

# Local e-government models: A comparative and critical overview

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**Abstract:** Over the last decades, local public administrations have looked for new ways of providing public services through Internet developing e-government projects. To achieve information about the progress of these projects several models have been developed to assess and classify e-government websites of cities and municipalities. This paper intends to identify the models that analyze the process of local e-government, checking the main contributions in the literature.

From the analysis of literature it was possible to identify two sets of approaches, on the one hand, the studies that analyze the levels of maturity of e-government process, and on the other hand, some works that intend to describe the practices of electronic governance. The research made it possible to verify that approaches with technological focus are dominant, underestimating important aspects of public administration management.

**Keywords:** local e-government, digital governance, level of maturity, local administration, websites management

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## 1. Introduction

Local governments have looked for new ways of providing public services with the use of ICTs and especially with the use of Internet. In the last decades public administrations developed e-government projects aiming to provide information and services to citizens and companies. Local administrations realized an opportunity for the modernization of their services, as well as the potential that the good use of Internet can have on development of their cities. Thus, municipalities have designed their websites, making available content and providing services on digital network. To understand the development of these projects several models have been produced and used to evaluate and rank e-government websites. Therefore the objective of this paper is to identify the models that analyze the development of the process of local e-government, checking the main contributions in the literature.

The research made it possible to identify two different sets of approaches. On the one hand, the models that analyze the

levels of maturity of e-government process. Levels of maturity are a succession of developmental stages that require continued integration of devices of different levels of technology and sophistication in the websites. Therefore, these models have mainly technological focus. And, on the other hand, it was possible to identify the studies that analyze electronic governance practices. On these set of approaches models are also composed of dimensions based on criteria mainly of technical and technological nature (security and privacy, accessibility, navigability, usability, etc.), expressing concern to show functionality and quality of websites.

This paper is organized as follows. The next section introduces the concept of e-government and local e-government. The third section presents the literature review and the main research on local e-government. The fourth section discusses the most important findings and presents the main conclusions.

## 2. What is local e-government?

ICTs have brought many impacts and challenges to public administrations enabling a wide range of possibilities to rethink the ways of working and namely, to modernize their regulatory and bureaucratic work processes. The use of Internet by these entities changed the way that government works, the way to interact with other agents in the society and the way to provide services. Thus, since the late 1990s, central and local governments have developed e-government projects aiming to provide information and services to citizens and companies through Internet. In literature e-government definitions converge and, in a simple way, it consists on the provision by public administration of information and services to citizens and businesses through the Internet. 'When we talk about e-government we refer to the use that public administration, whether central, regional or local, make of information and communication technologies' (Santos and Amaral, 2002, p. 25). 'E-government refers to the delivery of government information and services online through the Internet or other digital means. Unlike traditional structures, which are hierarchical, linear, and one-way, Internet delivery systems are nonhierarchical, nonlinear, two-way, and available 24 hours a day, seven days a week' (West, 2004, p. 16). 'E-government is characterized by inter-organizational relationships including policy coordination and policy implementation and by the delivery of services online or through other electronic means to citizens' (UN, 2002, p. 54). 'E-government is usually defined as the use of technology to enhance information sharing, service delivery, constituency and client participation and governance by transforming internal and external relationships' (Jayashree and Marthandan, 2010, p. 2206).

Public services that can be offered are guided by the types of relationship between the government and various entities that comprise the society as citizens (G2C), business enterprises (G2B), employees (G2E), visitors and tourists (G2V), government agencies and other governments (G2G) (Rodríguez et al., 2015, p. 187). When this supply of information and services by ICTs occurs at the level of local administration, it is called *local e-government*. 'It is the use of Information and Communication Technologies to offer to individuals and businesses in a given territory the services and conditions for the promotion of democracy and quality of life, relating the political power and local Public Administration with the citizen and the companies, resorting to information exchange of electronic base' (Gouveia, 2004,

p. 25). The concept of local e-government is based on the same principles of e-government but presents a differentiating factor, which is the closer proximity with citizen, that is, the territorial proximity to the individual is reinforced by building a closer digital relationship with local community (Gouveia, 2004, p. 24). Responsibility for the conduction of local e-government is from local authorities, which can be organized in different degrees depending on the country concerned, but underlines mostly the activities of the City Councils and Parish Councils (Gouveia, 2004, p. 26). Gouveia (2004, p. 36) presents a set of local e-government functions: to publish information; interact with the citizen; perform transactions with citizens and remaining local public administration; integrate information with other local public administration; and transform information.

Nowadays, the Internet is seen as a governance tool and, therefore, there are many public entities that have designed their websites, making available content and providing services on the network, such as the city councils. 'Digital government has the potential to connect every citizen with elected officials and decision-makers like no previous innovation or activity. It offers individuals new and greater access to information and knowledge, subsequently redefining personal freedom' (UN, 2002, p. 54). In cities, municipal websites have allowed modernization of services, and local administration has been able to realize the potential that the good use of digital networks can have on the development and innovation at regional and local level, as well as in the welfare of citizens and businesses. E-government policies can be an opportunity to improve the quality of the goods and services offered, to expand communication channels, to a transparent management and to promote citizen participation (Schejtman et al., 2014, p. 6). In the digital economy, relationships depend increasingly on digital networks and applications; then cities must understand the advantages that technologies bring to their territories. 'In smart cities, creativity, innovation, and entrepreneurship, together with smart technologies, are the ingredients for developing new solutions for their citizens' (Vrabie, 2018, p. 1177).

To achieve information about the progress of e-government projects, several models have been developed to assess and classify e-government websites of cities and municipalities. In fact, municipal managers need information that could reflect the progress level, and therefore that could allow the management of these processes in order to have satisfactory results. According to Batlle-Montserrat et al. (2009, p. 4), two important aspects are needed to lead the transformation process successfully: the existence of an e-government city model and the measurement of the city's e-government development. They state that the transformation to be a success, municipal managers have to reflect on issues such as: 'How is the city doing the journey? Where is the city going? At which stage of this journey is the city?' (Batlle-Montserrat et al., 2009, p. 4).

### **3. Research on local e-government**

Due to its potential, the process of e-government has been widely studied. Different researches had been developed and focused in themes as benefits, evolutionary stages, barriers to its development, aspects of electronic governance, websites assessment, among others. This paper intends to focus on the models that have been developed to assess and rank e-gov-

ernment websites of local public administrations. In the literature that studies and evaluates local e-government processes, it was possible to identify two different sets of approaches. On the one hand, studies that evaluate the level of maturity of e-government process and, on the other hand, studies that analyze the electronic governance practices.

### 3.1. Studies on the level of maturity of e-government

The review of literature in e-government area points to the existence of a line of investigation where it is possible to verify several maturity models that explain the implementation of e-government as a set of development stages. ‘An e-government e-portal’s maturity model is a set of stages (from basic to advanced ones) that determines the maturity of the e-government e-portal’ (Fath-Allah et al., 2014, p. 71). The various phases show how it develops the government offer of information and services through the Internet platforms, resulting in an ongoing process of integration and incorporation of different levels of technology of utilities, services and functions in the websites. From the literature review, a summary of the e-government maturity models and the maturity levels considered in each one is presented in Table 1.

Most models that studied the evolution of e-government projects, including the local e-government ones, present some differences regarding the year when they were designed (some older and others more recent), regarding the countries where they were developed and applied, regarding the level of government considered (central, local), regarding the number of maturity stages and also regarding the classification of stages. Nevertheless, when considered the description of the stages, most of them end up in coinciding and presenting similar characteristics, varying the number of stages according to the aggregation or disaggregation of technological characteristics that are being analyzed. Each stage presents a higher degree of sophistication of the websites by allowing the increase of its capacity to provide information, services and communication, which is performed by the continued integration of devices from different levels of technology.

Table 1. Studies on the level of maturity of electronic government

<b>Models and studies</b>	<b>Levels of e-government maturity</b>
Baum and Di Maio (2000)	1—Web presence; 2—Interaction; 3—Transaction; 4—Transformation
Layne and Lee (2001)	1—Catalogue; 2—Transaction; 3—Vertical integration; 4—Horizontal integration
Hiller and Bélanger (2001)	1—Information; 2—Two-way communications; 3—Transaction; 4—Integration; 5—Political participation
Wescott (2001)	1—Setting up an e-mail system and internal network; 2—Enabling inter-organizational and public access to information; 3—Allowing two-way communication; 4—Allowing exchange of value; 5—Digital democracy; 6—Joined-up government
European Commission (2001, 2002, 2003, 2004, 2005, 2006)	1—Information; 2—One-way interaction; 3—Two-way interaction; 4—Transaction
European Commission (2007, 2009, 2010)	1—Information; 2—One-way interaction; 3—Two-way interaction; 4—Transaction; 5—Personalization targetization/ automation

Models and studies	Levels of e-government maturity
KEeLAN (2002), Arslan (2008)	0—Not online; 1—Information; 2—One-way interaction; 3—Two-way interaction; 4—Transaction; 5—Service integration
Moon (2002)	1—Information: dissemination/ catalogue; 2—Two-way communication; 3—Service and financial transaction; 4—Vertical and horizontal integration; 5—Political participation
Norris (2003)	1—Citizen access to information and services; 2—Citizens' ability to contact and interact with officials; 3—Citizens' ability to conduct online transactions with government; 4—Citizen participation in governmental activities and programmes; 5—Citizen participation in governmental decision-making; 6—Voting
UMIC (2003)	1—Internet presence/ Information; 2—Interaction; 3—Bidirectional Transaction/ Interaction; 4—Transformation
Santos <i>et al.</i> (2003)	1—Information; 2—Interaction; 3—Two-way interaction; 4—Transaction
Santos and Amaral (2000, 2003, 2005, 2006, 2008a, 2008b, 2012), Santos <i>et al.</i> (2005)	1—Publication of information; 2—Download of forms; 3—Download and upload of forms and processes status; 4—Transaction, online payments and processes status
Soares <i>et al.</i> (2014a, 2014b, 2016), Soares <i>et al.</i> (2017)	1—Possibility of the citizen to download and upload, with or without authentication, the form to request its realization; 2—Citizens can fill out and deliver online, with or without authentication, the form to request their completion; 3—Possibility of an authenticated citizen to check online the execution status of the service; 4—Possibility of the citizen to pay online the respective service and the level of security associated with this payment process
UN (2003, 2004, 2005, 2008)	1—Emerging Presence; 2—Enhanced presence; 3—Interactive presence; 4—Transactional presence; 5—Networked presence
UN (2010, 2012)	1—Emerging information services; 2—Enhanced information services; 3—Transactional services; 4—Connected services
Deloitte and Eurocities (2003, 2004)	1—One-way information flow; 2—Interactive; 3—Transaction-based; 4—Integrated
Siau and Long (2004)	1—Web presence; 2—Interaction; 3—Transaction; 4—Transformation; 5—E-democracy
West (2004)	1—The billboard stage; 2—The partial-service-delivery stage; 3—The portal stage; 4—Interactive democracy
Esteves (2005), Esteves and Sousa (2006), Aramouni <i>et al.</i> (2006), PUCChile (2006), Esteves (2006), Sousa and López (2007), Gómez (2007), Salazar <i>et al.</i> (2010), Almeida (2011)	1—Presence; 2—Urban information; 3—Interaction; 4—Transaction; 5—E-democracy
Torres (2006)	1—Initial presence; 2—Intensive presence and interaction; 3—Financial transactions and services; 4—Vertical and horizontal integration; 5—Open and borderless integration

Models and studies	Levels of e-government maturity
Pratas (2007)	0—The municipality does not provide any administrative information of its archives and registers; 1—The municipality provides very little information of its archives and registers (up to five administrative documents); 2—The municipality provides some dispersed information of its archives and registers (six or more administrative documents); 3—The municipality provides dispersed information that includes: (a) Or the options of the plan and budget of the current year and the report of accounts of the previous year; (b) Or the decisions of the City Council and the Municipal Assembly; 4—The municipality provides all the information that is published in paper; 5—The municipality provides all the decisions of its organs; 6—The municipality provides all the decisions of its organs. In addition, it provides access to all (non-reserved) documents of at least 10 administrative processes; 7—The municipality provides all the administrative information (not reserved) of its archives and registers.
Fernández Arroyo and Pando (2007, 2009), Boix et al. (2010), Nacke and Calamari (2011), Nacke et al. (2012)	1—Presence; 2—Information; 3—Interaction; 4—Transaction; 5—Transformation
Batlle-Montserrat et al. (2009)	1—Information; 2—Interactivity; 3—Transaction; 4—Transformation; 5—Participation
Vrabie (2010, 2012, 2015) Vrabie and Öktem (2012)	1—Displaying information on the web pages—one-way communication; 2—Two-way communication; 3—Financial systems and web transactions; 4—Vertical integration (inter-department) and horizontal (intra-department) of the public services available online; 5—Citizen participation in the government activity
Jayashree and Marthandan (2010)	1—Web presence; 2—Interaction; 3—Transaction; 4—Integration; 5—E-society
Fan (2011)	1—One-way information/ communication; 2—Two-way communication; 3—Transactional capability; 4—Citizen participation; 5—One-stop portal capability
García-Sánchez et al. (2011), Frías-Aceituno et al. (2014)	1—E-government; 2—E-governance; 3—E-democracy
Dias and Costa (2013), Dias and Gomes (2014), Maciel et al. (2016)	1—Information; 2—Service; 3—Participation
Schejtman et al. (2014)	1—Presence; 2—Information; 3—Interaction; 4—Transaction; 5—Transparency and transformation
Rodríguez et al. (2015)	1—Emergent; 2—Expanded; 3—Iterative; 4—Transactional; 5—Total integration

Source: Author's own elaboration.

In general, the maturity levels begin with the provision of information at lower levels and include the possibility of payments at the highest levels. Models have in general 4 to 5 stages, which may be summarized in: information (online presence with the creation of the website and information availability), interaction (one-way and two-way communication),

transaction (payments, process status consultation, requests), vertical and horizontal integration (integration of public services at different levels of government and different functions in a single website) and citizen participation/ e-democracy (public forums, opinion surveys, suggestions and complaints, comments, chats, e-meetings, and the possibility to vote).

The model of Baum and Di Maio (2000) (Gartner Group) pioneered the establishment of a set of stages and is the most referenced in the literature, having inspired many others. Some studies that analyze the maturity levels of e-government process, specifically at the municipal/ local level, are the following examples: Moon (2002), Norris (2003), Santos and Amaral (2000, 2003, 2005, 2006, 2008a, 2008b, 2012), Santos et al. (2005), Soares et al. (2014b, 2016), Soares et al. (2017), Deloitte and Eurocities (2004), Esteves (2005), Torres (2006), Pratas (2007), Nacke et al. (2012), KEeLAN (2002), Arslan (2008), Batlle-Montserrat et al. (2009), Vrabie (2010, 2012, 2015), Fan (2011), Schejtman et al. (2014), Frías-Aceituno et al. (2014), Dias and Costa (2013), Dias and Gomes (2014), Maciel et al. (2016).

Among these studies stands out the KEeLAN (2002) model because it is designed specifically for the local level of administration. KEeLAN (2002) describes the relation between the role of e-government in service delivery and the resulting degree of change of the organization of the local authority. According to KEeLAN (2002, p. 8), in the early stages of maturity (e-government as an ‘enabler’), the implementation of e-government does not require redesign of service delivery of the local authority (the first three stages 0, 1 and 2). In further stages of maturity (e-government as a ‘transformer’), the implementation of e-government results in redesign of the process of service delivery of local authority (the last three stages 3, 4 and 5) (KEeLAN, 2002, p. 9).

Moon (2002) is one of the most referenced studies by several researchers that analyzed the process of local e-government. This study sought to examine the reality of e-government at the municipal level in the USA (Moon, 2002, p. 424). Moon (2002, p. 428) considered the following five stages of evolution of e-government: information dissemination/catalogue (unidirectional communication); two-way communication (request and response); service and financial transaction (licenses, payments); vertical and horizontal integration (sending and sharing of information and data between different functional units [intragovernmental] and levels of government [intergovernmental] integrating online and back-office systems); political participation (online voting, online public forums, online opinion polls). These phases consist of a five-stage structure adapted from the methodology of Hiller and Bélanger (2001), a conceptual tool to analyze the evolution of e-government (Moon, 2002, p. 426).

Some models present as the last level of evolution of e-government services a stage named of citizen participation (Hiller and Bélanger, 2001) (Moon, 2002) (Norris, 2003) (Vrabie, 2010, 2012, 2015) (Batlle-Montserrat et al., 2009) (Fan, 2011) (Dias and Costa, 2013) (Dias and Gomes, 2014) (Maciel et al., 2016), that is the highest level of maturity of websites. This stage, sometimes classified as e-democracy (Siau and Long, 2004) (Esteves, 2005) (Wescott, 2001) (García-Sánchez et al., 2011), means going beyond the availability of information and transactions, allowing citizen involvement in governmental activities and decisions. This participation is allowed by the availability of online features such as online public forums, online opinion polls, online suggestions and complaints, chats, e-meetings and the possibility

of voting. Jayashree and Marthandan (2010, p. 2209) go further in the last stage of the e-government process by proposing the concept of e-society a more comprehensive situation than e-democracy which includes the digital presence of most relationships in society (e-business, e-health services, e-payments, e-procurement, e-education, e-banking, e-democracy, e-parliament, e-ministries, e-billing, etc.).

Although the ordering of stages suggests a continuous sequence of phases, these are not necessarily always consecutive, thus not always evolution is necessarily linear and progressive in its technical development (Moon, 2002, p. 427) (UN, 2003, p. 18) (Coursey and Norris, 2008, p. 533) (Stoica and Ilas, 2009, p. 172) and as a result the levels of sophistication are not dependent on each other (Fan, 2011, p. 932). Therefore, not all websites go through all steps or in the order that is suggested (West, 2004, p. 17). 'The development of the model based on an evolutionary approach does not imply that the steps must be consecutive or mutually exclusive, but complementary and can be present simultaneously in a portal, which represents a greater level of technological and political complexity for its implementation' (Nacke et al., 2012, p. 9).

The development stages of e-government suggest a positive change in the relationship between governments and citizens allowed by the supply of information and services more and more citizen-centric. The main suggestion seems to be that more e-government is better, i.e. more interaction, more transaction and more integration can generate e-participation and e-democracy, therefore a fundamental change in the relationship between governments and citizens (Coursey and Norris, 2008, p. 525). On the other hand, these potentialities should not be perceived without restriction, because more technology will not be sufficient to achieve a higher participation of the citizen and reach a higher degree in e-democracy. According to Coursey and Norris (2008, p. 533), the e-government process may not lead to the government reforms that so many models suggest in the last stages of the process, and may even be more likely to hope to support the interests of dominant political-administrative powers in governmental organizations.

Coursey and Norris (2008, p. 525) also refer that the models do not indicate how much time each stage takes, nor how the transformation occurs, nor how to overcome many significant barriers (for example, financial, legal, organizational, technological, political) that can arise with a higher offer of information and services. Therefore, 'Technology is probably not a major barrier to e-government, especially when governments gain experience. Organizational and political factors tend to significantly affect application development, performance, and adoption of e-government' (Coursey and Norris, 2008, p. 533). In any case, levels of maturity should not be viewed so rigidly, but also as a way of thinking about the direction of development of the e-government process (Fan, 2011, p. 932) and a way to incorporate functionalities in the websites (West, 2004, p. 17).

### **3.2. Studies on digital governance**

The review of literature in e-government area also made it possible to identify several models that analyze and explain the electronic governance practices. This line of investigation studies new management paradigms for the public sector that emerged from the use of ICT



in governance, where stands out among others, the concept of electronic/ digital governance. 'With the advent of ICTs, electronic governance appears as an emerging trend to reinvent the functioning of the government, especially in the provision of public services and citizen participation in the management, of online way' (Mello and Slomski, 2010, p. 378).

According to the UN (2002, p. 53–54), governance is not the government as a physical entity, or the act of governing individuals, but it should be understood as a process by which institutions, organizations and citizens are guided. 'E-governance is the public sector's use of the most innovative information and communication technologies, like the Internet, to deliver to all citizens improved services, reliable information and greater knowledge in order to facilitate access to the governing process and encourage deeper citizen participation. It is an unequivocal commitment by decision-makers to strengthening the partnership between the private citizen and the public sector' (UN, 2002, p. 54). To Jayashree and Marthandan (2010, p. 2206) 'e-governance is beyond the scope of e-government. While e-government is defined as a mere delivery of government services and information to the public using electronic means, e-governance allows citizen direct participation of constituents in political activities going beyond government and includes E-democracy, E-voting and participating political activity online.'

The electronic governance practices have been the theme of several studies and are represented in models that include a set of dimensions based on criteria mainly of technical and technological nature. Table 2 presents a summary of the dimensions that describe the local e-governance practices considered in the various models found in literature.

This set of approaches studies the characteristics and attributes of local government websites that is, tries to identify the characteristics, features and tools of websites, grouping and sorting the functionalities in a certain number of categories. Thus, the models of this line of research explain the electronic governance practices adopted by local governments grouping and sorting features and tools of websites on dimensions/ categories that represent these practices. Each dimension groups the websites devices according to criteria mainly of technical and technological nature. Examples of dimensions/ categories that are analyzed are security and privacy, accessibility, navigability, services, usability, content, among others, expressing concern to show the functionality and quality of websites. These models present some differences regarding the countries where they were designed and applied, regarding the year when they were developed, regarding the number of dimensions considered and also regarding the classifications of the dimensions/ categories. The differences between models are mainly in the way how the characteristics of websites are grouped and classified. Some dimensions appear as main categories in some studies, appearing in others as subdimensions, that is, functionalities integrated in other main dimensions.

The model developed by Holzer and Kim (2003) is among the most referenced and as a result of their studies appeared several examples of evaluation of digital governance practices at municipal level, such as the works of Goldberg (2009), Mello (2009), Mello and Slomski (2010), Moura et al. (2011), Moura et al. (2012), Stoica and Ilas (2009), Carrizales et al. (2011), Souza et al. (2012), Vrabie and Öktem (2012), Vrabie (2010, 2012, 2015), Fan (2011).

Holzer and Kim (2003) consider that the digital governance includes both digital government (delivery of public service) and digital democracy (citizen participation in govern-

ance), and that these two groups are represented by five subgroups practices: Security and Privacy; Usability; Content; Services; and Citizen Participation. In an attempt to measure these practices, studies by Holzer and Kim (2003, 2006, 2008), Holzer et al. (2010), Holzer et al. (2014), Holzer and Manoharan (2012, 2016) aimed to propose an e-governance performance index to evaluate municipal websites of 100 cities around the world (the most wired cities—global cities based on their population size and the total number of individuals using the Internet in each nation). The study was replicated several times. The research instrument is composed of 104 measures distributed among the five categories of digital governance considered (Holzer and Manoharan, 2016, p. 13). The same objective is also present in most of the studies which try to find a way to quantify the level of development of e-governance practices implemented in the websites. This quantification is performed through a scoring system that allows obtaining an indicator or performance index of e-governance.

Table 2. Studies on digital governance at local public administration level

Studies	Dimensions	Websites analyzed
<b>Quantitative approaches</b>		
Holzer and Kim (2003, 2006, 2008), Holzer et al. (2010), Holzer et al. (2014), Holzer and Manoharan (2012, 2016)	Privacy/ Security, Usability, Content, Services, Citizen and Social Engagement	100 most wired cities (global cities based on their population size and the total number of individuals using the Internet in each nation)
Goldberg (2009)	Usability (to include design and functionality), Content, Services, Citizen Participation, and Security/ Privacy	31 government websites of cities in the State of Texas, USA
Carrizales et al. (2011)	Privacy/ Security, Usability, Content, Services, Citizen Participation	22 administrative districts of the city of Prague, Czech Republic
Stoica and Ilas (2009)	Security, Usability, Contents, Services, Digital Democracy	165 cities of Romania
Mello (2009), Mello and Slomski (2010), Moura et al. (2011), Moura et al. (2012), Souza et al. (2012)	Privacy and Security, Usability and Accessibility, Contents, Services, Citizen Participation	27 Brazilian states and Federal District (Mello, 2009; Mello and Slomski, 2010) 57 municipalities of Santa Catarina state, Brazil (Moura et al., 2011) 26 Brazilian states (Moura et al., 2012) 26 state capitals, Brazil (Souza et al., 2012)
Fan (2011)	Privacy/ Security, Usability, E-content, E-services, E-participation, Feedback on website	14 local governments of the region of Great Western Sydney (GWS), Australia
West (2003)	Readability, Disability Access, Services Provided, Online Information, Privacy and Security	1933 city government websites in the 70 largest metropolitan areas of the USA
Vrabie (2010, 2012, 2015), Vrabie and Öktem (2012)	Transparency, E-DOC, Communication, Useful Content, General Information	103 municipalities of Romania (Vrabie, 2010, 2012, 2015) 2 municipalities of Romania and 2 of Turkey (Vrabie and Öktem, 2012, p. 12)

Studies	Dimensions	Websites analyzed
Rover et al. (2010)	Service Availability, Interaction, Navigability/ Usability, Search Engine; Update; Embeed Content; Recommendation WAI (Web Accessibility Initiative)	18 websites of the federal government of Brazil
Santos and Amaral (2000, 2003, 2005, 2006, 2008a, 2008b, 2012), Santos et al. (2003), Santos et al. (2005)	Content, Content Update, Accessibility, Navigability, Facilities for Citizens with Special Needs, Online Services	305 websites available from 308 Portuguese municipal councils with Internet presence (Santos and Amaral, 2012) 1197 accessible websites of 1243 Portuguese parish councils with presence on the Internet (4261 existing parishes) (Santos and Amaral, 2008c)
Soares et al. (2014a, 2014b, 2016), Soares et al. (2017)	Contents: Type and Update; Accessibility, Navigation and Ease of Use; Online Services; Participation	308 websites of the 308 municipal councils in Portugal
KEeLAN (2002), Arslan (2008)	Policy Making, Economic Development, Personal Documents, Credits and Loans/ Financial Support, Education, Building Permits, Environment, Culture and Leisure, Information	700 local authorities of the EU (KEeLAN, 2002) 63 local Turkish governments (Arslan, 2008)
Batlle-Montserrat et al. (2009), Batlle-Montserrat et al. (2016)	Channelling, Citizens' Engagement, Education, Employment and Business, Environment, Life Cycle, Social Care, Transport and Mobility, Urban Planning	15 European cities
Schejtman et al. (2014)	Contents, Usability	119 Argentine municipal governments
Sá et al. (2017)	Management, Services, Quality of Information, Technical Quality	255 online service users of the Municipality of Penacova, Portugal
<b>Qualitative approaches</b>		
Musso et al. (1999)	The city as service delivery system: entrepreneurial reform—enterprise development (providing services to local business to facilitate economic development) and service reform (improving the provision of local services to the citizenry) The city as civic polity: participatory reforms—pluralist (facilitating the formation of interest groups) and communitarian (seek the strengthening of social networks, or 'social capital')	270 municipal websites in California, USA
Teixeira (2005), Teixeira and Gouveia (2005)	Analysis of the current role of information and communication technologies in the Local Public Administration: the organizational complexity and multifaceted nature of the Parish Councils, the degree of introduction of ICT, barriers and expectations associated with the introduction of e-government solutions, positioning face to Electronic Government, among other issues	24 Parish Councils of the Municipality of Vila Nova de Gaia, Porto, Portugal

Studies	Dimensions	Websites analyzed
Simões (2007)	Presence on the Internet, navigation, facilities for citizens with special needs, contents, updating and publication of information	15 municipalities of the district of Leiria, Portugal
Deloitte and Eurocities (2003, 2004, 2005)	Re-engineering, e-Learning, e-Security and e-Democracy (Deloitte and Eurocities, 2003, 2004); Governance, e-Europe, Employment, Education programme (Deloitte and Eurocities, 2005)	EUROCITIES network—represents more than 100 major cities in some 32 European countries (Deloitte and Eurocities, 2005)
UBI_CES (2007)	Security and Privacy, Accessibility, Navigability, Contents and Services	4 Portuguese case studies: Évora Distrito Digital, Leiria Região Digital, Gaia Global and Beja Digital
Rodríguez et al. (2007)	Identifies and describes successful European Cities Models of e-Government and characterizes the relevant key success factors in e-Services adoption	7 European Cities: Barcelona, Vienna, Munich, Birmingham, Stockholm, The Hague and Turin

Source: Author's own elaboration.

This finding can also be observed in the works of West (2003), Santos and Amaral (2000, 2003, 2005, 2006, 2008a, 2008b, 2012), Santos et al. (2003), Santos et al. (2005), Soares et al. (2014a, 2014b, 2016), Soares et al. (2017), Rover et al. (2010), Vrabie (2010, 2012, 2015), Mello (2009), Mello and Slomski (2010), Moura et al. (2011), Moura et al. (2012), Souza et al. (2012), Stoica and Ilas (2009), Carrizales et al. (2011), KEeLAN (2002), Arslan (2008).

With more qualitative than quantitative approaches should be mentioned the studies of Musso et al. (1999), Teixeira and Gouveia (2005), Simões (2007), Deloitte and Eurocities (2003, 2004, 2005), Rodríguez et al. (2007), UBI\_CES (2007). In these works are examined aspects that go beyond the characteristics of the websites and intended to be reflections on the direction of development of e-government processes in cities, analyzing in particular: e-government policies, strategic planning of projects, success factors, process leadership, and other aspects.

#### 4. Discussion and main conclusions

The Internet and namely e-government has been representing an opportunity to local authorities to provide more and better services, in a more efficient way, and has the potential to bring public policies closer to the citizens. To achieve information about the progress of e-government projects of local administration, several models have been developed to assess their websites. The objective of this paper was to identify the models that analyze the process of local e-government, checking the main contributions in the literature. The analysis allowed finding that in the last two decades several models have been developed and used to assess and/ or rank e-government websites and it was possible to identify two different groups of approaches that study the development of this process. On the one hand, there are

the studies that analyze the levels of maturity of e-government process, on the other hand, there are the studies that analyze the electronic governance practices.

In the first group of approaches it was possible to find the works that analyze local e-government as a process of evolution in which the maturity of the websites is analyzed through stages of development. The basic idea is to show that local governments begin their presence on the Internet through the creation of websites that allow the availability of information, and sequentially and gradually provide more complex services, driven either by public demand or by decision makers' choice, or by technological development. In the second group of approaches it was possible to find research papers that analyze the features and functionalities offered by websites, aggregating them in a number of categories that represent practices of digital governance. These studies have produced models composed of technical dimensions, such as security and privacy, accessibility, services, usability, etc., where are framed the devices that compose the websites, concerned to show the functionality and quality of these platforms.

Both perspectives are important for a better understanding of local e-government process, thus it is possible to find studies where the e-governance practices and the level of maturity are analyzed together. Examples of this situation are the studies of Santos and Amaral (2000, 2003, 2005, 2006, 2008a, 2008b, 2012), Santos et al. (2005), Soares et al. (2014a, 2014b, 2016), Soares et al. (2017), Batlle-Montserrat et al. (2009), Vrabie (2010, 2012, 2015), Fan (2011), Schejtman et al. (2014).

In the literature about local e-government it is possible to find that the approaches with technological focus are dominant. Most models presented to analyze the development of e-government process are composed of dimensions based on measuring mainly aspects of technological nature, evaluating the quality of the infrastructure and leaving in second plan management aspects that are important for public administration. On the one hand, the models that analyze the electronic governance practices use essentially categories of technical aspects, such as usability, accessibility and security to evaluate websites, and its management is realized according to the fulfilment of that set of technological functionalities. On the other hand, the models that analyze the maturity of e-government services also present a technological focus, since the succession of stages on which the models are based requires continuous integration of devices of different levels of technology and sophistication in the websites. Thus, the architecture for e-government, as well as most of the criteria and indicators used in the analyses are based on technological assumptions underestimating social aspects, among others (Carrizales et al. 2011, p. 944; UBI\_CES, 2007, p. 44; Vidigal, 2005, p. 16). Coursey and Norris (2008, p. 532) consider that there are inconsistencies in e-government evolution models, because they have been created in a vacuum, without the basis of empirical studies, based on engineering models and not from the business management area or public administration, and ignoring barriers in the adoption of e-government process. For Rodríguez et al. (2007, p. 140) e-government cannot be considered only as a technical or technological subject even when it is included in an IT department, but should be a management related issue, since it implies the provision of new services, improvement of the existing ones or the reengineering of operations.

Batlle-Montserrat et al. (2009, p. 5) consider that local e-government research has focused mainly on general aspects of websites, and rarely focuses on the quality of e-services or their adoption by citizens, concluding that there are no processes for e-government measurement at city level to give a full picture of the process. Batlle-Montserrat et al. (2011, p. 255) refer that most studies have focused on central governments and that little attention has been paid to local administrations, at the same time they have been based on analyses of nonspecific functions of cities and local governments and thus, not addressing to those that are developed at local level. The same authors point out that many studies present incomplete information since they do not contemplate advanced stages of e-administration that have already been reached (were not considered at the time the models were designed), on the other hand, they do not measure the level of demand nor the level of adoption of services by users; and still they do not contemplate the diversity of digital channels (digital television and mobile devices) used to provide these services and others that may appear (Batlle-Montserrat, 2011, p. 255). Frías-Aceituno et al. (2014, p. 104) consider that many previous studies have essentially focused on analyzing how far digital administration has developed but do not allow to observe different styles of digital government, as well as the drivers behind the overall development of e-government especially in the local sphere.

This analysis allows to note that research on e-government processes has left behind important aspects of the management of public administrations and that it results both from their normal functioning and from the territorial framework that they manage, and from the challenges that the information and knowledge society has brought. In this sense, theories in the area of knowledge management and intellectual capital bring arguments adding to the analysis some aspects of organizational management. In this area, studies about websites try to show that these infrastructures have a role to play in knowledge management as they allow its creation, use and dissemination (Tapscott et al., 2000; Terra and Gordon, 2002; Ruta, 2009; Joia, 2009; Chen, 2011). Literature in this area suggests that when a critical infrastructural level (initial priority) is reached in the development of e-government projects, the priorities should be based on contents and mechanisms that foster the creation, use and improvement of knowledge among other intangible resources important to improve the management of local public administration and their territories such as transparency, citizen participation, network of relations and cooperation, human capital, social and environmental responsibility, knowledge production, investment attraction, territorial marketing and consequently, it should be considered their influence in the development of the e-government projects (Bailoa, 2015; 2016). Therefore, after the technological equipping, the human and relational aspects are highlighted in the development of the projects. Serrano et al. (2005, p. 141) refer that when having reached a critical technological base, then the priorities should focus on contents and the impulse of new forms of social, economic and political-administrative organization.

This analysis allows to conclude that electronic governance seems to require a broader view since existing models are based only on technical criteria and these do not seem to be enough to explain the failure situations and the way to overcome the barriers on the development of the e-government process. The use of information technology in public organizations represents a great potential for achieving savings, but the risk of its implementation being unsuccessful is also high (Carrizales et al., 2011, p. 944). Thus, this research suggests that future

studies and future models may explore a typology of e-governance practices that considers beyond the technological aspects, dimensions of analysis that represent a set of assets important for the organizational and territorial management activities of local public administrations (such as transparency, network of relations, human resource management, economic policy, quality of services, citizen participation, social and environmental responsibility, territorial marketing, spatial planning, among others). It is possible to see already this acknowledgement on the work of Sá et al. (2017) which defines a model that analyzes the quality of local government online services that includes among others the dimension of management, where aspects such as transparency, process management, e-participation, are considered.

It is also suggested that future research about issues affecting good digital governance could consider a greater compatibility between the challenges of technology and the challenges of organizational management. It can be a contribution to improve the development of e-government process. And it can therefore help local authorities to provide an answer to a demand for more efficient, effective and less bureaucratic services; to take advantage of a set of new opportunities for administrative modernization; to reformulate the way of governing; to improve the administration of the cities; and to bring public policies closer to the citizens. It also can allow formulating a better digital strategy trying to improve quality and to provide more valuable online services and contents to citizens and other users.

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## Lokalne modele e-administracji – krytyczny przegląd stosowanych rozwiązań

**Abstrakt:** W ciągu ostatnich dziesięcioleci lokalne administracje publiczne szukały nowych sposobów świadczenia usług publicznych z wykorzystaniem internetu, rozwijając projekty e-administracji. Aby uzyskać informacje na temat postępów w realizacji tych projektów przez samorządy lokalne, opracowano kilka modeli oceny i klasyfikacji stron internetowych e-administracji miast i gmin. Na bazie dostępnej literatury przedmiotu w artykule podjęto próbę identyfikacji modeli, które analizują proces lokalnej e-administracji.

Na podstawie analizy dostępnych publikacji z tego zakresu wyróżniono dwa podejścia służące identyfikacji przyjętego przez e-administrację modelu. Z jednej strony rozpatrywany jest poziom dojrzałości (zaawansowania) procesów e-administracji, z drugiej opisywane są praktyki zarządzania elektronicznego. W wyniku przeprowadzonych badań stwierdzono dominację podejścia technicznego (wykorzystywane technologie) w ewaluacji rozwiązań wprowadzanych w e-administracji nad aspektami zarządczymi, które choć bardzo istotne, wydają się tu niedoceniane.

**Słowa kluczowe:** e-administracja, administracja lokalna, zarządzanie cyfrowe, samorząd terytorialny, zarządzanie stronami internetowymi