathering lessons learned in order to create a guideline are defined as the methodology of this research. It is intended to analyze multiple cases of different countries all over the world.

“A multiple case study enables the researcher to explore differences within and between cases. The goal is to replicate findings across cases. Because comparisons will be drawn, it is imperative that the cases are chosen carefully so that the researcher can predict similar results across cases, or predict contrasting results based on a theory” (Baxter & Jack, 2008)

Another reason of choosing multiple case study approach is that smart government transformation is highly related to the cultural, political and educational circumstances of the countries. Therefore, analyzing multiple cases with different conditions might be the best method for defining the factors, opportunities and challenges in the broader point of view. Even though it is difficult to reach generalized outcomes with the case study method, it is possible to have valuable qualitative information in a more accessible way (Mechant & Walravens, 2018). As Gil-Garcia, Helbig and Ojo (2014) mentioned in their study, case studies on smart government initiatives help to analyze benefits and challenges based on real world experiences.

### 2.1.1 Case Study Approach Design

In the sense of the case study method, the steps that are intended to be accomplished can be stated as follows: Defining smart government concepts, significant challenges and opportunities of smart government, characterizing the current situation of C2G and G2C with some best smart government initiatives (such as smart city, open governance etc.) of the countries, presenting the strategies for improving the current implementations and proposing a guideline/roadmap to better address these challenges.

It is intended to analyze two countries that have smart government initiative cases: Estonia and Singapore. At the end of the analysis, with the help of comparison of the cases regarding the benefits, challenges and strategical approach of implementation, a roadmap would be proposed for the governments for future initiatives.

According to literature review findings, the case analysis will be conducted with the following factors that affect smart government transformation:

- Areas
- Citizen Engagement
- Enterprises and Other Stakeholders
- Challenges
- Discussion / Success Factors

## **2.2 Estonia Case Study**

Estonia, gained its independence from the Soviet Union in 1991, is a Northeast European country with a population of 1,3 million people (Statistics Estonia, 2020). Estonia is known as achieving a great progress in terms of creating an information and digital society, with having an online option for all public services (Kalvet, 2012). Estonia is the leading country in the world on digitalization of the government and innovation in public services; undoubtedly, the culture of Estonians for emerging technology usage, optimization and sustainability should be taken into account on this achievement (Kassen, 2019). The size of the country and homogeneity certainly helped this transformation. Estonia defined its main goal as to use digital technology in public services for optimization and better citizen satisfaction (Maaten, 2004). Estonia's digital transformation can be seen as a conversion from an old communist country to a democratic government (Björklund, 2016).

### **2.2.1 Areas**

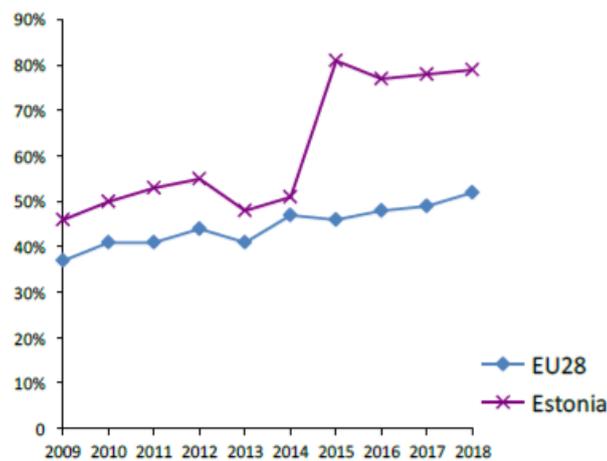
The goals of the digitalization of public services in Estonia are growth in administration ability, providing sustainable and technology oriented services to citizens, sustainable economic growth and building a successful image of e-Estonia in the world (Castaños, 2018). For those purposes, Estonia has started supplying digitalized public services to its citizens.

In addition to the digitalization of all public services, Estonia focused on creating a maximum Internet access scope (Björklund, 2016). By the end of the 1990s, all schools went online in all over the country and a lot of foundation provided for ICT infrastructure (Roonemaa, 2017). They applied e-government fundamentals for all public services, e-signatures, e-filing for all declarations including tax return, online health services, e-voting, m-services, e-police, e-notary, e-school and so on (Kalvet, 2012). With the help of IoT, it is expected to achieve "remote diagnostics of its infrastructure, energy consumption, and safer traffic and transport management" as it is stated in the Digital Agenda for 2020 (Castaños, 2018). As another clue of Estonia's technological success; world-wide used online video conference tool Skype was established in 2003 in Estonia (Goede, 2019), in addition to

online money transfer application without any transaction costs by using blockchain technology, Transferwise (Kassen, 2019).

According to the European Commission Report of “Digital Government Factsheet Estonia” (2019), the percentage of internet usage of individuals for interacting public authorities of Estonia is much higher than EU average. Figure 13 shows clearly that Estonia is far ahead of EU countries.

*Figure 13: % of individuals using the internet for interacting with public authorities*



*Source: European Commission (2019).*

It is the leading country for having mobile services including emergency calls with automatic location determination, and the citizens have been able to pay car parking systems with mobile phones since 2000 (Kalvet, 2012).

They have created a service called ‘X-Road’ in the late 2001 (European Commission, 2019), for the purpose of “the implementation of unified interfaces for different existing databases and a data-exchange layer that allows officials as well as legal entities and private individuals to process data from national databases over the internet within the limits of their authority” (Kalvet, 2012). All the public data is stored in more than 360 databases with constant communication between them; which serves the aim of “a secure data exchange for residents, public institutions, and private companies” (Goede, 2019). In fact, X-Road is not totally centralized, the information is transferred via “end-to-end encrypted pathways” from different servers (Heller, 2017). Estonia has determined the main principles of X-Road as “decentralisation”, “interconnectivity”, “integrity”, “open platform”, “no legacy” and “transparency” (Castaños, 2018).

The services provided by the Estonian government via X-Road are: “authentication; authorisation; MISP (mini-portal system); register of simple queries; queries to various databases and registers; opportunities to write registers; sending large amounts of data over

the Internet; secure data interchange, recording logs and search tracking option; running of citizen portal and operator's portal; central and local monitoring and collection service description in a special database (WSDL mode)” (European Commission , 2019). It is estimated that services provided via X-Road could “save more than 820 years of working time” for government agencies and citizens every year (Barlow & Lévy-Bencheton, 2018).

All the citizens have their ID-cards which has been available since 2002 and can be used for authentication and authorization processes for all e-services (both public and private). ID cards have both physical and digital features; with a chip inside for all the digital information of all citizens, and is secured by personal pin-codes (Maaten, 2004). There is an excellent legislative infrastructure for ID cards in terms of security and privacy of personal data (Goede, 2019).

Additionally, Estonians have another option called “Mobile-ID” for mobile phone users, which is an “ID-card based identity verification and digital signature solution” with the equal legal level as e-ID (European Commission , 2019).

Online health services include four main services: “electronic health records (EHR), digital registrations, digital imaging, and digital prescriptions” (Goede, 2019). As a result of e-health systems, the citizens do not have to fulfill any papers in the hospitals, the doctors can reach all the information needed about the patients. Furthermore, Estonia has an app called “e-ambulance”, for being used by medical assistants on the way of a patient who needs an urgent treatment, and also on the way of hospital it can be used for getting ready all the necessary registrations about the patient (Heller, 2017).

E-voting process was first discussed in Estonia in 2001, the following year the legislation foundation was prepared and in 2003 the official project was started by National Electoral Committee (Maaten, 2004). With e-voting initiative, it is expected to increase voter participation in the country. As all the online public services, ID cards are necessary for e-voting.

Maaten (2004) summarizes the fundamentals of e-voting as following:

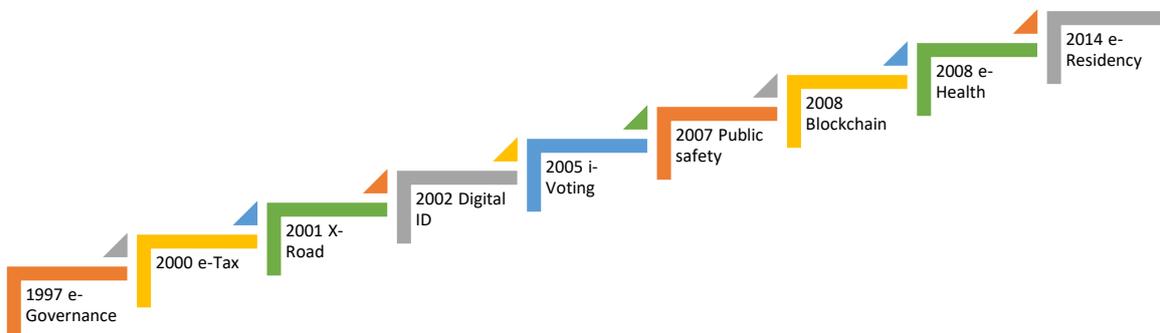
- Should have the same security and confidence as traditional ways
- Should be as simple as possible and understandable for all citizens
- Must be secret, confidential, reliable, accountable and transparent

Estonia has started e-voting in 2005 for local elections and in 2007 for parliament elections (Björklund, 2016). In 2007 elections, the rate of online voting was 5%; however, in 2009 European parliamentary elections, the rate went up to 15% (Kitsing, 2011), which is a proof of an increase in the usage rate of e-voting system.

One of the most important and innovative online services of the Estonian government is called e-residency. Estonia is the first country that had achieved this initiative in the world

(Goede, 2019). The services basically offer foreigners to be able to start a business in Estonia without even coming to the country. It should be kept in mind that e-residency service “does not offer physical residency, the right to enter the country, or the right to use the smart ID card as a travel document or physical identification” (Goede, 2019). Heller (2017) states that by 2017, 28.000 people applied for e-residency mainly from Finland and Russia. According to a report from the beginning of 2019, more than 50 thousand people applied to e-residency from different countries (Schulze, 2019).

*Figure 14: Timeline of Estonia's Digital Transformation*



*Source: Goede (2019).*

The rate of online option for government services in Estonia is 99%; the rate is not wanted to happen completely because, some of the services like marriage and divorce, it is preferred to happen face-to-face (Goede, 2019; Heller, 2017; Tham 2018).

According to the European Commission Report prepared in 2018; “98% of Estonians have a national ID-card, over 30% of Estonian voters from 116 countries use i-Voting in Estonian elections and 98% of companies are established online” (Castaños, 2018).

Estonia uses blockchain technology for security and privacy related issues. It is claimed that the technology called K.S.I. protects all the information “without seeing the information itself” (Heller, 2017). With digital signatures and time stamps, the safety of all data is ensured (Barlow & Lévy-Bencheton, 2018).

### 2.2.2 Citizen Engagement

In order to create a clear citizen awareness and commitment, communication is one of the key drivers. Estonia managed to create different communication levels, such as professional level, citizen level and foreign organizations (Castaños, 2018).

X-Road, providing 2000 e-services in total, is an open source application where developers can merge new services with the full responsibility of well function (Margetts & Naumann, 2017). Citizens can manage and control their data in X-Road platform. They can monitor and determine the situations in which their data was viewed by other people or agencies, via government's portal (Roonemaa, 2017). Moreover, in case of unauthorized reach of personal data, citizens can fulfill a complaint report through an online portal and, if the misuse of personal data is confirmed, legal consequences are applied to the related individuals or organizations.

The portal called TOM (Täna Otsustan Mina) for getting suggestions about laws and legislations from citizens was started using in 2001 (Kitsing, 2011).

Estonia applies an open data platform for citizens to get interactive and efficient feedback about various topics (Kassen, 2019).

It is claimed that citizens find the government's e-services "reliable" and "trustworthy" (Goede, 2019). The official communication platform of government has become e-mails from formal government e-mail addresses, which is helpful for creating trust between citizens and public agencies (Barlow & Lévy-Bencheton, 2018).

Estonia has put AI based projects on the primary focus of public sector digitalization. In the "Digital Agenda 2020" of the country, the goal of having "at least 50 use-cases of artificial intelligence in the public sector by 2020" is set by the public authorities, as well as increasing the citizen awareness regarding AI (European Commission , 2019).

### 2.2.3 Enterprises and Other Stakeholders

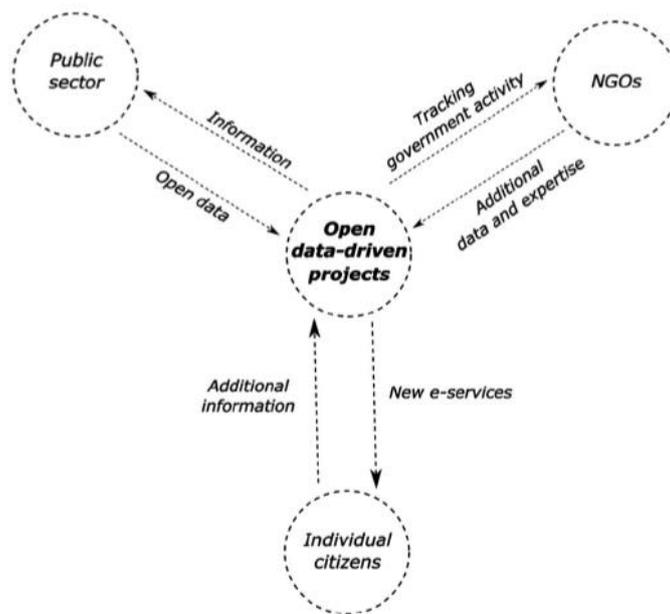
The coalition of public and private companies created an initiative with the aim of increasing digital awareness and the usage of ICT, and their first project was to provide "free computer training to 102.697 participants, or 10% of the adult population" (Roonemaa, 2017). The NGO's and academic organizations' contributions of Estonia's digitalization has been crucial for their success. E-Governance Academy, Look@World Foundation, Estonian Association of Information Technology and Telecommunications are the main NGO's which has worked with the government during this process as well as University of Tartu and Tallinn University (Castaños, 2018).

Estonia, with the lowest business-tax rate in EU and its technological developments, the country has been a great tech-hub for entrepreneurs (Goede, 2019). Businesses can perform

their legal registrations totally online (European Commission , 2019). Another success factor of Estonia’s digital transformation was emphasizing on the IT community with the full support of politicians. What Estonia did at the first stage was creating the IT community which includes IT specialists, scientists and government administrators, and getting help from them for policies on IT related initiatives since the 1990s (Kitsing, 2011). With the combination of the knowledge of the IT community, the support of politicians and contributions of private companies; Estonia achieved its success (Kitsing, 2011).

According to Kassen (2019), public administrators’ contribution on “third-party ICT-specialists to develop applications, researching the topic in academia, consulting or co-funding various development projects in the sphere in close partnership with a wide range of technological companies, NGOs and international organizations, or even working closely with the local mass media in outreaching the projects in the public sphere” was significant and favorable for their success story.

*Figure 15: The promotion of open data-driven projects in Estonia*



*Source: Kassen (2019).*

Another factor that leads the way of success for Estonia is private and public sector cooperation. It is a known fact that innovations in the public sector are influenced by private companies (Björklund, 2016). In Estonia’s case, mostly banking and telecommunication companies led and/or helped the way of the digital transformation of government (Goede, 2019). Online banking technologies was the origin of e-services of public sector (Kitsing, 2011), and thus can be said that banking industry was leading the journey of this transformation.

#### 2.2.4 Challenges

As it is determined in the literature review section, the main challenges of smart government transformation are lack of awareness and motivation, resistance to change, data privacy and security, lack of leadership commitment, financing, poor coordination and, insufficient skills and know-how. In the Estonia case, it can be claimed that those possible challenges are appropriately managed.

According to the case analysis of Estonia, it can be stated that one of the most critical success factors is leadership commitment and motivation which Estonia has managed this challenge from the beginning of the digital transformation initiatives. Data privacy and security appear to be another big challenge; nevertheless, Estonia achieved a favorable outcome with the help of a strict legislative basis and strong fines to whom access or use the data in an unauthorized way. About financing issues, Estonia is using foundations from three different sources: “targeted and baseline financing (national financing), foreign funds (mainly Structural Funds) and private funding” (Castaños, 2018). Additionally, Estonia has focused on the improvement of skills and know-how via training and continuous learning mechanisms.

Last but not least, the challenge of citizens' trust and commitment, Estonia has used communication channels very effectively and by being transparent in every stage of the governance, some would say that Estonia accomplished this goal successfully.

#### 2.2.5 Discussion / Success Factors of Estonia

It is said that even though Estonia did not have a strategy-focused approach for the digital government, the most important factor of their success was the politicians' commitment (Kalvet, 2012) in addition to continuous improvement (Goede, 2019). Estonia did not have a strategy for the digitalization of the government; instead, they focused on the process of application (Kitsing, 2011). The citizen-centric approach and creating an online democracy system helped Estonia to become more powerful in the sense of public services and politics (Kassen, 2019).

Estonia has been using a top-down approach in the digitalization of the government, with the help of “standardization”, “compatibility” and “concentration of data” to be able to achieve the centralization (Björklund, 2016). The main principles of Estonian Information Policy determine also the success factors of their digital transformation:

- The development of the information society
- The protection of fundamental freedoms and rights
- Cooperation between the public, private and third sector
- Estonian language and culture will be ensured
- Everybody should have access to the internet (Castaños, 2018)

Some claim that the crucial elements of Estonia’s success lie behind the sufficient leadership skills, funding and ICT improvement (Kalvet, 2012) and additionally the awareness of politicians and administrators in terms of possible benefits of digital government (Björklund, 2016).

Castaños (2018), summarizes the main drivers of Estonia’s success as in Table 5.

*Table 5: Main Drivers of Estonia's Success*

<b>Political</b>	<ul style="list-style-type: none"> <li>✓ Small new country</li> <li>✓ Active role of the public sector</li> <li>✓ Cooperation and reciprocity</li> </ul>
<b>Economic</b>	<ul style="list-style-type: none"> <li>✓ Pro-active ICT sector and banking sector (Look@Word Foundation)</li> </ul>
<b>Societal</b>	<ul style="list-style-type: none"> <li>✓ Tech-savvy population</li> <li>✓ The confidence of its citizens</li> </ul>
<b>Technological</b>	<ul style="list-style-type: none"> <li>✓ Foreign Direct Investments (FDI) and technology imports</li> <li>✓ Interoperability Infrastructure and Enablers (X-Road framework, Internet network, Electronic Identity, Secure Data Exchange)</li> <li>✓ Pioneered state security standards</li> </ul>
<b>Legal</b>	<ul style="list-style-type: none"> <li>✓ The protection of fundamental freedoms and rights, personal data and identity is ensured</li> </ul>

*Source: Castaños (2018).*

According to Margetts and Naumann (2017), the key elements behind Estonia’s success are openness, simplicity, clear legislation, participation and collaboration of citizens and other stakeholders, security and central leadership. In that vein, Castaños (2018) determines the main success factors as cooperation (between public agencies, private companies, academic organizations and citizens) and reciprocity (obtaining citizens’ trust and in turn getting authorization to use personal data of citizens).

“The technology developed by the Estonians is also being used by NATO, US Department of Defence, as well as European Union information systems to ensure cyber security.”  
(Castaños, 2018)

### **2.3 Singapore Case Study**

Singapore is an island city-state with a population of 5,7 million ( Singapore Department of Statistics, 2019) located in Southeast Asia. Singapore aims to be the first smart nation in the world with the usage of IoT, by “connecting everyone to everything, everywhere, all the time, a hyper-connected Singapore promises to be smarter, cleaner and more efficient” (Boon, 2015). As a result of the population density, innovative technological solutions are essential to create an efficient urban life and to increase the quality of services and citizens’ lifestyles (Foo & Pan, 2016).

Smart nation initiative of Singapore has the citizens in the centre of four facilitators; “governance, manpower, partnerships and technology” (Foo & Pan, 2016). Singapore has set its concept as “E3A’: Everyone, Everything, Everywhere, All the time.”. (Lee, Kwon, Cho, Kim, & Lee, 2016).

Singapore has been affected by the lack of natural resources; the economy of the state mostly depends on international trade, expert labor force and manufacturing, due to not having essential resources like farms, forests and energy depositions (Lee, Kwon, Cho, Kim, & Lee, 2016). Nonetheless, Singapore has achieved successful level of healthcare, education, life quality and so on (Lee, Kwon, Cho, Kim, & Lee, 2016).

Singapore’s digital transformation has initiated in 1980 and required master plans are prepared for achieving the aim of being an “intelligent island” (Foo & Pan, 2016). Smart Nation Initiative was announced in 2015, aiming to be the first smart nation in the world by 2025 (Foo & Pan, 2016). The plan should be seen as long-term, which targets to improve the decision-making process and citizens’ life quality (Cavada, Tight, & Rogers, 2019).

### 2.3.1 Areas

Improvement of connectivity all over the state and better analysis and action plans via data collection are the desired outcomes of Singapore’s smart nation transformation (Lee, Kwon, Cho, Kim, & Lee, 2016).

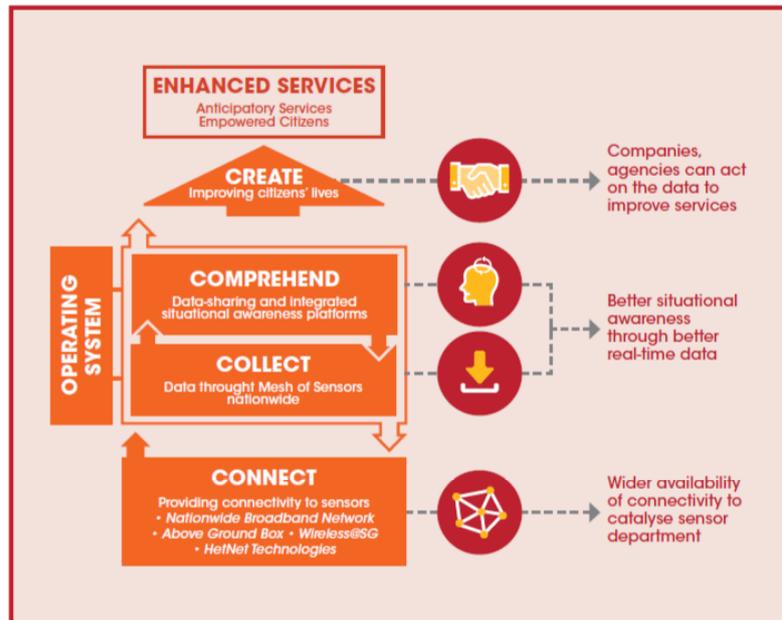
Singapore uses the main logic of big data analytics, which consists of collecting the real-time data, analyzing it, creating insights and then gaining meaningful operations according to that (Foo & Pan, 2016). Smart Nation Platform is created with the programme of three core areas; Connect, Collect, and Comprehend, including creating a Smart Nation Operating System (SN-OS) (Foo & Pan, 2016) and Communications & Sensor Network (Lee, Kwon, Cho, Kim, & Lee, 2016).

Communications & Sensor Network includes communication infrastructure (by wire or wireless) such as sensors and smart meters, in order to collect information and share the necessary information with related agencies for taking an action (Lee, Kwon, Cho, Kim, & Lee, 2016).

Singapore has implemented AI technologies widely with the aim of advancing the citizens’ life quality, and has given financial support to AI research initiatives (Varakantham, An, Low, & Zhang, 2017). Moreover, cloud computing is another major technology being used in Singapore’s smart nation transformation (Ng, 2018).

Singapore’s smart nation initiative includes four main areas: healthcare, transportation/mobility, security and manufacturing. Singapore has started 52 initiatives for becoming a smart nation (Cavada, Tight, & Rogers, 2019).

Figure 16: Singapore's Smart Nation Programme



Source: Foo & Pan (2016).

The main goal is to become eco-friendlier and more efficient by optimizing the resource usage, and to attain sustainable development.

“Health: Four initiatives aim to assist with patient care by developing health-related analytics, supporting elderly mobility using robotics, an app linked with citizens’ wearables to encourage exercise, and monitoring health for those patients at home.”

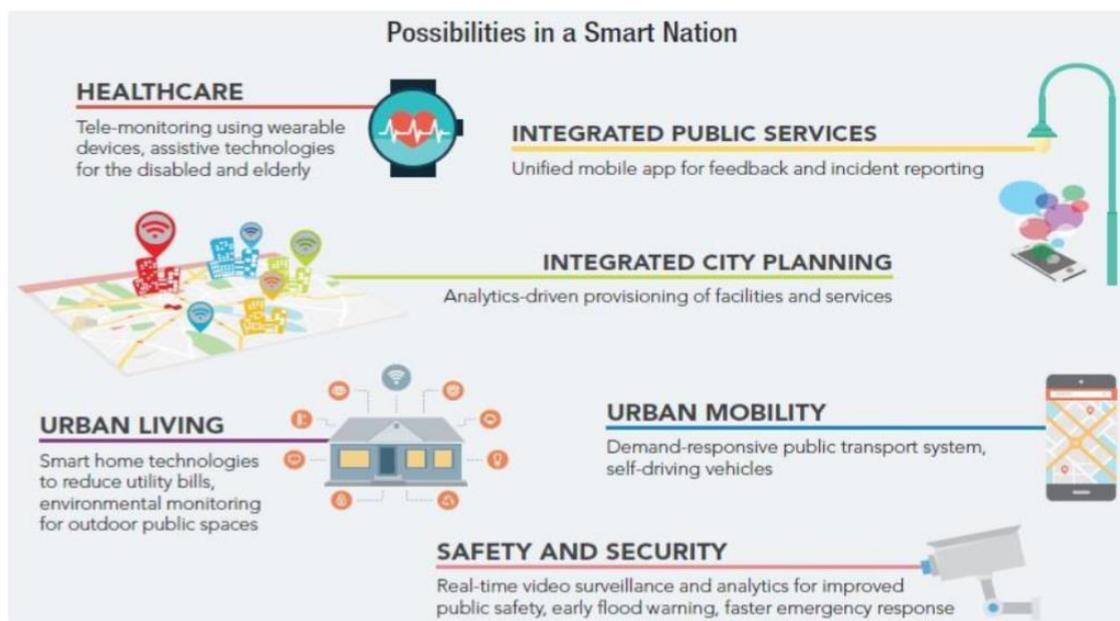
(Cavada, Tight, & Rogers, 2019)

Due to the problem of the growing elderly population and decreasing birth rates, SN-OS provides user-friendly sensors at homes for the elderly who are in need of health monitoring (Foo & Pan, 2016). With the help of wearable technologies, it is intended to manage healthcare monitoring and treatments remotely by health professions (Boon, 2015). This innovation is triggered by the need of efficient usage of resources and of increasing the life quality of citizens. A program called The Smart Elderly Monitoring and Alert System (SEMAS) is being used for this purpose by caregivers of the elderly (Foo & Pan, 2016). The digitalization of the healthcare system does not only affect the elder population, it is used also for all the citizens to manage their small controls or treatments remotely by wearable technological devices (Foo & Pan, 2016). AI and operations research technologies are being used for healthcare improvements to optimize resources and demand (Varakantham, An, Low, & Zhang, 2017). As a result of these improvements, some claim that the healthcare system of Singapore is one of the most strong and well-organized healthcare systems in all over the world (Goede, 2019).

“Mobility: The four initiatives here are focused on a crowd-based mobility technology, for example, technologies to aid citizen access to public transportation and mobility analytics—mostly on public mobility, but also parking. Singapore particularly supports autonomous mobility testing and research on requirements for public mobility.” (Cavada, Tight, & Rogers, 2019)

Because of population density and poor land area, mobility and transportation are the focus areas of Singapore’s smart nation transformation (Varakantham, An, Low, & Zhang, 2017). There are limitations on the number of vehicles on the road, and citizens mostly use other transportation forms like public transportation or bicycle (Lee, Kwon, Cho, Kim, & Lee, 2016). In order to reduce traffic problems, Singapore is focusing on driverless trucks for post deliveries during the nights and driverless buses for public transportation (Boon, 2015), with implications of automated systems such as “intention-aware motion planning and pedestrian avoidance for driverless vehicles” (Varakantham, An, Low, & Zhang, 2017).

Figure 17: Possibilities of a Smart Nation



Source: Lee, Kwon, Cho, Kim, & Lee (2016).

In addition, ride-sharing and car-sharing initiatives are being placed for the purpose of reducing traffic density. With the sensors in the roads, parks and bus stops; the government is able to analyze traffic density, accidents, air quality (Foo & Pan, 2016); furthermore, simulation models are modeled to analyze the possible ways of increasing efficiency in the roads and commonly used places (Varakantham, An, Low, & Zhang, 2017). Moreover; a portal called One.Motoring, is developed for the drivers with the aim of having real-time traffic density data collected via cameras and sensors on the roads (Lee, Kwon, Cho, Kim, & Lee, 2016). One.Monitoring portal also serves more information to vehicle owners about trade and maintenance of the vehicles (Lee, Kwon, Cho, Kim, & Lee, 2016).

The actions taken in the transportation area, use “machine learning, planning under uncertainty, robotics, game theory, and multiagent systems (including agent-based simulations)” technologies (Varakantham, An, Low, & Zhang, 2017).

“Smart waste bins” allow the collection of waste efficiently by sending a signal when they need to be collected (Boon, 2015). Additionally, smart technologies are implied to household devices which use sensors for remote control (Boon, 2015).

Jurong Lake District (JLD) pilot initiative has been created for analyzing real-time environmental data like air quality, heat and humidity, and for recognizing smoking behavior in the banned areas (Foo & Pan, 2016).

Regarding the security area, Singapore has focused on the following three problems: “security in both cyber and physical space”, “interdiction of the illegal flow of drugs, weapons, and money” and “suppression of urban crime” (Varakantham, An, Low, & Zhang, 2017). Furthermore; the government created the “Government Data Incident Reporting Platform” for the purpose of reporting any unauthorized data display and usage by everyone (Smart Nation Singapore, 2020).

As a crucial part of Singapore’s economy, the manufacturing area is another focus for smart nation initiative in order to be able to survive in this competitive world. Singapore is the first state in Asia that has developed “Advanced Remanufacturing and Technology Centre” (Varakantham, An, Low, & Zhang, 2017).

### 2.3.2 Citizen Engagement

Singapore has been following the citizen-centric approach in these transformation initiatives. The initiatives allow a better communication between government agencies and citizens, and thus bring a broad social advantage (Cavada, Tight, & Rogers, 2019).

“There are 10 initiatives aimed at connecting citizens with digital government services, open datasets (also containing personal information on banking and health), digital training programs and fellowships, further agencies to assist with citizens’ questions, and a crowd platform for sharing new ideas.” (Cavada, Tight, & Rogers, 2019).

Singapore uses open data technology to obtain citizen engagement; the data collected by the government is shared online publicly, and so forth, citizens are able to collaborate on new solutions (Smart Nation Singapore, 2020).

Data-as-a-Service (DaaS) pilot program is initiated to collaborate with public data users and private data companies for achieving an effective big data analytics (Foo & Pan, 2016).

Furthermore, the Singapore government promotes all agencies to establish their own applications for being able to answer citizens' various needs (Lee, Kwon, Cho, Kim, & Lee, 2016).

### 2.3.3 Enterprises and Other Stakeholders

As it is identified by Singapore, one of the key success factors is “Partnerships”, which indicates the significance of “multi-government agencies and public-private sector collaborations” (Foo & Pan, 2016). Those collaborations and scientific research initiatives are funded by the government (Cavada, Tight, & Rogers, 2019). It can be claimed that the Singapore government is in the leading position for these partnerships, with getting information, skills and feedback from citizens, private companies and other stakeholders.

“Agency for Science, Technology and Research (A\*STAR)” initiative is an example of public-public partnership (Foo & Pan, 2016). National University of Singapore (NUS), Nanyang Technological University (NTU), Singapore Management University (SMU) and Singapore University of Technology and Design (SUTD) are the research institutions that work collaboratively with the government (Varakantham, An, Low, & Zhang, 2017).

The government had developed meetings with some managers of different industries in order to create a collaborative work on policy making for smart government initiatives (Ng, 2018).

Additionally, the government wants to create a “living lab” and encourages the all stakeholders from all around the world in order to work collaboratively and to build digital and smart innovations (Lee, Kwon, Cho, Kim, & Lee, 2016).

The collaborative works with private companies do not only help on the digital transformation process, but also have a positive effect on the economy (Cavada, Tight, & Rogers, 2019).

### 2.3.4 Challenges

Undoubtedly, the digitalization of the services and the usage of IoT bring a crucial risk of cyber security. In order to deal with this challenge, Singapore “needs to place tough restrictions on data collection and storage by businesses so as to limit the amount of damage in the event of a cyber breach, while making it mandatory for smart devices to utilise encryption so that even if data were stolen, it cannot be read.” (Boon, 2015). As it was reported in 2018, data breach occurred from a medical organization, which has led the risks related to data security as a crucial and main challenge of digital transformation (Cavada, Tight, & Rogers, 2019).

One of the challenges Singapore has been facing is not having a complete integration between different agencies, which might cause complexity due to the fact that agencies

imply their own operations in their own operations center (Lee, Kwon, Cho, Kim, & Lee, 2016).

Some claim that as an unintentional output, low-skilled workers would have to face with unemployment as a consequence of transforming unqualified jobs from humans to smart technologies (Boon, 2015). Due to driverless vehicle technologies, some jobs such as taxi drivers, bus drivers, parking attendants, and valet parking attendants would be phased out (Huiling & Goh, 2017).

In addition, it might be claimed that with the usage of smart technologies, human interactions would be reduced and consequently, social relationships would be affected (Boon, 2015).

### 2.3.5 Discussion / Success Factors

It can be stated that in a city-state like Singapore, digital transformation was needed to maintain “economic development, social cohesion, better city administration and infrastructure management” (Foo & Pan, 2016).

Singapore has defined five key success factors for its digital transformation: “Dynamic governance”, “Technology”, “Manpower”, “Partnerships” and “People” (Foo & Pan, 2016).

Dynamic governance is defined as “an approach to decision-making, organizational and corporate governance, and project management that creates more inclusive and effective organizations. It gives everyone in an organization an ear, a voice, and informed influence over policy that affects them, while maintaining the efficiency of vertical hierarchy.” (Creative Learning Solutions).

Singapore identifies the key three focus areas of its transformation: “innovation, integration and internationalisation” as shown in Figure 18.

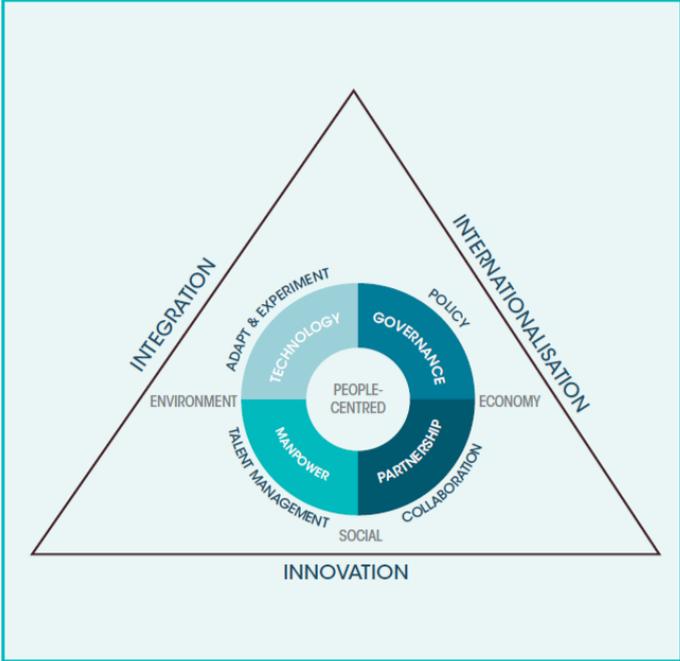
Foo and Pan (2016) define the lessons learned from Singapore’s smart nation transformation as; leadership commitment, change management strategies, clear communication, collaborative work, continuous learning and adaptation.

According to Ng (2018), the main drivers of Singapore’s smart nation transformation are the following:

1. Public demand for and satisfaction with e-government services;
2. Focus on whole-of-government policies and practices;
3. Restructuring of technology agencies to integrate strategy and implementation;
4. Building the Smart Nation Platform;
5. Purpose driven cloud applications especially in healthcare.

In addition, the pilot implementation approach has been crucially important for Singapore’s success with providing a better assessment of the risks, costs and citizen satisfaction levels.

Figure 18: Singapore's Transformation Framework



Source: Foo & Pan (2016).

### 2.4 Comparison of Estonia and Singapore Cases

As a result of the case analysis, it can be stated that both Estonia and Singapore smart government cases have plenty of success factors in common, as in Table 6.

Both countries have started their smart government transformation processes after their independencies. Singapore has started its digital transformation in the 1980s, whilst for Estonia, this has begun in the 1990s.

Singapore, as an island, has benefitted from this isolation as well as Estonia; even though it is not an island, it has the position of being isolated from its neighbors (Goede, 2019; Keen, 2018).

Both countries have been using the citizen-centric approach; they concentrated citizen trust and commitment, by being transparent and creating coherent and effective communication. Open online platforms are used for not only getting feedback from citizens but also creating an environment for citizens to collaborate the digital solutions by open data technology.

In both cases, the government is the leader of the initiatives, and private companies, research institutions and non-profit organizations assist by collaborative work. They both gained a success against corruption with their initiatives (Goede, 2019).

*Table 6: Common Success Factors of Estonia and Singapore*

<b>1</b>	Leadership (government agencies) commitment
<b>2</b>	Collaborative work with all the stakeholders
<b>3</b>	Education & Trainings
<b>4</b>	Clear communication with citizens and other stakeholders
<b>5</b>	Citizen engagement
<b>6</b>	Technologically skilled citizens
<b>7</b>	Awareness of citizens, government agencies and other stakeholders
<b>8</b>	Citizen trust
<b>9</b>	Strong and clear legislative basis
<b>10</b>	Sustaining privacy and security

*Source: Own work.*

Estonia has an effective connection and communication between government agencies and their databases, whilst the government agencies in Singapore have their own databases and applications.

Estonia has given importance to creating a digital society, by focusing on education in all levels, which has led to the country's success of smart government transformation. Likewise, Estonians' culture had a positive effect on this success; technology usage, optimization, and sustainability are some of the characteristics that Estonians have in their daily life. The government set clear goals for the digitalization processes, created their own database and technological infrastructure, and built a strong legislative basis with severe fines.

Furthermore, Singapore has benefited from the pilot implementation approach for its success in smart government transformation. This strategy helped the country by providing a better assessment of the risks, costs and citizen satisfaction levels.

### **3 DISCUSSION**

Smart government transformation is a challenging and complicated process, it should not be considered as a simple action. In addition to having to change the whole structure, from beginning to end, it involves people which makes the transformation more complicated and

sensitive. Due to that, it is advised governments to use change management strategies when applying smart government transformation initiatives.

“Change management is the systematic approach and application of knowledge, tools and resources to deal with change. It involves defining and adopting corporate strategies, structures, procedures and technologies to handle changes in external conditions and the business environment.” (Society for Human Resource Management (SHRM), 2017)

Change management approach is used for transforming people or organizations. In this study, organizational change management methods are taken into consideration. The literature points out that unsuccessful digital government transformation initiatives are directly related to insufficient change management strategy (Nograšek, 2011; Kifle and Low Kim Cheng, 2009; Saboohi and Sushil, 2010).

Although there are plenty of approaches on change management strategies in the literature, Kotter’s strategy is chosen for this study. Kotter (1995) defined the best steps for organizational change management as following:

1. Establishing a sense of urgency
2. Forming a powerful guiding coalition
3. Creating a vision
4. Communicating the vision
5. Empowering the others to act on the vision
6. Planning for and creating short term wins
7. Consolidating improvements and producing still more change
8. Institutionalizing new approaches

As indicated in the previous sections - literature review and case study - , leadership guidance and support appear to be among the most critical success factors of smart government transformation. In order to deal with complicated changes in large-scale organizations such as governments, there is a need for a new style of leadership (Nograšek, 2011). Even though smart government transformation cannot be achieved only by public authorities, it requires the participation of citizens, private companies, NGO's and universities; "commitment of politicians and public sector managers is crucial in order to manage change" (Nograšek, 2011). Smart government transformation should be seen as an organizational change, rather than just a technical & technological process.

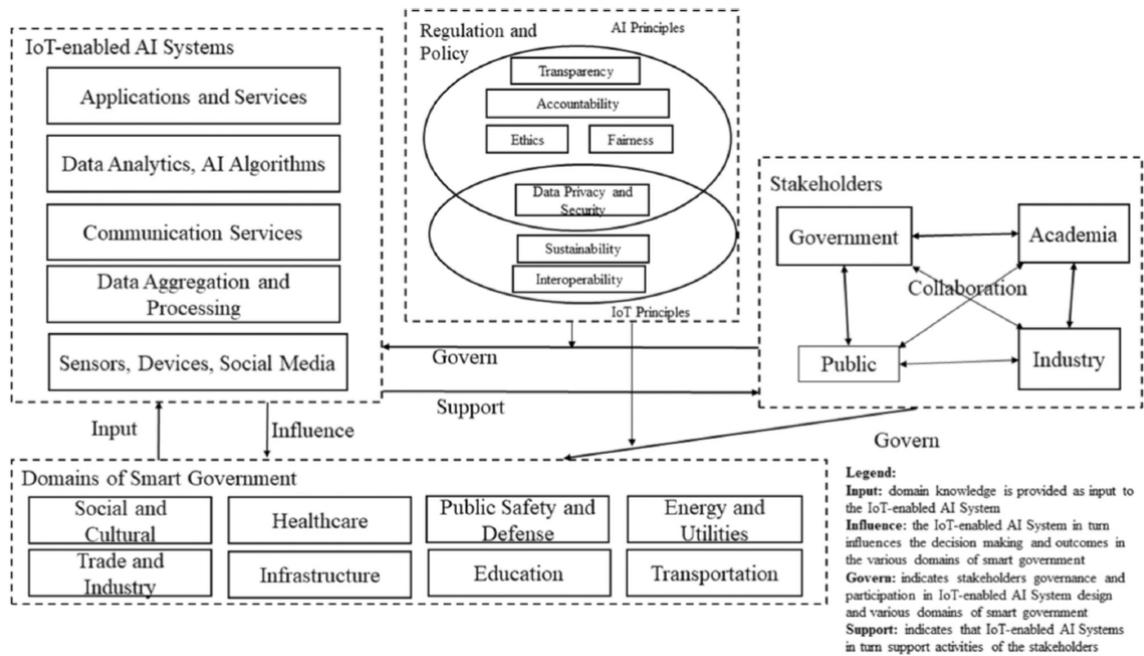
With the aim of a successful implementation of smart government, there is a need for a clear and acceptable strategic plan with enough resources and fair expected results with the coordination of administrations, citizens and other enterprises (Schedler, Guenduez, & Frischknecht, 2017). Additionally, it is necessary to give regular training to administratives, to build change management strategies and strong communication, and to plan every stage step by step (Schedler, Guenduez, & Frischknecht, 2017).

Deloitte (2019) proposes a roadmap for smart government initiatives as following:

1. Identify the goal
2. Explore appropriate sources of financing
3. Build and manage an ecosystem
4. Address the skills gap
5. Build a robust cybersecurity framework

On the other hand, according to a study conducted by Kankanhalli, Charalabidis and Mellouli (2019), for a successful smart government initiative, IoT-enabled AI Systems Framework (Figure 19) should be taken into consideration.

Figure 19: Framework for IoT-enabled AI Systems for Smart Government



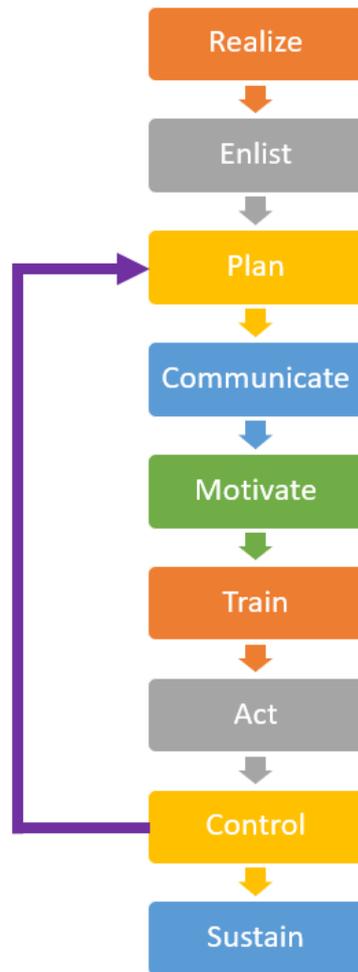
Source: Kankanhalli, Charalabidis, & Mellouli (2019).

## 4 PROPOSED ROADMAP FOR SMART GOVERNMENT

In this section, it is intended to propose a roadmap for future smart government initiatives, as the primary outcome of this work, according to the findings from the previous sections.

According to the literature review and case analysis results, a roadmap is proposed with the aim of guiding the future smart government transformation initiatives:

Figure 20: Smart Government Transformation - Proposed Roadmap



Source: Own work.

#### 1. Realize: Awareness of the need

The organizational change would achieve the desired success unless the need for the change is understood clearly. This awareness should occur for all the stakeholders, and should be supported with the leadership commitment.

After the realization of the problem, the necessary information should be collected and the problem or the need for change should be identified clearly in the early stages of the planning.

#### 2. Enlist : Building an executive committee

The leadership or the top management levels of government agencies should assign a committee in order to create the strategic plan, action plan and to execute all the processes from beginning to the end.

The executive committee should contain professionals from government agencies, NGO's, universities and institutions, and IT experts from private companies. The quality and diversity of the committee have a direct effect on the success of the transformation.

### 3. Plan: Creating the vision and the strategic plan

The third stage of the smart government transformation is the planning stage. The executive committee should create the vision and the strategic plan for the transformation. The vision statement should be as clear, short and straightforward as possible; it is essential to be understandable for everyone. The strategic plan should include stakeholder mapping, resource analysis in terms of human, finance, materials, tools, applications, ICT infrastructure and architecture, legal framework, challenges assessment and risk analysis.

For the aim of gaining citizens' and all the stakeholders' trust; security, privacy and transparency should be the top priorities for every level of the transformation.

Finally, the strategic plan should have milestones and short-term wins, to be able to keep the progress and motivation of the stakeholders.

Governments should give importance to provide fully integrated services and infrastructure, effective and efficient solutions, continuous innovation and improvement. Therefore, the strategic plan should be built correspondingly.

### 4. Communicate: Clear and honest communication

Communication is another essential factor for successful smart government initiatives. The need for the change, the vision statement, the strategic plan should be communicated clearly by the leadership and executive committee to all the stakeholders. The recommended way of communication is face-to-face, as far as possible.

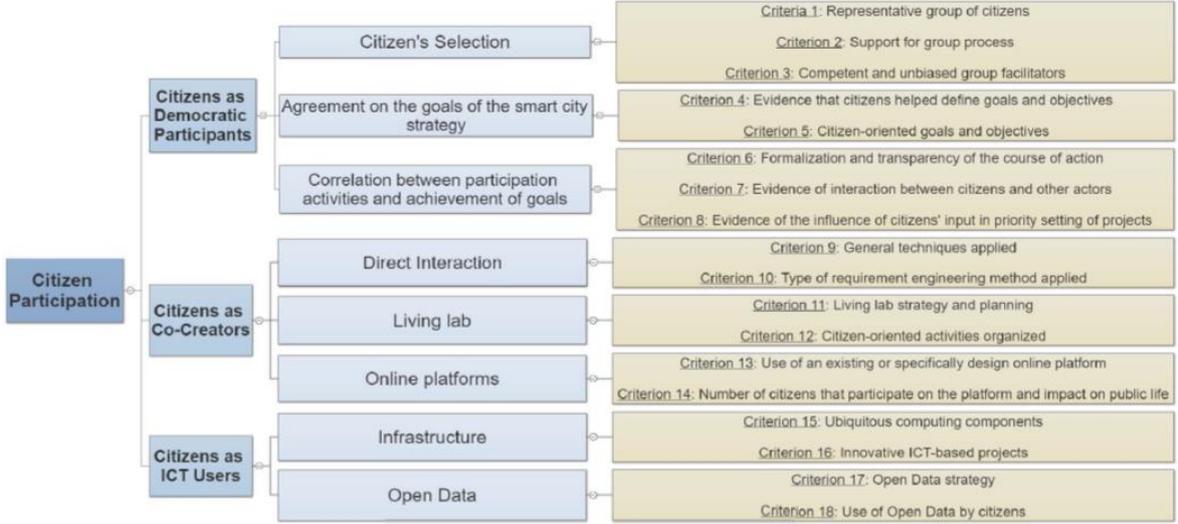
As one of the results of the case study and literature review, public and private partnerships/collaborations bring a significant benefit for smart government transformation. Governments should lead the way and create an open environment for collaborated works for NGO's, universities, institutions and private companies. For creating coordination and collaboration with the stakeholders, clear communication must be achieved during the transformation.

### 5. Motivate: Motivating / empowering towards the action and the change

Smart government transformation requires the contribution of all the stakeholders, including (especially) citizens. Therefore, the leadership and the executive committee should also focus on sustaining the motivation. It is important to empower people towards the action and the change. The literature review and the case study findings show that citizen engagement and citizen participation play a crucial role for smart governments. In both cases, Estonia and Singapore, the contribution of citizens was a significant addition towards the success.

Hence, the findings of the research conducted by Simonofski, De Smedt, Asensio and Snoeck (2017) are proposed for smart government initiatives. According to the research, citizen participation can be divided into three categories: “Citizens as democratic participants”, “Citizens as co-creators”, “Citizens as ICT users”.

Figure 21: Citizen Participation Framework



Source: Simonofski, De Smedt, Asensio, & Snoeck (2017).

Under the concept of “Citizens as democratic participants”, a representative group of citizens is selected to get involved the decision-making process. After a deep learning process of technical issues about administration and governance, they can present their perspective to administrators before taking any action. Likewise, administrators are able to realize the benefits or the challenges of any legal decision directly from the citizens. The most critical issue is the selection of the citizens; it must be representative enough from all the community and avoid having bias problems. In addition, there should be an assistance package for the citizens in terms of education and motivation.

With the aim of having citizens in the center of smart government initiatives, it can be stated that buttom-up method is more sufficient than top-down method. “Citizens as co-creators” concept requires an active participation in every process. This can be achieved by taking citizens’ ideas through interviews or focus groups (“direct interaction”), with brainstorming via “living labs”, and “online platforms” such as social media, crowdsourcing platforms, and other ICT tools.

Living labs can be defined as “user-driven open innovation ecosystem based on business-citizens-government partnership which enables users to take active part in the research, development and innovation process” (Simonofski, De Smedt, Asensio, & Snoeck, 2017).

Finally, “Citizens as ICT users” category refers the full participation of citizens via advanced ICT tools such as Augmented Reality, Citizen Science, Open Data platforms in which citizens can actively involve with their technological knowledge.

#### 6. Train: Education / training

Since the smart government initiatives include advanced ICT tools and applications, education is needed for the all the stakeholders in order to reach the desired knowledge, skills and ability. It is a known fact that education and technology knowledge levels of individuals cannot be the same; however, it can be balanced with the help of education.

The essential skills for the smart government transformation can be listed as following: information technology, information management, organizational change, risk management, finance, collaboration, partnership. Smart government transformation requires a continuous learning, which means education and training should be established consecutively.

#### 7. Act: Implementation / action

After the awareness of the need, building the team, planning, communicating, motivating and training; the action time takes place. Even though this stage seems the most important one, if all the previous stages are completed strong and successful, implementation should transpire smoothly.

It is recommended to start with pilot implementations rather than the whole country, as it can be seen in the Singapore case. Pilot implementations help to understand the possible challenges and risks quickly and harmlessly. Instead of applying the change at one time in the whole country, selecting some pilot regions and pilot sub-projects might decrease the risks and increase the opportunities for the smart government initiatives.

#### 8. Control: Getting feedback and changing the plan if needed

A significant change can not be done without feedback. After the implementation stage, control process is recommended as the 8<sup>th</sup> stage of the roadmap. The results of the action should be analyzed and honest feedback should be collected after implementation, and if it is needed, the plan should be altered. The executive committee should go back to stage 3 and follow the stages from there accordingly.

It is vital to analyze citizen satisfaction levels for the control stage, as the transformation puts the citizens in the center; in other words, it follows the citizen-centric approach. It can be claimed that ease of use and compatibility of the online tools and services, and trustworthiness are important factors for increasing the citizen satisfaction. Data ownership, transparency and effective legal framework lead the way to gain citizen trust; such as creating strict rules to prevent misuse of private data. Additionally, governments should provide equal services for all the citizens, in order to sustain social equity.

## 9. Sustain: Consolidation and sustaining the transformation

With the condition that the results of the control stage fit the desired outcomes, the final stage of the transformation occurs: Consolidation. The governments should take into consideration that openness at every level of the transformation is crucial. Therefore, even if the achieved results are negative, it is essential to communicate transparently. Clear and honest communication is essential in order to gain and sustain the trust of the citizens and all the stakeholders.

In the last stage, not only consolidating the processes but also sustaining the digital transformation should be carried out by the authorities. As it was stated previously, smart government transformation is a continuous process, and it is important to sustain the profitable results in the long term.

*Table 7: Smart Government Transformation - Proposed Roadmap*

<p>Realize</p> <ul style="list-style-type: none"> <li>• Awareness of the need</li> <li>• Gathering information</li> <li>• Identifying the problem</li> </ul>
<p>Enlist</p> <ul style="list-style-type: none"> <li>• Building an executive committee</li> </ul>
<p>Plan</p> <ul style="list-style-type: none"> <li>• Creating the vision and the strategic plan</li> <li>• Stakeholder mapping</li> <li>• Resources (human, financial, materials, tools, applications)</li> <li>• ICT infrastructure and architecture</li> <li>• Legal framework</li> <li>• Security and privacy</li> <li>• Trust</li> <li>• Milestones &amp; short-term wins</li> <li>• Risk analysis and challenges assessment</li> </ul>
<p>Communicate</p> <ul style="list-style-type: none"> <li>• Clear and honest communication</li> <li>• The need</li> <li>• The vision</li> <li>• The strategic plan</li> <li>• Coordination and collaboration</li> </ul>
<p>Motivate</p> <ul style="list-style-type: none"> <li>• Motivating / empowering towards the action and the change</li> <li>• Citizen engagement &amp; participation</li> </ul>
<p>Train</p> <ul style="list-style-type: none"> <li>• Education / training</li> <li>• To have desired knowledge, skills and ability</li> <li>• Essential skills: IT, IM, ICT, organization change, risk management, finance, collaboration, partnership</li> </ul>
<p>Act</p> <ul style="list-style-type: none"> <li>• Implementation / action</li> <li>• Pilot implementations</li> </ul>
<p>Control</p> <ul style="list-style-type: none"> <li>• Control – getting feedback and changing the plan if needed</li> <li>• Citizen satisfaction levels</li> </ul>
<p>Sustain</p> <ul style="list-style-type: none"> <li>• Consolidation and sustaining the transformation</li> <li>• Communicate the results even if negative</li> <li>• Openness is crucial</li> </ul>

*Source: Own work.*

## CONCLUSION

As a result of the rapid technological development and increasing use of Information and Communication Technologies (ICT) in every level of our lives, the governments also try to engage this digital transformation in their processes and services. This transformation also has the opportunity of increasing transparency, economic performance, efficiency, effectiveness and a decrease in the costs.

However; the implementation of smart government is not smooth and straightforward, there are plenty of challenges and risks that should be considered before the initializing the action. In addition to resistance to change; there are legal, technical, organizational, financial, strategic and political difficulties which the organizations have to face with, which brings us the need of having a proper change management strategy. This research aims to reveal the difficulties and possible benefits of technological development of governments, and to create a strategic point of view with the help of change management processes with focusing on citizen and government relationship.

The main goal of this research is to propose a guideline for C2G / G2C smart government initiatives that is able to take advantage of the technologies and to support the strategy for the digital transformation of countries.

The steps of the developed work are the following: Defining the smart government concepts, the history of the digital transformation of governments, the areas of smart government, citizen engagement, enterprises and stakeholders, characteristics of smart governments, significant challenges and opportunities; characterizing the current situation of C2G and G2C with Estonia and Singapore case analysis using the factors (areas, citizen engagement, enterprises and other stakeholders, challenges, discussion / success factors) that are defined in accordance with the literature review results, comparison of two cases and proposing a guideline/roadmap to better address for future initiatives.

This study focuses on literature review on smart government and multiple case study analysis. The proposed roadmap for future smart government initiatives is developed according to the results of the literature review and qualitative research about Estonia and Singapore cases; therefore, the study is limited to a qualitative perspective.

The study aimed to analyze used cases and to propose a guideline with the help of literature review and lessons learned. The future work may use a detailed quantitative research with the participation of government agencies, universities, NGO's and citizens. The quantitative research may focus on creating a model about how citizen participation affects the success of smart government transformation, or how the private sector help to improve smart government initiatives.

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## **APPENDICES**



## **Appendix 1: Summary in Slovene**

Z agresivnim tehnološkim razvojem in naraščajočo uporabo Informacijske in komunikacijske tehnologije (IKT) [po angleško, Information and Communication Technologies (ICT)] na vseh ravneh našega življenja, tudi vlade poskušajo to digitalno preobrazbo vključiti v svoje procese in storitve. Za zagotavljanje visoko kakovostnih storitev, širok dostop do informacij in zagotavljanje možnosti demokratičnega procesa odločanja državljanom, morajo vlade ustvariti okvir digitalne preobrazbe v svojih notranjih in zunanjih procesih. Ta pristop ima tudi priložnost za povečanje preglednosti, gospodarske uspešnosti, učinkovitosti, uspešnosti in zmanjšanja stroškov.

Vendar; izvajanje pametne vlade ni gladko in enostavno, obstaja veliko izzivov in tveganj, ki bi jih bilo treba upoštevati pred začetkom akcije. Poleg odpora do sprememb; organizacije se morajo soočiti s pravnimi, tehničnimi, organizacijskimi, finančnimi, strateškimi in političnimi težavami, zaradi česar moramo imeti ustrezno strategijo upravljanja sprememb. Cilj te raziskave je razkriti težave in možne koristi tehnološkega razvoja vlad, ter oblikovati strateško stališče s pomočjo procesov upravljanja sprememb s poudarkom na odnosu med državljanom/državljanke in vlado.

Glavni cilj te raziskave je predlagati smernice za pametne vladne pobude C2G / G2C, ki lahko izkoristijo tehnologije in podprejo strategijo za digitalno preobrazbo držav.

Koraki razvitega dela so naslednji: opredelitev konceptov pametne vlade, zgodovina digitalne preobrazbe vlad, področja pametne vlade, sodelovanje državljanov, podjetij in deležnikov, značilnosti pametnih vlad, pomembni izzivi in priložnosti; karakterizacija trenutnega stanja C2G in G2C z analizo primerov iz Estonije in Singapurja z uporabo dejavnikov (področja, vključenost državljanov, podjetja in druge zainteresirane strani, izzivi, dejavniki razprave/uspeha), ki so opredeljeni v skladu z rezultati pregleda literature, primerjava dveh primerov in predlaga smernice/načrta za boljše obravnavanje prihodnjih pobud.

## **Appendix 2: Summary in English**

With the aggressive technological development and growing use of Information and Communication Technologies (ICT) in every level of our lives, the governments also try to engage this digital transformation in their processes and services. In order to provide high-quality services, broad access to information and deliver the opportunity of the democratic decision-making process to the citizens, governments have to create a framework of digital transformation in their internal and external processes. This approach also has the opportunity of increasing transparency, economic performance, efficiency, effectiveness and a decrease in the costs.

However; the implementation of smart government is not smooth and straightforward, there are plenty of challenges and risks that should be considered before the initializing the action. In addition to resistance to change; there are legal, technical, organizational, financial, strategic and political difficulties which the organizations have to face with, which brings us the need of having a proper change management strategy. This research aims to reveal the difficulties and possible benefits of technological development of governments, and to create a strategic point of view with the help of change management processes with focusing on citizen and government relationship.

The main goal of this research is to propose a guideline for C2G / G2C smart government initiatives that is able to take advantage of the technologies and to support the strategy for the digital transformation of countries.

The steps of the developed work are the following: Defining the smart government concepts, the history of the digital transformation of governments, the areas of smart government, citizen engagement, enterprises and stakeholders, characteristics of smart governments, significant challenges and opportunities; characterizing the current situation of C2G and G2C with Estonia and Singapore case analysis using the factors (areas, citizen engagement, enterprises and other stakeholders, challenges, discussion / success factors) that are defined in accordance with the literature review results, comparison of two cases and proposing a guideline/roadmap to better address for future initiatives.

**Keywords:** Citizen Engagement; E-government; G2C; Open Data; Smart City; Smart Government