Towards a typology of adaptive governance in the digital government context: The role of decision-making and accountability

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A B S T R A C T

The notion of adaptive governance was originally created to capture forms of collaboration in socio-ecological systems that can respond to rapid changes in the environment. However, such a notion also has a great potential to be transferred and understood in the digital government context, where there is an increasing need to establish forms of collaboration that can respond to swift changes in the environment related to technology and citizen demands. Drawing on the analysis of four cases of IT-related project collaboration, we put forward that the degree of sharing of decision-making power and of accountability between government and non-government actors is critical to developing different types of adaptive governance. Findings show that the distribution of decision-making power and of accountability can be decoupled, resulting in three types of adaptive governance – namely polycentric, agile, and organic governance. We contribute to research by detailing and empirically testing the notion of adaptive governance in a digital government context, and to practice by highlighting the role of the distribution of decision-making power and of accountability in devising adaptive governance strategies.

1. Introduction

The increasing complexity of public issues and the rapid advancement of Information Technology (IT) and services (e.g., social media, big data, smart cities) put high demands on governments to develop the capacity to evaluate, respond to, and implement new technologies and processes. Moreover, as governments in the last decades have increasingly transferred their capabilities externally through outsourcing projects (Cordella & Willcocks, 2010), they are often left with reduced skill sets and limited capacity. This has created challenges for governments to adapt to swift changes, especially in the implementation of IT-related projects (Gil-Garcia, Zhang, & Puron-Cid, 2016; Mergel, 2016; Tassabehji, Hackney, & Popovič, 2016).

Confronted with such challenges, governments have sought to deliver public services through new working relationships with private organizations (Klievink, Bharosa, & Tan, 2016). These relationships are characterized by the voluntary combination of separate private and public organizations into a coherent service delivery system (Bertot, Estevez, & Janowski, 2016; Scupola & Zanfei, 2016). In such new organizational set-ups, established governance mechanisms for enhancing control and enforcing procedures are no longer suitable for reacting and adapting quickly to changes in the environment (Gong & Janssen, 2012; Janowski, Pardo, & Davies, 2012). Governments are thus expected to adopt new governance practices to accommodate the evolving and dynamic collaborative relationships around government (Ojo & Mellouli, 2016).

This emphasis on devising flexible arrangements that can adapt to changes in the environment is echoed in the principles of *adaptive governance*. The concept of adaptive governance has been formulated within studies on social-ecological systems (SESs) (Chaffin, Gosnell, & Cosens, 2014), but has the potential to be applied to different contexts. Recently, a call has been made to use the notion of adaptive governance in investigating government IT initiatives (Janssen & van der Voort, 2016). The notion of *adaptive governance in the context of digital government* has been tentatively characterized by "decentralized bottom-up decision-making, efforts to mobilize internal and external capabilities, wider participation to spot and internalize developments, and continuous adjustments to deal with uncertainty" (Janssen & van der Voort, 2016, p. 4). This type of governance aims at making governments more adaptable to changes in their surrounding environment, while also preserving stability and accountability, which are highly valued by government organizations.

While potentially suitable to capture the need of governments to establish governance practices that can respond to swiftly changing

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environments at a conceptual level, the notion of adaptive governance still needs to be further detailed and empirically tested in the context of digital government practices. Further research is required to identify, stemming from the abstract principles of adaptive governance, the key dimensions across which adaptive governance can vary in the specific contexts of IT-related project collaboration.

When transferred to a digital government context, the dimensions of *decision-making power* and of *accountability* become of key importance. To find a balance between achieving greater adaptability and maintaining stability (Janssen & van der Voort, 2016), governments engaged in IT-related project collaboration need to move away from hierarchical principles of governance, and rethink the way decision-making power and accountability are distributed among government and non-government organizations.

Existing research on governance of collaboration between government and non-government actors shows the importance of the distribution of decision-making power (Doberstein, 2016), and of accountability (Papadopoulos, 2007) in governance arrangements. However, it's still unclear how different configurations of distribution of decision-making power and accountability across government and non-government actors provide a ground for the adaptiveness of governance arrangements. This study thus aims at tackling this gap by answering the following research question: *How can decision-making power and accountability be distributed among government and non-government actors in adaptive governance arrangements in the context of digital government?*

Drawing on an analysis of four cases of collaboration between government and non-government actors in IT-related projects, we aim to refine the conceptualization of adaptive governance in a digital government context by proposing a typology based on the two dimensions of distribution of decision-making power and of accountability.

The article is structured as follows. In the next section, we discuss existing research on the governance of collaboration between government and non-government actors, and the emergence of the concept of adaptive governance in a digital government context. We highlight the gaps in current research, arguing for the need to focus on the role of decision-making power and accountability in investigating the notion of adaptive governance. In Section 3, we explain four cases of IT-related project collaboration between government and non-government actors in China as our sources of empirical data, and illustrate the methods of data collection and analysis used in our study. In Section 4, we present the findings from the analysis of the four cases, focusing on the distribution of decision-making power and of accountability between government and non-government actors. Drawing on these findings, in Section 5, we propose a typology of adaptive governance based on the nature of the distribution of decision-making power and of accountability, putting forward three types of adaptive governance. In Section 6, we present the implications of our study for both the research and practice of adaptive governance in a digital government context, and discuss the limitations of the study. In the concluding section, we summarize our study and identify avenues for future research.

2. Background

2.1. Adaptive governance in the digital government context

Governance has been defined as an attempt to improve coordination between relatively dependent actors for the purpose of solving societal problems (Klijn, 2008) and, within research on Information Systems, as the solution that individuals and organizations devise for addressing issues of coordination (Markus & Bui, 2012).

The wide array of studies on governance has been clustered around four main views of governance (Klijn, 2008) which – rather than emphasize the structure of government or the limit of government capacity – emphasize the process of governing: 1) the good governance perspective, focusing on the principles of a properly governed state and

how government operates; 2) governance as New Public Management, focusing on how to improve the performance of government by shifting the role of implementation to non-state actors (Dunleavy & Hood, 1994); 3) multi-level governance, focusing on the use of networks crossing agency boundaries and levels of government (Rukanova, Wigand, van Stijn, & Tan, 2015); and 4) network governance, focusing on the complex processes taking place in networks of public and non-public actors (Provan & Kenis, 2008).

The two perspectives of governance as New Public Management and of network governance (Lecy, Mergel, & Schmitz, 2014) have aimed at capturing how government and non-government actors concur in the design, implementation, and management of policies through different forms of collaboration (Bovaird, 2005; Provan & Kenis, 2008). This has in turn characterized the increasing complexity of contemporary policy-making. Empirical research on governance shows how established mechanisms of governance that imply enhancing control and enforcing procedures are found no longer suitable for reacting and adapting to swift changes in the environment (Chatfield & AlAnazi, 2015; Gong & Janssen, 2012). Established approaches to the governance of the interactions between government and non-government actors, such as the ones inspired by the New Public Management, fail to capture the complexity and the change introduced by digital networks (Dawes, 2009; Dunleavy, Margetts, Bastow, & Tinkler, 2006; Margetts & Dunleavy, 2013). In particular, collaboration between public and private actors in IT-related projects is found to require new governance practices that can respond to rapidly changing environments (Janowski et al., 2012).

The need to adapt to swiftly changing environments lies at the core of the concept of *adaptive governance*. The term adaptive governance originated within research on socio-ecological systems (Dietz, Ostrom, & Stern, 2003) and was coined to indicate a new approach to governance for managing uncertainty and complexity stemming from critical environmental challenges, such as transboundary pollution, tropical deforestation, and climate change (Chaffin et al., 2014). As such, the concept of adaptive governance has been fruitfully employed to describe strategies to cope with transformations linked to climate change (Brunner & Lynch, 2013), community relocation (Bronen & Chapin, 2013), and ecological systems (Folke, Hahn, Olsson, & Norberg, 2005; Robertson & Choi, 2010).

In recent years, the concept of adaptive governance has been applied to areas other than socio-ecological systems. These include international trade (Cooney & Lang, 2007), health research (Andrew & Kendra, 2012), political science (Heilmann & Perry, 2011), disaster research (Djalante, 2012; Djalante, Holley, & Thomalla, 2011), and law (Garmestani & Allen, 2014). As a result, the concept of adaptive governance has developed to include a variety of dimensions, depending on the specific context of study. These dimensions include: flexibility in response and adjustment (Bodin & Crona, 2009; Bodin, Crona, & Ernstson, 2006; Folke et al., 2005; Lebel et al., 2006), learning (Pahl-Wostl, 2009), individual leadership and trust building (Folke et al., 2005; Olsson, Folke, & Berkes, 2004; Olsson, Folke, & Hahn, 2004), and power sharing (Folke et al., 2005). This abundance of dimensions had contributed to the concept's popularity but has also defused clarity on the topic and resulted in the absence of a shared definition.

Surprisingly, to date the promising concept of adaptive governance has not yet been applied to the area of digital government. Only recently there has been a call to unfold the potential of the concept of adaptive governance to be used in the context of digital government (Janssen & van der Voort, 2016).

Since *adaptive governance in the context of digital government* is only loosely referred to as "a principle providing strategies for dealing with uncertainty and adapting to changes originating from the environment" (Janssen & van der Voort, 2016, p. 3), it has no established definition yet. Nevertheless, from the perspective of government, four key characteristics of adaptive governance in the context of digital government

have been posited: "decentralized bottom-up decision-making, efforts to mobilize internal and external capabilities, wider participation to spot and internalize developments, and continuous adjustments to deal with uncertainty" (Janssen & van der Voort, 2016, p. 4).

While potentially able to cope with uncertainty at a conceptual level, the notion of adaptive governance still needs to be detailed and empirically tested in the context of digital government. Further research is required to identify, stemming from the abstract principles of adaptive governance, the key dimensions across which adaptive governance can vary in the specific contexts of collaboration between government and non-government actors engaged in IT-related projects.

In particular, as noted by Janssen and van der Voort (2016), transferring the concept of adaptive governance to the digital government context requires bringing to the foreground the need to achieve flexibility and responsiveness, while at the same time maintaining the attributes of stability and accountability required in public action. Governments that collaborate with non-government actors, in fact, should carefully distribute *decision-making power* and *accountability* to allow responsiveness and, at the same time, maintain mechanisms that ensure reasonable stability and accountability of the public action.

2.2. The role of decision-making power and of accountability

Studies on governance of government and non-government actors engaged in collaborative policy initiatives have focused on the key aspect of *decision-making power* and its changing nature (Edelenbos & Klijn, 2006). We see decision-making as "the process of making choices from among alternatives" (Lunenburg, 2011, p. 1). The study of decision-making power focuses on the actors, or groups of actors, that have the main influence on choices that affect other participants in a governance arrangement.

These studies highlight that many actors are involved in decision-making, and that these actors not only possess vital resources to realize policy goals and outcomes, but also have different perceptions of the problem and the solutions (Hanf & Scharpf, 1978; Kickert, Klijn, & Koppenjan, 1997; Marsh & Rhodes, 1992; Rhodes, 1997; Scharpf, 1997). In particular, since the governance of public digital projects is a complex socio-technical phenomenon (Dawes, 2009), a key to defining different types of governance arrangements in public-private collaboration is to investigate how decision-making power is distributed among the actors engaged in collaboration (Doberstein, 2016).

The balancing of decision-making power is found to be the key element in the governance of public-private platforms (Klievink et al., 2016; Klievink & Janssen, 2014). Recent research on the distribution of decision-making power in the governance of public-private collaboration in IT-related projects has focused on the extent to which governments retain decision-making power after entering into collaboration with non-government actors. Among the various actors involved in digitally-enabled public-private collaboration, governments have been found to control governance networks (Ojo & Mellouli, 2016).

On the other hand, with shifts in the distribution of decision-making power between government and non-government actors introduced by different governance practices, the other key issue of *accountability* emerges. Accountability is defined as "a process in which a person has a potential obligation to explain his/her actions to another party who has the right to pass judgment on those actions and to administer potential positive or negative consequences in response to them" (Vance, Lowry, & Eggett, 2015, p. 347). In this study, we refer to the accountability of each organizational actor to the collaboration they are part of, and not to the general accountability of public officials to citizens (Stivers, 2010).

Common among studies using the governance lens is the observation that, with the changes in the distribution of decision-making power between government and non-government actors, it becomes more complex to identify the accountable agents within a collaboration setting (Papadopoulos, 2007; Schedler, 1999). Governments are often not

prepared to adjust to governance arrangements. Accountability, in fact, is found to be based on self-referential organization decisions, rather than on joint inter-organizational policy making (Teisman & Klijn, 2002). Similarly to the distribution of decision-making power across actors participating in collaboration, accountability is often found to still reside with government actors (Johnston, Hicks, Nan, & Auer, 2011; Rummery, 2006). Recent research has identified tensions between individuals' accountability to their own organizations, and the organizations' accountability to the collaboration arrangements they are part of (Vangen & Winchester, 2014), especially in cross-sector collaborations (Vangen, Hayes, & Cornforth, 2015).

Overall, existing research on the role of decision-making power and of accountability in governance shows notable gaps. The distribution of decision-making power and of accountability is often simply conceptualized as attributed either to government actors, or to non-government actors. While many studies highlight the process of transfer of decision-making power and accountability from government to non-government actors, the different configurations of how decision-making power and accountability are shared across actors is still under-investigated (Osborne, Radnor, & Nasi, 2013).

In addition, the dimensions of decision-making power and accountability require a special focus when we aim at transferring the notion of adaptive governance to the digital government context. Understanding the way decision-making power and accountability are distributed enables governance arrangements that can balance between adaptiveness and stability; and such balance is what characterizes adaptive governance in the context of digital government (Janssen & van der Voort, 2016). The dimensions of decision-making power and accountability are in fact central to each of the before-mentioned four characteristics of adaptive governance in digital government: 1) decentralized bottom-up decision-making; 2) efforts to mobilize internal and external capabilities; 3) wider participation to spot and internalize developments; and 4) continuous adjustments to deal with uncertainty (Janssen & van der Voort, 2016, p. 4). These four aspects need further specification. In *decentralized bottom-up decision-making*, since hierarchy-based mechanisms of collaboration are discarded, it is very important to articulate how decision-making power and accountability are distributed across participants in collaboration. In making *efforts to mobilize internal and external capabilities,* the exchange of knowledge and redistribution of resources creates overlaps that need new distribution of decision-making power and accountability. Since *wider participation to spot and internalize developments* implies that the pool of participants in the collaboration can expand, there is a need to understand how decision-making power and accountability are distributed when new participants join the collaboration. To implement *continuous adjustments to deal with uncertainty,* project revisions and renegotiations require rapid responses that are incompatible with rigid distribution procedures of decision-making power and accountability. Therefore, there is a need to understand how decision-making power and accountability are distributed in practice in such contexts.

In this study, we aim at filling these gaps by focusing on how adaptive governance can be devised with different configurations of distribution of decision-making power and of accountability between government and non-government actors engaged in digital government projects. While we acknowledge that there are multiple dimensions of adaptive governance in the socio-ecological systems literature, we argue that decision-making power and accountability are of the outmost importance when transferring the concept of adaptive governance to the context of digital government. Understanding the way decision-making power and accountability are distributed enables governance arrangements that can balance between adaptiveness and stability; such balance is what characterizes adaptive governance in the context of digital government (Janssen & van der Voort, 2016).

3. Method

3.1. Case description

Our research question is as follows: "How can decision-making power and accountability be distributed among government and non-government actors in adaptive governance arrangements in the context of digital government?" To answer it, we selected four case examples of adaptive governance arrangements, i.e., collaborations between government and non-government organizations engaged in IT-related projects in China. We define IT projects as projects "used to develop products and services such as new software, hardware, networks, research reports and training on new systems", and which consist of the four broad phases of initiating, planning, executing, and controlling (Schwalbe, 2015, p. 59).

We selected the four cases based on the four key characteristics of adaptive governance in the digital government context. We operationalized each characteristic as follows: *decentralized bottom-up decision-making* as the presence of multiple decision-making authorities during project development, and of decision-making processes that do not follow a hierarchical order; *efforts to mobilize internal and external capabilities* as the presence of exchange of knowledge between participants in the collaboration, and the presence of distribution and redistribution of project-related resources (e.g., budget, human resources) between participants in the collaboration; *participation to spot and internalize developments* as the presence of expanding networks of stakeholders during the project development (i.e., new stakeholders joining the project over time); and *continuous adjustments to deal with uncertainty* as the presence of revisions of various aspects of the project based on collected feedback, or of negotiation between stakeholders.

Below we present the four cases by detailing on the manifestations of the operationalized characteristics of adaptive governance in the digital government context (Janssen & van der Voort, 2016, p. 4). Table 1 provides an overview of the characteristics of the four cases.

Case 1. *A website development and social media management project in Lu'an city, China.*

The Lu'an project is an IT project between the informatization office of the Jin'an District government in Lu'an Municipality, Anhui Province, and a local medium-sized IT company, named Longsun. The project is carried out under a service contract where Longsun provides a set of IT services to the Jin'an District government, including handling the technical development and maintenance of the municipal website, the IT infrastructure, and the office administration (OA) systems. According to the contract, Longsun charges fees for additional services required by the Jin'an District government.

Initially, Longsun carried out the development of websites and OA systems. The Jin'an District government was under pressure to pay Longsun for any changes the government required, which in total exceeded the original budget for the project. To turn the situation around, the Jin'an District government improved its IT capabilities by hiring new IT staff and actively seeking new knowledge on IT public services through training programs, conferences, and seminars. During this process, the Jin'an district government also expanded its network of potential partners for new IT services by taking notice of companies and IT professionals that were present at the conferences and seminars. Through these networks, the Jin'an District Informatization Office became equipped with an updated set of knowledge on the new development of public-related IT and broader options for IT service providers.

The increasing IT capabilities in government and the broadened network of potential partners and IT professionals set the interaction between the Jin'an District Informatization Office and Longsun on a more balanced track. At the time of our data collection, the Jin'an District Informatization Office was co-developing the OA system and the website with Longsun, and managing the content on these platforms. Without changing the contract, the Jin'an District government now has a more flexible way to interact with Longsun, where the government partakes in the development of website and OA systems with Longsun, bolstered with their own IT expertise and extended assistance from the network that they are part of. Their authority in IT expertise grants them with more decision-making power in their negotiations with Longsun, and enables them to fully takeover the project, if necessary under certain critical situations (e.g., when financial resources are very limited). When the Jin'an District Informatization Office needs more capacity to attend to tasks other than system development, the government is comfortable having Longsun solely make decisions in carrying out the project.

We recognize Case 1 as an example of adaptive governance, as the case reflects aspects of the four key characteristics of adaptive governance: 1) multiple decision-making authorities both at the level of district-government and company, as well as non-hierarchical decision-making processes; 2) active redistribution of knowledge, human and financial resources in district government over time; 3) an expanding network of potential partners and IT professionals from the government side; 4) constant adjustments on project by government actors based on the new knowledge and requirements on public-related IT gathered from training programs, conferences and seminars.

Case 2. *A social media management project in Shanghai, China.*

The Shanghai WeChat Service project operates under a strategic partnership agreement started in 2015 between Shanghai Municipality and one of the largest IT companies in the country, Tencent Holdings Limited. Under the agreement, Tencent assists the Shanghai Municipality and its subordinated units (such as the Shanghai Meteorological Bureau, Shanghai Police, and the Shanghai Municipal Administration of Taxation) to manage the governments' public accounts on Tencent's major social media platform, WeChat. While these government units have full decision-making power over content creation on the public accounts, the publishing process is limited by the framework design of WeChat, which has made Tencent more than just a technical supporter in the management of public accounts in some occasions. In addition, the Shanghai Municipality and its subordinated units have also agreed to co-develop a digital public service provision platform on WeChat, named City Services Platform.

In planning the project, Tencent started with a list of public services it wanted to launch and took the initiative to negotiate with the relevant departments and bureaus. This act started to integrate different levels of government and bureaus, as they previously operated rather independently from each other. These government units started to connect with each other, forming a network of government units under the umbrella of City Services Platform. Once the agreement was reached, Tencent provided these government units with technical support to develop digital service functionality on the platform. Each government unit redistributed human and financial resources from developing standalone apps to the City Services Platform on WeChat, which is less costly and has a significantly larger user base. In April 2015, Tencent launched the first version of the City Services Platform, including fourteen functionalities. These fourteen functionalities were re-ordered and improved after a short trial period, based on user engagement, as well as on the development of services across government units.

In the same year, in August, WeChat launched the application function of City Service Platform for existing government accounts on WeChat. This application feature invites any government agency that wants to establish a digital service functionality on WeChat to apply for it from Tencent. As a result, the establishment of new functionalities on the City Services Platform can be initiated either by Tencent or by government. Tencent uses specific criteria (e.g., volume of service traffic) to evaluate whether a certain proposed service can be established, which increases their decision-making power in the relationship with government. This especially disadvantages lower-level

Table 1
Overview of the characteristics of the four cases.

	Case 1 *Lu'an*	Case 2 *Shanghai WeChat Service*	Case 3 *Shanghai Open Data Apps (SODA)*	Case 4 *Observe*
Purpose of the collaboration	Software development and maintenance	Application development	Application design and development based on government open data	Evaluation and revision of implemented IT-related government projects
Number of government organizations	4 +	14 +	8 +	6 +
Number of non-government organizations	2	1	7 +	6 +
Duration	9 years +	2 years	2 years	2 years
Motivation for adaptiveness	Need to adjust to the rapid change of technology within available resources	Need for governments to adapt to the complexity of the platform technology; Need for the platform owner to understand the complexity of the available public services	Heterogeneity of stakeholders; Uncertainty on which stakeholders should be involved	Amount and heterogeneity of the stakeholders
Decentralized bottom-up decision-making	Multiple decision-making authorities both at the level of district-government and company; Decision-making processes do not follow a hierarchical order	Multiple decision-making authorities at municipal-level government and bureau, district-level government and bureau, and company; Decision-making processes do not follow a hierarchical order	Multiple decision-making authorities at municipal-level governments and bureaus, companies, universities, and NGOs; Decision-making processes do not follow a hierarchical order	Multiple decision-making authorities among the network of governments, companies, universities, and NGOs; Decision-making processes do not follow a hierarchical order
Efforts to mobilize internal and external capabilities	Active redistribution of knowledge, human, and financial resources in district government	Active redistribution of knowledge, human, and financial resources in each involved government and bureau	Active redistribution of knowledge, human, and financial resources among members of the open data interest group	Active redistribution of knowledge and human resources among the network of governments, companies, universities, and NGOs
Wider participation to spot and internalize developments	Expanding network of potential partners and IT professionals from the government side	Expanding network among previously independent government units	Expanding network in the open data interest groups as well as among the participants	Expanding network through both online and offline participation
Continuous adjustments to deal with uncertainty	Government actors adjust the project based on the new knowledge and requirements on public-related IT gathered from training programs, conferences, and seminars	Government and non-government actors constantly adjust functionalities of the digital service platform based on user feedback and the development of services among government units	Through the annual contest, the government improves public services based on new demands extracted from open government data	In the periodical events, the participating stakeholders adapt and react to new developments in the relevant IT field

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government units (e.g., district-level government), which may draw a smaller set of users.

We recognize Case 2 as an example of adaptive governance because it caters to the four characteristics of adaptive governance by having: 1) multiple decision-making authorities at municipal-level government and bureaus, district-level government and bureaus, and the company as well as non-hierarchical decision-making processes; 2) active redistribution of knowledge, human, and financial resources in each involved government and bureau; 3) expanding network among previously independent government units; and 4) constant adjustments by government and non-government actors of the functionalities of digital service platform based on user feedback and the development of services among government units.

Case 3. An open data-related contest project in Shanghai, China.

The Shanghai Open Data Apps (SODA) project is a municipal-level case competition organized in Shanghai, to award the best applications developed using open government data. An annual event that started in 2015, it aims to help the government to identify new digital public services based on open government data. The contest is initiated and organized by a group of open data advocates that are affiliated with government units, IT-related businesses, universities, and NGOs. The organization of SODA mainly resides in a chat group on the social media platform WeChat where these advocates are members. In the chat group, each member shares his or her resources (e.g., knowledge, financial, and human resources) to drive the project forward. The coordination for planning the project also takes place in the chat group, where all the stakeholders take part in making decisions on a wide array of issues, ranging from budget allocation to daily operations.

The organizing group expands each year with new contributors from governments, companies, universities, and NGOs. Like the members of the organizing group, the contest participants also come from very diverse backgrounds, including private companies, government agencies, and research institutes. They participate in the contest in teams. Each year, the contest revolves around a public service area (e.g., public transportation), soliciting teams to develop applications based on open government data. The teams submit their work based on the selected topic and, after three rounds of evaluation, the contest winners are selected. The winning teams are awarded and their projects are forwarded to the relevant government units and investors to implement their proposal.

The SODA project works as a form of IT project crowdsourcing, where the government involves external organizations (the contest participants) in initiating and planning feasible applications to extract value from the open government datasets. Each year, the number of participants increases and is pooled into an existing network through the contest's digital platform. Given knowledge gained from both the increasing number of participants and prototypes submitted each year, the government is able to stay updated with new demands in public service, benefiting all the stakeholders in the network.

We recognize Case 3 as an example of adaptive governance arrangement, as it caters to the four characteristics of adaptive governance by having: 1) multiple decision-making authorities at municipal-level government and bureaus, companies, universities, and NGOs, as well as non-hierarchical decision-making processes; 2) active redistribution of knowledge, human, and financial resources among the open data interest group; 3) an expanding network of members in the contest organizing group, as well as among the contest participants; and 4) regular adjustments on themes and suitable form of collaborative activities, where government improves public services based on new demands extracted from open government data each year.

Case 4. A digital-service provision-related workshop project in Shanghai, China.

The Observe project is a series of IT project workshops initiated by a network of government, university, and NGO actors across China in 2015. The workshop participants give feedback to each other on on-going local IT projects, including digital-service provision issues (i.e., big data, open data, and smart city projects), in the form of seminars, lectures, and open discussions. The discussion themes are chosen based on the needs of both government and non-government stakeholders. Interaction between participants is further supported by open online chat groups, which enable new participants to ask questions and give feedback on the implementation of IT-related public projects.

The Observe project broadens the network of participants through both online and offline participation in discussions, providing opportunities for governments to evaluate and control implemented IT projects and acquire new knowledge and potential human resources from the network of participants.

The IT project workshop series started with local government units in Zhaoqing City and Fudan University in Shanghai that were both already involved in the network, and spread over time to other local government units and regions, accompanying the widening of the participants. The series of workshops and seminars of *Observe* are an umbrella IT project (Schwalbe, 2015) for government and non-government actors to control their independently implemented projects. While non-government IT service providers participate in *Observe* to improve the implementation of their IT service provision based on the government actors' feedback, government actors improve the adaptation of the IT services based on the non-government actors' suggestions. Through these periodical events that take place several times a year, the expanding network of participants who work on similar IT projects are able to adapt and react to new developments in the IT field.

We recognize Case 4 as an example of adaptive governance arrangement, as it caters to the four characteristics of adaptive governance by having: 1) multiple decision-making authorities among the network of governments, companies, universities, and NGOs as well as non-hierarchical decision-making processes; 2) active redistribution of knowledge and human resources among the network of governments, companies, universities, and NGOs; 3) expanding network of participants through both online and offline participation; and 4) regular adjustments on themes and suitable activities for discussion through periodical events, where the participating stakeholders adapt and react to new developments in relevant IT field.

Lastly, the cases have also been selected based on the unique characteristics of the wider context that they share, that is the rapidly changing environment of China. This can be divided into China's macro-environment, the IT ecosystem of China, and its institutional context. The macro-environment of China that forms the context of the four cases is characterized by a rapidly developing economy, along with swift societal changes. The increase in demand from citizens and businesses for digital public services linked to the boom of the Chinese economy represents an ideal example of a fast-changing environment that a government needs to face. Regarding the Chinese IT ecosystem, the Chinese Internet is characterized by an ecosystem of IT applications that is rich, unique, and rapidly evolving (Yang, 2015). The emergence of unique social media applications such as WeChat and Weibo, and of innovative e-commerce platforms such as Taobao and Alibaba, represent a rapidly expanding digital ecosystem that public actors have to respond to when envisioning public policies and new modes of cooperation with digital private enterprises (Chen, Xu, Cao, & Zhang, 2016; Medaglia & Zheng, 2017). In its institutional context, China is a case of hybrid transition between a command economy and a relatively newly-established market economy. This implies that the boundaries between the public and the private sector are in a state of rapid change and continuous negotiation, as new governance practices are devised to respond to the challenges posed by the environment (Gao, Song, & Zhu, 2013; Zhang, Zhao, Zhang, Meng, & Tan, 2017).

3.2. Data collection and analysis

To investigate how decision-making power and accountability are

Table 2
Overview of interview data sources.

Case	Informant	Organizational affiliation	Position	Informant code	Interview N
1 – Lu'an	Government 1	Lu'an Municipality E-government Office	Vice Director	1G01	1
	Government 2	Lu'an Municipality Internet Propaganda Office	Vice Director	1G02	1
	Government 3	Jin'an District Organization department	Department head	1G03	1
	Government 4	Jin'an District Informatization Office	Vice Director	1G04	1
	Non-government 1	Longsun	Project manager	1NG01	1
	Non-government 2	Lu'wang Forum	CEO	1NG02	1
2– Shanghai WeChat Service	Government 1	Internet Propaganda Office, Shanghai Police Department	Vice Director	2G01	1
	Government 2		Employee	2G02	
	Government 3		Employee	2G03	
	Government 4	Technology Service Centre, Shanghai Meteorological	Vice Director	2G04	1
	Government 5	Bureau	Employee	2G05	
	Government 6		Employee	2G06	
	Government 7	Shanghai Release, Shanghai Municipal Government	Director	2G07	1
	Government 8		Employee	2G08	
	Non-government 1	eGov Media Cooperation Office, Tencent Da Shen	Chief eGov Media Cooperation Officer	2NG01	1
3– SODA	Government 1	Shanghai Municipal Commission of Economy and Informatization (SMCEI)	Information Chief	3G01	2
	Non-government 1	China Industrial Design Institute (CIDI) Shanghai	Vice-CEO	3NG01	2
	Non-government 2	Kesci	CEO	3NG02	1
	Non-government 3	Opendatachina.com	Director	3NG03	4
	Non-government 4	China Industrial Design Institute (CIDI) Shanghai	Secretary	3NG04	1
	Non-government 5	Enerlong	CEO	3NG05	1
	Non-government 6	021 Incubator	CEO	3NG06	1
	Non-government 7	Shanghai Jiaotong University	Lab member	3NG07	1
	Non-government 8	Fudan University	Professor	3NG08	1
	Non-government 9	Fudan University	Lab member	3NG09	1
4– Observe	Government 1	Technology Service Centre Shanghai Meteorological Bureau	Director	4G01	1
	Non-government 1	Fudan University	Professor	4NG01	1
	Non-government 2	Opendatachina.com	Director	4NG02	1
	Non-government 3	Enerlong	CEO	4NG03	1
	Non-government 4	Taiwan Open Data Activist		4NG04	1
Total					28

distributed in the adaptive governance practices of the four cases of collaboration between government and non-government organizations in IT-related projects, we collected data using several qualitative methods, including semi-structured interviews, observation, and participant document analysis. The data collection on these four cases took place from June 2015 to August 2016.

The semi-structured interviews were carried out with the main stakeholders of each case. Table 2 presents an overview of the interview data sources.

The interviews consisted of open-ended questions framed around the formation of the partnership, the collaboration process in the partnership, the responsibility of each actor in their own organization as well as in the collaboration, and the IT capacity of the organizational actors. Examples of the questions include: what is your main responsibility in the collaboration? Who is responsible if certain issues start to emerge around the platform? Who calls the action in this project?

All interviews were recorded, transcribed, and translated from Mandarin Chinese to English. The protocols used for the interviews are available from the authors upon request. Transcriptions were coded using the software NVivo version 11, and put through a 3-stage coding process. First, we conducted open coding on the interview data, the field notes from the participant observation, and the documents (Strauss & Corbin, 1998). To trace instances of adaptive governance, our open coding was organized based on each organization's responsibilities in the collaboration, each organization's IT capabilities, and the transitional events that indicate the shift of responsibilities and IT capabilities between the government and non-government actors. The initial open coding has provided a wide range of first-order codes, such as "government's responsibility", "shared responsibility" and "backlash event".

Second, we re-grouped the first-order codes into more abstract second-order codes based on the identification of common features,

using iterations of data examination and an initial theoretical understanding of adaptive governance. This resulted in second-order codes such as "task distribution", "dominant decision-making power of professional expertise", and "transferred decision-making power".

Third, with a refined understanding of adaptive governance from a broader review of existing literature, we re-visited the common features between the second-order codes and the two identified key dimensions of adaptive governance in the digital government context (decision-making power and accountability). Subsequent iterations led to two third-order themes: *the distribution of decision-making power* and *the distribution of accountability*. For instance, the interview quote "Yes. If there needs to be big adjustment, we will definitely find them. We will contact them if there are big problems with the whole software platform" [1G04] was classified under the first-order code "shared responsibility", and further grouped into the second-order code "actual task distribution". This latter coding eventually was grouped in the dimension of "distribution of accountability".

In addition to the interviews, the first author also conducted participant observation in Cases 3 and 4. Participant observation is useful for revealing contextualized and otherwise inaccessible data to understand the tacit knowledge shared in the organizations (Locke, 2011). The observations included attending benchmark meetings, workshops, and seminars, and shadowing the daily working scenarios in different organizations. We also conducted online observations including unobtrusive observation of some of the chat groups used to coordinate the collaborations.

Document analysis for each case included event reports, meeting minutes, and company and event brochures.

Table 3 provides an example of the data coding procedure.

Table 3
Example of the data coding procedure.

Empirical data	First-order coding	Second-order coding	Third-order coding
"*Back then (2007) our whole website was in the company. The IT equipment room was very small and outdated. That was actually common across the government, nobody was in a good shape. Because [the handling of website and other tasks] were in the company, basically what you did was to help the company.*" [1G04]	Company's responsibility	Actual task distribution	Distribution of accountability
"*There were two of us recruited in 2007. The other one is a programmer. We two people basically did what a company needed to do. That was so much pressure. We even rebuilt the IT equipment room, and also managed and maintained it afterwards. It took us around two years to build the IT infrastructure in the government. This also includes the website, etc.*" [1G04]	Government's responsibility		
Observation: The company informant often flatteringly called the government informant as "expert"			
"*The other colleague of mine left his position afterwards because this was such a tiresome job. Two people do what a company should do. Back then we always stayed at work till around midnight.*" [1G04]	Backlash event		
"*Yes. If there needs to be big adjustment, we will definitely contact them. We will contact them if there are big problems with the whole software platform.*" [1G04]	Shared responsibility		
"*There were times when the district mayor wanted to change something, or relaunch something with additional contents, for example, add a propaganda theme, and the company would charge us for it.*" [1G04]	Public-private interaction T1	Dominant decision-making power of professional expertise	Distribution of decision-making power
"*They [Longsun] were so pissed off [1G04 said smiling]. They even closed off their on-site office in our government building. The three people who used to work in the on-site office moved to other district or county to carry out new business! They really didn't earn anything in the first couple of years.*" [1G04]	Public-private interaction T2	Transferred professional decision-making power	
Observation: sometimes the company informant said directly to the government informant that "deputy director Li, you are the expert in doing this. You probably even know what to do better than us"	Public-private interaction T3		
Observation: There is prevalent use of the word "leader (领导)" throughout the interviews, when government informants address the higher management in the government, or company informants address anybody in the government	Public-private interaction T3	Institutional authority of government to the company	

4. Findings

In this section, we present the analysis of the four cases focusing on the distribution of decision-making power and of accountability across government and non-government organizations involved in collaboration. In relation to the *distribution of decision-making power*, we analyze which organizations hold actual power to make decisions that affect the processes and outcomes of the collaboration between the organizations involved in each case. In relation to the *distribution of accountability*, we analyze which organizations are formally or informally held accountable for the collaboration of the processes and outcomes of the collaboration in each case. In presenting the findings, we use G in the informants' code name to refer to a government stakeholder, and NG to a non-government stakeholder.

4.1. Case 1 – the Lu'an project

4.1.1. Distribution of decision-making power

In the case of Lu'an city, there are two main groups of actors: the local private IT companies, and the Lu'an government units at municipal and district level. Among these actors, the private company Longsun and the government Jin'an District Informatization Office are the two organizations that are closest to the operation of the project. The *decision-making power* in this case has been shifting between the Jin'an District Informatization Office and Longsun. Initially, in 2007, the Jin'an District Informatization Office was in an IT service contract with the Longsun company, which mainly worked on the development and maintenance of the municipal website, the IT infrastructure of the Jin'an district authority, and the office automation systems. During this period, the informatization office assumed a passive role in negotiations with Longsun. Longsun often made decisions for the Jin'an District government. As stated by the Vice-Director of the Jin'an District Informatization Office:

> There were times when the district mayor wanted to change something, or relaunch something with additional contents – for

example, adding a propaganda theme on the website – and the company would charge us for it. This put the government in a very passive position. So, when we [two employees] were recruited, the district mayor said to us: 'you have to break the deadlock', that is to say, we have to develop our own 'brand'.

> [1G04]

Giving an overview of the development of informatization in the whole Lu'an Municipality, the Vice-Director of the Lu'an Municipality E-government office also remarked on the issue of the government lacking IT capabilities and resources, and its potential impact on the government's dynamics with the contracted IT company:

> The government website builders like us often use websites from municipalities such as Shanghai for references. But we have to admit that informatization is a money-burning process. Compared to municipalities like Shanghai, we have much more limited resources. Even compared to our district governments, where the informatization office is relatively small, we have almost as many IT experts as they do. This surely has some consequences on the things we can demand from the company, and on the dynamics with them.
>
> [1G01]

In this phase, the decision-making power rested with the company, primarily due to the lack of internal capabilities in the government. Subsequently, two government employees, including informant 1G04, were hired to change the situation in the Jin'an district Informatization Office. In three years, the two government employees managed to take over the maintenance of the IT projects by self-training on programming and the implementation of hardware. They also attended seminars and conferences on IT and public service, and reported to take notice of the companies who approached them with new services to keep themselves in the loop on new technology development. For a period of time, the Jin'an District Informatization Office managed to marginalize the Longsun company from making decisions for the government on what new technologies they need to purchase. As stated by the government informant: "With my colleague and my efforts, the company

didn't even manage to earn a penny out of us on our web portals for three years" [1G04]. Referring to the collaboration, the same person said:

> They [the Longsun company] were so pissed off. They even closed off their on-site office in our government building. The three people who used to work in the on-site office moved to another district or county to carry out new business! […] They really didn't earn anything in the first couple of years.
>
> [1G04]

The head of the Jin'an District Organization Department, who is also the superior of the Jin'an District Informatization Office, also praised the informatization office for the work they have done:

> Thanks to the hard-working people in the informatization office, we have a more balanced interaction with the company now. We don't have to agree to everything they suggest, and we have a better idea of what we need and what we don't need… This is not to say no to the new things, it is about how to stay updated with the world within a reasonable budget… If you look at the evaluation results of informatization of our district government, we actually rank quite high across the district and county governments, but with a very low spending.
>
> [1G03]

So, over time, decision-making power slowly shifted to the government side. Ever since then, the decision-making power has been almost solely consolidated in the hands of the government. As an example of this, during the interviews with the company, whenever company employees addressed anybody in the government, they always referred to them as a "leader", indicating a formal recognition of their authority, but also an informal recognition of the "leader of IT" [1NG01], as they put it themselves. For example, when informant 1NG01 was introducing the company's service for the government, he mentioned that "the last time the leader came, he gave more guidance on this aspect."

In summary, in this case, over the course of project development, the distribution of decision-making power either rested in the hands of the government actors or the non-government actors.

4.1.2. Distribution of accountability

Initially, in 2007, accountability was clearly divided between the Jin'an District government and the Longsun company. The company took full care of the technical development of the portal website, office administration systems, and other tasks, and the district government had an assisting role in the collaboration. As stated by a government informant:

> Back then [in 2007] our whole website was in the company. The IT equipment room was very small and outdated. That was actually common across the government. Nobody was in a good shape, because [the handling of the website and other tasks] were in the company. Basically what we did was to help the company.
>
> [1G04]

In this phase, the company was accountable for the technical tasks, while the government was accountable for the assisting tasks. Then, in 2007, two IT professionals were hired into the government and started to take over all the technical development tasks from the company side. In two years, they managed to finish the technical development all by themselves without the help of the company. As one of them explained:

> There were two of us recruited in 2007. The other one is a programmer. We two people basically did what a company needed to do. That was so much pressure. We even rebuilt the IT equipment room, and also managed and maintained it afterwards. It took us around two years to build the IT infrastructure in the government. This also includes the website.

> [1G04]

In this phase, the government took over the technical tasks and the company was driven out of the scope in the project. However, pressured by the workload of both technical development and content management, the government turned back to the company and started to re-initiate the collaboration.

> But when things started to develop, we as government, especially the informatization office, realized that we couldn't just rely on two people to make the whole informatization process mature. When it comes to technical terms, we still need to rely on the company.
>
> [1G01]

The Vice-Director from the Lu'an Municipality Internet Propaganda Office made a similar observation on the division of labour between government and the company in the process of informatization:

> Our type of office needs more than just a few IT people. There are a lot of different kinds of tasks that we, or an informatization office, or an e-government office, needs to handle. It is necessary to divide the labour between the company and the government so that each can focus with its best expertise.
>
> [1G02]

In a year's time, the government agency had changed from bearing the technical task of building platforms, to the current management task that focuses more on content creation and, in the words of the government informants, "to have the market cooperation". A government informant explained "market cooperation" as follows:

> I mean, to collaborate with company, you know, cooperate with market. The company provides technology and service, and we take care of the management of the platform, maintain it, and make it come into play, as it should be.
>
> [1G04]

However, in this phase, the government's previous IT development experiences enabled it to jump in and take over the technical tasks from time to time. For example, as a government informant said:

> Last time I wanted to add a theme or what not, I just did it myself. There was also a time when I had something that needed their help, our employees went out to the company and told them what needed to be added where. And they [the company] couldn't even pull it together. They just don't know how to use it.
>
> [1G04]

An informant from Longsun also reconfirmed the exchange of ideas on tasks and saw the IT expertise of 1G04 as a merit for enabling collaboration to develop projects:

> It is easier with people, like 1G04, who have more expertise in IT in general. When we have a new system in place, he just needs to have a few training sessions, and he can easily start to use our new services or platforms… Sometimes he can even 'lead' us with new ideas to improve stuff. This is much more difficult for the officials who don't have a background in IT. We don't mind giving a lot of training sessions, but most of the time, the government officials are just not getting it.
>
> [1NG01]

In summary, in this case, the distribution of accountability has been shared in different forms between the government actors and the non-government actors throughout the project development.

4.2. Case 2 – the Shanghai WeChat Service project

4.2.1. Distribution of decision-making power

In the case of Shanghai WeChat, there are two main groups of actors: the Tencent corporation, and the group of Shanghai government

units at municipal and district level. Initially, in the collaboration with WeChat, the group of Shanghai government units occupied a dominant position in decision-making. The Chief eGov Media Cooperation Officer of Tencent used the metaphor of "half-life" to describe their position in the collaboration with the government units: "Tencent actually has only half-life. The other half is in the partners' hands […] the other half of our life is in each government unit's hands. That is how it actually is" [2NG01]. This was especially true in the beginning, when Tencent was proposing the city service platform project to the municipal government. As stated by 2NG01:

> We actually had a lot of solutions, but whether they were accepted or not, it depended on the government. From a technical perspective, we had a very mature framework and solutions. But whether such kind of solutions were accepted or not, or whether this would be pushed through or not, the final decision was made by the government.
>
> [2NG01]

The government units expressed their initial concerns behind whether to join the platform or not. As an informant from Shanghai Police said:

> Of course we'd like to make our service better, the more channels to open up the service, the merrier… but we can't just agree with everything, it is not possible either. As the police, we are always very concerned about the security of our data, and we need to evaluate what services we can provide and what we can't.
>
> [2G02]

The comment by Shanghai Police is indicative of a general concern among public agencies about the security of government-owned data. The government units are also concerned about the synchronization of agreement among the service-related bureaus. As stated by an informant from Shanghai Police:

> Tencent has to negotiate this with each department and bureau. Take us as an example, the tasks we work with, such as collecting fines, handling entry and exit documents, they are not only done in the police system. Sometimes it is actually more connected to the tax bureau, or other subordinated bureaus or governments. It is not that if we say yes to provide certain kind of services for the WeChat platform, then it is going to work. The agreement also has to be reached in sync with other connected bureaus. In a way, it is easier now than before; since the collaboration with WeChat is agreed at a municipal level, then other bureaus have to follow.
>
> [2G01]

From the government's point of view, such synchronization is also related to the capacity of each bureau:

> When you try to make a unified service platform like this, it is like making a bucket out of different wood boards of different length. It can only work when the one with the lowest capacity works, and that would significantly limit what services others may provide… Sometimes the proposed solution [by WeChat] sets such a high bar that it requires too much work and resources from us, that makes us less willing to cooperate too.
>
> [2G02]

The distribution of decision-making power between Tencent and some of the government agencies changed when an application feature was established on WeChat. This application feature requires any government agency that wants to establish digital service functionality on WeChat to apply to Tencent, who then has the power to accept or reject the application, based on a loosely identified series of criteria. These criteria can include the volume of service traffic and the coverage of users. As described by one of the informants working for Tencent:

> At first you apply at the backstage [of the platform], saying 'I'd like

to integrate my functions'. Then WeChat would review and make a decision whether the functions you claim are true to what they are. For example, whether you have a wide reach, or potential coverage of users. […] But this is only the first step, meaning that there is potential. There are other reviewing processes to make sure whether you actually covered most of these activities. The detailed reviewing procedure is in WeChat.
>
> [2NG01]

The establishment of this application platform especially reduces the decision-making power of the "weaker" government units, namely those with less resources, that have a lower position in the government hierarchy (such as district governments) or that are weaker because of the type of service they provide. The veto power obtained by Tencent after the establishment of the application platform is exemplified in the following instance, where Tencent refused to implement an information service functionality proposed by a Shanghai district government because Tencent felt that the provided services go beyond the competencies of a district:

> Shanghai always has a relatively prosperous scene of cultural performances, but cultural performances are always scattered. Maybe each district has their own platform for cultural performances. As a district platform wanting to be connected to the city service platform, this does not meet our criteria. You [Shanghai district] can't be integrated.
>
> [2NG01]

However, for larger and more powerful government units, the decision-making power is relatively unaltered, even after the establishment of the application platform.

As claimed by one of the informants at Tencent, in reference to co-developing the platform:

> When it comes to the realization of the functions, and what is to be launched online, we in fact need to constantly collide and negotiate.
>
> [2NG01]

At the stage of deployment, the government units reported to have most of the decision-making power in their own hands, particularly when it comes to what kind of content the government units or bureaus would like to publish daily on the public account. However, government units also reported to being limited by the design frame of public service accounts on WeChat when it comes to, for example, the number of articles that they could present each day to their subscribers. The original design on WeChat public accounts allows each public service account to present a maximum of eight short articles to their subscribers per day all at once. This means that, when for example a typhoon forecast needs to be presented to subscribers, after the quota is exhausted, the government bureaus have to apply for extra room to WeChat before they can publish the forecast, despite its critical nature. Interviewee 2G04 from Technology Service Centre of Shanghai Meteorological Bureau and interviewees 2G07 and 2G08 from Shanghai Release of Shanghai Municipal Government have reported incidents where they had to apply for extra quota on the platform for forecasting sudden meteorological disasters. As 2G08 put it:

> In theory, WeChat can deny our application. But usually they respond rather quickly, and give a fair evaluation. But no, we cannot really push them for the decision other than stating the severity of the situation.
>
> [2G08]

In summary, in this case, the distribution of decision-making power is shared between the group of government agencies involved in the collaboration and the non-government actor, Tencent.

4.2.2. Distribution of accountability

Throughout the collaboration, the distribution of accountability

between Tencent and Shanghai government units is clearly separated. Tencent plays a supporting role in the collaboration with the group of government units. The informant from Tencent sees himself as "commissioned to do the technical development" [2NG01]. As he further elaborates on company tasks:

> We are actually the cooperation side; we are a platform to cooperate, support, and provide service, so it is more about how to do it. But first and foremost, whether the function should be developed or not, how it is wanted, what kind of effects we'd like to reach, this is actually up to each government organization.
>
> [2NG01]

The same informant from Tencent also explicitly asserted: "we don't do framework design for the government. We can't arrange their affairs" [2NG01].

The government bureaus share a similar view on this, yet on a more positive note:

> I am really happy that there is more collaboration from these new media platforms [WeChat] with us. I mean why would a meteorological bureau sign a strategic collaboration agreement with Tencent at all? I have my eyes on their platform, and I'd like them to release the latest information we have on weather and climate. Back then, we wanted to develop apps as well, but we didn't have the resources to develop or maintain an app. If we outsource it to a company, the company charges us on every single change, and the app may not even have a broad reach. We simply just cannot afford this… With the support from Tencent, we can now make changes rather easily, reach a lot of people, while paying very reasonable fees.
>
> [2G04]

Overall, in this case the accountability is in the government actors' hands. The non-government actor acts solely as the service provider.

4.3. Case 3 – the Shanghai Open Data Apps (SODA) project

4.3.1. Distribution of decision-making power

The Shanghai Open Data Apps (SODA) project includes a wide constellation of organizations. The group of government actors includes more than eight government agencies at the district, municipal, and national levels, who take roles in data provision, coordination, and supervision. The non-government actors include two universities and six companies who take care of the main coordination. There are also more companies who have played a supporting role in providing computing devices, campaign service, and data provision.

In this case, the decision-making power is shared among the main coordinators in the collaboration, who come from both government and non-government. The informants were especially excited in telling us about the collaboration process because, in their opinion, it differs from the traditional style of project collaboration in which the government makes all the decisions in a hierarchical fashion. Both government and non-government informants vividly described how many major issues are discussed and agreed online with "everybody's participation in making that decision" [3G01]. As one of the non-government actors elaborated:

> The way the contest is organized is like open data itself. It is like when the government data is open to the public, you don't really control what they do with the data. You have your own way. You can use that.
>
> [3NG04]

Some informants specifically attribute this decision-making style to the collaboration between the government actors and the non-government actors. As elaborated by the director of Opendatachina.com:

> I would actually describe SODA as collaboration between

government actors and the community of non-government actors. As a community of non-government actors, including companies, universities, and NGOs, we enjoy much more freedom and ease in decision-making. There is relatively more space for that.
>
> [3NG03]

This shared decision-making style of collaboration co-exists with other situations in which the government maintains a strong role overseeing the decision-making processes. This co-existence can manifest itself in ambiguous ways. For example, the non-government actors reported inviting high level government officials into their online chat groups, just to ensure that the government officials are informed about the process and can grant permission to the tasks by giving a "silent agreement" [3NG08]. Sometimes, the ones who have the decision-making power can also change from event to event. As elaborated by one of the non-government actors:

> It is difficult to say, maybe every participant, for example, government or the committee, thinks they are the ones who have the say on SODA. But in fact each participant decides on different things at different stages of SODA. In general, for those important offline events – for example, the final, or the road show, where government has a lot of presence – often the government side has more power in deciding things. And naturally the form of those events often turns out to be more government-like. But at other times, the governments' power weakens a lot, mainly because governments also don't have this kind of energy to constantly be the leading decision-maker for everything and for such a long period of time. Then, also most of the time, the committee, that is the rest of us, takes the job and decides on whatever that comes our way.
>
> [3NG03]

In summary, in this case, the distribution of decision-making power is shared between the government and non-government actors. Government actors and non-government actors make decisions contingently depending on the criticality of the issue.

4.3.2. Distribution of accountability

In the case of SODA, the accountability is clearly divided between the government actors and the non-government actors. The government actors mainly take care of data provision for the open data contest, and of "opening doors" and "bridging resources" for the non-government actors to ensure the progress of the collaboration. As both government and non-government informants recognized, "there is a clear line between government and the rest" [3NG04] "on how tasks are divided" [3G01].

Referring to the role of the government actors in the collaboration, government informants have specified that the main responsibility of the government side is to take care of resource and network provision, while the non-government actors are to take care of the management of these resources and of the actual contact with relevant parties. As a government informant stated:

> The government's responsibility is very clear […] We provided a very limited amount of funds for SODA. I also help them to find sponsorships. The sponsorships are then settled at his layer [the private company China Industrial Design Institute (CIDI)], but I did introduce these people to his way.
>
> [3G01]

Another related task of government (i.e., SHCEI) reported by the non-government stakeholders is the coordination among the government stakeholders. This was mentioned by several informants, such as [3NG06] and [3NG03], as "something we simply cannot do". As elaborated by the director of Opendatachina.com:

> When it comes to offline events, things just have to be organized around the bureaucratic system. For example, the schedule of the event has to be adjusted according to the availability of higher

officials. The order of the presence of important government officials also needs to be attended. When it comes to the coordination of data, we need an official letter as an endorsement. There are even bureaus that refuse to communicate with the committee. They only communicate with people from SHCEI… We need to rely on SHCEI to open doors for us.

[3NG03]

Also, the government actors are reported to be in charge of "steering the boat" for the project, especially on major issues of principle. The divide occurs mainly among the 'leading tasks' that focus on decision-making and networking, and the coordination tasks that focus on daily operations. As a non-government informant puts it:

If we leave government alone and only look at the other side, then this competition is a pure coordination between us [non-government actors].

[3NG04]

Other non-government actors have made similar remarks and have detailed the divide of tasks between government and non-government actors when reflecting on how the planning of SODA was carried out. As stated by the CEO of KESCI, the developer for the digital platform of the contest:

We [referring to the non-government side] did most of the job, for example together with [3NG01], [3NG03], and [3NG05], especially during the planning stage, researching other countries' cases on open data, proposing the frames for the contest, creating the website, etc. […] The government side also contributes with a lot of ideas in the discussion, but for delivering the actual final product, like presentations of the proposal for the contest, and the digital platform, the higher officials, especially the ones who were not involved in the planning process, are mostly in the position of granting permissions […] We as the developer see engineering as the fundamental support of the whole project, so we pay particular attention to the tech-tasks and actual operations.

[3NG02]

In summary, in this case, the distribution of accountability is clearly separated between the government actors and the non-government actors.

4.4. Case 4 – the Observe project

4.4.1. Distribution of decision-making power

In the case of Observe, the actors include the government host of the IT project workshops, other relevant government agencies across different regions, private companies, and NGOs. By participating in the workshops, these actors gradually formed a community in which new ideas and resources are proposed for organizing new workshops. In this community, there is a loosely defined group of core actors. Most of these core actors have participated in the workshops from an early stage, and have followed up in the subsequent series of workshops. This core group consists of both government actors and non-government actors. Among these actors, one of the university actors who initiated the workshop [4NG01] has gradually taken up the role as a main co-ordinator. He facilitates the decision-making process in organizing the workshop by taking into consideration the opinions of other core actors. The decision-making power is thus distributed among the core actors of the workshop.

There are two ways to initiate a workshop: volunteered and pushed-through. In the first scenario, either a member of the core community or a participant from a previous workshop proposes to the main co-ordinator [4NG01] that he/she would like to host the upcoming workshop. These initiators could be either government actors or non-government actors. Among government actors, they are often the ones involved in 'newly' implemented IT projects (e.g., related to big data or

to open data), and are motivated to collect more feedback from society to "test the connection between the government's project and the market" [4G01]. Among non-government actors, they are the universities, companies, or NGOs who have novel solutions for existing public projects and would like to see these solutions implemented. Some of them are also involved in existing IT-related project collaboration. They are motivated to "cultivate government with leading knowledge in the field" [4NG04] and to "accelerate the process of converting new solution into actual practices in the public project". [4NG03]

Each workshop requires one government actor and one non-government actor as co-initiators to enable collaboration between the two sides, especially to align goals and interests among the stakeholders. After the co-initiators submit the proposal to the main coordinator, the main coordinator will then pass the information to the core actors and discuss the potential themes for discussion. The result of the discussion, often in the form of a list of potential themes, is then sent to the rest of the community to test for relevance via online chat groups. Once the themes are agreed to within the community, the decision is made, and the initiators who proposed the event become the main contact people for the workshop. In one of the early workshops, an informant from the Technology Service Center in Shanghai Meteorological Bureau recalled this process:

In the workshop, we had an online group where people can just invite themselves in with a QR code. It is very open, and they can just make suggestions. Last time, when we had the workshop "Observe Meteorological Bureau", people from the Caiyun app [a popular weather forecast app in China] just joined us in the group. As the Observe workshop ran both online and offline, we posted the real-time speeches in the group, and we put the interactions in these groups on live. That time they asked questions in the group, we discussed them offline and answered them in the online group.

[4G01]

In the second scenario, the main coordinator suggests a theme and plan for a workshop and persuades some known actors in the community to host it. Informant 4NG01 described this process as an "easy push", as the coordinator only persuades the actors that he knows would be interested in hosting. The subsequent acts would be decided among the core actors and the community again.

As showed in the process above, the organization of the IT-project workshops is based on open decision-making processes, where several themes can be pre-approved, but still changed when new stakeholders join the network. The distribution of decision-making power is shared between the government actors and the non-government actors.

4.4.2. Distribution of accountability

In the case of Observe, the accountability is shared across the actors from the core group, and according to the resources each person has. For example, one informant has specifically mentioned that the rationale behind having a rather mobile workshop that changes host every time is to "avoid overloading any actor with immense responsibilities" [4NG01]. The accountability, in this sense, is transferred from one host to another host, which are always made up of two "co-chairs", one from government and one from non-government.

Some informants also see it as part of the process to negotiate accountabilities between government and non-government stakeholders in controlling the development of IT-related project collaboration. As the Vice Director of the Technology Service Centre, from Shanghai Meteorological Bureau puts it:

We are all in this process of collision right now. Because, really, including myself, the governments think it is very difficult to integrate different kinds of needs. At least I think it is very difficult, because each bureau and industry has its own characteristics. And there are a lot of them. We need to have a division of labour on what
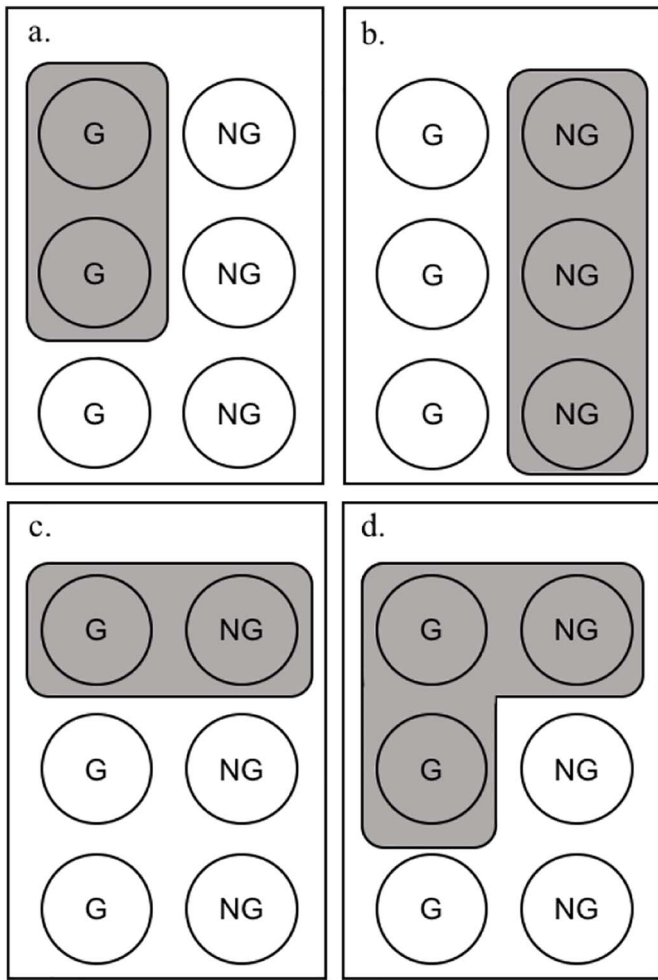
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Fig. 1. Examples of polarized (a. & b.), and polycentric (c. & d.) distributions between government (G) and non-government (NG) organizations.

governments should do, what the society should do in running, for example, an open data project. All these have to be negotiated in detail, but how to do it? This form of meet-up is a good testing ground.

[4G01]

In summary, in this case, the distribution of accountability is shared contingently between the government and non-government actors, and revolves around the resources each actor possesses.

5. A typology of adaptive governance

The observed distribution of decision-making power and of accountability across the four cases analyzed shows different patterns.

Focusing on the modes of collaboration between government and non-government actors, we identify two types of configurations in the distribution of decision-making power and of accountability between government and non-government actors.

The first configuration encompasses all cases in which the distribution of decision-making power (or accountability) is concentrated in *either* government actors *or* non-government actors; in other words, cases where the separation between those with decision-making power (or accountability) and those without occurs with distinguishing between government and non-government actors. We label this type of distribution as *polarized*.

The second configuration encompasses all cases in which decision-making power (or accountability) is shared, at least at some point in time, between at least one government and one non-government actor. We label this type of distribution *polycentric*.

Fig. 1 shows four abstract examples of distribution between government and non-government actors involved in collaboration. The distribution configurations apply without difference to both decision-making power, and to accountability.

As illustrated in examples a. and b. in Fig. 1, a distribution is *polarized* when the decision-making power (or the accountability) is concentrated in either the government or non-government side. The two examples illustrate that the concentration does not necessarily need to involve all organizations of one type (government or non-government) (example a.), and can be either concentrated on the government or on the non-government side (example b.).

On the other hand, a distribution is *polycentric* when the decision-making power (or the accountability) is shared between government and non-government actors. To qualify as a polycentric distribution, the sharing can occur between only two actors (example c.), or can involve any number of actors on the two sides (government and non-government) of the collaboration (example d.).

As evidenced in the case analysis, the distribution of decision-making power and the distribution of accountability are two distinct phenomena. An organization (or a group of organizations) that is held accountable for the processes and outcomes of a collaboration project might or might not hold the decision-making power. This gives rise to governance practices between government and non-government actors where there are different combinations of *polarized* and *polycentric* distributions of decision-making power and of accountability.

To understand the significance of the relationship between decision-making power and accountability for the nature of governance practices, we combine them in a two-dimensional framework. The combination of the two dimensions of distribution of decision-making power and of accountability defines four types of governance of collaboration between government and non-government organizations. Three of these types feature at least one of the dimensions of distribution of decision-making power or of accountability to be polycentric (that is shared across government and non-government actors). As these three types of governance arrangements are aimed at ensuring adaptiveness to rapid changes in the environment occurring in IT-related projects, we conceptualize them as different types of adaptive governance. The three

Table 4

A typology of adaptive governance: distribution of decision-making power and of accountability across government and non-government actors.

		Distribution of decision-making power	
		Polarized	Polycentric
Distribution of accountability	Polarized		*Polycentric governance*
			● Case 2 – Shanghai WeChat service
			● Case 3 – Shanghai Open Data Apps (SODA)
	Polycentric	*Agile governance*	*Organic governance*
		● Case 1 – Lu'an	● Case 4 – Observe

types are illustrated in Table 4.

The typology is descriptive and not normative, in the sense that it does not prescribe one type of adaptive governance as better than another.

One type of governance is characterized by a polarized distribution of decision-making power and a polycentric distribution of accountability. This type of governance is well-exemplified by case 1, the Lu'an project. This case exemplifies a governance practice aimed at adapting to rapid changes in the environment by flexibly sharing accountability across government and non-government actors, while maintaining decision-making power only on one side. We label this type of adaptive governance as *agile governance*.

A second type of governance is characterized by a polycentric distribution of decision-making power and a polarized distribution of accountability. This is exemplified by case 2, the Shanghai WeChat project, and case 3, the Shanghai Open Data Apps (SODA) project. Both cases exemplify governance practices aimed at adapting to rapid changes in the environment by flexibly sharing decision-making power across government and non-government actors, while maintaining accountability only on one side. We label this type of adaptive governance as *polycentric governance*.

A third type of governance is characterized by a polycentric decision-making power and a polycentric distribution of accountability. This is exemplified by case 4, the Observe project. This case exemplifies a governance practice aimed at adapting to rapid changes in the environment by flexibly sharing both decision-making power and accountability across government and non-government actors. We label this type of adaptive governance as *organic governance*.

In the next section, we discuss the findings and the implications of our analysis for research and practice of adaptive governance in the context of digital government.

6. Discussion and implications

6.1. Implications for research

The governance of digital projects is a complex socio-technical phenomenon (Dawes, 2009), and governments facing economic pressure, social tensions, and global competition have to work through networks of diverse actors to organize existing resources, knowledge, and capabilities in the pursuit of public goals (Janowski et al., 2012). While potentially able to capture the need of governments to establish governance practices that can respond to swiftly changing environments at a conceptual level, the notion of adaptive governance needs to be tested and understood in a context of digital government. Drawing on the analysis of four empirical cases, this study provides several contributions to research on adaptive governance in the context of digital government.

First, our study puts the role of digital tools at the center of the notion of adaptive governance. Existing research has started to investigate the notion of adaptive governance in a variety of policy areas, including climate change (Brunner & Lynch, 2013), community relocation (Bronen & Chapin, 2013), and ecological systems (Folke et al., 2005; Robertson & Choi, 2010). We bring the role of digital technologies to the forefront in enabling governance configurations that can ensure adaptiveness. Through our case analyses, we showed how the use, management, and implementation of a wide array of digital tools – including web platforms, open government data platforms, and social media applications – represent a core element of adaptive governance arrangements.

Second, combing the stream of adaptive governance scholarship (Chaffin et al., 2014; Janssen & van der Voort, 2016) with the governance practices we observed, we articulated the complexity of the two dimensions of the distribution of decision-making power and accountability, which play a critical role in devising adaptive governance strategies in a digital government context.

Existing scholarship on governance of collaboration between government and non-government actors often views decision-making power and accountability as going hand-in-hand. Decision-making power and accountability have been conceptualized as attributed either to government actors, or to non-government actors. Our study, on the contrary, articulates that: a) decision-making power and accountability can be decoupled from each other in different contexts, and when they change, they do not necessarily change in the same direction; b) the distribution of decision-making power and accountability can run across the line of government/non-government distinction, and take the form of a *polycentric* distribution; and c) that distributions of decision-making power and of accountability across government and non-government actors vary independently, and can dynamically change over time. These observations provide empirical evidence to support the ambidextrous and dynamic nature of adaptive governance arrangements, as initially suggested by Janssen and van der Voort (2016).

Third, we propose a typology of adaptive governance based on empirical data analysis, which can provide clarification in further operationalizing the concept of adaptive governance. Research on the concept of adaptive governance so far has moved in various directions, resulting in a marked 'theoretical multiplicity' (Karpouzoglou, Dewulf, & Clark, 2016). The extant body of research does not share a common framework for classifying the different dimensions of adaptive governance in a systematic fashion. By putting forward our typology, we contribute to reducing the ambiguity of the adaptive governance notion and its multiple aspects, and aim at fitting it into the context of digital government in a more structured manner. This typology can function as a tool for better comparisons in research on cases of adaptive governance, and as a guide for practice in real-life contexts.

6.2. Implications for practice

Our proposed typology of adaptive governance based on an analysis of real-life empirical cases also provides two keys insights for public managers engaged in the governance of IT-related project collaboration between government and non-government actors.

First, our findings suggest that adaptive governance may imply decoupling the distribution of decision-making power from the distribution of accountability. We showed that a relief of responsibilities is not necessarily equal to the loss of decision-making power. Rather, it can result in improved flexibility and adaptiveness. Public managers engaged in establishing collaboration with diverse non-government actors can consider distributing decision-making power and accountability across different constellations of actors, without jeopardizing the effectiveness of the adaptive governance arrangement. Moreover, these distributions can also change over time, which requires government and non-government actors to pay constant attention to the emerging governance arrangements, as well as adjustment of expectations and practices.

Second, the case analysis shows that distributing decision-making power or accountability across the divide between government and non-government actors can be accommodated in different forms of adaptive governance arrangements. By experimenting with different configurations of distribution of decision-making power and accountability across government and non-government actors, public managers can actively design and fine-tune arrangements among agile, polycentric, or organic governance to best suit the challenges of adaptiveness at hand. This also requires public managers to pay more attention to contextual variables, such as the collaborative technologies employed and the configuration of government resources in comparison to non-government actors.

6.3. Limitations

As all studies, ours also has some limitations. The first concerns the focus of the study. When transferring the concept of adaptive

governance from the research on social-ecological systems (Chaffin et al., 2014) to the context of digital government, we deliberately highlighted the dimensions of decision-making power and accountability. The dimensions of decision-making and accountability require a special focus when we aim at transferring the notion of adaptive governance to the digital government context. In fact, understanding how decision-making power and accountability are distributed enables governance arrangements that can balance adaptiveness and stability: such balance is what characterizes adaptive governance in the context of digital government (Janssen & van der Voort, 2016). However, there are other dimensions to be explored in adaptive governance arrangements, which we have not focused on in our study. These dimensions include the role of trust or distrust (Ansell & Gash, 2008), the distribution of resources (Cristofoli, Markovic, & Meneguzzo, 2014), and the extent to which different actors have different goals (Saz-Carranza & Ospina, 2011). We acknowledge this limitation, and put forward our proposed framework as a stepping stone for expanding future research foci to these other dimensions as well.

The second limitation concerns our unit of analysis. Because we aimed at investigating the distribution of decision-making power and accountability across the divide between government and non-government organizations, we deliberately chose not to focus on the characteristics of the distribution of decision-making power and accountability *within* groups of organizations of the same nature (governmental or non-governmental). For instance, regarding the distribution of decision-making power, in the case history of the Shanghai WeChat project, we observed some differences in the distribution of decision-making power between the Shanghai municipality and the smaller Shanghai districts, *vis-à-vis* the non-government actor, the Tencent company. Moreover, regarding the distribution of accountability, we focused on the accountability of each organizational actor to the collaboration arrangement, and not on the accountability of individuals to their own organization, or to society at large (Huxham & Vangen, 2005; Vangen & Winchester, 2014). We acknowledge that these nuances were not at the forefront in our case analysis. However, our focus choice was motivated by our pursuit of a clear conceptualization of adaptive governance, and was aligned with the study's research question, which focused only on the principal divide between government and non-government actors engaged in collaboration.

Third, the choice of our cases may limit the generalizability of the findings. While we argue that the unique institutional, economic, and IT-related characteristics of China (Gao et al., 2013; Zhang et al., 2017) provide a very good context in which to test the key dimensions of adaptive governance, we acknowledge that there could also be downsides of such a choice. For example, the changing nature of the distinction between the public and private sector, which characterizes China as a country in transformation (Li, Gao, & Mao, 2014), could hinder the generalizability of our findings to cases in other countries, which are characterized by different institutional settings. However, it is to be noted that in this study we did not aim at providing generalizable findings applicable to other empirical settings, but rather at investigating theoretical concepts and principles (Lee & Baskerville, 2003).

The last limitation concerns the operationalization of the two dimensions of the typology. For the sake of conceptual clarity, the typology treats the polarized/polycentric dimension as a discrete variable; however, it could be argued that it would be more accurate to treat it as a continuum. We acknowledge that our representation of the two dimensions is a simplification of the complexity of adaptive governance arrangements. However, we deem the shortcoming of treating the polarized/polycentric dimension as a discrete variable to be mitigated by the fact that our proposed typology is dynamic in nature, meaning that a case of adaptive governance can shift over time between featuring the characteristics of an organic, polycentric, or agile governance arrangement, depending on the contextual demands.

7. Conclusion and future research

Governments are increasingly facing challenges that require them to envision collaboration with non-government actors in a responsive fashion, by being able to adapt to swiftly changing demands from the environment, especially in IT-related endeavors. The notion of adaptive governance aims at capturing new forms of collaboration between government and non-government actors that can respond to these challenges. However, while potentially useful, the nascent notion of adaptive governance still needs to be detailed and tested in the context of digital government.

In this study, we have aimed at refining and empirically testing the notion of adaptive governance by focusing on the two dimensions of the distribution of decision-making power and of accountability among government and non-government actors. Our analysis of four cases of IT-enabled project collaboration shows that different configurations of distribution of decision-making power and of accountability result in different types of adaptive governance – namely polycentric, agile, and organic. This articulation of the concept of adaptive governance can represent a starting point for future research on a number of issues related to this nascent notion, which in turn can be used to further inform research and practice.

Future research should thus be directed towards two goals. First, there is a need to understand what are the *determining factors* for the emergence of each of the specific types of adaptive governance. The very notion of adaptive governance implies that a governance arrangement between government and non-government actors should be shaped around the needs of a swiftly changing context. Contextual factors that can affect the need for adaptiveness include: the type of policy area (e.g., service provision, business model development, information provision) that a collaboration is required to tackle; the regulatory environment; the timeline of goals to be achieved by the collaboration; and the existence of a previous record of collaboration between participating actors. Further research is thus required to identify which contextual factors are more often linked to the emergence of a specific type of adaptive governance.

To capture these changing contexts, future studies should pay particular attention to the selection of empirical cases. It would be ideal if the selected cases feature shifting contextual factors, such as policy shifts, project timeline changes, or changing composition of stakeholders. By removing and reintroducing a certain contextual factor, such shifts can provide a unique natural experimental setting to test the link between certain contextual factor and the emergence of each of the specific types of adaptive governance. This also implies that the cases need to be studied in a longitudinal fashion to allow for observation of changes. Conceptually, the research results reported from such settings can increase the generalizability of the theoretical propositions derived from the identified dimensions of adaptive governance in this study. Practically, they would also help public managers to better understand which type of adaptive governance strategy can be expected to work better in which specific situation.

Second, findings from our study call for further research on the *consequences* of the adoption of a specific type of adaptive governance. The existing body of research on governance has already focused to some extent on assessing the impacts of governance arrangements between government and non-government actors, in terms of project success or failure. What need to be further investigated are the impacts of the adoption of each of the different types of adaptive governance on aspects *other than* project success. These can include the impacts on stakeholders participating in collaboration, and on external actors, such as the citizens affected by the outcomes of the collaboration projects.

In terms of impacts on stakeholders, future research should focus on understanding, for instance, how the adoption of a *polycentric governance* regime (characterized by a polycentric distribution of decision-making power, but a polarized distribution of accountability) affects the motivation and the levels of satisfaction of government and non-

government stakeholders engaged in collaboration, in comparison with an *agile governance* regime (characterized by a polarized distribution of decision-making power, but a polycentric distribution of accountability). Stakeholder motivation and satisfaction levels are, in fact, key factors in making an adaptive governance arrangement desirable and sustainable over time.

In terms of impacts on citizens, future research could focus on investigating how the outputs of *organic governance* regimes of collaboration (where both the distribution of decision-making power and accountability are polycentric) are perceived by the recipients of the public services resulting from these collaborations. While citizens use public services and interact with government and non-government actors, they have various assumptions on the differences between these sets of actors and on the role they should play in delivering public value (Chatfield & AlHujran, 2007; Cordella & Bonina, 2012; Cordella & Tempini, 2015). Understanding how each of the adaptive governance arrangements impacts citizens' perception of the legitimacy of public policies, for instance, will be key for assessing the value and sustainability of each governance arrangement.

The notion of adaptive governance possesses a strong potential for enhancing our understanding of the mechanisms of new governance practices, and for orienting the management of IT-related collaboration. By articulating this concept and testing it in revelatory empirical settings, in this study we aimed at providing a first step towards unleashing this potential in a digital government context.

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