

Creating public value through smart technologies and strategies

From digital services to artificial intelligence and beyond

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Abstract

Purpose – The purpose of this paper is to introduce the special issue about generation of public value through smart technologies and strategies. The key argument is that smart technologies have the potential to foster co-creation of public services and the generation of public value in management processes, based on the collaborative, social and horizontal nature of these smart technologies. Understanding these processes from a public management perspective is the purpose of this paper and the rest of the special issue.

Design/methodology/approach – The approach to this paper is a theoretical and conceptual review, whereas practical implications both for scholars and practitioners arise from the review of the literature and the conceptual approximation to the notion of smartness in technologies and government. This approach is rooted in the potential of the latest smart technologies and strategies to transform public administrations and to better understand and cope societal problems.

Findings – The conceptual and theoretical perspective of this paper offers ideas for future developments. The content of this paper shows that new smart technologies and strategies will shape, and will be shaped by, the future of public organizations and management. This paper illustrates the process of change in public value generation over time, as a result of different public management paradigms (from traditional public administration to new public management), but also different types of technologies (from mainframes to websites and social media and beyond). The empirical evidence of the articles of this special issue supports this conclusion; that open and collaborative innovation processes developed under this emergent technological wave could become encouraging transformative practices in the public sector.

Research limitations/implications – The theoretical and conceptual nature of this paper needs further empirical research to validate some of the discussed assumptions and ideas.

Originality/value – Although this paper is oriented to present the main contents of the special issue, it also provides an original approach to the theme of public value generation using smart technologies and strategies in public sector management.

Keywords Artificial intelligence, Social media, Open data, Public management, Blockchain, Open government, Smart technologies, Smart government

Paper type General review

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Corrigendum: It has come to the attention of the publisher that the article J. Ignacio Criado and J. Ramon Gil-Garcia “Creating public value through smart technologies and strategies: from digital services to artificial intelligence and beyond” published in the *International Journal of Public Sector Management* in Vol. 32 No. 5 did not include the following funding acknowledgment: Project Grant Local Public Governance through Technologies for Transparency, Participation, and Public Innovation, Ministry of Science and Universities, Spain (Reference No. RTI2018-095344-A-I00). This error was introduced by the authors and has now been corrected in the online version. The authors sincerely apologise for this.



Introduction

Governments around the world are attempting to create value using emerging, disruptive and smart technologies and strategies. Different public agencies are advancing in the implementation of smart technologies in public sector management across different policy domains and government functions. However, the impact of technologies to foster public value creation using open data and transparency websites, crowdsourcing and participation platforms, smart city sensors, or social media technologies, among others, remains broadly unexplored from the perspective of public sector management. At the same time, the future it is not clear and there is the potential of a variety of pitfalls, opportunities and threats derived from the implementation of smart technologies. Hence, this paper, and the rest of this special issue, is oriented to emphasize implications for public management (including the potential emergence of post-new public management (NPM) approaches) of smart technologies and how and why they might produce a difference in the process of value creation in public services within a context of big, linked and open data, oriented to develop smarter governments.

The notion of public value creation in digital government is very important and has received increasing attention in the last few years. In fact, the interaction between public value and digital government has been studied by scholars from diverse perspectives (Bannister and Connolly, 2014; Castelnovo, 2013; Cordella and Bonina, 2012). In the first case, the authors distinguish between the profit of the private sector and the social value in (e-)government (Bannister and Connolly, 2014). In the second case, the author suggests that government actions are intended to impact directly on stakeholder groups and on their interests, instead of making a direct impact on particular citizens (Castelnovo, 2013). In the last case, the notion of public value implies understanding the socio-political impacts of information and communication technologies (ICTs) on public sector management (Cordella and Bonina, 2012). Following the traditional approach of Moore (1995), this perspective sees public value through technologies as composite outcomes that are socially accepted, including expectations of fairness, trust and legitimacy, with effects depending on contextual factors (Cordella and Bonina, 2012).

More recently, Twizeyimana and Andersson (2019) define public value in digital government as the ability of e-government systems to provide efficiency in government, improved services to citizens and participation. Hence, they identify with the argument of Pang *et al.* (2014) that technological innovation may be derived from five organizational capabilities, including: public service delivery, resource-building, co-production, public engagement and public sector innovation. From our point of view, the last three dimensions are crucial to understand the transformation in the process of public value creation during the last technological wave. In other words, a new generation of social and smart technologies is changing the landscape of public management and the capacities of public agencies to create public value.

The focus of “smart technologies and strategies” in public management research has been on how the ultimate technological innovations might improve the capacity of public agencies to cope with complex (or even wicked) problems. Our central argument is that smart technologies have the potential to foster co-creation of public services and the generation of public value in management processes, based on the collaborative, social and horizontal nature of these smart technologies. At the same time, what may be considered as “smart” may greatly differ depending on contextual conditions such as political systems, geographical situations and technological diffusion itself (Meijer *et al.*, 2016). The “smartness” of government is an issue of interest that has increasingly been present in the conversation of academics and scholars of digital government. However, our knowledge about how this smartness affects public value is underdeveloped and requires a more detailed understanding (Gil-Garcia, 2015; Gil-Garcia *et al.*, 2014). This paper, and the

rest of the special issue, debates ideas about these concepts and the growing importance of smart technologies and strategies in public sector management.

The paper is organized in five sections, including this brief Introduction. The second section explains the implications of different technological waves on the process of public value creation, from the first steps of automation using information technologies to most recent public sector innovations, including sensors and artificial intelligence. The third section summarizes the articles of this special issue highlighting their contribution to the analysis of public value using smart technologies and strategies, including open government (OG) and data initiatives, digital transparency and participation platforms, web portals for public services delivery and the utilization of social media technologies. The fourth section conceptualizes smartness in government as a comprehensive notion of digital government that includes the technological dimension, but also organizational dynamics and strategies for public value creation. Finally, the fifth section provides some concluding remarks and suggests ideas for future research about this topic.

The evolution of information and communication technologies and the generation of public value

In the last few decades, different technologies have resulted in multiple models of value creation in the public sector. Since the turn of the century, ICTs and the internet have increasingly attracted the interest of scholarly research and professional practice into public sector management. This section presents a selection of issues that play a central role in the interconnection of smart technologies, public value and the improvement of public sector management, including the relationships between government and citizens. This implies understanding ICTs not only as a toolkit to achieve managerial objectives or improve organizational functions, but also as a research object that itself deserves interest in order to understand the dynamics of power, conflict or collaboration, both inside and outside public sector organizations (Fountain, 2001; Gil-Garcia, 2012a; Scholl, 2009; Yildiz, 2007). This reality has become increasingly noticeable as a result of the generalization of public web portals or the digitalization of administrative processes and, more recently, with the adoption of a new wave of technological innovations such as crowdsourcing participatory platforms and social media, mobile devices, sensors, APPs, big and open data, etc. (Charalabidis and Loukis, 2012; Chourabi *et al.*, 2012; Chun *et al.*, 2010; Criado and Ruvalcaba-Gomez, 2018; Criado and Villodre, 2018; Gil-Garcia *et al.*, 2016; Harrison *et al.*, 2012; Jaeger and Bertot, 2010; Levine and Prietula, 2013). Therefore, the process of public value generation based on ICTs is not just a direct result of technological diffusion. It also depends on the characteristics of certain dominant public management paradigms in a specific context and time.

From the 1950s to the 1970s, technologies in government agencies only played a limited role, very much in line with the dynamics of bureaucracies and traditional public administration, aimed at the automation of tasks and functions as the source of public value creation. This model was archetypical of public administrations that adopted ICTs with the aim of supplanting certain activities and calculations carried out by human beings, in some cases from the middle of the previous century (Bellamy and Taylor, 1998). The most important technological tools were the so-called mainframes, which allowed an important advance in two aspects: first, they developed the capacity of the machines to perform faster large-scale numerical processing tasks; and second, they improved their capacity to be programmed. Therefore, information technologies in that moment became the ideal complement of the model of large bureaucratic organizations and the traditional public administration, with values of the industrial society and limited capacity to go beyond replacing internal management activities.

The next two stages are contemporary in time with the emergence and development of the NPM paradigm. Since the 1980s, the deployment of microcomputers within public organizations opened a period that is identified with the computerization of the public sector (Heeks, 2006). This process resulted in a rapid development and diffusion of information technology at a microlevel, and the existing management and organizational structures and, especially work processes, were questioned (Danziger and Kraemer, 1986; Garson, 2003; Kraemer and King, 2003). From the 1990s, innovations in computer architecture and information systems did not stop growing and encountered the foundations of current developments of ICTs in public organizations. The emergence of the web and the social diffusion of the internet were the catalyst of a new milestone in the evolution of public sector management. A version of the NPM oriented to efficient resource management implied the use of ICTs' capabilities to guide the optimization of internal processes, reduction of certain administrative burdens and the digitalization of services, in a similar way of what e-commerce represented in the private sector (Dunleavy *et al.*, 2006; Hood, 2011; Hood and Margetts, 2007). In other words, new web and internet-based applications were adopted in the public sector promoting an economic centred version of ICTs. Nonetheless, and in line with public governance models, new digital technologies and communication systems opened the doors of the public sector to other societal actors, not only through the provision of information or public services online, but also as a result of the implementation of increasingly sophisticated communication systems and interoperability among systems from different public organizations (Dawes *et al.*, 2009; Pardo *et al.*, 2012).

More recently, the last stage of this process of technological diffusion displays disruptive features with the potential of real transformations in economic sectors, organizational models and also in public sector management. From the 2010s onwards, these disruptive capabilities of smart technologies and strategies in the public sector derive, among others, from factors such as (Clark *et al.*, 2013; Criado *et al.*, 2013, 2017; Linders, 2012; Luna-Reyes and Gil-García, 2014; Mergel, 2015; Mergel and Desouza, 2013; Picazo-Vela *et al.*, 2012): inclusion of external agents to the decision-making processes in public organizations; collaborative dynamics requiring to launch certain projects in distributed work groups (holacracy); radical transparency of organizational processes; transformation of the intermediation dynamics; cost reduction of making information accessible; and continuous evaluation linked to the traceability of actions in these new digital cooperative spaces. Although the empirical evidence is still weak, the first available results state that open and collaborative innovation processes developed under this technological wave are encouraging transformative practices in the public sector.

Smart technologies and strategies in action: international examples and studies

The articles of this special issue illustrate different dimensions and areas of value creation in the public sector using smart technologies and strategies during the last stage. Articles of this volume provide a general understanding of emerging topics in the field of digital government regarding smart technologies and strategies from different areas of interest, including a diverse range of theoretical and conceptual approaches, methodological lenses, data sources and methods and perspectives about the implications of results. Each article gives a particular taste of the actual research about ICTs in government and public value, including open data and governance, smart cities, technologies for transparency and accountability, social media technologies and digital service delivery. In our perspective, they produce a broad picture of this research field and provide ideas and conclusions that may be useful both for scholars and managers in public sector organizations. Therefore, our interest here is to look at the implications of these studies for public sector management research and practice, and their interconnection based on their contributions to public value generation. In other words, they open up the discussion about disruptive technologies that

are reaching the public sector management agenda, and how to understand the public value creation process derived from their implementation.

The article of Hitz-Gamper *et al.*, “Balancing control, usability, and visibility on linked open government data to create public value”, addresses the potential of OG data to create public value. In particular, this study shows how linked open government data (LOGD) experiences are a source of public value creation. The article analyses three different LOGD modes of governance that the authors deduce from their literature review and conceptual examination, namely dedicated triple store, shared triple store and open knowledge triple store. These three governance modes have different effects on usability and visibility of open data, control over governmental data and potential to gain public value by the increased use of open data by citizens. Hence, these three governance modes of LOGD are tested using a case study analysis of public sector organizations in Switzerland (Swiss Federal Office of Topography; Swiss Federal Archives Linked Data Service; and Swiss municipalities with open knowledge bases in Wikidata). As we see it, the main finding of this study is the verification of different LOGD governance regimes for data publishing and their impact addressing the degree of control, data quality, data usability and data visibility. Then, public value creation derived from LOGD will be dependent of public organizations’ mix of data quality and their need of control over the data during the life cycle. In conclusion, as no single LOGD governance mode combines all the advantages, public administrations should select a regime depending on political and organizational strategies, legal requirements and institutional constraints.

The study of Puron-Cid *et al.*, “Public value of online financial transparency: Financial Sustainability and Corruption of U.S. State Governments”, explicitly uses Moore’s public value model in the context of e-government research to delve into online government financial transparency and accountability. This study analyses financial transparency as an organizational goal and a driving force for financial sustainability and to fight against public officials’ corruption. This article assumes that online budget transparency has a direct effect on fiscal sustainability and corruption. Hence, Moore’s public value approach is adapted suggesting that fiscal transparency is both a public value goal and a means to other public values (financial sustainability and corruption reduction). According to Moore’s model, the authorizing environment is the political, social and economic context; the operational capability is the state government’s organizational ability to implement fiscal transparency by digital means; and the public value goals are improving financial sustainability and to reduce public officials’ corruption. The article uses the US Public Interest Research Group’s “Following the Money” longitudinal data from state government level. Methodologically, structural equation modelling is applied to analyze the array of variables of the public value framework. Here, results validate the refined public value model based on the interaction of online fiscal transparency with financial sustainability and level of corruption. Then, public organizations and managers should develop online transparency of budget information as a mechanism to fight corruption and meet fiscal sustainability. In conclusion, this study discovers how smart technologies and strategies help to advance in the accomplishment of public value from the side of transparency and accountability.

In their article entitled “Outcomes of open government. Does an online platform improve citizens’ perception of local government?”, Schmidhuber *et al.* study the results of OG initiatives. In particular, they look at the extent that citizens participation is related to perceived outcomes of government and improved policy-making process, adding public value to public sector organizations. This study is based on the OG literature and the assumption that perceived outcomes are influenced by individual participation and involvement. In other words, the more time citizens spend on a digital participatory platform the more satisfied they are with the outcomes of OG, and the higher is the perceived public

value of the implemented policies. This correlation is based on the literature about psychological reasoning from consumer and social psychology (individual's perceptions and behaviours differ on how psychologically distant an object feels to an individual). Empirically, this study analyses the case of the city of Linz (Austria), and "MyLinz", an idea generation digital platform to submit proposals on urban development and planning. The analysis of this study is supported by survey data and statistical analysis of answers from users of the above mentioned digital platform. The results of this study verify that citizen-sourcing participation positively relates to perceived outcomes of OG projects by citizens (i.e. information flows, trust and satisfaction with local government), but their repetitive participation does not relate to users' outcome evaluation. From the perspective of public value creation, this study confirms that digital participation platforms also collaborate with public managers to identify societal problems in cities, opening up new routes to collaborate in government decision-making processes.

The article of Timor "The citipreneur: how a local entrepreneur creates public value through smart technologies and strategies", explores the potential of local entrepreneurs to lead changes and generate public value by strategic partnerships around smart technologies. The study explores the potential of local entrepreneurs to drive systemic changes generating public value by forging strategic partnerships around smart technological solutions in local contexts. Then, this study draws on the role of smart bottom-up initiatives to creating public value in smart cities as a form of governance. This article explores the role that local entrepreneurs, positioned between civil society and the market, play in creating public value through smart technologies and strategies. This study addresses the case of the Smart Solar Charging (SSC) project in the city of Utrecht (the Netherlands), a community based, smart and sustainable grid-to-vehicle energy system launched by a local entrepreneur. The approach to value creation of this paper addresses the pioneering use of smart technologies in the case of the SSC project, based on the development of strategic relationships with companies and local authorities and citizens. In this case, value creation using smart technologies is forged with attention to the actors involved in the process, targeting sustainability and energy transition for which it urges the active involvement of all of them. Then, processes in which the creation of public value are supported by entrepreneurs in cities are of interest as they act as agents of local communities regarding the needs of groups that will implement the technologies in their day-to-day lives. In consequence, this case provides compelling evidence of the human dimension of public value through smart technologies and strategies, a critical factor to understand the final outcomes in the smart city.

The article of Valle-Cruz "Public value of e-government services through emerging technologies" studies factors promoting public value in digital services based on smart technologies. This article reviews the literature of e-government to state some hypotheses regarding public value creation in digital public service delivery. This group of hypotheses is tested with a model (using a multivariate linear regression) in the metropolitan area of Toluca Valley, State of Mexico (a central region of Mexico). The results of this article arise from the analysis of smart digital services in local governments and provide evidence about some central issues related to public value. Overall, the analysis supports that the most significant factors for generating public value, based on e-government, are anti-corruption strategies, access to information and data privacy and the existence of service-kiosks and one-stop-shops. At the same time, other conclusions emerged from this study. On the one hand, open data initiatives generate public value only if the data are relevant for citizens, giving them the opportunity to get involved in participation processes. On the other hand, smart strategies to access information and foster anti-corruption actions improve trust in government and public value generation. However, it is not confirmed that corruption in government is reduced by using smart technologies. Besides, citizens understand

e-government services and emerging technologies as a persuasion rather than a dialogue mechanism between government and themselves. In conclusion, public value is a central dimension of smart digital services, however they need to be understood by citizens, in order to meet all their potential.

Macadar *et al.*'s article "Key drivers for public value creation enhancing the adoption of electronic public services by citizens" analyze the key drivers for public value creation that can enhance the adoption of electronic public services by citizens. This study highlights the importance of digital services as a basis for applying other smart technologies in the public sector. It uses the model of Savoldelli *et al.* (2014), that regards public value key drivers, including citizen trust, e-service design, governmental readiness and collaborative process between government and service users. Methodologically, this article is based on a comprehensive qualitative study with 46 semi-structured interviews, and direct observation at three public centres in the state of Rio Grande do Sul (regional government in the south of Brazil). One of the main findings of this article highlights the idea that public value in digital public services may be directly perceived either by those who use the service, or indirectly by the observation of other people who have adopted it. Hence, a two-dimensional framework showing the direct and indirect factors fostering public value is needed. At the same time, this article moves forward the discussion about the future design of digital services based on big data and smart technologies. Here, the authors suggest that the evaluation of the impact of emerging technologies (i.e. social media, artificial intelligence or IoT) should address identified key drivers for public value.

Zavattaro and Brainard close this special issue with the article "Social media as micro-encounters: millennial preferences as moderators of digital value creation purpose" addressing the potential of social media technologies to create public value. In particular, this study introduces a conceptual framework to understand how the preferences of millennials' use of social media can help public administrators to change their service delivery ethos, and create meaningful micro-interactions in digital spaces to create public value. The theoretical perspective of this article is not only based on a review of literature about social media in public administration, but also millennials' characteristics, social media use for citizens engagement and micro-encounters. Particularly, this study looks at public value in the public sector regarding if public administrators can learn from millennials how to transform public service delivery and democratic interaction. Millennials desire immediacy, feel entitled to self-expression, want authentic relationships and finally, exhibit a sense of emotional attachment to the social media tools themselves. However, public agencies do not use social media to foster the previous public values. Another conclusion of this article explores the metrics of social media technologies and how to measure public value. Here, the authors suggest the need of using data about comments, dialogue, social sharing and collaboration, rethinking other traditional statistics, such as likes, follows and shares. In other words, qualitative data about social media outcomes will contribute to understand whether this perspective is successful in creation of public value.

Smart government? Towards a comprehensive perspective to promote public value through the use of emergent technologies and strategies

This article explores different ideas regarding the generation of public value with smart technologies and strategies. Recently, the nature, size and scope of the opportunities facing digital governments have changed, whereas many of the traditional challenges of ICTs in the public sector have persisted (Dawes, 2013; Gil-García and Helbig, 2006; Gil-García and Pardo, 2005). Governments face complex socio-technical problems and, in response, they have developed strategies based on the innovative use of sophisticated ICTs to create public value (Gil-García *et al.*, 2015). As mentioned above, there are several dimensions in the field of digital government: websites and government portals, open data

and government platforms, social media technologies and networks, transparency and participation; and smart cities, among others. Therefore, there are probably many routes to integrate these issues into a single phenomenon and research object, facilitating a better understanding of its nature and implications, including the professional practice of public management and administration (Ospina and Dodge, 2005; Perry, 2012). Here, we suggest using the term smart government as a theoretical and conceptual approach to identify and analyze diverse issues and topics regarding digital government at different layers. In other words, smart government is a concept encompassing different dimensions related to digital government, both traditional and emerging trends, converging to create value for government and society.

From our point of view, the above mentioned smart technologies and strategies converge, or may converge, towards a smarter government, more efficient, more effective, better communicated, more responsive and closer to the citizens. Meijer *et al.* (2016) identify three critical issues to advance the study and understanding of smart government and governance in the context of cities: contextual conditions, governance models and the evaluation of public value. These dimensions can be addressed to foster efficiency, including the future potential of smart technologies and strategies. The big questions and debates mentioned before are reflected in the dimensions identified in the literature regarding how to make a government smarter. However, the term smart city, which could be interpreted as a smart local government, is not clearly defined and lacks consensus in the academic literature. This concept is analyzed and used in various forms by different scholars and practitioners (Gil-García *et al.*, 2015; Scholl and Scholl, 2014). The phenomenon can be conceptualized through the study of multiple components and features of a smart government. Nonetheless, the scholarly literature has emphasized the local level of government, that is, the notion of smart city and relatively less attention was given to the general concept and components of a more general smart government or a smart state (Gil-García, 2012b).

Among the common characteristics in different definitions of smartness, there are three of paramount importance: the use of ICTs in government; with attention to the physical and network infrastructures; and the provision of better services to citizens (Gil-García *et al.*, 2015). At the same time, Gil-García *et al.* (2018) suggest other complementary components of the notion of smartness in government: sustainability, efficiency, effectiveness, innovation, resilience, creativity, openness and transparency, equity, entrepreneurship, integration, technology, participation, integration, data and citizen-centred. These authors argue that such dimensions are ends in themselves, while others are a means to achieve a smarter government. For example, integration and interoperability in government facilitates to respond faster and better to citizen demands. In addition, an equitable government with inclusive policies for social minorities is desirable and could also be considered smarter.

Under a comprehensive vision of what a smart government involves, there are many public sector organizations that are already smart. Scholars and professionals in public sector management increasingly identify smart government as a multidimensional phenomenon, including a diversity of elements, many of them not directly related to technology, but essential for the development of smart strategies (Gil-García, 2015). To be smart, a government needs to be transformed in a meaningful way involving all the key players at stake. ICTs can encourage and facilitate such transformations, although they will be possible only if organizational, legal and policy changes take place at the same time. To put it differently, technology should be implemented in parallel with organizational and regulatory changes to achieve successful outcomes with real social impact (Gil-García, 2015). Specifically, we emphasize that it is important to think about the degree, area and intensity of “smartness”, in opposition to a dichotomy between being and not being a smart government. Therefore, smartness should be seen more as a multidimensional continuum

including very diverse elements. In addition, citizens and government alike can take actions to become smarter in that continuum, encompassing different domains of public policy and aspects of public management. We argue that an added value of using a comprehensive vision of smartness in government is that it allows identifying policy implications and the connections between theory and practice, as well as understanding the relationships between different variables in complex social contexts.

Consequently, a changing future could be envisioned regarding the use of smart technologies and strategies in government. Increasingly sophisticated tools emerge in all spheres and areas of public policy and management. The future development of public management may be supported by computational models, including government analytics, big data, policy modelling and the use artificial intelligence. Cloud computing grants the integration of information without borders and with flexible availability. In addition, the combination of sensors, some innovative uses of geographical services, and other emerging technologies, are advancing as a result of specific needs of users and this new potential could greatly change governments and their relationships with citizens and other stakeholders. To mention a few, we foresee blockchain, the Internet of Things (IoT), quantum computing and artificial intelligence as a part of the potential future stages in the adoption and use of smart technologies in government (Janssen and Kuk, 2016; Meijer, 2017; Wirtz *et al.*, 2018). This will occur within a context of massive data available from different sources, making indispensable a focus on the governance of algorithms. Surely technologies are not going to reform government by themselves, but they might play a very important role and have deep implications.

Concluding remarks

This article attempts to start a conversation about the role of smart technologies and strategies in current innovations and the creation of public value. Understanding smart technologies and their corresponding strategies from a public management perspective was the objective of this article and the rest of the special issue. This article has illustrated the process of change in public value generation over time, as a result of different public management paradigms (from traditional public administration to NPM), but also different types of technologies (from mainframes to websites and social media). More recently, the notion of smart governance denotes that there might be a new and transformative public management perspective. This approach is rooted in the potential of the latest smart technologies and strategies to transform the (inter)mediation processes between public administrations and the citizenry to better understand and solve societal problems. Therefore, this stage is expected to have a significant impact in the (co)production of public services and the delivery of public value and different dimensions of public management. The empirical evidence of the articles of this special issue supports this conclusion; that open and collaborative innovation processes developed under this emergent technological wave could become encouraging transformative practices in the public sector.

The articles presented in this special issue provide evidence from different countries around the globe. We have studies from Austria, Brazil, Mexico, Switzerland and the USA, telling stories and exploring critical questions for the theoretical and practical advancement of digital government. Particularly, the question “how to create public value using smart technologies and strategies?” shines in the articles of the special issue. Here, we would like to highlight some lessons learned from them. First, government data are becoming one of the core assets to create public value based on technological innovation. Particularly, government digital platforms facilitate transparency and participatory mechanisms to transform public decision making and citizens’ engagement in public affairs. At the same time, cities have become one of the most plausible political, social and geographical spaces to implement smart technologies and strategies in government. The growing complexity of

cities has been tackled with collaborative innovation by local governments, including co-production of public services and co-design of experimental cases in different policy domains (i.e. local energy, mobility, housing, etc.). In addition, improving public service delivery is one of the goals of smart technologies in government. Here, the complexity of public value generation through innovative public services remains a challenge in different contexts, and more in developing countries. Finally, although social media technologies are among the most recent technologies looking at a citizen-centric approach, governments need to define solid strategies within this approach. Probably, this could be the case of the future smart technologies and smart governments themselves.

Finally, there is still an open conversation among digital government and public management scholars regarding public value generation using smart technologies and strategies. This goes hand in hand with public agencies adopting the most recent technologies in order to make their governments more innovative and smarter in different dimensions and specific functions of public management. How to deal with the challenges ahead will depend on the contextual conditions in which a specific initiative is embedded and a diversity of public value generation mechanisms, including smart technologies and strategies. In addition, the smart technologies of the near future (i.e. blockchain, IoT, quantum computing, artificial intelligence and more) are expected to grow in importance and actual use within the public sector in the next few decades. As Gil-Garcia *et al.* (2018, p. 12) suggest, research with a holistic view of digital-age governance requires collaboration among digital government and public management researchers. Our collaborative purpose with this special issue is to underline the prospects of smart technologies and strategies in public sector management, contributing to smarter governments that could generate public value for different social groups and the society as a whole, in a more complex and diverse world. We argue that this special issue is a good way to contribute to this conversation and hope colleagues interested in these topics continue doing research and practice about the potential of smart technologies and strategies in the public sector.

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References

- Bannister, F. and Connolly, R. (2014), "ICT, public values and transformative government: a framework and programme for research", *Government Information Quarterly*, Vol. 31 No. 1, pp. 119-128, available at: <https://doi.org/10.1016/j.giq.2013.06.002>
- Bellamy, C. and Taylor, J.A. (1998), *Governing in the Information Age*, Open University Press, Buckingham.
- Castelnovo, W. (2013), "A stakeholder based approach to public value", paper presented at 13th European Conference on eGovernment, Como, 13-14th June.
- Charalabidis, Y. and Loukis, E. (2012), "Participative public policy making through multiple social media platforms utilization", *International Journal of Electronic Government Research*, Vol. 8 No. 3, pp. 78-97.
- Chourabi, H., Nam, T., Walker, S., Gil-Garcia, J.R., Mellouli, S., Nahon, K. and Scholl, H.J. (2012), "Understanding smart cities: an integrative framework", *2012 IEEE 45th Hawaii International Conference on En System Science*, pp. 2289-2297.

- Chun, S.A., Shulman, S., Sandoval, R. and Hovy, E. (2010), "Government 2.0. making connections between citizens, data and government", *Information Polity*, Vol. 15 Nos 1-2, pp. 1-9, doi: 10.3233/IP-2010-0205.
- Clark, B.J., Brudney, J. and Jang, S.-G. (2013), "Coproduction of government services and the new information technology: investigating the distributional biases", *Public Administration Review*, Vol. 73 No. 5, pp. 687-701, doi: 10.1111/puar.12092.
- Cordella, A. and Bonina, C.M. (2012), "A public value perspective for ICT enabled public sector reforms: a theoretical reflection", *Government Information Quarterly*, Vol. 29 No. 4, pp. 512-520.
- Criado, J.I. and Ruvalcaba-Gomez, E.A. (2018), "Perceptions of city managers about open government policies: concepts, development, and implementation in the local level of government in Spain", *International Journal of Electronic Government Research*, Vol. 14 No. 1, pp. 1-22, available at: <https://doi.org/10.4018/IJEGR.2018010101>
- Criado, J.I. and Villodre, J. (2018), "Public employees in social media communities: exploring factors for internal collaboration using social network analysis", *First Monday*, Vol. 23 No. 4, available at: <https://doi.org/10.5210/fm.v23i4.8348>
- Criado, J.I., Rojas-Martín, F. and Gil-García, J.R. (2017), "Enacting social media success in local public administrations: an empirical analysis of organizational, institutional, and contextual factors", *International Journal of Public Sector Management*, Vol. 30 No. 1, pp. 31-47, available at: <https://doi.org/10.1108/IJPSM-03-2016-0053>
- Criado, J.I., Sandoval-Almazán, R. and Gil-García, R. (2013), "Government innovation through social media", *Government Information Quarterly*, Vol. 30 No. 4, pp. 320-328, doi: 10.1016/j.giq.2013.10.003.
- Danziger, J.N. and Kraemer, K.L. (1986), *People and Computers. The Impacts of Computing on End Users in Organizations*, Columbia University Press, New York, NY.
- Dawes, S.S. (2013), "Advancing digital government: 'the research-practice knowledge connection'", *Gestión y Política Pública*, special issue on digital government, pp. 49-67.
- Dawes, S.S., Cresswell, A.M. and Pardo, T.A. (2009), "From 'need to know' to 'need to share': tangled problems, information boundaries, and the building of public sector knowledge networks", *Public Administration Review*, Vol. 69 No. 3, pp. 392-402.
- Dunleavy, P., Margetts, H., Bastow, S. and Tinkler, J. (2006), *Digital Era Governance: IT Corporations, the State and E-government*, Oxford University Press, Oxford.
- Fountain, J.E. (2001), *Building the Virtual State. Information Technology and Institutional Change*, Brookings Institution Press, Washington, DC.
- Garson, G.D. (2003), "Toward an information technology research agenda for public administration", in Garson, G.D. (Ed.), *Public Information Technology: Policy and Management Issues*, Idea Group, Hershey, PA, pp. 331-357.
- Gil-García, J.R. (2012a), *Enacting Electronic Government Success: An Integrative Study of Government-wide Websites, Organizational Capabilities, and Institutions*, Springer, New York, NY.
- Gil-García, J.R. (2012b), "Towards a smart state? Inter-agency collaboration, information integration and beyond", *Information Polity*, Vol. 17 No. 1, pp. 269-280, doi: 10.3233/IP-2012-000287.
- Gil-García, J.R. (2015), "Prologue", in Rodríguez-Bolívar, M.P. (Ed.), *Transforming City Governments for Successful Smart Cities*, Springer International Publishing, Cham.
- Gil-García, J.R. and Helbig, N. (2006), "Exploring e-government benefits and success factors", in Anttiroiko, A.-V. and Malkia, M. (Eds), *Encyclopedia of Electronic Government*, Idea Group, Hershey, PA, pp. 803-811.
- Gil-García, J.R. and Pardo, T. (2005), "E-government success factors: mapping practical tools to theoretical foundations", *Government Information Quarterly*, Vol. 22 No. 2, pp. 187-216, doi: 10.1016/j.giq.2005.02.001.
- Gil-García, J.R., Helbig, N. and Ojo, A. (2014), "Being smart: emerging technologies and innovation in the public sector", *Government Information Quarterly*, Vol. 31 No. S1, pp. 1-8, doi: 10.1016/j.giq.2014.09.001.

- Gil-Garcia, J.R., Dawes, S.S., and Pardo, T.A. (2018), "Digital government and public management research: finding the crossroads", *Public Management Review*, Vol. 20 No. 5, pp. 633-646.
- Gil-Garcia, J.R., Pardo, T.A. and Nam, T. (2015), "What makes a city smart? Identifying core components and proposing an integrative and comprehensive conceptualization", *Information Polity*, Vol. 20 No. 1, pp. 61-87.
- Gil-Garcia, J.R., Zhang, J. and Puron-Cid, G. (2016), "Conceptualizing smartness in government: an integrative and multi-dimensional view", *Government Information Quarterly*, Vol. 33 No. 3, pp. 524-534, doi: 10.1016/j.giq.2016.03.002.
- Harrison, T.M., Guerrero, S., Burke, G.B., Cook, M., Cresswell, A., Helbig, N., Hrdinova, J. and Pardo, T. (2012), "Open government and e-government: democratic challenges from a public value perspective", *Information Polity*, Vol. 17 No. 2, pp. 83-97, doi: 10.3233/IP-2012-0269.
- Heeks, R. (2006), *Implementing and Managing e-Government. An International Text*, Sage, London.
- Hood, C. (2011), "From FOI world to wikileaks world: a new chapter in the transparency story?", *Governance*, Vol. 24 No. 4, pp. 635-638, doi: 10.1111/j.1468-0491.2011.01546.x.
- Hood, C. and Margetts, H. (2007), *The Tools of Government in the Digital Age*, Palgrave, London.
- Jaeger, P.T. and Bertot, J.C. (2010), "Transparency and technological change: ensuring equal and sustained public access to government information", *Government Information Quarterly*, Vol. 27 No. 4, pp. 371-376, doi: 10.1016/j.giq.2010.05.003.
- Janssen, M. and Kuk, G. (2016), "The challenges and limits of big data algorithms in technocratic governance", *Government Information Quarterly*, Vol. 33 No. 3, pp. 371-377.
- Kraemer, K.L. and King, J.L. (2003), "Information technology and administrative reform: will the time after e-government be different?", Ponencia presentada en *Heinrich Reiner Mann Schrift Fest*, Post Graduate School of Administration, Speyer (29 de septiembre de 2003).
- Levine, S. and Prietula, M.J. (2013), "Open collaboration for innovation: principles and performance", *Organization Science*, Vol. 25 No. 5, pp. 1414-1433, doi: doi.org/10.1287/orsc.2013.0872.
- Linders, D. (2012), "From e-government to we-government: defining a typology for citizen coproduction in the age of social media", *Government Information Quarterly*, Vol. 29 No. 4, pp. 446-454, doi: 10.1016/j.giq.2012.06.003.
- Luna-Reyes, L.F. and Gil-García, J.R. (2014), "Digital government transformation and internet portals: the co-evolution of institutions, technology, and organizations", *Government Information Quarterly*, Vol. 31 No. 4, pp. 545-555, doi: 10.1016/j.giq.2014.08.001.
- Meijer, A. (2017), "Datapolis: a public governance perspective on 'smart cities'", *Perspectives on Public Management and Governance*, Vol. 1 No. 3, pp. 195-203.
- Meijer, A.J., Gil-Garcia, J.R. and Bolivar, M.P.R. (2016), "Smart city research: contextual conditions, governance models, and public value assessment", *Social Science Computer Review*, Vol. 34 No. 6, pp. 647-656, available at: <https://doi.org/10.1177/0894439315618890>
- Mergel, I. (2015), "Open collaboration in the public sector: the case of social coding on GitHub", *Government Information Quarterly*, Vol. 32 No. 4, pp. 464-472, doi: 10.1016/j.giq.2015.09.004.
- Mergel, I. and Desouza, K. (2013), "Implementing open innovation in the public sector: the case of Challenge.gov", *Public Administration Review*, Vol. 73 No. 6, pp. 882-890, doi: 10.1111/puar.12141.
- Moore, M.H. (1995), *Creating Public Value: Strategic Management in Government*, Harvard University Press.
- Ospina, S.M. and Dodge, J. (2005), "Narrative inquiry and the search for connectedness: practitioners and academics developing public administration scholarship", *Public Administration Review*, Vol. 65 No. 4, pp. 409-423.
- Pang, M.S., Lee, G. and Delone, W.H. (2014), "In public sector organisations: a public-value management perspective", *Journal of Information Technology*, Vol. 29 No. 3, pp. 187-205.
- Pardo, T.A., Nam, T. and Burke, G.B. (2012), "E-government interoperability: interaction of policy, management, and technology dimensions", *Social Science Computer Review*, Vol. 30 No. 1, pp. 7-23, doi: 10.1177/0894439310392184.

- Perry, J.L. (2012), "How can we improve our science to generate more usable knowledge for public professionals?", *Public Administration Review*, Vol. 72 No. 4, pp. 479-482.
- Picazo-Vela, S., Gutiérrez-Martínez, I. and Luna-Reyes, L.F. (2012), "Understanding risks, benefits, and strategic alternatives of social media applications in the public sector", *Government Information Quarterly*, Vol. 29 No. 4, pp. 504-511, doi: 10.1016/j.giq.2012.07.002.
- Savoldelli, A., Codagnone, C. and Misuraca, G. (2014), "Understanding the e-government paradox: learning from literature and practice on barriers to adoption", *Government Information Quarterly*, Vol. 31 No. S1, pp. S63-S71, available at: <https://doi.org/10.1016/j.giq.2014.01.008>
- Scholl, H.J. (2009), "Profiling the EG research community and its core, en", in Wimmer, M.A. *et al.* (Eds), *EGOV 2009, LNCS 5693*, Springer-Verlag, Berlin and Heidelberg, pp. 1-12.
- Scholl, H.J. and Scholl, M.C. (2014), "Smart governance: a roadmap for research and practice (4-7 de marzo de 2014, Berlín, Alemania)", *Actas de la iConference 2014 Proceedings Breaking Down Walls. Culture – Context – Computing*, pp. 163-176.
- Twizeyimana, J.D. and Andersson, A. (2019), "The public value of E-Government – a literature review", *Government Information Quarterly*, Vol. 36, pp. 167-178, available at: <https://doi.org/10.1016/j.giq.2019.01.001>
- Wirtz, B.W., Weyerer, J.C. and Geyer, C. (2018), "Artificial intelligence and the public sector. Applications and challenges", *International Journal of Public Administration*, Vol. 13 No. 7, pp. 1-20.
- Yildiz, M. (2007), "E-government research. reviewing the literature, limitations, and ways forward", *Government Information Quarterly*, Vol. 24 No. 3, pp. 646-665, doi: 10.1016/j.giq.2007.01.002.

Further reading

Noveck, B.S. (2015), *Smart Citizens, Smarter State*, Harvard University Press, Cambridge, MA.

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