Editorial

Special issue on internet plus government: New opportunities to solve public problems?

ABSTRACT

This editorial opens by introducing Internet Plus Government, a new government initiative emerging after the US presidential election in 2008. Comparing to the more descriptive definitions of e-government, supporters of 'Internet Plus Government' emphasize the transformative and normative aspect of the newest generation of Information and Communication Technology (ICTs). They argue that the new initiative designates how government should operate and in turn implies how state-citizen relationships are transformed. To understand the core of this initiative and whether it offers new opportunities to solve public problems, we conducted analyses of research articles published in the e-governance[1] area between 2008 and 2017. Our analysis suggests that the Internet Plus Government initiative has enriched the government information infrastructure. That is, it has enabled the accumulation and use of huge volumes of data for better decision making. The advancement of open data, the wide use of social media, and the potential of data analytics have also generated pressure to address challenging questions and issues in e-democracy.[2] However, the analysis leads us to deliberate on whether Internet Plus Government initiatives worldwide have actually achieved their goal. After introducing papers included in this special issue, we present challenges to be addressed before Internet Plus Government initiatives realize their potential towards better public governance.

1. Introduction

After the US presidential election in 2008, many scholars and politicians began to argue that new ICTs such as social media are already playing a transformative role in reshaping citizens' choices in the election (Effing, Van Hillegersberg, & Huibers, 2011; Vitak et al., 2011; Kushin & Yamamoto, 2010; AGIMO, 2010; EU, 2010; Zhang, Johnson, Seltzer, & Bichard, 2010; Obama, 2009). They suggest that the wide use of the new generation of ICTs, including the Internet of Things (IoT), cloud computing, big data, machine learning and artificial intelligence (AI), and the mobile Internet, among others, are reshaping the values and practices of government, businesses, and society (Keane, 2016). These new government initiatives, named Internet Plus Government, represents a new movement claiming to give full play to Web 2.0 in government innovation and social development in the last decade (Li, 2016). Comparing to some more descriptive definitions of e-government, researchers of Internet Plus Government "emphasize the transformative and normative aspect of the newest generation of ICTs" (Al-Hakim, 2007). They argue that "the new initiative designates how government should operate and in turn implies how state-citizen relationships and the activity of citizens ought to constitute" (Henman, 2010a).

As Internet Plus Government is being implemented in many governments around the world, new opportunities and challenges emerge. Questions related to the use of technology innovations to reshape government operation and redefine state-citizen relationships largely remain to be answered when it comes to the adoption, implementation, diffusion and use of these ICTs in governance process. Supporters of the initiative claim that the adoption, implementation, diffusion and use of the newest wave of ICTs may help achieve the transformative goal in redefining models of government operation and state-citizen relationships. Investigations and reflections therefore must be carried out to see whether this was the case.

This special issue on the theme of "Internet Plus Government: New Opportunities to Solve Public Problems" in *Government Information Quarterly* is

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[1] *E-governance* is majorly concerned with the adoption, implementation and use of ICTs in the relationships between state and the society in the complex process of delivery of public policy and public operations (Mueleman, 2008). It includes three distinct strands: Administrative governance; interactive governance and governance as self-organizing networks (Osborne, 2010).

[2] *E-democracy* involves the use of digital networks by which government solicits or receives the views of citizens, businesses and other organizations "on matters ranging from full-scale legislative change to the tweaking of the management of services and programs" (Perri 6, 2004)

dedicated to this emergent direction. The theme responds to the need for new knowledge about the ways in which the latest wave of technology innovations is increasingly integrated with government, industries, businesses, and society in general. In this special issue, authors of five papers present findings from and deliberation on their empirical research to help broaden our perspective on possible opportunities and challenges that Internet Plus Government efforts are encountering globally. The authors covered four e-governance areas that are developing with the wide implementation of Web2.0: open data, government transparency, the use of social media in government–citizen interaction, and cyber-security in smart cities. Some of the work contributes to understanding how policy entrepreneurs and local leaders should promote innovation diffusion in Australia and Korea, others explore on how data should be disclosed and shared by governments in Mexico and the USA, yet others provide innovative solutions to addressing cyber-security issues in smart cities.

Expanding from the articles included in this special issue, we want to investigate whether Internet Plus Government initiatives have actually become a new form of e-governance and redefined state-citizen relationships worldwide. Thus we conducted analyses of research articles published in the e-governance area between 2008 and 2017 (Liu, Pan, & Chen, 2018). The past decade is also the period when Internet Plus Government initiatives were widely promoted globally. The goal of the analyses is to delineate the progress of E-governance in the last ten years by addressing three research questions (RQ): (1) RQ1:What types of innovative ICTs have been adopted in governance process while public administration continued to evolve in the past decade (2008–2017)[3]? (2) RQ2: How did the introduction of new ICTs and techniques impact the investigation of technology adoption, implementation, diffusion and use in different governance domains after 2008? (3) RQ3: What areas of e-governance have been impacted by the new wave of innovative ICTs in the past decade?

This editorial proceeds as follows: Section 2 describes details of our research approach and analytical procedures employed in this article. The findings addressing the three research questions were presented in Section 3. The contribution of the special issue is discussed in Section 4. Conclusions on whether Internet Plus Government represents a different form of e-governance and what further studies of this form are required from the research community is presented in Section 5.

2. Citation data and analysis

Researchers and politicians promoting Internet Plus Government believe these initiatives can eventually redefine models of government operation and state-citizen relationships (EU, 2013; Obama, 2009; Zuiderwijk & Janssen, 2015). To decipher whether the transformative goals of Internet Plus Government has been achieved and thus represents the latest advancement in e-governance, we need first to reflect on the progress of e-governance in the last ten years. This editorial focuses on analyzing the refereed journal articles on interactions between innovative technology adoption and public governance published in leading academic databases[4] during the period of 2008–2017. The idea behind this was that refereed journal articles not only set quality standards but also provide a filter, thus establishing the nature and scope of the ideas presented to the academic community in the last ten years.

The data analysis process comprised five steps:

1) Step 1: We first downloaded 1203 articles that assessed technology adoption, implementation, diffusion and use in the governance process since 2008 from major research databases.[5] These represented roughly one-fifth of the articles published in the electronic governance domain in the past decade. We focus our searches on relevant literature in major databases in the field of public administration, information science, computer science and engineering, and electronic government. These databases include: Wiley Online Library – Journals, Web of Science Core Collection – Social Sciences Citation Index, EBSCO – Academic Search Premier, Springer Link Journal, and JSTOR.

   The articles were then analyzed and filtered by three 3-member teams formed from the eight student research assistants and one of the co-authors. We chose to omit a wide variety of topics from the final dataset, including pure technology and system design and commercial technology use, that had no relevance to our chosen focus of study (Cooper & Zmud, 1990; Cooper & Zmud, 1990; Kwon and Zmud, 1987, and Zmud & Apple, 1992). As the result, 360 articles addressing the topic of the adoption, implementation, diffusion and use[6] of the newest generation of ICT in governance globally since 2008 served as the basis of our content analysis. Details on the key concepts and criteria used to classify articles in the content analysis can be found in Table 1.

2) Step 2: Fifty papers were randomly selected from the literature database for a pilot content analysis, targeting five papers from each year. Eight graduate students at Fudan University attached classification labels to research ideas and practice addressed in the 50 papers. The classification labels used were selected and adapted from those previously used in public administration research by Munoz and Hernandez (2010) and information science research by Hawkins (2001).

   A preliminary classification system was created integrating labels attached to each of the 50 papers. Brainstorming meetings were held to decide on the accuracy of 21 classification themes assigned to each paper before an updated classification system was created. During this process, labels were integrated or collapsed into different classification themes (Cooper & Zmud, 1990; Kwon and Zmud, 1987; Zmud & Apple, 1992). An extensive memo book that recorded our decision criteria and guided our decisions in the pilot content analysis was also created. This memo book was refined and developed while members of the research team continued analyzing all articles (Lan & Anders, 2000).

   Each of the 360 articles was then analyzed separately employing the newly created classification system following the same procedure using consistent, computer-based coding and recoding techniques (Lan & Anders, 2000). Any disagreements concerning the definition of the classification themes were resolved while the themes were updated. This classification system summarized major research themes emerging in

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[3] The US presidential election in 2008 was perceived as a milestone where many scholars began to perceive or question whether new ICTs such as social media can already play a transformative role in reshaping citizens' choices in the election (Effing et al., 2011; Jan Johnson, Zhang, Bichard, & Kaye, 2008; Kushin & Yamamoto, 2010; Vitak et al., 2011; Zhang et al., 2010). Thus our investigation starts from the year of 2008.

[4] Wiley Online Library – Journals, Web of Science Core Collection – Social Sciences Citation Index, EBSCO – Academic Search Premier, Springer Link Journal, and JSTOR.

[5] We employed multiple sets of keywords during the retrieval process, including: (adoption OR implementation OR diffusion OR use) AND (information and communication technology OR ICT) AND (government OR governance OR public administration OR public policy OR public affairs OR public management OR politics OR public management OR administrative governance OR interactive governance OR network governance). Our search scope is limited to titles, abstracts and keywords.

[6] We cite Cooper and Zmud (1990), Kwon and Zmud (1987) and Zmud and Apple (1992) on the specific criteria used to classify papers separately with technology adoption, technology implementation, technology diffusion and technology use. Details on criteria enforced in the coding process can be found in Table 1.

Table 1
Key concepts used to classify articles in the content analysis.

Key concepts	Definitions
Adoption	
Process	Active and/or passive scanning of organizational problems, opportunities and ICT solutions are undertaken
	Pressure to evolve come from organization need (pull), technological innovation (push), or both
	Rational and political negotiations ensue to get organizational backing for implementation of ICT solutions
Product	A match is found between an ICT solution and its application in the organization
	A decision is reached to invest the resources necessary to accommodate the implementation efforts
Implementation	
Process	The ICT application is developed, installed and maintained. Organizational procedures are revised and developed
	Organizational members are trained in the new procedures and in the ICT application.
Product	The ICT applications is available for use in the organization
Diffusion	
Process	Organizational members are induced to commit to ICT application usage
Product	The ICT application is employed in organizational work
Use	
Process	Usage of the ICT application is encouraged as a normal activity
Product	The organization's governance systems are adjusted to account for the It application
	The ICT application is no longer perceived as something out of the ordinary

scholarly work and government technology adoption and use over the past ten years (Dawes, 2008). Critical phases in government ICT adoption emerged from the content analysis of 360 articles addressing the adoption of ICT worldwide. The evolution of government ICT adoption practices since 2008 was documented systematically (Liu & Yuan, 2015).

3) Step 3: Each paper was further scrutinized and grouped into four categories according to the specific technology type discussed in the paper, the specific methodological approaches employed by the researchers, the governance domain the innovative ICT was applied to, and the specific issue addressed (Zhang and Li, 2004; Zhang et al., 2002).

4) Step 4: Additionally we downloaded and analyzed 7305 articles from the E-government Reference Library (Version 13.5)[7] to triangulate findings from the above content analysis. Based on both the content analysis and the statistical analysis, eight leading types of innovative ICT adopted in different governance domains in the last decade were identified and later presented in Section 3.1 (Alpaydin, 2014; Atzori, Iera, & Morabito, 2010; Carr & Hayes, 2015; Charniak, 1985; Hashem et al., 2015).

   We then went back to the E-government Reference Library (Version 13.5) to specifically search for articles investigating issues and challenges that government and society face when adopting and using these eight types of technologies (Cooper & Zmud, 1990). Through this process we were able to identify 2105 relevant articles. These papers and their citations were downloaded and systematically analyzed with the assistance of the eight research assistants.

   The outcomes of step 3 and 4 correspond to three research questions introduced in Section 1.

5) Step 5: We then focused on the five top-cited articles among the 2105 papers for co-citation analysis (White and McCain, 1998; Wasserman & Faust, 1994). Comparing to content analysis and descriptive statistical analysis, co-citation analysis of top authors and journals complements in providing the evolutionary pattern emerging in academic investigation and governance changes over the years and thus further inform RQ2 and RQ3.

The author frequency matrix was constructed to record the number of times each pair of the five high-impact papers was co-cited over the last decade. Five leading journals and conference proceedings that published the largest number of high-impact papers were also examined following similar procedures. Among all five journals and conference proceedings, every journal/conference proceeding was paired with the other four publication venues. The Social Science and Science Citation Index (SSCI and SCI) database were used to search for the number of times the paired journals and conference proceedings were co-cited. The exact number was entered into the appropriate cell of the journal co-citation frequency matrix.

The two frequency matrices were then converted to two correlation matrices to understand the relatedness of the paired papers and paired publication venues (Tsay, Xu, & Wu, 2003). The outcomes of step 5 are employed to triangulate findings from the previous two steps.

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[7] The *E*-Government Reference Library (Version 13.5) is one of the most comprehensive e-libraries of scholarly work about ICT use and public administration. It contains all 9901 articles published in core e-government conference proceedings and journals from 1981 to 2017 (Scholl, 2017). Among them, 7305 papers were published in the last decade and served as the basis for analysis in this step.
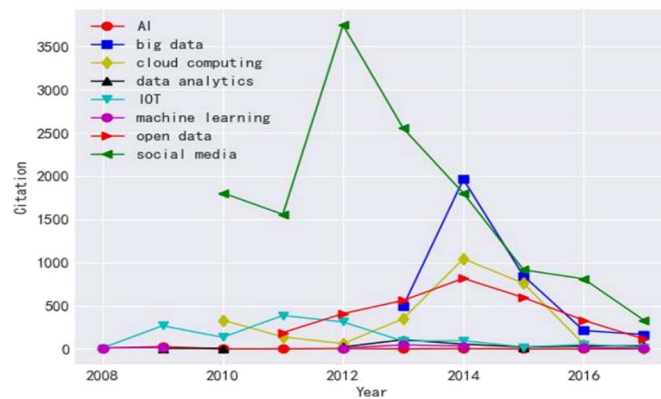
Fig. 1. Innovative ICT use in governance in the last decade.

3. ICT use and advances in public governance

3.1. RQ1: adoption of innovative ICT in public governance in the past decade

The adoption of ICT in the public sector started as early as the 1970s. A preliminary analysis of the 7305 articles included in the E-Government Reference Library and their citations demonstrated that researchers paid close attention to the interaction between the newest generation of ICT and governance evolution in the past decade. As shown in Fig. 1, the last ten years have witnessed an acceleration of publications in the e-government discipline. Scholars have focused on eight major types of the most innovative ICTs – social media, cloud computing, artificial intelligence, big data, data analytics,[8] IoT, machine learning, and open data – and how the use of these technologies interacted with governance practices (Gandomi & Haider, 2015).

A closer look at Fig. 1 indicates that, while social media use for governance purposes is still among the top concerns of policymakers and scholars, the research interest in it is drastically descending. On one hand, multiple studies published before 2012 emphasizing social media's challenges to current governance worldwide were among the top cited pieces (Bertot, Jaeger, & Grimes, 2010; Bertot, Jaeger, & Hansen, 2012). This may originate from the power social media has demonstrated in political mobilization and public opinion solicitation. On the other hand, its potential as an informal data accumulator for public opinion is also attracting wide attention among scholars promoting open government, open data, and civic engagement (Linders, 2012; Lee & Kwak, 2012). However, to successfully unleash the full potential of social media, the public sectors still face multiple layers of challenges. These challenges include: lawmaking and strategy realignment, participatory decision making, procedure design, operational capability enhancement, and crowd co-production in addition to technical proficiency and data analytics capability development (Mergel, 2012; Sandoval-Almazan & Gil-Garcia, 2012).

It is not surprising to see that big data, cloud computing, and open data are becoming the next front of innovative technology adopted and used by different stakeholders in governance (Kalampokis, Hausenblas, & Tarabanis, 2011; Lourenço, 2015; Ohemeng & Ofosu-Adarkwa, 2015; Zuiderwijk, Helbig, Gil-García, & Janssen, 2014). Many scholars have begun to reflect on how to utilize the huge volumes of data available to inform governance and decision making with the quick development of open data and data analytics techniques (Chang, Kauffman, & Kwon, 2014; Chen & Zhang, 2014).

Cloud computing is in its early stage, being adopted as data sharing and service provision platform (Paquette, Jaeger, & Wilson, 2010). The academic interests are currently focusing on the technical feasibility, maturity assessment, and security risks associated with its adoption (Klievink, Romijn, Cunningham, & de Bruijn, 2017; Corrêa, Sheffer, De Assis Mota, Toledo Moreira Mota, & Luiz Pizzigatti Corrêa, 2014; Shin, 2014; Zwattendorfer, Hillebold, & Teufl, 2013; Khan, Young Yoon, Kim, & Woo Park, 2014). Governments in Europe and the US that have adopted cloud computing in daily public operations are actively collaborating with scholars to understand the challenges and benefits that cloud-based platforms could introduce to government-citizen interactions (Lian, 2015; Aziz, Abawajy, & Chowhury, 2013; Knapp, Denney, & Barner, 2011).

Interestingly, the recent revolution in artificial intelligence and machine learning is presenting the potential of utilizing open and social data for better governance purposes (Teufl, Payer, & Parycek, 2009). However, the scarcity of research on this topic might indicate that scholars in the e-government discipline are still waiting to observe its interactions with and influence on current governance practices (Moosa & Alsaffar, 2008). Governments, traditionally followers instead of pioneers in the innovation diffusion process, are still struggling with issues such as secure adoption and technical proficiency to safely manage such new techniques (Liu & Yuan, 2015; Rogers & Shoemaker, 1983). Only a few government offices globally, most law enforcement, have adopted artificial intelligence and machine learning in their daily operations (Smith, 2014; Ku & Leroy, 2014).

3.2. RQ2: how did the introduction of new ICTs and techniques impact the investigation of technology adoption, implementation, diffusion and use in different governance domains after 2008?

The introduction of the newest wave of ICT also created potential for employing new approaches to investigate technology adoption, implementation, diffusion and use in different governance domains. Our analysis of how the top five high-impact articles of the E-Government Reference Library (Version 13.5) published between 2008 and 2017 were co-cited suggests that there has been a clear shift from qualitative theorizing methodologically in the last three years (Fig. 2) (Klievink et al., 2017; Palmirani & Girardi, 2016; Koussouris, Lampathaki, Kokkinakos,

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[8] In the analysis, we differentiate between big data and data analytics, citing Gandomi and Haider (2015, p141). Papers labeled with big data are articles discussing the interactions between data management techniques and governance affairs. Data management techniques here include the acquisition and recording of data, the extraction, cleaning, and annotation of data, integration aggregation, and representation of data. Data analytics here specifically refer to data modeling and analysis and to the interpretation and inference process.
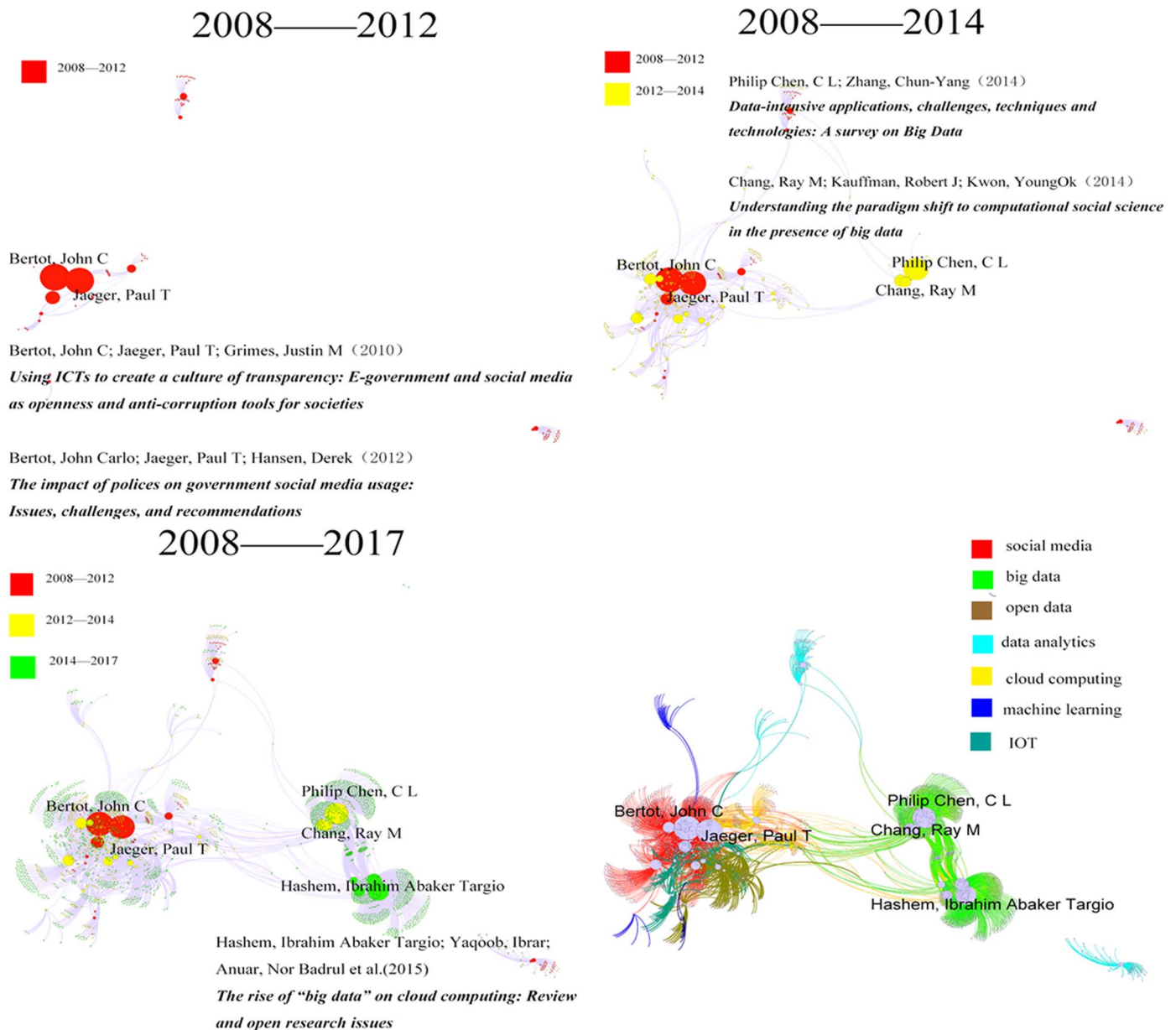
Fig. 2. Top five cited articles and their co-citations.

Askounis, & Misuraca, 2015). Scholars citing these five articles published in different disciplines emphasizing different methodological approaches slowly start to absorb and integrate insights from other disciplines.

In Fig. 3, our co-citation analysis indicates that five journals and conferences are becoming core for critical finding on technology adoption, implementation, diffusion and use in different governance domains in the past ten years. These journals and conferences are *Government Information Quarterly*, *Information Sciences*, *Information Systems*, *Decision Support Systems*, and *The CIRP Conference on Industrial Product-Service Systems* (Fig. 3).

Different from *Government Information Quarterly*, which has established its reputation among e-government researchers, *Decision Support Systems* was traditionally mostly sought by computer scientists. *Information Sciences* and *Information Systems* were designed for researchers in information engineering and intelligent systems. They published articles concerning the design and implementation of languages, data models, process models, algorithms, software, and hardware for information systems (Naumann, Shasha, and Vossen, 2017).

The graphs in the top and lower left corners of Fig. 3 demonstrate the evolution of the co-citation patterns manifested by the articles citing the top five publication venues from 2008 to 2007. Co-citations and mutual references across these journals and conference proceedings have almost tripled in the past years. More scholars from different disciplines have begun to collaborate as data analytics and machine learning start to gain their popularity after 2011 (Ku & Leroy, 2014; Piscopo, Siebes, & Hardman, 2017).

The co-citation networks in Fig. 4 use links in different colors to reveal the co-citation patterns among researchers with different technological focuses embraced by different journals and conferences. Clusters in different colors are papers studying the adoption and use of different types of new ICTs in governance. While *Government Information Quarterly* still publishes the largest number of academic research on the use of social media, cloud computing, and IoT in governance, other top journals and conferences publish more on the impact of big data and data analytics on governance. It might be worth mentioning that five papers included in this special issue fit well to *GIQ* given their emphasis on government affairs rather than on technological development. At the same time, explorations on big data, machine learning, open data, and data analytics are creating more
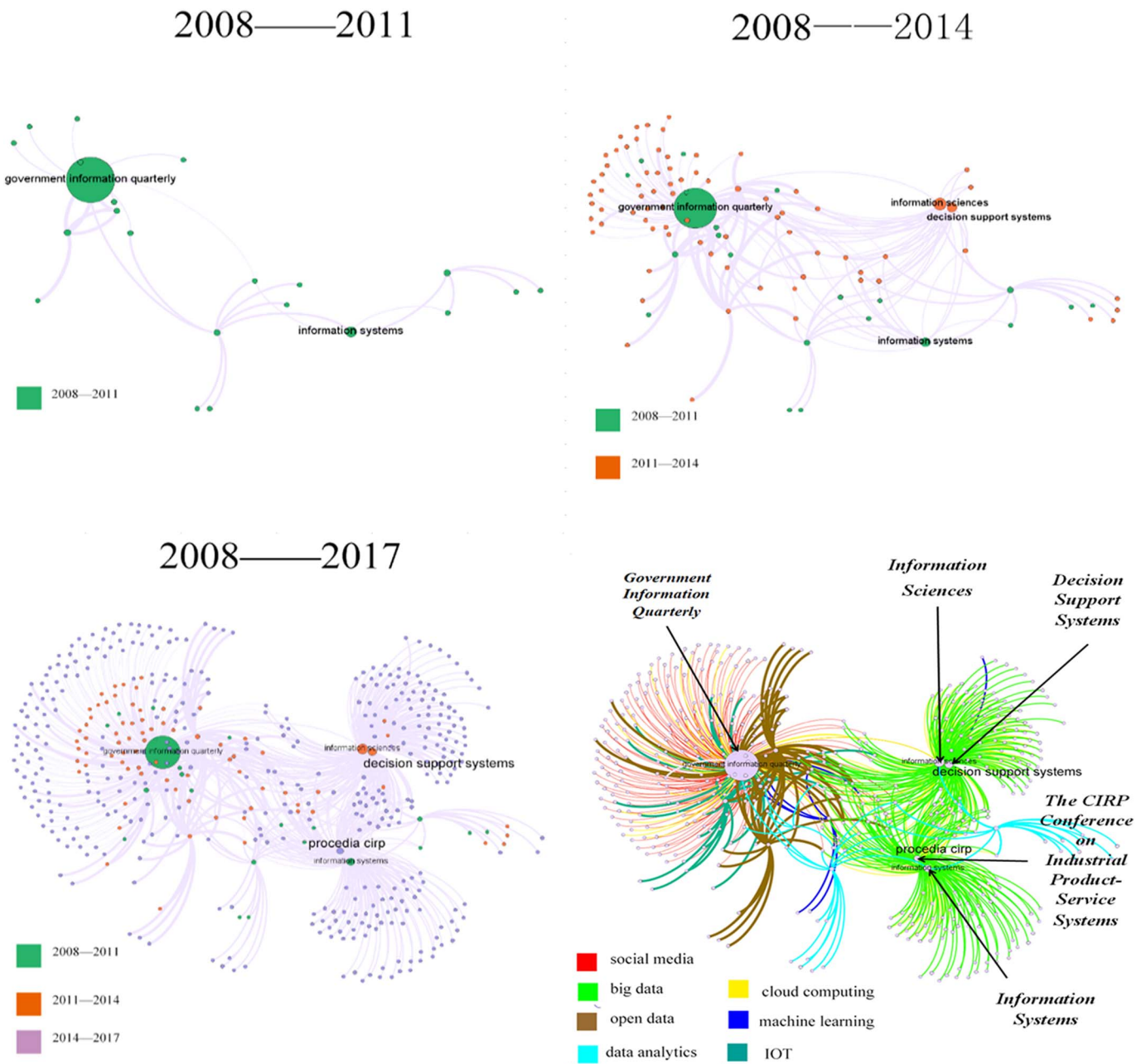
Fig. 3. the evolution of the co-citation patterns of the top publication venues.

opportunities for researchers from multiple disciplines to collaborate (Sandoval-Almazan and Gil-Garcia, 2014; Kavanaugh et al., 2012; Effing et al., 2011).

3.3. RQ3: what areas of e-governance have been impacted by the new wave of innovative ICTs in the past decade?

One question that continuously haunts e-government academia is whether and how innovative ICTs can actually effect governance practices (Dawes, 2008). This is also the key to substantiate whether the transformative goal of Internet Plus Government has been achieved. Our co-citation analysis suggests that the current research agenda in e-governance can be divided into three dimensions: technology adoption and use (nodes in green), data management (nodes in yellow), and issues and challenges emerging in specific application domains (nodes in blue), as annotated in Fig. 5.

When assessing challenges to e-governance a decade ago, Dawes (2008) concluded that the most progress made by then was in enhanced public services and improved management. A variety of technology innovations have since been added to the existing government information infrastructure to support precise service provision and internal management improvement (Lourenço, 2015; Ohemeng & Ofosu-Adarkwa, 2015;
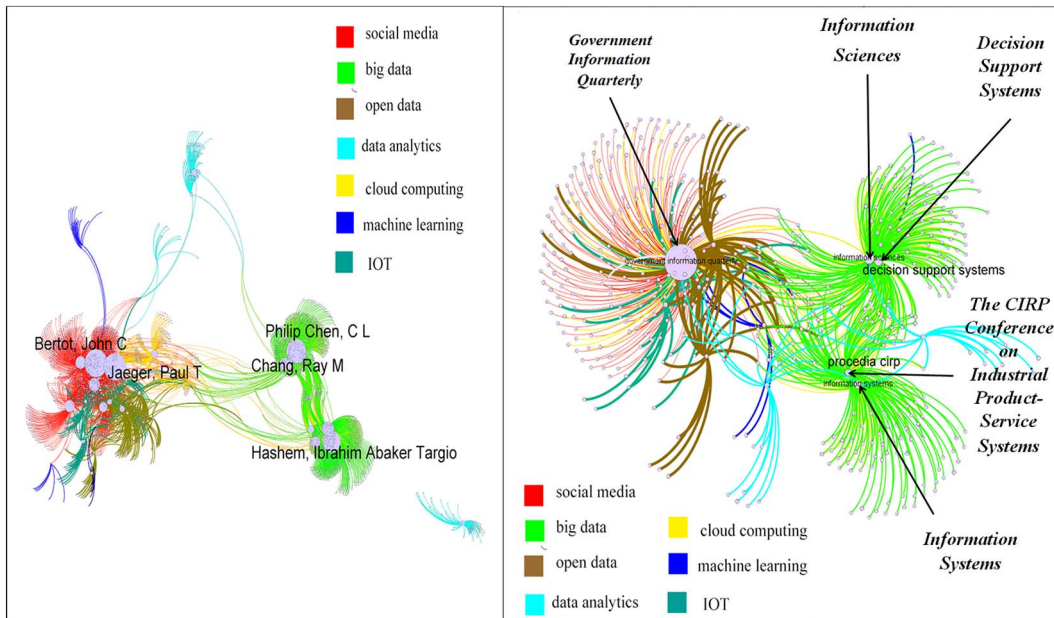
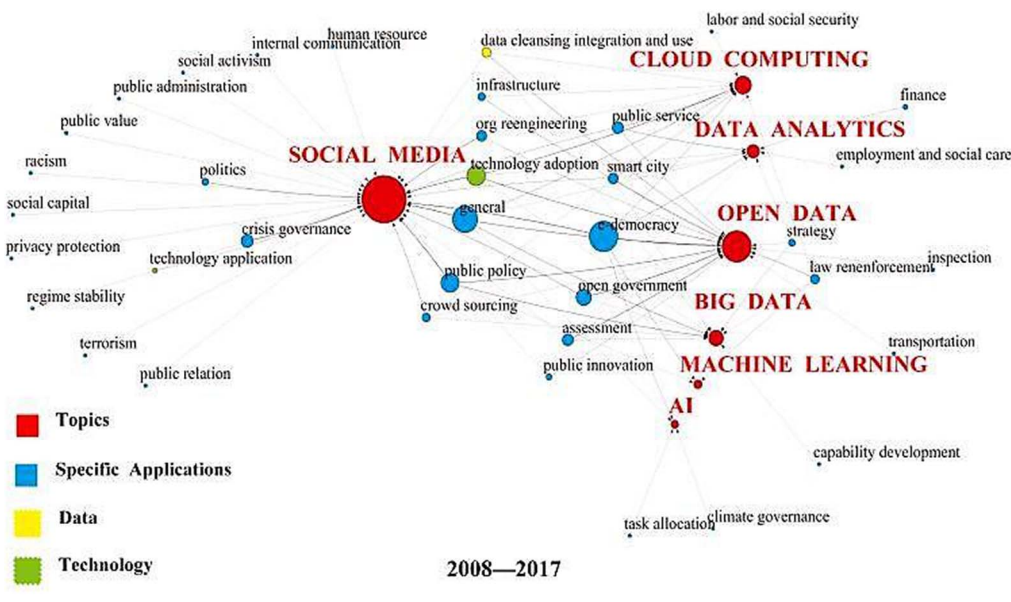**Fig. 4.** Inter-citations among top publication channels.

Fig. 5. The use of innovative ICTs in different governance domains.

Zuiderwijk & Janssen, 2015). Governments worldwide have adopted cloud computing platforms, promoted open data initiatives, and encouraged officials to interact with citizens more frequently and systematically on social media. Fig. 5 presents core governance areas that have witnessed influences from the adoption, diffusion, implementation and use of multiple types of innovative ICTs.

Dawes (2008) pointed out that e-democracy,[9] including civil society engagement, and public consultation and political discourse have received little attention. This tendency has changed slowly in the past decade with the wide use of social media. Research contributions include the exploration of policy initiatives and strategy design to incorporate public opinion mined from social media. Studies have also attempted to provide theoretical guidance for governments to employ cloud computing and machine learning to support citizen engagement and public consultation (Bertot et al., 2012). However, explorations as such were still on a more general level of discussion and less concerned with actual practices (Bertot et al., 2010). Very few governments have implemented formal procedures for political discourse encouraging public participation in decision and policymaking online or offline (Kim & Liu, 2017).

Open data initiatives promoted by both authoritarian and liberal governments located on different continents truly created pressure for government to share data with the public (Janssen, Charalabidis, & Zuiderwijk, 2012). This in the longer term might shed light on how to build a more

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[9] "*E-democracy* focus on the way the internet (and other advanced ICTs) contributes to and transforms the workings of the parliament, the relationship between citizens and their elected representatives and the conduct of politics" (Henman, 2010b, p48).

transparent political environment worldwide. The cooperation between data scientists and e-government researchers also provided innovative approaches used to interpret and utilize open and social media data to support transparency. However, currently, both government offices and citizens are still struggling with poor data quality and a lack of efficient techniques in processing huge amounts of data in a real-time manner. Moreover, issues and challenges such as privacy infringement associated with integrating social media and open data in business processes and capability development are still daunting for both scholars and practitioners.

Concurrently emerging is a new research direction: the exploration of the complications and complexity of adopting multiple types of innovative technology in the bureaucratic governance process. On the one hand, social media obviously has been widely employed in different government sectors. Its significance has been accepted by both the general public and practitioners (Bertot et al., 2010). A few research teams have already devoted themselves to investigating how the use of social media, the adoption of cloud computing platforms, and open data initiatives can be integrated to support better decision making (Chang et al., 2014; Chen & Zhang, 2014; Hashem et al., 2015). On the other hand, very little research has been conducted to systematically diagnose and predict the complications and risks that a huge and complex information infrastructure might introduce to practitioners. Since the millennium change, network-invasive computer viruses have prompted awareness, education, and monitoring efforts and led to a market for new products to protect information and systems from hackers and other threats (Dawes, 2008).

However, research on these security measures is mostly technical. It focuses only on the analysis of potential risk associated with single technology without relating it to the broader government information infrastructure system (Conradie and Choennin, 2014; Martin, Foulonneau, Turki, & Ihadjadene, 2013). Discussions of the life cycle of technology adoption, implementation, and use are not systematically paralleled with the evolution of bureaucratic operation. Thus, government ICT workforces and civil servants constantly found themselves debating. The adoption of a new technology without having the full picture of challenges associated with a complicated and multiple-layered information and data structure demands more comprehensive investigation.

4. This special issue

Based on the analysis conducted in previous sections, we can see that it is premature for initiators of Internet Plus Government to claim that the new wave of ICTs is already transforming governance. But it is fair to state that many governments have been attempting to use innovative ICTs in improving state-citizen relationships. Government use of social media offers three major opportunities for ICTs to impact governance: (1) promoting democratic participation and engagement; (2) facilitating co-production of materials between governments and members of the public; and (3) crowdsourcing solutions and innovations (Bertot et al., 2010). These are all key to Internet Plus Government before existing closed systems of governance can be transformed.

DePaula, Dincelli, and Harrison (this issue) argue that if the government wants to promote democratic discourse, they need to pay special attention to the type of the symbolic and image-based content communicated on social media. By including interaction that involves symbolic exchanges, self-presentation, political positioning, and marketing, their work extend the democratic framework used to assess government social communication. The typology and discussion gives researchers and practitioners a more complete picture of how to think about the information exchanged between government and citizens.

Gearing towards providing guidance to improve government responsiveness, Eom, Hwang, and Kim (this issue) analyze roles mayors and public officials played in social media networks. The research findings shed new light on the potential of social media as a tool for responsiveness enhancement. The study contributes to understanding of the role of political leaders as a bridging hub in the Twitter network for responsiveness improvement.

Both articles contribute to the understanding of social media as major tools promoting democratic participation and engagement. But researchers approach the same subject employing very different methods. This is consistent with our findings in Section 3.2. Scholars of e-governance begin to borrow methods from other disciplines and investigate the subject area with the support of new data driven analytic tools. Government can also benefit from data modeling, prediction techniques and machine learning to understand the true needs of citizens more easily. However, issues and challenges such as privacy infringement associated with integrating social media data are still daunting for both scholars and practitioners.

Politicians all over the world have stated to support the disclosure of open government data to accomplish a wide variety of public values (Zuiderwijk & Janssen, 2015). Openness and transparency were crowned as the top two collectively defined objectives of open government data expressed, mediated and consumed by the citizenry (EU, 2013; Obama, 2009). However, many governments are reluctant to open their data, as they fear the potential risks associated with shifting from a closed to an open system of governance endorsed by promoters of Internet Plus Government.

Chatfield and Reddick (this issue) explain how policy innovation on open data can be effectively diffused in government offices. They investigate the role of policy entrepreneurs in promoting open government data policy. Their findings have important implications in promoting of openly sharing the government-owned datasets with the public. Puron-cid and Bolívar (this issue) focus more on the online disclosure of financial information at the municipal level in Mexico. They contribute by proposing a scoring system to promote government online financial transparency. Their results are significant in identifying best practices of online financial disclosure in government.

As the last piece, Li and Liao (this issue) is among the first few works exploring economic solutions to improve the cybersecurity of governments and smart cities. By modeling the life cycle of vulnerabilities, the authors identify key factors determining the probability of cyber-attacks. Their findings could motivate governments, smart product vendors, and vulnerability researchers to improve the cybersecurity of smart cities via alternative economic solutions. Their work also contributes to the methodological approach researchers could employ to decipher the complication among multiple types of technologies, governance, and security risk.

5. Where are we heading?

Since the US presidential election in 2008, supporters of Internet Plus Government claim that ICTs can transform governance and redefine the state-citizen relationships. However as stated before, the newest generation of ICTs has not achieved the transformative power emphasized in Internet Plus Government initiatives.

On the technical level, the use of data analytics and machine learning might support participatory decision and policymaking. Data modeling and prediction techniques could make it more convenient for governments to understand the needs of citizens. It also equips scholars with prediction tools to go beyond the descriptive nature limited by certain qualitative methods. Some authors of the five articles presented evidence that the newest wave of technology promoted innovation, transparency, and civic engagement while presenting complicated security threats. However, both

government offices and citizens are still struggling with poor data quality and lack of efficient techniques in processing huge amounts of data in a real-time manner. *Issues in relation to technology adoption, use and diffusion in addition to data management, cleaning and analysis have to be comprehensively addressed to provide the technical foundation for Internet Plus Government.*

On the management and operational level, the adoption, implementation and use of innovative ICTs have truly contributed to service delivery and management efficiency. But most existing research is still centering around the adoption and implementation of the Innovative ICTs in internal administration and data management. Practitioners of only a few governance domains have started to establish analytical procedures to intake public opinions from open networking platforms. What is even more daunting is that certain governments are also employing similar technology for monitoring and witch-hunting purposes. *How to balance the benefits associated with the new wave of data-driven innovations in government and protection of citizen rights is definitely among the top issues to be addressed in the coming seasons.*

On the political level, governments adopting the Internet Plus Government initiatives hope to develop a more sustainable model of social development (Li, 2016). They hope to utilize Web 2.0 as the fundamental facility and implementation tool throughout governance processes and activities. Research in this special issue points out that transparency and civil consultation are two definite by-products of innovative technology adoption in public governance. Any government hoping to focus solely on economic development and bypass the political transformation might actually become very brittle in the longer term. *This might be the greatest obstacle many practitioners and scholars of Internet Plus Government have to face before achieving the final goal of transforming governance.*

Acknowledgement

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Shuhua Monica Liu[a],[*], Yushim Kim[b]

[a] *School of International Relations and Public Affairs, The Research Institute of Intelligent Complex Systems (RIICS), Fudan University, Shanghai, China*
[b] *School of Public Affairs, Arizona State University, Phoenix, AZ, United States*
E-mail address: shuhualiu@fudan.edu.cn

* Corresponding author.