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Smart governance in the context of smart cities: A literature review

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Abstract. This literature review has focused on smart governance as an emerging domain of study that attracts significant scientific and policy attention. More specifically, this paper aims to provide more insight in the definitions of and relationships between smart governance and concepts such as smart and electronic government, in the context of smart cities. The literature review shows that smart government can be considered as a basis for developing smart governance, through the application of emergent information and communication technologies (ICT) for governing. Smart governance as the intelligent use of ICT to improve decision-making through better collaboration among different stakeholders, including government and citizens, can be strongly related to government approaches. In this case ICT-based tools, such as social media, and openness can be factors that increase citizen engagement and support the development of new governance models for smart government. Smart governance may also have an important role in smart city initiatives, which require complex interactions between governments, citizens and other stakeholders. Based on the literature review, this paper coins a definition of 'smart city governance' and contributes to developing a framework for building new, smart governance models addressing the challenges of the digital society, collaborative governance, information sharing, citizen engagement, transparency and openness.

Keywords: Smart governance, e-government, smart city governance, e-governance, smart government, collaborative governance

1. Introduction

The digital transformation is altering governance models in a disruptive way. Governance is the enabling environment that requires adequate legal frameworks and efficient processes to enable the responsiveness of government to the needs of citizens (UN Habitat, 2008). Governance can also be defined as interaction and collaboration of different stakeholders in decision-making processes (Alonso & Lippez-De Castro, 2016; Albino et al., 2015). The concept is commonly used to describe the action or manner of governing a state, an organisation, or other constellation of actors. This shows that government and governance are related, but different concepts. *Smart* Governance is defined as "the capacity of employing intelligent and adaptive acts and activities of looking after and making decisions about something" (Scholl & Alawadhi, 2016, p. 22). According to H. Scholl and M. Scholl (2014) smart governance can be seen as basis to smart, open and participatory government. These concepts play a key role in the

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growing discourse on smart cities, so we may expect that Information and Communication Technologies (ICTs) play a key role in smart government as part of wider models of smart governance. From this, it follows that the adjective 'smart' refers to context- and site-embedded combinations of ICT, technology, and innovation, as well some sort of democratic aspect (Gil-Garcia et al., 2014; H. Scholl & M. Scholl, 2014). Estevez and Janowski (2013) have shown that the related concepts of *electronic* government and *electronic* governance (commonly abbreviated as e-government and e-governance) also emphasize the importance of ICTs in urban governance.

Smart cities are related to ICT-based urban innovation, i.e. intelligent use of ICTs to deliver better urban services, dealing with growing urban problems due to increasing urbanization, without the proper establishment of policies focused on well-being. One of the main objectives of smart cities is increasing the quality of life in the city. Testoni and Boeri (2015) suggest that to manage the dynamics of smart cities, a new model of governance is needed along with strong coordination by the local government to support in managing complex co-operation processes with a variety of stakeholders, in particular citizens. This scenario requires reshaping the role of governments, citizens, and other social actors, as well as exploring the new and emergent information technologies to frame a new governance model, including new relationships, new processes, and new government structures (Gil-Garcia, 2012).

The question is then: what should smart governance look like in the context of smart cities? More than the lack of clear definitions of concepts related to smart governance, we observe that some concepts overlap in many aspects, emphasizing the need for more conceptual clarity and definitions that support governments and other actors in their quest of smart governance and its associated elements. This paper reports a thorough literature review that will assist this quest for more clarity.

The objective of this paper is twofold: 1) to provide more insight in the definitions of and relationships between smart governance and the concepts of smart and electronic government, and 2) to define the key elements of smart governance in the context of smart cities.

Considering this objective, smart governance is defined here as the ability of governments to make better decisions through the combination of ICT-based tools and collaborative governance. In this sense, we understand that smart governance is the use of evidence (data, people, and other resources) to improve decision making and deliver results that meet the needs of the citizens. This is particularly important for smart cities initiatives which are usually technology-grounded. Among the main success factors in smart-city initiatives are "reshaping administrative structures and processes across multiple local government agencies and departments" as well as "stakeholder involvement in governance" (Alawadhi & Scholl, 2016, p. 2953). Creating smart governance frames for urban policies is a way to improve the decision-making processes and increase the quality of public services delivery (Elisei et al., 2014). The importance of transforming the relation between government and the public, and the collaborative governance as a key aspect of smart governance leads us to the concept of participatory government, which is strongly related to the new governance model (as a method) in promoting communication, interaction, collaboration, participation in decision-making and direct democracy.

The paper is structured as follows. The next section shortly outlines our methodological approach towards the literature review. Section 3 presents the results of the literature review, subsequently dealing with smart and electronic government (3.1), smart and electronic governance (3.2), and the smart city domain (3.3), focussing particularly on smart city governance. Section 4 provides a discussion of the findings, structured along the two research questions. Finally, Section 5 delivers our conclusions and suggestions for further research.

2. Literature review design

The literature review consisted of analysing a broad set of papers on the smart governance topic. Basically, the design of the review entailed a three-step approach (Webster & Watson, 2002). First of all, we have searched for the keywords "smart governance" and "smart government" in Scopus, which resulted in 50 entries. Complementary to this approach, we identified leading journals in the field which have widely recognised and major contributions to the literature. Among the most influential academic journals (Estevez & Janowski, 2013), we have selected the first four: Government Information Quarterly, International Journal of Electronic Government Research, Information Polity and Transforming Government: People, Process, Policy. Keywords such as "smart governance", "smart government", and "smart city", were used to identify relevant literature by searching articles full-text. Additionally, the keywords "electronic government" and "electronic governance" were searched. The search queries led us to obtain a total of 123 papers about smart governance and smart cities. The second step of the literature review consisted of selecting appropriate papers based on their abstracts and introduction, considering their relevance for the debate on smart governance and smart cities. The main criterion was the existence of definitions or explanation, including frameworks or indicators of the concepts. In addition, we checked and discarded double counted articles. This process resulted in a sample of 77 papers that were included in the final analysis to address the research question. The third and final step consisted of a snowball approach in order to review references from the 77 identified articles to determine further relevant material. This allowed us to include papers for a diverse range of journals, conferences and grey literature.

Finally, Government Information Quarterly and Information Polity had the majority of the papers related to the search domain with 48 and 8 papers respectively, followed by Transforming Government (4), Social Science Computer Review (2), International Journal of Electronic Government Research (1) among other journal papers with one occurrence. The final sample consisted also of 11 book chapter/series, 6 conference papers, and reports such as Un-Habitat and OECD.

3. Results of the literature review

We will now turn to the analysis of concepts that are outlined in the objective of the paper, based on the literature review. Firstly, Section 3.1 deals with the definitions, main dimensions and features of the concepts of electronic government (3.1.1) and smart government (3.1.2). This is followed in Section 3.2 by a review of the core components that constitute the concepts of electronic and smart governance. Section 3.3 moves on to discuss the smart city domain and its dimensions, and provides an in-depth discussion of smart governance particularly in the context for smart cities, i.e. smart city governance.

3.1. Electronic government and smart government

This section aims at understanding and discussing initiatives undertaken by the government to integrate ICT in their operations, functions, processes and relationships with other stakeholders. The terms *electronic government* (*e-government*) and *smart government* are still under development and have received great attention from researchers in diverse research and application fields in the last decade (Khan & Park, 2013; Layne & Lee, 2001; Moon, 2002; Meneklis & Douligeris, 2010). There are many different perspectives on smartness and smart governments that mainly represent the essence of governing in a broad way or on the use of emergent ICTs (Gil-Garcia et al., 2014). In the next subsections we will further explore different perspectives on both the terms e-government and smart government.

3.1.1. E-government definitions and dimensions

According to Janssen and Estevez (2013), governments from all over the world are being challenged to become more innovative while at the same time reducing costs, operate in a connected environment, and engage stakeholders in solving societal problems. In this context, the use of ICT in government has become a strategy for administrative reforms at all levels of government (Sandoval-Almazan & Gil-Garcia, 2012). E-government or Digital government can thus be seen as a transformational effort through the introduction of ICT in government organizations in order to achieve several objectives: improve the efficiency of public sector activities and service delivery (Janssen & Estevez, 2013); transform government functions, internal organization, and practices through a citizen-centric approach; increase transparency; promote openness and reduce corruption (Khan & Park, 2013; Sandoval-Almazan & Gil-Garcia, 2012; Helbig et al., 2009; Bertot et al., 2010; Ayanso et al., 2011; Hu et al., 2012; Janowski et al., 2012). Therefore, governments around the world are adopting e-government strategies for improving the use of ICT. These emerging strategies mainly revolve around three added value 'generators': *administrative efficiency and interoperability, service improvement and citizen centricity*. Starting from these three major themes, the next subsections highlight the main transformational consequences of e-government strategies on these and other closely related aspects.

Administrative efficiency and interoperability (performance, effectiveness, productivity)

Administrative efficiency exploits the automation effects of ICT in various levels of government, in values such as efficiency, effectiveness, productivity, performance of administrative functions, relations and information sharing between different departments of the public administration (Sandoval-Almazan & Gil-Garcia, 2012; Persson & Heeager, 2015). Important aspects of ICT investment for pursuing administrative efficiency relate to cost reductions and reduced staff numbers, improved staff efficiency, performance, and management and sharing of information. Cross-department information sharing is a key element for achieving organizational efficiency, cost savings, policy effectiveness, accountability and openness (Gil-Garcia, 2012; Yang & Maxwell, 2011; Viale et al., 2017). Interoperability among various governmental departments through investment in shared infrastructures and applications (hardware and software), data management services, integration and alignment of system architectures and work processes also plays an important role in achieving greater administrative efficiency through ICT (Gottschalk, 2009; Klievink & Janssen, 2009; Zissis & Lekkas, 2011). ICT Investment in improved administrative efficiency, automation and performance is expected to have a great impact on service improvement and availability to citizens; themes to which we will turn now.

Service improvement

This theme relates to the citizen's increasing demand of e-service provision and experiences with ICT-savvy governments, including better access to (public) services and information, shorter response times, online applications and transactions, and cost savings for citizens (Khalil, 2011). According to Awoleye, Ojuloge and Ilori (2014), e-government is characterized by the progress in improving the delivery of public information and services through organizational processes and technologies that allow information to be more accessible and disseminated across all government agencies. Along with the increased quality of public services in e-government (Lambert, 2013), there are many ways in which individual citizens can benefit from such investments. According to Hamner and Al-Qahtani (2009), these include: reducing costs associated with registration and submission of forms (e.g. regarding permits); reducing errors and increasing accuracy of data, as human error is reduced; increasing the ability to communicate directly and more quickly with institutions; eliminating the need for time-consuming face-to-face

appointments; providing (local) government services to citizens 24-hours-a-day, 7-days-a-week; and delivering government services from any place and accessible from any device. In this sense, the role of mobile technologies and applications has become crucial in improving performance of e-government service provision (Hung et al., 2013). Mobile e-government services have already been incorporated in order to improve user-to-government communication effectiveness and strengthen the relationship between government and citizens (Hung et al., 2013). This brings us to the final added value 'generator' of e-government: citizen-centricity.

Citizen-centricity (increased transparency and trust in government)

The increasing needs and aspirations of citizens for more democratic practices and higher involvement in government activities, together with advances and investment in ICT and the resulting improved government-citizen interaction and communication, have their impacts on e-government strategies. Consequently, these strategies are placing more and more emphasis on the citizen-centric component. This component focuses on the importance and role of citizens, not only as 'customers' to create customer-driven services adopting a less techno-centric approach (Janssen & Estevez, 2013; Helbig et al., 2009), but also as partners in the co-production of public services.

The increased focus on citizens enables stronger citizen engagement based on collaboration, participation, and community empowerment (Rose et al., 2015; Lambert, 2013; Linders, 2012).

In turn, this new approach may produce greater transparency on the part of government (Bertot et al., 2010) and increased citizen trust and satisfaction. According to Reddick and Roy (2013), citizens are satisfied when they can accomplish their task, i.e. they are able to get the information they desire and have a service experience that solves their problems. A higher level of satisfaction leads to more use of e-government and increase in its future development. The ever more important role of citizens and closer interactions with government lead to a model of smart government where the relationship goes beyond service improvement and delivery and into areas of decision making, openness, wider societal issues and wider stakeholder networks.

3.1.2. Smart government definitions

Smart government is often used to describe activities that invest "in emerging technologies coupled with innovative strategies to achieve more agile and resilient government structures and governance infrastructures" (Gil-Garcia et al., 2014, p.1). Smart government is also referred to by Mellouli, Luna-Reyes and Zhang (2014) as the extensive use of technology by government, following two important trends: the movement to open data and the technology ubiquity, which contribute to better understand societal problems and improve government relationships with citizens, private organizations, NGOs and other governments. Recently, Gil-Garcia et al. (2016) identified multiple dimensions of smartness that contribute to the understanding and development of smart governments: integration, innovation, information sharing, evidence-based, citizen-centricity, sustainability, creativity, effectiveness, efficiency, equality, entrepreneurialism, citizen engagement, openness, resiliency, and technology savviness. Some of these dimensions (integration, efficiency, citizen-centricity, technology savviness) are proper of e-governments too (and have therefore been discussed in Subsection 3.1.1). Below, we will focus on three further dimensions outlined by Gil-Garcia et al. (2016):

- *Sustainability and resilience:* These two concepts are widely discussed in the literature and their implications for governments and the wider society as a whole are discussed at length elsewhere (see e.g. (Jansson, 2013)). Gil-Garcia et al. (2016) emphasize that smart governments should possess both dimensions being able to take into account the ecological implications of growth and development, improving the quality of life for future generations, and quickly recover and respond to their citizens in cases of emergency and disaster.

- *Creativity, entrepreneurialism, and social equality:* creativity and entrepreneurship concern stimulating a diverse culture of smart citizens. Entrepreneurialism can be encouraged through a focus on integrating knowledge-based and innovation-oriented economic development. In terms of equality, the authors stress that the use of ICT, data, and appropriate strategies could support reducing social exclusion and promoting social justice. However, several other authors (Burkhardt et al., 2014; Jaeger, 2011; Norris, 2001; Picazo-Vela et al., 2012) have highlighted the inherent potentially negative effects of technology and the 'digital divide' on the exclusion of certain categories of the general population (e.g. elderly, lower income, people with disabilities).
- *Citizen engagement in and evidence-based decision-making processes:* These two aspects concern the engagement of citizens in decision-making processes rather than participating in the improvement of services based on a citizen/customer approach. This increases government openness, transparency, accountability and therefore the quality of the relationship between citizens and governments. Governments use, and share, data, information and knowledge to support evidence-based decision making which enables governments to make more informed decisions and improve the effectiveness of public policies and programs. This last dimension deserves particular attention as one of the most important and characterising aspects of smart governments.

Evidence-based, participatory decision-making process and the rise of social media

As stated by Nam and Pardo (2014), a smart government is expected to create collaborative environments and promote collaboration among government and other external organizations and citizens. As part of this expectation and of more collaborative environments, better measurement processes, sharing of information by agencies, Higher utilization of resources, and performance evaluation are assumed to arise, thus facilitating public participation in decision-making and monitoring (Chun & Sandoval-Almazan, 2012; Estevez & Janowski, 2010; Maheshwari & Janssen, 2014). The potential of ICT strategies to improve and advance the interactions between citizens, businesses, and government has been explored already for over a decade. According to Jaeger (2003), who referred to e-government, an effective e-government has the capacity to create new forms for public participation in government, electronically threading together citizens, businesses, and all levels of government in a nation. The need for increased participation of citizens in public life still applies, adding to the pressure from various stakeholders to increase government openness and transparency (Navarro-Galera et al., 2016).

The use of ICT solutions to increase public participation in government has long been known as *e-participation* (Macintosh & Smith, 2002; Zissis et al., 2008). E-participation facilitates public involvement, increasing the abilities of citizens, the level of democracy, and the quality and acceptability of government decisions (Hu et al., 2012; Boyd, 2008). However, according to Bonsón et al, (2015), the opposite is also true, in the sense that the institutional setting has great influence on e-participation and citizen engagement. Citizens tend to engage more when they notice their governments are truly open to interaction and integrating their point of view in decision-making, but also when they have access to useful, relevant, and complete set of information from the government (Bonsón et al., 2015; Mellouli et al., 2014). ICT-based tools can mediate, extend, and transform participation in democratic and consultative societal processes (Sæbø et al., 2008). Thus, the task of e-participation is to empower people through ICT, making it possible to act in decision-making processes and develop social and political responsibility (Zissis & Lekkas, 2011).

New internet platforms are identified as an evolution of communication linkages between political representatives and citizens, allowing citizens to effectively participate in decision-making processes (Wijnhoven et al., 2015; Zissis & Lekkas, 2011). Among these platforms, Web 2.0 and social media play a major role in creating a new generation of e-participation, innovating organizational and decision-making

processes, and reshaping the relationships between governments and other actors (Sandoval-Almazan & Gil-Garcia, 2012; Sandoval-Almazan & Gil-Garcia, 2014; Criado et al., 2013; Ferro et al., 2013; Kleinhans et al., 2015; Porwol et al., 2016). The use of social media in government has several positive effects such as improved government-citizens collaboration and communication, citizen empowerment, government transparency, openness, and ultimately governance (Bonsón et al., 2015; Criado et al., 2013; Stamati et al., 2015).

Exchange of user-generated content, greater information sharing and dissemination, and crowdsourcing are essential features of social media and Web 2.0 (Bertot et al., 2010; Kaplan & Haenlein, 2010; Kavanaugh et al., 2012; Khan, 2015). When discussing about the futures of participatory democracy, Meijer (2012) regards new social media as an enabler for governments to reach and engage citizens in the production of government policies. Stamati, Papadopoulos and Anagnostopoulos (2015) hold that the inclusion of social media functionalities in the public sector has positive effects on openness and accountability, as well as on new governance strategies for public consultation and interaction in public policy making. As a result, this is transforming the role of citizen into co-creators of policies and services. Making citizens co-creators of services and policies can enhance their innovation and effectiveness and lead to new forms of government-to-citizen and citizen-to-government collaborations (Linders, 2012). The potential of social media and the new resulting citizen-government relationship leads Stamati, Papadopoulos and Anagnostopoulos (2015) to recognize the urge for public policy makers to rethink the current mode of governance into new governance models which are centred on communication, interaction, collaboration, and participation in decision-making so facilitating openness and transparency, and promoting direct democracy. According to Al Athmay (2015), e-openness is the major theme of e-governance, supporting people to participate in decision-making processes, being defined as the extent to which the public are able to obtain government information through ICT. This leads us to discuss new forms of governance as a result of all these processes, namely smart and electronic governance. These are the topic of Section 3.2.

3.2. Smart Governance and electronic governance

This section shifts the focus from government to governance, i.e. two particular forms of governance: electronic governance and smart governance. *Smart Governance* is generally defined as the capacity of applying digital technologies and intelligent activities in processing of information and decision-making (Scholl & Alawadhi, 2016). *Electronic governance* is commonly defined as the application of technology by governments in order to transform themselves, their interactions with customers and the relationships with and citizens, businesses, other non-state actors and other arms of government, creating impact on the society (Estevez & Janowski, 2013; Janowski et al., 2012). Within these definitions, results from the literature review highlight fundamental aspects which refer mainly to two sub-themes, which will be discussed in two consecutive subsections:

1. Data and evidence-based policymaking;
2. Collaborative, open and citizen-centric forms of governance.

3.2.1. Data and evidence-based policymaking

In order to achieve better governance and evidence-based policymaking, novel ICT solutions could be applied for processing, integrating and exploiting the huge and ever growing amount of data available and produced nowadays (by sensors, social media users, government, business and other stakeholders) and improving knowledge management capacities (Misuraca et al., 2012; Ubaldi, 2013). According to

Reddick et al. (2015) the use of data to improve performance and decision-making is already a reality in public sector organizations. Open government data (OGD) as a specific set of data produced and made available for free by government organizations is constantly increasing (Peled, 2014) and lays the foundations for data-driven decision making and crowdsourced solutions through digital and mobile applications (Silva, 2013). In this context, the term *open governance* emerged from the understanding that information belongs to the public, and, alongside electronic democracy practices, can transform electronic government to electronic governance (Wijnhoven et al., 2015; Klaus, 2016). Open data and open government are fundamental prerequisites of institutional settings which foster collaborative forms of governance where open data and information are accessible, having an impact on transparency of and trust in government agencies (Meloulli et al., 2014; Bonsón et al., 2015).

Another set of unstructured and ever-growing data is represented by social media data and feedback which are increasingly being used by governments to communicate with citizens and implement forms of citizen-centric governance, see Section 3.1.2 (and see Barnes et al., 2008; Bekkers et al., 2013; Mergel, 2013).

3.2.2. Collaborative, open and citizen-centric forms of governance

According to Linders et al. (2015), the advent of social media, mobile connectivity, and big and open data is pushing governments towards developing a vision of ICT-facilitated governance which is more open, collaborative, and responsive to the needs and aspirations of citizens. The understanding that government data and information belongs to the general public lays the foundations for open forms of governance (Klaus, 2016). ICT innovations change the way government works, delivers services, and solves public problems in collaboration with citizens, but also addresses social impact and citizen empowerment (Linders et al., 2015). In this sense and by making use of ICT in a collaborative way, smart governance can be a way to overcome top-down coordination by defining a consensus framework for collaboration (Linders, 2013) with an impact on effective governance through a clear allocation of decision making rights to the main stakeholders at different stages of the policy cycle (Ferro et al., 2013; Khan et al., 2014). Nevertheless, a definition and realisation of new ICT-enabled governance models is still missing, where the balance of power and the roles and responsibilities of governments, citizens and other societal actors must be rethought (Misuraca et al., 2012). According to Khan et al. (2014), ICT-enabled urban management is a consequence of increasing demands from citizens to participate in decision-making, requiring changes in regulatory, policymaking and governance processes. Citizen centric e-governance, therefore, is considered as a new way to make use of ICT in order to enhance citizen's engagement with political discourse and decision making, influencing meaningful change in public policy and governance (Chatfield et al., 2015; Reddick et al., 2015).

3.3. Smart city domain

The concept of smart city has been attracting attention from academics and practitioners due to the fact that many cities are expanding their efforts to become smarter (Lee & Lee, 2014). Despite the many definitions and perspectives in the smart city domain, in most of them governance has an important role, especially by connecting initiatives between governments and citizens and keeping the decision processes transparent (Albino et al., 2015; Castelnovo et al., 2015). In order to have an overview about the domain, in the next subsections we will explore the smart city dimensions and the smart city governance concept.

3.3.1. Smart city dimensions

Smart city has been recognized as an interdisciplinary domain and is characterized by the efforts of governments to increase the quality of life in the cities. Based on many definitions of the concept, "the smart city field has come to a uniform definition, which deals with innovation (not necessarily but mainly ICT-based) in the urban space that aims to enhance the six city dimensions (people, economy, government, mobility, living and environment)" (Anthopoulos et al., 2016, p.12). Castelnovo et al. (2015) have revealed that most of the concepts in literature acknowledge that smart cities are multidimensional systems. Smart cities are characterized by a new way of governing with the use of technology and the consequent increase in the public administration capacity of improving the quality of life of citizens, provision of public services and democracy (Anthopoulos & Reddick, 2016; Castelnovo et al., 2015). The smart city concept is often represented by frameworks in which the technology has an important role. Since this is not the focus of the paper but relevant for understanding the smart city concept, a non-extensive overview of frameworks and the role of technology will be described in the following subsections.

Smart city frameworks

One of the most recognized frameworks for Smart Cities was developed based on theories of urban growth and development by Giffinger and Pichler-Milanović (2007). In this work, smart cities are defined as those with good performance and prospects in areas such as economy, people, governance, mobility, environment and livelihoods. The main elements identified by the authors in the above dimensions refer to economic competitiveness, social and human capital, participation, transport and ICT-related factors, natural resources and aspects related to quality of life (Giffinger et al., 2007). An integrative framework of smart cities was proposed by Gil-Garcia et al. (2015) in order to identify core components that are represented by four dimensions (1) technology and data, (2) government, (3) society, and (4) physical environment. The interesting aspect in this framework is the multidimensional and multifaceted view of smart cities and the central function of technology as a component that extends across other components and helps to enhancing and interconnecting them. More recently, Anthopoulos et al. (2016) synthesized existing smart city conceptualizations into a unified smart city model, which addresses eight classes of conceptual models including smart city 1) architecture, 2) governance, 3) planning and management, 4) data and knowledge, 5) energy, 6) health, 7) people and 8) environment, as well as six classes of benchmarking tools, such as smart city progress, smart city monitoring, city capacity, city sustainability, resilience, and policy impact. In general, smart city can be considered an umbrella term for the different types of innovations in the urban environment (Anthopoulos et al., 2016).

The role of technology

The historical predecessors or synonyms of smart city, such as intelligent city, information city, knowledge city, digital city and ubiquitous city, reflect advances of the related technologies applied in urban management and serving citizens (Lee & Lee, 2014). However, the technology has a crucial role on smart cities that goes beyond the traditional objectives of supporting to optimize urban services and improve quality of life. ICT-enabled solutions can be especially applied for increasing the quality of the relationship between government and its constituency, and to create networks that allow people to get connected to government by electronic public services (Castelnovo et al., 2015). Lee and Lee (2014) call those services "smart city services", which can contribute to enhance the city's competitiveness and citizens' quality of life by using ICT in city planning and management. The innovative services also provide information, knowledge and transaction capabilities to citizens regarding the different aspects

of their life in the city (Lee & Lee, 2014). Besides the ICT infrastructure that is needed for creating smart operations and promoting smart services, Scholl and AlAwadhi (2016) have identified the need for fundamental change in organizational integration, alignment and interorganizational cooperation, especially regarding information systems interoperability, as well as an adequate ICT governance model.

Although its central function, governments striving to create a smart city are not only concerned with adopting innovation in technology, but also dealing with overall management, governance and policies, as well as other factors such as human capital and education as drivers of change (Lee & Lee, 2014). This aspect brings us to the topic of the next subsection, which provides a governance perspective of smart cities.

3.3.2. Smart city governance

This section focuses on the existing relationships among governance and smart cities, specifically in the smart cities literature. There is no clear definition about the smart city governance concept but some attempts to identify the main perspectives in which governance is applied to smart cities. For example, Meijer and Bolívar (2016) identified four ideal-typical conceptualizations of smart city governance: (1) government of a smart city, (2) smart decision-making, (3) smart administration and (4) smart urban collaboration. In turn, the authors address the governance in smart cities as a new form of collaboration through the use of ICTs. The same is perceived by Castelnovo et al. (2015), in which governance is often related to citizen participation in the smart city literature. Osella et al. (2016) also relate the concept of smart cities with the notion of governance, in which it perceives a greater intention on value creation for society through aspects such as leadership, citizen participation, partnerships, public-private partnerships, accountability, responsiveness, transparency, collaboration, data sharing and information integration services and communication. According to Meijer (2016), smart city governance is about using new technologies (not necessarily the most advanced) to develop innovative governance arrangements and to provide better outcomes and processes. Thus, new and innovative forms of governance are needed to address the challenges of smart cities going beyond the traditional institutions and the classical processes of governing (Bolívar, 2016). Finally, by proposing a framework for the assessment of smart city governance in which the citizen engagement process has a central role, Castelnovo et al. (2015, p. 12) "reaffirm the central role of citizens in the decision-making process and their fundamental contribution to public value creation in the city context". Due to the strong focus of the smart city governance concept on the citizens, we will discuss this specific aspect in the following section.

Citizen-centricity

Citizen engagement is considered a foundation of smart city governance (Castelnovo et al., 2015). The citizen centricity of smart city decision making process is an important aspect in analysing the contribution of smart city governance to generate public values, including economic growth (Castelnovo et al., 2015; Meijer & Bolívar, 2016; Meijer et al., 2016). According to Meijer et al. (2016), a realistic smart city strategy includes the development of contextual conditions, governance models and public value. Stimulating citizen participation in decision-making by collecting suggestions and their point of view on how to improve public services is a traditional engagement approach (Castelnovo et al., 2015). However, in order to raise the number of participants in public debate and include those people that are excluded or not attracted by traditional participation instruments, ICT-based applications, such as Social Media, can help decision makers to make better decisions that fit with the population's needs (Kleinhans et al., 2015; Castelnovo et al., 2015). In other words, city planning and management can be improved through new technologies by connecting people to places in smart city contexts (Khan et al., 2015).

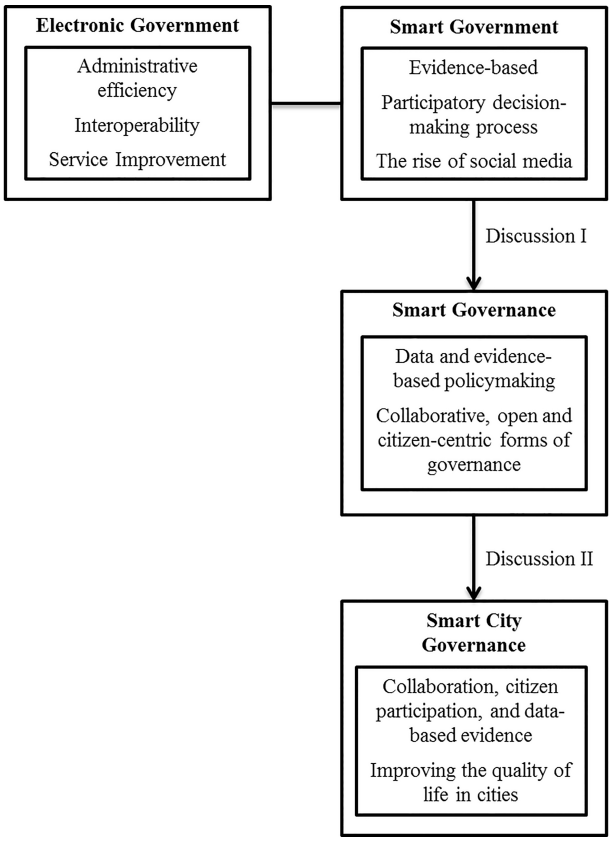

Fig. 1. Building smart city governance.

4. Discussion

Based on the results of our literature review as presented in Sections 3.1, 3.2 and 3.3, in this section we discuss the concepts analysed, their relationships and evolution in the literature. The section is structured into two separate sub-sections which reflect the research questions posed in the introduction. Thus, Section 4.1 deals with the relationships between smart/electronic government and smart/electronic governance. Whereas Section 4.2, by building on Section 4.1, deals with the smart city domain and discusses the key elements of smart governance in the context of smart cities.

The Fig. 1 illustrates the framework developed in this study on building smart city governance based on the relationship between smart government and smart governance.

The framework illustrates the government's evolutionary (but not necessarily linear) process of adopting necessary capabilities and models of electronic and smart government, followed by the development of effective *smart governance* settings and the collaborative environment which characterises them. This smart governance model can be translated to the local level to elaborate and come up with smart city plans, initiatives and solutions. The Digital Government Evolution Model proposed by Janowski (2015) corroborates this idea in which the evolution is related to the transformation level that goes from no governmental transformation, to internal government transformation, transformation that also affects the relationships between government and non-government stakeholders, and finally transformations that depends on the national, city or sectoral government context. The main relations of the concepts pre-

Table 1
Identified concepts and definitions

Dimension	Definition	**Indicators**	References*
E-Government	Introduction of ICT in government organizations in order to achieve administrative efficiency and interoperability, service improvement and citizen centricity	– Administrative efficiency – Interoperability – Service Improvement – Citizen centricity (focus on transpar-ency and trust in government)	Ayanso et al., 2011; Bertot et al., 2010; Gil-Garcia, 2012; Gottschalk, 2009; Helbig et al., 2009; Hu et al., 2012; Janowski et al., 2012; Janssen & Estevez, 2013; Khan & Park, 2013; Linders, 2012; Rose et al., 2015; Sandoval-Almazan & Gil-Garcia, 2012; Zissis & Lekkas, 2011
Smart government	Initiatives undertaken by the government to integrate ICT in their operations, functions, processes and relationships with other stakeholders	– Evidence-based – Participatory decision-making process – The rise of social media – ICT-promoted internal transformation	Burkhardt et al., 2014; Chun et al., 2012; Estevez et al., 2010; Gil-Garcia et al., 2014; Gil-Garcia et al., 2016; Jansson, 2013; Mellouli et al., 2014; Nam & Pardo, 2014; Picazo-Vela et al., 2012
Smart governance	The capacity of applying digital technologies and intelligent activities in processing of information and decision-making	– Data and evidence-based policymaking – Collaborative open and citizen-centric forms of governance – ICT-promoted transformation (internal and within the society)	Barnes et al., 2008; Bonsón et al., 2015; Estevez & Janowski, 2013; Janowski et al., 2012; Klaus, 2016; Linders et al., 2015; Mergel, 2013; Misuraca et al., 2012; Reddick et al., 2015; Scholl & AlAwadhi, 2016a; Scholl & AlAwadhi, 2016b; Silva, 2013; Ubaldi, 2013; Wijnhoven et al., 2015
Smart city governance	A form of smart governance, allocating decision-making rights to stakeholders (in particular citizens) and enabling them to participate in effective and efficient decision-making processes to improve the quality of life in cities	– Collaboration, citizen participation and data-based evidence – Improving the quality of life in cities	Bolívar, 2016; Castelnovo et al., 2015; Khan et al., 2015; Meijer, 2016; Meijer & Bolívar, 2016; Meijer et al., 2016; Osella et al., 2016

* – Here we provide some of the most relevant references.

sented in the framework are represented by the Discussions I and II (respectively Sections 4.1 and 4.2) and synthetized at Table 1.

4.1. Discussion I: the relationship between smart government and smart governance

In Sections 3.1 and 3.2, we presented the results of our literature review regarding the concepts of smart/electronic government and smart/electronic governance. In line with the objective of this paper, i.e. providing more insight in the definitions of and relationships between smart governance and the concepts of smart and electronic government, we now turn to the discussion of these relationships. The review has reconfirmed that the concepts of government and governance are strongly related. This connection arises from a number of larger trends. First of all, governments from all over the world are being challenged to become much more innovative and simultaneously reduce costs, increase efficiency and effectiveness, and engage a wide range of stakeholders in solving various societal problems. It appears that challenges to governments are not only based on issues related to economy, health care, transport, built environment, climate change, democracy, social (in)equality, justice, etc., but also on the increasing

number and complexity of (flexible) *governance* arrangements surrounding each of these issues. Governments not only need to become smarter in their operations, but also engage with complex issues in the context of the multi-actor governance surrounding problems and tasks. The adjective 'smart' implies that governments need to acquire almost chameleonic skills and flexibility to become effective in the wake of constantly changing governance settings. A useful perspective on this relationship is the digital government evolution model designed by Janowski (2015), which conceptualises how e-government evolves toward contextualization and complexity in a four-stage model comprising the technology in government, electronic government, electronic governance and policy-driven electronic governance. It starts with digitization with no organizational change, moving to internal government transformation only, thus affecting the external relations and context-specific transformation.

Furthermore, technology plays an important facilitating role making the connection between government and governance, as expressed by Gil-Garcia and colleagues (2014, p. 1): "emerging technologies coupled with innovative strategies to achieve more agile and resilient government structures and governance infrastructures" (Gil-Garcia et al., 2014, p. 1). However, technology is neither the only component affecting the relationship between government and governance, nor do we perceive a unidirectional relationship. In fact, the literature has shown that institutional settings have a strong influence on digital forms of citizen engagement in government activities (Bonsón et al., 2015; Mellouli et al., 2014; Sæbø et al., 2008; Zissis & Lekkas, 2011). The application of ICT, digital and mobile technologies, a key feature of both smart and electronic *governance* (Estevez & Janowski, 2013; Janowski et al., 2012; Scholl & Alawadhi, 2016), emphasises the transformational nature of the efforts by governments, citizens, businesses, and other actors to meet the aforementioned challenges in improving the performance of their organisation, but also the performance and effectiveness of the respective governance setting.

Finally, the transformational element is also clear in the increasing use of new digital platforms and social media in the evolution of communication linkages between political representatives and citizens (Sandoval-Almazan & Gil-Garcia, 2012; Sandoval-Almazan & Gil-Garcia, 2014; Criado et al., 2013; Ferro et al., 2013; Kleinhans et al., 2015; Porwol et al., 2016). There is evidence that social media use by governments has positive effects, including (but not exclusively) improved and increased government-citizens exchange and collaboration, citizen empowerment, transparency, openness, and ultimately, governance (Bonsón et al., 2015; Criado et al., 2013; Stamati et al., 2015). Especially when governments are open to be influenced by such public media, deploying them is an act of governance, with digital platforms and social media enabling transformation in the delivery of (public) services, decision-making and collective action. The next section reconsiders these issues in the context of smart cities and in particular smart city governance.

4.2. Discussion II: Smart City governance

The first part of the discussion of this paper presented the relationship between smart government and smart governance and the main elements that emerged from those concepts. In Section 3.3 we presented the findings of the literature review on the Smart City domain. Thus, in line with the second objective of this paper, i.e. defining the key elements of smart governance in the context of smart cities, we now combine the results of the first discussion on smart governance as a new perspective of governance in the smart cities context. Smart governance is a concept that can be applied to the different levels of government as the application of emerging technologies for improving decision-making processes. When applied to the local government, smart city governance strongly focuses on the decisions made by government for improving the quality of life in cities, being the intersection of the main smart city

dimensions (Smart Living, Smart Mobility, Smart People, Smart Economy and Smart Environment). Thus, the main objective of smart city governance is to increase the quality of the urban environment through the use of new technologies (Meijer, 2016).

As discussed in Section 3.2, collaboration, citizen participation, and data-based evidence are among the main elements which characterize the concept of smart (city) governance. Meijer and Bolívar (2016) make a strong connection between technology, human resources and governance (as synonym of collaboration) when defining the mains aspects of smart cities. Information sharing and cooperation are the main elements in framing the use of ICT to enable collaborative governance in smart cities along with participation and engagement practices in decision making (Viale Pereira et al., 2017; Estevez et al., 2010; Chun et al., 2012). In this sense, collaborative and effective governance has the main goal of enabling and allocating decision making rights to stakeholders to participate in decision making processes (Ferro et al., 2013; Attard et al., 2015). This aspect is related to the previous Section (4.1) on collaboration in government and the transformational element of the new digital platforms to be deployed in order to improve the delivery of (urban) services, increase evidence-based decision making and promote collective action.

Among the potential benefits of using ICT in local governments are the increasing openness and the possibility for mass collaboration and participation, which in turn may radically change governance models to become smarter (Misuraca et al., 2012). The interesting aspect of the emerging technologies is that besides challenging existing governance models, they make it possible for new governance models to emerge. The interdisciplinary nature of smart cities and the changes on the complexity of contemporary urban problems make flexible institutional arrangements necessary which are able to deal with context-specific solutions and multi-stakeholders' environment.

When discussing the role of e-government in the smart city domain, governance plays a role as one of the six smart city capacity dimensions and smart services can be seen as a key local e-government capacity (Antholoulos & Reddick, 2016). According to Anthopoulos and Reddick (2016, p. 2) "smart cities can be considered as a means for governments to enhance public service delivery and democracy in urban spaces". Looking at the growing political and administrative complexity of contemporary playing fields, we understand that smart cities can only achieve their aims if they manage to effectively deploy forms of governance that make the best of the available technological options, but also of the interactions between various stakeholders, in particular citizens. In sum, we define smart city governance as a form of smart governance, allocating decision-making rights to stakeholders (in particular citizens) and enabling them to participate in effective and efficient decision-making processes to improve the quality of life in cities.

5. Concluding remarks

This paper has focused on smart governance as an emerging domain of study that attracts significant scientific and policy attention. More specifically, the literature review presented here has served a twofold purpose: 1) to provide more insight in the definitions of and relationships between smart governance and concepts of smart and electronic government, and 2) to define the key elements of smart governance in the context of smart cities. The main contribution of this paper to the literature is to provide a better distinction between the strongly related concepts of government and governance in the context of smart cities, which is prone to a predominantly technological approach that may not always pay proper attention to the governance aspects of (lacking) collaboration between smart governments, smart citizens, and other stakeholders. This review provides the needed clarity to start building new

governance models that address the challenges of the digital society regarding collaborative governance, information sharing, evidence-based decision making, citizen engagement, transparency and openness.

We have found that the development of *e-government* and therefore the use of ICT for purposes mainly related to improving administrative efficiency, performance, citizen-centricity and improved service delivery, lays the foundation as an essential prerequisite for the development of a *smart government*. In this concept, the use of ICT evolves from supporter of existing processes to a more pervasive facilitator of new relationships where the evidence-based nature and citizen-centric focus take on much more importance in participatory decision-making policy, cleverly using Web 2.0 and interactive social media. Once a 'status' of smart government is achieved, and processes become more collaborative, this forms the basis for the development of forms of *electronic* and *smart governance* where the government (by definition a smart government) is an essential part of new forms of governance and plays a pivotal role in the coordination efforts of all stakeholders involved. We therefore conclude that smart government can be considered as a basis for developing smart governance, through the application of emergent information and communication technologies (ICT) for governing. In other words, the application of technology enables governments to transform themselves, their interactions with customers and the relationships with citizens, businesses, other non-state actors and other arms of government, creating impact on the society (Estevez & Janowski, 2013; Janowski et al., 2012).

We also conclude that governments needs to go through an evolutionary non-linear process of adopting necessary capabilities and models of electronic/smart government before they are able to develop effective *smart governance* settings and the collaborative environment which characterises them. Once a model of smart governance has been developed and the smart government is intrinsically part of this smart governance, then maturity can be reached to elaborate and come up with smart city plans, initiatives and solutions.

While the concept of smart governance might be applied to various contexts, we have sought to contextualise it in relation to smart cities, which are characterized by a new way of governing with the use of technology and the increase in the public administration capacity of improving the quality of life of citizens, provision of public services and democracy (Castelnovo et al., 2015; Anthopoulos & Reddick, 2016). Previous literature has defined smart cities as places with good performance and prospects in areas such as economy, people, governance, mobility, environment and livelihoods (Giffinger & Pichler-Milanović, 2007; Gil-Garcia et al., 2015). We therefore conclude that the notion of smart governance in the context of smart cities has three fundamental implications:

It strongly focuses on government decisions for improving the quality of life in cities, which are the intersection of various dimensions (Smart Living, Smart Mobility, Smart People, Smart Economy and Smart Environment);

An indispensable role of widely-available, user-friendly and interactive technology that goes beyond the traditional objectives of supporting engagement of citizens and other stakeholders, to optimize and co-produce services and improve the quality of life; and

A strong focus on citizens, acknowledging their key role in collaborative decision-making processes to increase public values creation (see e.g. (Castelnovo et al., 2015; Meijer & Bolívar, 2016; Meijer et al., 2016)).

To encapsulate these implications, we have defined *smart city governance* as a form of smart governance, enabling and allocating decision-making rights to stakeholders (in particular citizens) to participate in effective and efficient decision-making processes to improve the quality of life in cities.

Obviously, this study has some limitations. The first limitation concerns the fact that, although we applied a systematic approach to the search strategy, we initially limited ourselves to a search in the four

most influential academic journals in the field of smart (city) governance. Even though we applied a snowball sampling technique to extend the sample of papers emerging from the four 'top' journals, we cannot exclude the possibility that we have missed relevant papers. Second, the review has targeted academic papers and book chapters, and thus misses out on 'grey' literature which may include government reports, policy briefs from knowledge centers and other practitioner-based fora.

Based on the conclusions and limitations of the literature review, we can identify several directions for further research. First, the operationalization of the concept and the proposed relations to be analysed in smart city initiatives can contribute in particular to the understanding of the transformational efforts needed to improve overall performance and opportunities for smart (city) governance.

Second, the digital transformations explained in this paper change the process of policy-making and governance models in a disruptive way. Rapid developments regarding open data, data processing, data mining and visualizations combined with social media, participatory tools and civic engagement increase the potential for online supported forms of co-production between governments and citizens. Nevertheless, there is still a lack of research that uncovers whether online forms of collaboration and (smart) governance truly result in offline improvements in the quality of life. More in-depth research is needed with regard to this matter.

Third, the impact of open government on collaborative governance as one of the main elements of smart city governance could be better explored. Data openness, along with transparency, participation, and collaboration remain the fundamental principles of open government. Open government is highly related to the collaborative governance concept, since open data increases the possibilities for knowledge development, decision making and interdisciplinary collaboration (Kamateri et al., 2015). Therefore, these new possibilities can enable stakeholder engagement in collaborative decision making processes with focus on the needs of the citizens to increase their quality of life.

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