Platform governance for sustainable development: Reshaping citizen-administration relationships in the digital age

Tomasz Janowski[a,b,*], Elsa Estevez[c,d], Rehema Baguma[e]

[a] *Department of Applied Informatics in Management, Faculty of Management and Economics, Gdańsk University of Technology, Poland*
[b] *Department of E-Governance in Economics and Administration, Faculty of Business and Globalization, Danube University Krems, Austria*
[c] *Departamento de Ciencias e Ingeniería de la Computación, Universidad Nacional del Sur, Argentina (UNS), Argentina*
[d] *Instituto de Ciencias e Ingeniería de la Computación UNS-CONICET, Argentina*
[e] *School of Computing and Information Technology, Makarere University, Uganda*

ARTICLE INFO

ABSTRACT

Changing governance paradigms has been shaping and reshaping the landscape of citizen-administration relationships, from impartial application of rules and regulations by administration to exercise its authority over citizens (bureaucratic paradigm), through provision of public services by administration to fulfil the needs of citizens (consumerist paradigm), to responsibility-sharing between administration and citizens for policy and service processes (participatory paradigm). The recent trend is the administration empowering citizens to create public value by themselves, through socio-technical systems that bring data, services, technologies and people together to respond to changing societal needs. Such systems are called "platforms" and the trend is called "platform paradigm". The aim of this article is to offer a conceptual framework for citizen-administration relationships under the platform paradigm. While existing models of citizen-administration relationships mainly focus on specific types of relationships, e.g. citizen trust versus administrative transparency, or citizen satisfaction versus administrative performance, the proposed framework identifies a comprehensive set of relationships that explain how decisions by citizens or administration and the policy environment mutually agreed by them contribute to shaping such relationships and building individual and collective capacity for pursuing sustainable development. The framework comprises 15 types of relationships organized along the four governance paradigms. It is illustrated through the analysis of 11 case studies published in the current issue. Based on this analysis, the article also formulates some insights that are relevant to researchers and policymakers who intend to utilize platform governance for sustainable development.

1. Introduction

In the pursuit of sustainable development, i.e. "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987, p. 41), modern societies expect their governments to addresses in a coherent and integrative way a multitude of social, economic, ecological and other policy challenges. Such challenges are generally complex, dynamic, uncertain and interdependent. Governments struggle to meet such expectations, having to rely on limited financial, human, physical, and information resources, and on external trust and legitimacy to deal with policy challenges embedded in their indigenous social, economic, and other contexts. However, trust in all types of institutions, especially government, and their legitimacy to act on society's behalf are in short supply today.

This pursuit towards sustainable development is refocusing attention away from the institutions of governing, e.g. government, to the processes of governing "whether undertaken by a government, market or network" and "whether through laws, norms, power or language", i.e. to governance (Bevir, 2012, p. 1). It also marks progression of governance arrangements from hierarchies to markets to networks, with respective impact on citizen-administration relationships, i.e. on "various ways in which individuals and public sector organizations interact" (Villeneuve, 2017, p. 1). This impact includes (Villeneuve, 2017): impartial application of rules by administration to exercise its authority over citizens (bureaucratic paradigm); provision of public services by administration to fulfill the needs of citizens (consumerist paradigm); and responsibility sharing between administration and citizens for policy and service processes (participatory paradigm).

The participatory paradigm, as applied here, integrates related

---

* Corresponding author at: Gdańsk University of Technology, Faculty of Economics and Management, ul. Gabriela Narutowicza 11/12, 80-233 Gdańsk, Poland
E-mail address: tomasz.janowski@pg.edu.pl (T. Janowski).

concepts of joint-up government (Bogdanor, 2005), network governance (Goldsmith & Eggers, 2004) and collaborative governance (Emerson, Nabatchi, & Balogh, 2012). Joint-up government involves "the development and implementation of policies across government departments and agencies" and through "private and voluntary bodies, working across organizational boundaries towards a common goal" (Bogdanor, 2005, pp. 1–2). Network governance redefines the role of government organizations from directly delivering public services to delivering such services through networks of public, private and non-profit organizations, while retaining the responsibility for creating, maintaining and resolving such networks (Goldsmith & Eggers, 2004). Collaborative governance covers "processes and structures of public policy decision making and management" that engage "people constructively across the boundaries of public agencies, levels of government, and/or the public, private and civic spheres in order to carry out a public purpose that could not otherwise be accomplished" (Emerson et al., 2012, p. 2). While all three concepts introduce structures that facilitate joint decision-making and collaboration between administration and citizens, they do not emphasize the role of administration in providing data, tools, coordination capacity and other structures that aim to empower citizens to create public value by themselves. However, for sustainable development this empowerment is critical.

The empowerment of citizens and other non-state actors to directly contribute to sustainable development is the essence of the platform paradigm. This paradigm, enabled by advances in methods and applications of digital technology, is tapping into assets, resources and competencies that exist within government and across the society, organizing them into common development platforms and using them to orchestrate collective action and pursue collective goals. The assets may include "finance, people's time and expertise, organisational structures and competences, networks, data, things, places, buildings, spaces, vehicles, and infrastructures" (Millard, this issue, p. 10), whereas platform users may include "companies, SMEs, civil society organisations, communities, groups and individuals, as well as hackers, designers and artists" (Millard, this issue, p. 8). From the technological viewpoint, platforms bring together and connect to each other services, applications, technologies and people, who can amend them in the ways not envisioned by their designers, to "evolve over time to adapt to changing needs by the interplay of technology, users, policy-makers and other actors" (Janssen & Estevez, 2013, p. S5).

Considering the continuum of governance modes between the extremes of state intervention, i.e. "traditional hierarchical government control through authoritative allocation of values to society" and societal autonomy, i.e. "self-organizing networks of co-coordinating societal actors" (Lange, Driessen, Sauer, Bornemann, & Burger, 2013, p. 408), platform governance is closer to the latter. However, government is still necessary to facilitate and orchestrate collective action, provide tools, manage assets and ensure public value (Millard, this issue). In this role, it cannot just act as central authority but respect stakeholder' autonomy and self-control, recognize that collaboration requires mutual trust and good will, and even accept that the orchestration role is distributed over several actors (Janssen & Estevez, 2013).

Platform governance can be related to different models of digital government. For digital government evolution (Janowski, 2015), it coincides with the contextualization stage which aims at improving development conditions for citizens and other development actors. Concerning Lean Government which reduces "the complexity of the public sector by simplifying and streamlining organizational structures and processes, at the same time at stimulating innovation by mobilizing stakeholders" (Janssen & Estevez, 2013, p. S1), Open Government which aims at "linking and integrating the worlds inside government, as well as linking and integrating these with the worlds outside government for the specific purpose of creating public value" (Millard, this issue, p. 4) or Adaptive Governance which enhances "the capacity of an organization to deal with and adapt to changes, while protecting the same organization from becoming unstable" (Janssen & van der Voort,

2016, p. 1), all concepts could be leveraged to advance sustainable development through platform governance.

Platform governance could be also used to enable public value co-production between citizens and administration, through e.g. consultation, ideation, crowdsourcing, co-delivery, reporting, informing, nudging, ecosystem embedding, self-organization, self-service and self-monitoring (Linders, 2012) to pursue a range of collective goals such as fighting crime and corruption, monitoring living conditions, managing social welfare, identifying risks to public health, implementing citizen budgets, planning public spaces, etc. More generally, platform governance could be used to govern processes "oriented towards the attainment of sustainable development" (Meadowcroft, 2007, p. 1). As sustainable development entails "promotion of societal transformation processes by governments, market actors and civil society" (Lange et al., 2013, p. 405), governance for sustainable development is about "working through formal and informal institutions" to bring about such transformation (Kemp, Parto, & Gibson, 2005, p. 19). Platform governance is well suited for this task. Reaching out directly to citizens, it can influence their habits, routines and other informal institutions, and create accumulated effect from individual to societal level.

Depending on the goals, the strategy adopted to pursue these goals and the context where this strategy is implemented, platform governance occurs in many variations. In particular, we see large variations in the shape of citizen-administration relationships that are part of this paradigm. The problem is to organize knowledge about such relationships as they emerge from cases of platform governance, to facilitate learning from such cases, and to apply and reapply learning outcomes between contexts. The aim of this article is to address this problem by offering a conceptual framework for citizen-administration relationships that occur under the platform governance paradigm. Fifteen types of relationships were identified based on the literature and conceptual analysis, organized incrementally along the sequence of four governance paradigms: bureaucratic, consumerist, participatory and platform. The framework was then tested through the analysis of 11 case studies published in the current issue to analyze various instantiations of citizen-administration relationships underpinning the platform paradigm. Aggregated results were also developed through cross-case analysis and grouping of cases using the digital government evolution stages (Janowski, 2015). The findings formulated based on this exercise are relevant to researchers and policymakers interested in utilizing platform governance to enable sustainable development.

The rest of this article is structured as follows. Section 2 outlines the methodology underpinning this research. Section 3 provides the analysis of citizen-administration relationships underpinning platform governance for sustainable development leading to the integrative conceptual framework of this paradigm. Section 4 applies the framework to analyze 11 case studies of platform governance for sustainable development. Section 5 carries out cross-case analysis and presents the findings while Section 6 offers some discussion and conclusions.

2. Methodology

This article pursues three research questions:

1. What is platform governance for sustainable development?
2. What citizen-administration relationships characterize platform governance for sustainable development?
3. How are citizen-administration relationships characterizing platform governance instantiated in practice?

In order to answer the first research question, we conducted literature analysis focused on theories, models or modes of governance for sustainable development across a range of governance paradigms, followed by the key characteristics of platform governance for sustainable development. The analysis was carried out through literature search on the Scopus database, using the search term: "sustainable development"

AND ("governance" OR "governing") AND ("theory" OR "model" OR "mode"). The outcome is part of Section 1.

In order to answer the second research question, we conducted literature analysis aimed at uncovering citizen-administration relationships between Citizens, Administration and Policy, three main entities taking part in governance for sustainable development. The literature search was carried out on the Scopus database using the family of search terms: "sustainable development" AND ("governance" OR "governing") AND XXX. Altogether, 15 citizen-administration relationships were uncovered in the process: administer, steer, regulate, serve, engage, transform, legitimize, disclose, monitor, participate, empower, learn, coordinate, create and collaborate. These relationships were explored using the corresponding search terms XXX:

1. "administer" OR "administering" OR "administration"
2. "steer" OR "steering" OR "direct" OR "directing"
3. "regulate" OR "regulating" OR "regulation"
4. "serve" OR "serving" OR "service"
5. "engage" OR "engaging" OR "engagement"
6. "transform" OR "transforming" OR "transformation"
7. "legitimize" OR "legitimizing" OR "legitimization"
8. "disclose" OR "disclosing" OR "disclosure"
9. "monitor" OR "monitoring"
10. "participate" OR "participating" OR "participation"
11. "empower" OR "empowering" OR "empowerment"
12. "learn" OR "learning"
13. "coordinate" OR "coordinating" OR "coordination"
14. "create" OR "creating" OR "creation"
15. "collaborate" OR "collaborating" OR "collaboration"

The uncovered relationships were mapped into four governance paradigms: bureaucratic, consumerist, participatory or platform, and integrated into conceptual framework of platform governance for sustainable development. The outcome is presented in Section 3.

In order to answer the third research question, we applied the conceptual framework to analyze 11 case studies represented by the research articles published in the current issue which initial versions were published in (Janowski, Holm, & Estevez, 2013). The case studies belong to the intersection of the digitalization, governance and development domains. The analysis captures the presence of citizen-administration relationships and identifies varieties of platform governance for sustainable development present among the cases. The analysis has been also performed across the cases. The in-case and cross-case analysis are described in Section 4 and Section 5 respectively.

3. Conceptual framework

The aim of this section is to analyze a variety of citizen-administration relationships that underpin different governance regimes for sustainable development and to build a conceptual framework of platform governance for sustainable development based on this analysis. The purpose of the framework is to organize knowledge about citizen-administration relationships which emerge from the cases of platform governance for sustainable development, to facilitate learning from such cases, and to reapply learning outcomes between contexts.

The four governance paradigms introduced in Section 1 – bureaucratic, consumerist, participatory and platform – were used to categorize the relationships. The categorization is soft: the dominant governance paradigms are identified for different relationships but the relationships could be moved across paradigms. It is also incremental – all relationships that belong to the bureaucratic paradigm also belong to the consumerist paradigm, all that belong to the consumerist paradigm also belong to the participatory paradigm, and all that belong to the participatory paradigm also belong to the platform paradigm. In the end, the platform paradigm accumulates all identified relationships. The categorization is depicted in Table 1.

Table 1
Citizen-administration relationships across governance paradigms.

Id	Citizen-administration relationships	Dominant governance paradigms			
		Bureaucratic	Consumerist	Participatory	Platform
1	Administer	x	x	x	x
2	Steer	x	x	x	x
3	Regulate	x	x	x	x
4	Serve		x	x	x
5	Engage		x	x	x
6	Transform		x	x	x
7	Legitimize		x	x	x
8	Disclose			x	x
9	Monitor			x	x
10	Participate			x	x
11	Empower				x
12	Learn				x
13	Coordinate				x
14	Create				x
15	Collaborate				x

Individual relationships were analyzed based upon specialized scientific literature on governance and sustainable development. The results are documented in Section 3.1 through Section 3.4 depending on the relationship's attachment to the latest governance paradigm. For instance, Section 3.4 covers relationships that are associated with the platform paradigm but not with the participatory paradigm. The conceptual framework for platform governance for sustainable development that integrates all 15 relationships is presented in Section 3.5.

3.1. Relationships for bureaucratic governance

Consider the internal performance of administration when governing towards sustainable development, i.e. the *administer* relationship. According to (Heinrichs & Laws, 2014, p. 2623), in line with specific responsibility of the state for coordinating sustainable development, the idea of sustainability should be integrated into "decision-making in politics and administration at all levels", the process and the outcome also called respectively "institutionalization of sustainability" and "sustainability state". Part of administration's role of managing sustainable development is building institutional capacity among state and civil society institutions to manage related processes (Mc Lennan & Ngoma, 2004). Institutional quality is also a start point of sustainability on both macro and micro levels, the latter promoting private sector participation (Schomaker, 2014). Administration should also adapt its approaches to sustainability, by developing sustainable development strategies into tools for strategic public management (Steurer, 2007).

Consider the administration's role to direct sustainable development efforts through various policy instruments, i.e. the *steer* relationship. As a normative objective of steering and governance, sustainability goals are "ambivalent, difficult to agree and hard to specify" (Walker & Shove, 2007, p. 213). Steering for sustainability has to reconcile "the demands of reflexivity (being open, self-critical and creative) with the demands of their existing political world (closed preferences, agenda driven, control)" (Hendriks & Grin, 2007, p. 333). Steering for sustainable development involves three problem dimensions: "ambivalence of sustainability as a goal, uncertainty of knowledge due to complex interactions between society, technology and nature, and distributed power to shape structural change in society" (Voß, Newig, Kastens, Monstadt, & Nölting, 2007, p. 193). In the case of ecological modernization, while central government creates new structures of governance "to keep its initiative over constitutionally independent expert agencies and municipal governments", such structures could make central steering almost impossible (Lundqvist, 2001, p. 319).

Consider how administration regulates the conduct of citizens, businesses and other non-state actors to advance sustainable

development, i.e. the *regulate* relationship. Responsible collective innovation that contributes to sustainable development could be furthered by "voluntary soft-law regulations that complement and extend national and international hard-law regulations" (Voegtlin & Scherer, 2017, p. 227). A voluntary contribution to sustainable development, Corporate Social Responsibility was initially aimed at downscaling government regulation but later progressed towards societal co-regulation (Steurer, 2010). More generally, steering businesses towards sustainable development can use various regulatory instruments, some relying on government, others on civil society (civil regulation) or businesses (self-regulation), and yet others on both (co-regulation) (Steurer, 2013). However, by promoting compliance with national sustainability standards, national government can restrict "local government's room to manoeuvre in balancing all relevant interests" but "environmental standards are either not problematically restrictive or, if they are, sectoral policy offers ways to circumvent them" (Van Stigt, Driessen, & Spit, 2013, p. 221).

3.2. Relationships for consumerist governance

Consider how administration delivers services to citizens and other non-state actors while meeting sustainability objectives, i.e. the *serve* relationship. According to (Grubnic, Thomson, & Georgakopoulos, 2015), governments and public service organizations should address sustainable development in their decision-making processes for public service provisions. Supporting institutions and building institutional capacity, particularly to deliver services that address poverty and exclusion, are key to supporting quality governance for sustainable development (Mc Lennan & Ngoma, 2004). The delivery of smart public services by city governments responds to sustainability requirements and to changes in service delivery such as "unbundling services from production processes, growth of the information-rich economy and society, the search for creativity in service production and consumption and continuing growth of digital technologies" (Anttiroiko, Valkama, & Bailey, 2014, p. 323). Applied in "knowledge-intensive public services such as education, healthcare and e-government", digital literacies help integrate marginalized segments of the society (Sharma, Fantin, Prabhu, Guan, & Dattakumar, 2016, p. 628).

Consider how administration engages citizens in co-deciding public policies that advance sustainable development, i.e. the *engage* relationship. In addition to voting, participating in political campaigns or running for public officer, citizens can "engage the policy-making process directly" by attending city council meeting, organizing protests or circulating petitions (Adams, 2007, pp. 3–20). In the case of policy-making for sustainable development, without "adequate representation of implicated interests", such policy-making will "fail to take account of relevant problem dimensions and decisions will lack legitimacy" (Meadowcroft, 2004, p. 166). For example, community engagement with local policymaking is key to carry out "sustainable neighbourhood regeneration" (Jarvis, Berkeley, & Broughton, 2012, p. 232). Early public engagement is also key to reconciling expert and public opinions in sustainable transport policies: experts prefer "techno-economic measures" while the public prefers "behaviour change and public transport improvement" (Xenias & Whitmarsh, 2013, p. 75).

Consider how administration undergoes internal transformation to be more effective towards sustainable development, i.e. the *transform* relationship. Inclusive sustainable development can be implemented through "transforming governance into interactive governance" and adopting appropriate governance instruments to create "conditions for adaptive learning and the empowerment" particularly for marginalized people (Gupta, Pouw, & Ros-Tonen, 2015, p. 541). On the local level, "local government transformation and restructuring" is a key challenge for pursuing local agenda for sustainable development (Roberts & Diederichs, 2002, p. 189). On the global level, to "bring about societal change at the level and speed needed to mitigate and adapt to earth system transformation", "transformative structural change in global

governance is needed" towards a "much stronger institutional framework for sustainable development" (Biermann et al., 2012, p. 51). On the infrastructure level, telecommunication networks advance a more "sustainable urban ecology" by "making buildings more efficient, shifting reliance from roads to fibers and transforming government" (Moss, Kaufman, & Townsend, 2006, p. 234).

Consider how citizens legitimize administration to act on their behalf in pursuing sustainable development, i.e. the *legitimize* relationship. The legitimacy of partnership networks for sustainable development would benefit from "clearer linkage to existing institutions and multilateral agreements" as well as "systematic review, reporting and monitoring mechanisms" (Bäckstrand, 2006, p. 290). The salience, credibility and legitimacy of science institutions among governance actors engaged in Sustainable Development Goals is grounded upon three modes of scientific authority: assessment mode, advice mode and solution mode (Van der Hel & Biermann, 2017). In the case of rural governance for sustainable development, legitimacy should be analyzed considering "specific contexts" and construction "through discursive processes" (Connelly, Richardson, & Miles, 2006, p. 267). In the case of local urban planning for sustainable development, the legitimation of local actors such as the local community or local government, is justified through "traditional forms of authorisation … expertise, representation or the common good" (Häikiö, 2007, p. 2147).

3.3. Relationships for participatory governance

Consider how administration opens its decisions and operations towards sustainable development to public scrutiny, i.e. the *disclose* relationship. During institutionalization of disclosure systems, technocratic and privatization rationales for governance transparency take a higher priority than democratization and marketization rationales (Gupta & Mason, 2016). Factors that promote the disclosure by governments of sustainability information on public policies include socio-economic information such as education and internet access, and e-government factors such as the provision of information and services online (Alcaraz-Quiles, Navarro-Galera, & Ortiz-Rodríguez, 2014). The Malaysian local authority websites feature low disclosure levels of stakeholder engagement information, which does not advance the goals of public sector transparency and accountability (Midin, Joseph, & Mohamed, 2017). An emerging role for government to develop "consumer trust and the expansion of sustainability consumption" is providing "access to information that fosters market transparency and efficiency", for instance through smart disclosure or open government initiatives (Zhang, Liu, Sayogo, Picazo-Vela, & Luna-Reyes, 2016).

Consider how citizens are monitoring administrative and policy performance towards sustainable development, i.e. the *monitor* relationship. Partnership networks for sustainable development could benefit from "clearer linkage to existing institutions and multilateral agreements, measurable targets and timetables, more effective leadership, improved accountability, systematic review, reporting and monitoring mechanisms" (Bäckstrand, 2006, p. 290). For example, monitoring to detect illegal trade includes "trade data analysis, production/ consumption analysis, paper audits, remote sensing analysis, and field investigations" (Smith, 2004, p. 293). However, information available for monitoring global sustainability goals is primarily focused on supply-related services, whereas much less information is available "on social behaviour, use, demand and governance measures" (Geijzendorffer et al., 2017, p. 40). Concerning available tools, mobile technology empowers citizen observatories for environmental monitoring by significantly improving "data coverage by the provision of near-real-time high-resolution data" (Castell et al., 2015, p. 370).

Consider how citizens provide inputs to administration concerning its pursuit of sustainable development, i.e. the *participate* relationship. While the value of public participation for addressing sustainability issues is well recognized, a deeper understanding is required about "conditions under which participation is likely to work and what it can

achieve in different circumstances" (Hurlbert & Gupta, 2015, p. 100). However, political salience of public participation initiatives for sustainable development is affected by cultural factors, key among them deep distrust in government or business initiatives to advance sustainability (Macnaghten & Jacobs, 1997). Public participation initiatives can range from "consensus-oriented processes in the pursuit of a common interest" to "compromise-oriented negotiation processes aiming at the adjustment of particular interests", the latter especially important for participatory initiatives that pursue sustainability (Van den Hove, 2006, p. 10). Meaningful public participation, particularly related to environmental assessment, also requires "critical education and the diversity of individual learning outcomes" (Sinclair, Diduck, & Fitzpatrick, 2008, p. 415). However, while participatory governance "improve civic skills and social capital", its effectiveness on "enforcing sustainable development" is marginal (Geissel, 2009, p. 401).

3.4. Relationships for platform governance

Consider how administration creates conditions for citizens to take up decisions and actions towards sustainable development by themselves, i.e. the *empower* relationship. The enabling conditions for inclusive development includes "adaptive learning and the empowerment of marginalized people", the main instrument to create such conditions is "genuine interactive governance" (Gupta et al., 2015, p. 541). On the local level, the role of government in adapting sustainable development to the local context is creating "an environment in which citizens empower themselves by collaboratively making the rules for participation" and identifying "key individuals who connect the various networks and involve them in the development of sustainability strategies" (Kusakabe, 2013, p. 1). On the same level, the integration of municipal government strategies and the development of intellectual capital by educational institutions empowers citizens to contribute to city sustainability (Ortiz-Fournier, Márquez, Flores, Rivera-Vázquez, & Colon, 2010). One tool for community empowerment is freedom of information and open data although both depend on "the quality, completeness and accessibility of government records and data" which suffer from chronic problems (Thurston, 2015, p. 703).

Consider how citizens, empowerment by administration, can engage in learning and self-development towards more sustainable future, i.e. the *learn* relationship. Building resilience in social-ecological systems requires "social context with flexible and open institutions and multi-level governance systems that allow for learning and increase adaptive capacity" (Folke et al., 2002, p. 437). On the organizational level, bottom-up learning and co-evolution of self-organized networks of organizations can advance organizational sustainability (Espinosa & Porter, 2011). On the individual level, education for sustainability could be integrated along "transdisciplinary study (head); practical skill sharing and development (hands); and translation of passion and values into behavior (heart)" to enable "community-based, applied learning experiences" (Sipos, Battisti, & Grimm, 2008, p. 68). At the same time, sustainability competencies such as "problem-solving skills and the ability to collaborate successfully with experts and stakeholders" can be acquired through "project- and problem-based learning, service learning, and internships in communities, businesses, and governments" (Brundiers, Wiek, & Redman, 2010, p. 308).

Consider how administration can coordinate societal decisions and actions towards sustainable development, i.e. the *coordinate* relationship. Countries are still at the early stages of how governments should organize processes towards sustainable development, with unresolved challenges of coordination with "the national budget", with "sub-national level sustainable development strategies" and with "other national-level strategy processes" (Volkery, Swanson, Jacob, Bregha, & Pintér, 2006, p. 2047). The central government plays a critical role in implementing such policy through "strategic coordination of policy aims, instruments, stakeholders and interests" (Söderholm & Wihlborg, 2016, p. 1). While sustainable development "strategies should play a

key role in better coordinating policies horizontally across sectors and vertically across levels of government", the potential of such strategies for vertical coordination across different levels of government is underutilized (Steurer & Hametner, 2013, p. 224). Some authors recommend that given the failure of integrated strategies "on sustainable development, climate change mitigation and adaptation in the EU-15 countries" to better coordinate policies, they should be recalibrated towards fulfilling more realistic goals such as "providing direction and raising awareness" (Casado-Asensio & Steurer, 2014, p. 437).

Consider how citizens, empowered by administration, can jointly create public value and more sustainable future for themselves and their communities, i.e. the *create* relationship. Public value creation is often dependent on the process of co-creation between the public sphere and citizens, including deliberation of competing interests and perspectives (Benington, 2009). Based on the urban planning example, co-creation benefits include "bottom-up character of several projects, better responsiveness and greater opportunities for different categories of actors" while the drawbacks include "greater difficulty in ensuring that certain objective are reached (e.g. in terms of fairness and representativeness) and a higher risk of the dispersion of resources" (Trivellato, 2017, p. 337). As an example from Kosovo, engaging the youth in urban planning through "a combination of game based learning, co-creation, simulation modelling and design thinking" using a "modern innovative game-like experience", is how local government can invest in long-term sustainability (Rexhepi, Filiposka, & Trajkovik, 2018, p. 114). In the Basque Country, entrepreneurial presence, co-creation and co-decision affect the adoption of local sustainability agenda by local government (Barrutia & Echebarria, 2012).

Consider how citizens collaborate with each other and with administration to jointly advance the sustainability agenda, i.e. the *collaborate* relationship. Three views on partnership for sustainable development, a process through which various societal actors jointly create more sustainable management practices are: a collaborative arrangement, a tool for deliberative social change or a public decision-making structure (Glasbergen, 2011). Based on three game theoretic tools - the prisoners' dilemma, the tragedy of the commons and the Nash equilibrium, it is possible to rationalize that "collaborative behaviours offer better results than individualistic ones" in the transition towards more sustainable society (Lozano, 2007, p. 370). For example, collaborative consumption, i.e. "peer-to-peer-based activity of obtaining, giving, or sharing the access to goods and services, coordinated through community-based online services" is expected to "alleviate societal problems such as hyper-consumption, pollution, and poverty by lowering the cost of economic coordination within communities" (Hamari, Sjöklint, & Ukkonen, 2016, p. 2047). Finally, collaboration among local government, residents and supporting organization networks "can bolster the capacity of local governments to plan and implement sustainability initiatives" (Hawkins & Wang, 2012, p. 7).

3.5. Integrative relationships framework

Consolidating the analysis carried out, this section proposes an integrative framework that captures three main actors in platform governance for sustainable development and various relationships between them at a high level. The framework, called *Platform Governance for Sustainable Development* is depicted in Fig. 1 and described as follows.

The framework assumes the presence of three main entities. The first, *Administration*, represents all state actors with authority and mandate to steer, coordinate and regulate development processes. The second, *Citizens*, comprises citizens, businesses and other non-state actors that delegate powers to *Administration* to act on their behalf, co-design and participate in development processes, and benefit from development outcomes if positive or absorb the impact of development failure otherwise. The third, *Policy*, represents systems of rules, regulations, incentives, networks, communities and other instruments through which *Administration* steers, coordinates and regulates development action, with
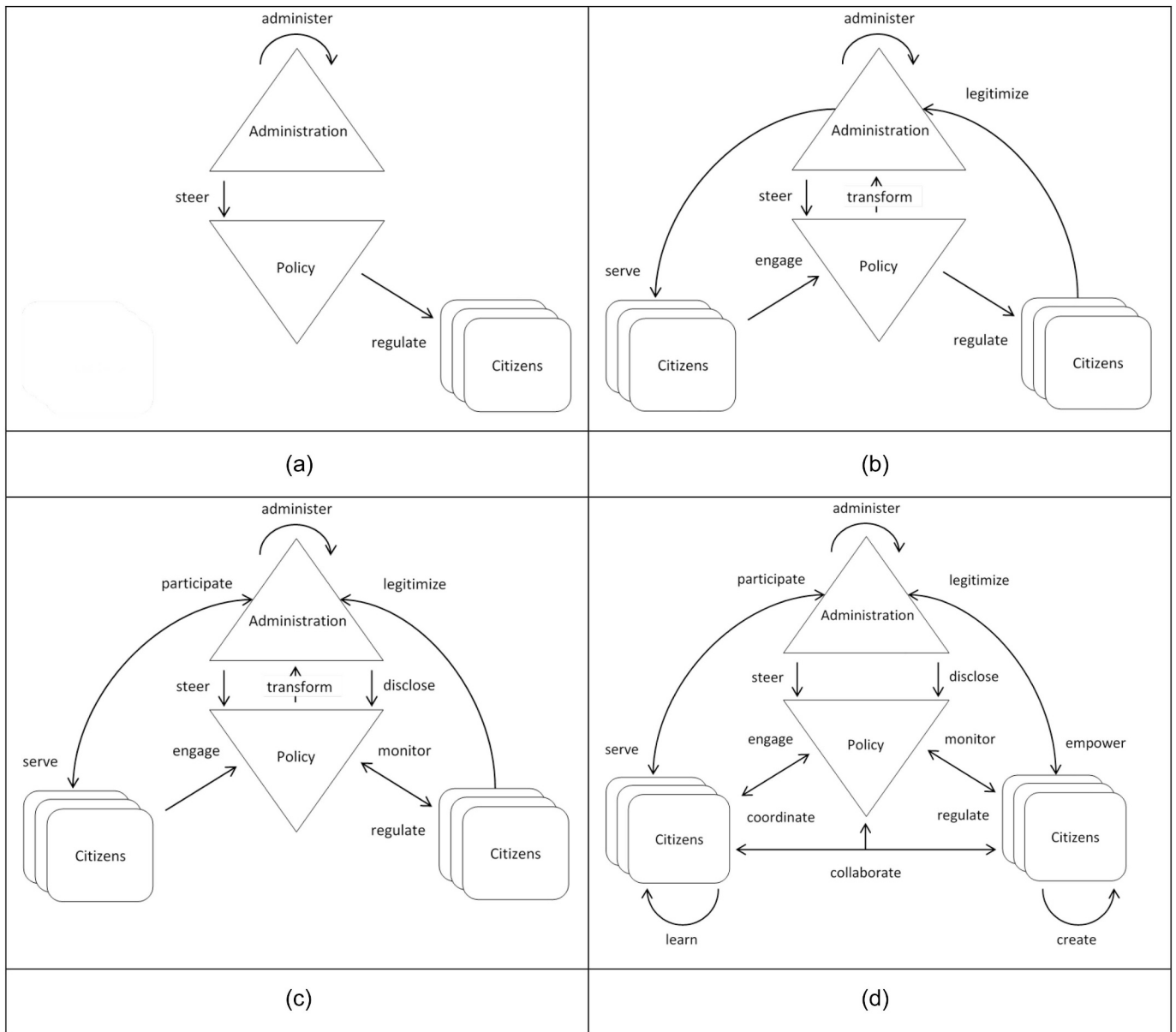
Fig. 1. Governance framework for sustainable development across four governance paradigms: a) bureaucratic, b) consumerist, c) participatory and d) platform.

Citizens engaging such action.

The internal performance of *Administration* is represented by the *administer* relationship. *Administration* enacts *Policy* through the *steer* relationship. It also regulates *Citizens'* performance through *Policy* and the *regulate* relationship. As depicted in Fig. 1a, the *administer*, *steer* and *regulate* relationships are part of the bureaucratic paradigm.

Administration provides public services to *Citizens* by means of the *serve* relationship. In return, *Citizens* engage in *Policy* processes through the *engage* relationship. Using this mechanism, *Citizens* can indirectly influence the transformation of *Administration* through the *transform* relationship. They can also delegate powers to *Administration* as part of the *legitimize* relationship. As depicted in Fig. 1b, the *serve*, *engage*, *transform* and *legitimize* relationships are part of the consumerist paradigm, in addition to those under the bureaucratic paradigm.

Administration can apply *Policy* to open its decisions and actions to public scrutiny in order to build trust. This is part of the *disclose* relationship. In turn, *Citizens* can monitor *Policy* performance, e.g. the outcomes of *Administration's* disclosures, through the *monitor* relationship. *Citizens* can also provide direct feedback to *Administration* through

the *participate* relationship. As depicted in Fig. 1c, the *disclose, monitor* and *participate* relationships are part of the participatory paradigm, in addition to those under the consumerist paradigm.

Administration can empower *Citizens* to engage in development directly. This is part of the *empower* relationship. Thanks to such empowerment, *Citizens* can learn and develop themselves, part of the *learn* relationship. *Administration* can also coordinate *Citizens'* collective action through the *coordinate* relationship. Partly thanks to such coordination, *Citizens* can co-create public value and development futures as part of the *create* relationship. They can do this in collaboration with each other and with *Administration* through the *collaborate* relationship. As depicted in Fig. 1d, the *empower, learn, coordinate, create* and *collaborate* relationships are part of the platform paradigm, in addition to those under the participatory paradigm. The key difference with earlier paradigms is the ability of citizens, enabled by administration, to take up development decisions and actions by themselves.

Digital technology is not explicitly mentioned among any of the elements in this framework, as it is assumed ubiquitous. It not only underpins but also transforms the operations and interactions of all

Table 2
Analyzed case studies.

Id	Case	Reference	Classification
Case 1	Privacy and payment in unseen Internet	(Rykowski & Cellary, this issue)	Digitalization
Case 2	Criminal justice monitoring system	(van Dijk, Kalidie, & Choenni, this issue)	Digitalization
Case 3	Standardizing e-waste management	(Kumar & Rawat, this issue)	Digitalization
Case 4	Electronic government procurement	(Klabi, Mellouli, & Rekik, this issue)	Transformation
Case 5	Cross-departmental collaboration	(Liu & Zheng, this issue)	Transformation
Case 6	Adoption of interoperability standards	(Henning, this issue)	Transformation
Case 7	Proactive e-governance	(Linders, Liao, & Wang, this issue)	Transformation
Case 8	Open governance systems	(Millard, this issue)	Engagement
Case 9	Software infrastructure for e-participation	(Porwol, Ojo, & Breslin, this issue)	Engagement
Case 10	Innovating policy cycle	(Janssen & Helbig, this issue)	Engagement
Case 11	Governance networks for societal challenges	(Ojo & Mellouli, this issue)	Engagement

actors involved. According to the digital government evolution model (Janowski, 2015), digital transformation of *Administration* and its interactions with *Citizens* constitutes the Transformation and Engagement stages respectively, while *Policy* transformation through digital technology to respond to the needs and circumstances of different local and sectoral contexts constitutes the Contextualization stage.

4. Case study analysis

This section carries out the qualitative analysis of 11 case studies that comprise this issue. The case studies are listed in Table 2 along with references to the corresponding articles. The table also contains the classification of the cases into four stages of the digital government evolution (Janowski, 2015): *digitalization* – digitalization of government information and services and automation of government operations; *transformation* – transformation of government structures, processes and services, and institutional reform; *engagement* – engagement of citizens and other non-state actors in government decisions and processes; or *contextualization* – creating conditions for territories and sectors to pursue development by themselves.

The analysis of individual cases using the *Platform Governance for Sustainable Development* framework is carried out in subsequent sections. Each section formulates a problem tackled by a case, presents a solution offered to this problem, and outlines possible instantiation of the case using the framework. It also presents a figure that depicts the instantiation, with parts of the framework that are used by the instantiation colored in black and the rest colored in grey.

4.1. Case 1 – Privacy and payment in unseen Internet

In the case (Rykowski & Cellary, this issue), the authors address two key challenges of the Unseen Internet, i.e. the protection of privacy and the execution of payments. Visible Internet connects servers with human-oriented terminals; its services are paid for directly through e.g. credit cards or indirectly through advertisements; and they are authorized by identification. Unseen Internet connects servers with sensors and actuators embedded in things, it is not controlled consciously by humans, its services are provided in the background paid through micro-payments, it operates mainly by incidental anonymous access, and it has limited ways of identification. Payments taking place within smart environments are coincidental, numerous and low-value. Also, for services enabled by the Unseen Internet to be viable, there is need for continuous tracking of people. The more information is provided about a person, the better the service is able to fulfill this person's needs. However, many people prefer to remain anonymous, particularly for coincidental interactions. This raises a problem of combining personalization with privacy protection for occasional interactions.

To address these problems, the authors propose a privacy protection scheme and a pico-payment system. Concerning privacy, they recommend that policy makers and government regulators set up and enforce rules of privacy protection, e.g. through third-party trust

providers. To deal with the trade-offs between personalization and privacy, the use of fragmentation and the "license-plate" approach is proposed whereby a trusted third-party provides registered users with secured "license plates" as unique identifiers for coincidental transactions. Such identifiers are then used by the smart environment operators to obtain information, authorized by the users, necessary for personalizing the services. Concerning payment, a pico-payment solution is proposed to cover two scenarios: several operators in a smart environment that provides different services to a single client and a single operator offering several services in a smart environment that deals with many clients. Since both operators and clients do not want to see pico-payments directly on their bank accounts, a pico-payment aggregator is proposed. The aggregator registers all pico-payments, sends a single aggregated bill to each client, and transfers payments to the service operators. As the case involves digital technology but no government transformation, it is associated with the digitalization stage.

The instantiation of the *Platform Governance for Sustainable Development* framework to this case is depicted in Fig. 2. Users, financial institutions, advertisers, pico-payment aggregators, "license plate" providers, and third party privacy service providers in the Unseen Internet are represented as *Citizens* whereas state agencies in charge of financial and cybersecurity regulations are represented as *Administration*. The *Policy* environment represents the financial regulations and policies, privacy laws and regulations, ICT laws, trade laws and policies as well as e-commerce regulations. *Citizens* share their data and resources with smart services, and produce and pay for such services through the *collaborate* relationship. *Administration* is responsible for
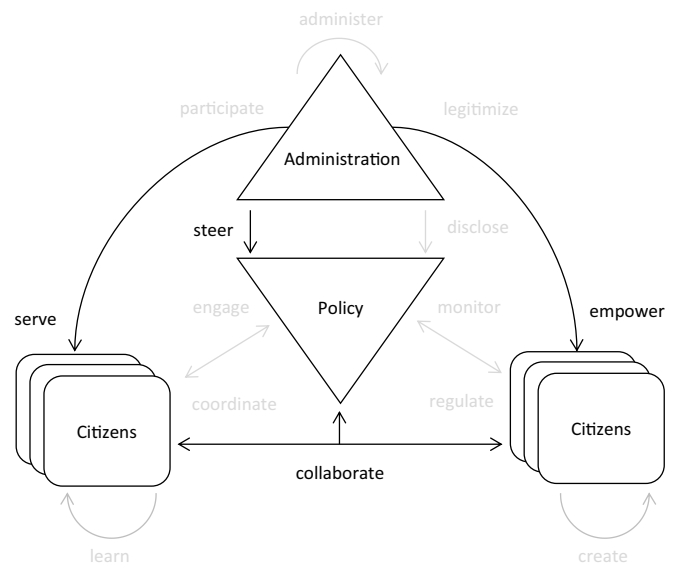

Fig. 2. Framework instantiation, "Privacy and payment in unseen Internet".

setting the adequate *Policy* environment, including legal frameworks and solutions to ensure privacy through the *steer* relationship. In addition, *Administration* needs to authorise third-party trust providers and deliver innovative services in smart environments through the *serve* relationship. The empowerment of enterprises enabled by the Unseen Internet to be paid for services and the users of such Internet to access and pay for services is represented by the *empower* relationship.

4.2. Case 2 – Criminal justice monitoring system

In the case (van Dijk et al., this issue), the authors address the problem of bottlenecks, deviations and error-prone aggregation of data used in the proceedings of the criminal justice system in the Netherlands. Such proceedings involve events carried out by the police, public prosecution, courts and other organizations comprising the system, connected into chains of events through provision of outputs from one organization as inputs to other organizations. However, this connection is impaired by the use of independent data sources by organizations, and the consequent use of different points of reference to the same real-life entities, different semantics and interpretations of data, different times and precisions used for recording events, and missing data. Such challenges make the automatic aggregation of data difficult, resolving instead to error-prone manual aggregation.

In order to address this problem, the authors propose a so-called data space system. The system is structured into three layers. First, the data space layer contains a set of data sources ranging from individual files to data warehouses. Second, the space management layer contains a database of variables that represent user-defined concepts with attributes stored in the data space layer, the relationship module containing expert-defined rules to guard the quality of data through handling of missing data and relations between data, and auxiliary modules to generate and normalize variables from the data space layer. Third, the interface layer is responsible for presenting data obtained from the space management layer to the end users. The system is used by several partners in the Dutch criminal justice system including the Ministry of Security and Justice. As the case involves a digital system for criminal justice organizations, but not transformation of such organizations, it is associated with the digitalization stage.

The instantiation of the framework to this case is depicted in Fig. 3. Ministry of justice, police, public prosecution, courts, and other organizations comprising the criminal justice system are represented by *Administration*, whereas policy makers, experts, citizens, businesses and other users of the justice system are represented as *Citizens*. The *Policy* environment represents privacy laws, information flows implemented within the criminal justice system, principles like "comply or explain" that assign responsibility to organizations for detecting and accounting for bottlenecks or deviations in information flows, or other regulations that guide the proceedings of the actors. *Policy* also includes expert-defined rules hosted in the space management layer to guard data quality. The purpose of the data space system is to support and improve the internal operations within and across the criminal justice system through the *administer* relationship. Another purpose is to make explicit the tacit knowledge obtained from experts in the criminal justice domain through the *create* relationship. The system makes the rules and expert insights available in *Policy* through the *engage* relationship. Yet another purpose is to help the end users *monitor* system performance and deliver justice to citizens using the *serve* relationship.

4.3. Case 3 – Standardizing e-waste assessment

In the case (Kumar & Rawat, this issue), the authors address the problem of increasing volumes of waste of electrical and electronic equipment (e-waste) due to the fast pace of technological change, fast obsolescence of products and accelerated consumption, and lack of reliable and complete data concerning the assessment of e-waste. As many governments adopt policies concerning the disposal, recycling
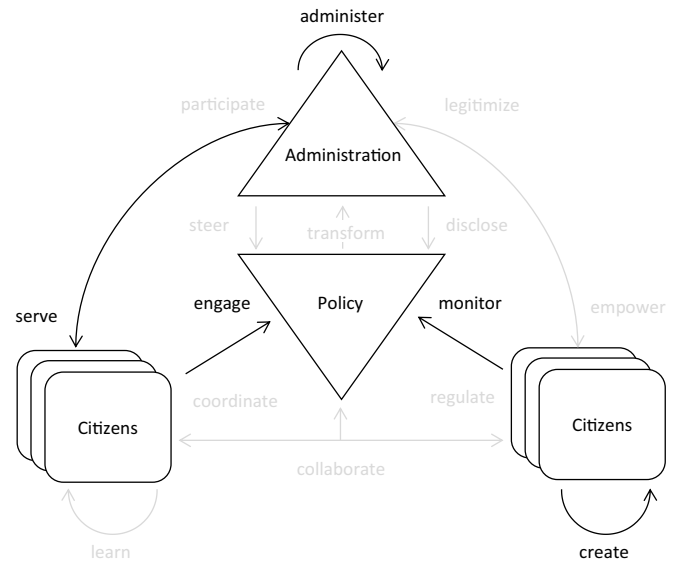

Fig. 3. Framework instantiation, "Criminal justice monitoring system" case.

and management of e-waste, lack of reliable and complete data directly influences the implementation of such policies. The problem is particularly acute in many developing countries that receive e-waste in violation of international agreements from more affluent countries and process it by the informal sector outside any control of the health or environmental hazards. Further problem is that existing methods rely heavily on average values concerning the lifespan or weight of consumed or produced equipment, which makes them imprecise particularly in view of the increased variety of such equipment on the market.

To address this problem and using the data from India, the authors propose a system for managing information about the use of electrical and electronic equipment by the public sector. The authors identify information requirements for such a system, including types, quantities, production years, and users or disposers of the relevant equipment. The system comprises three parts. The first is three reference indices to provide common coding and classification: Global Commodity Index that categorizes different kinds of equipment, National Offices Index that identifies government agencies that use such equipment and Disposal Agencies Index that identifies disposal agencies. The second part is the Consumption Database that holds existing stock of equipment across the entire lifespan from request for proposals, through bidding and tendering, to delivery, consumption and disposal. The third part is the user interface to facilitate access and update of the data held in previous two parts. The authors also present possible system usage scenarios. As the case involves development of a standard to be adopted by government organizations but not transformation of such organizations, it is classified to belong to the digitalization stage.

The instantiation of the framework to this case is depicted in Fig. 4. The public sector and agencies identified in the National Offices Index are represented as *Administration*. The informal sector, the main handler of e-waste, and all authorized disposal centers, dismantlers and recyclers in the Disposal Agency Index are represented as *Citizens*. The policies and regulations concerning the disposal, recycling and generally handling of e-waste are part of *Policy*, along with three indices adopted by government through the *steer* relationship. Standardization of e-waste management across the sector and different scenarios for the use of the system by *Administration* are part of the *administer* relationship. *Administration* is also regulating, through *Policy*, how e-waste is handled by *Citizens* using the *regulate* relationship. The actual handling of e-waste is carried out through the *create* relationship.
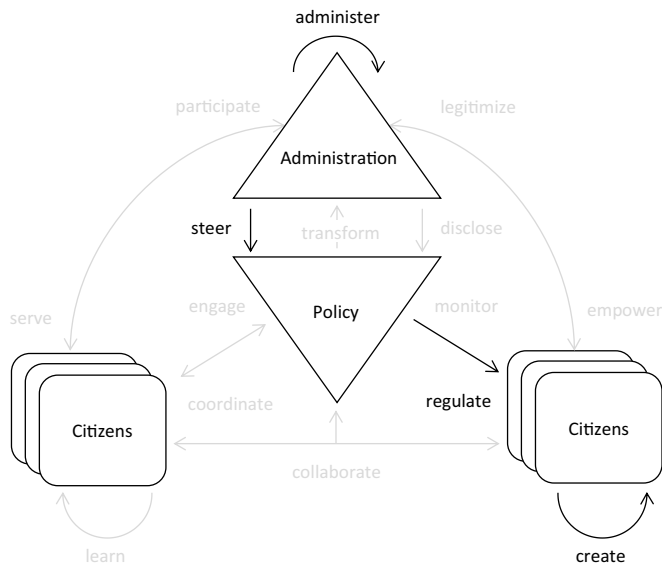
Fig. 4. Framework instantiation, "Standardizing e-waste assessment" case.

Fig. 5. Framework instantiation, "Electronic government procurement" case.

4.4. Case 4 – Electronic government procurement

In the case (Klabi et al., this issue) the authors address the problem of supplier selection by government agencies when the asking price is the only criteria applied to carry out such selection during procurement. In this scenario, the failure of individual suppliers to deliver on outsourcing contracts increases the total costs of outsourcing for government. However, individual government agencies may have limited experience to minimize the risk of erroneous selection and their inability to systematically learn from the outsourcing experience, and lack of mechanisms to use such learning to inform future procurement decisions may further increase the losses for government.

To address this problem, the authors propose a computational model for supplier selection that takes into account the price and suppliers' reputation. The calculation of suppliers' reputation is based on three measures: 1) direct reputation, which represents the experience of past arrangements between an agency and a supplier, the timing of the past arrangements, and the economic impact of the arrangement; 2) indirect reputation, which is the direct reputation of the supplier with other agencies; and 3) the difference in beliefs, which is the difference between the request for proposals and the actual proposals submitted. The model was validated through a study of transportation service procurement. In general, considering reputation in procurement decisions increases direct costs but reduces total costs, while exchanging information among agencies results in gains in direct costs, hidden costs and total costs. The adoption of the reputation-based procurement practice is also discussed. As the case involves transformation of government procurement practice but not government-business relationships, it is classified to belong to the transformation stage.

The instantiation of the framework to this case is depicted in Fig. 5. Government agencies that carry out supplier selection and those consulted about their supplier experience are represented by *Administration*, while suppliers are represented by *Citizens*. A process through which agencies advertise opportunities for suppliers to competitively bid for provision of products or services is realized through the *empower* relationship, based on which they can bid for provision of products or services through the *participate* relationship. The entire selection process is done through *administer*, part of internal performance of *Administration*. The public procurement laws and guidelines and requests for proposals are part of *Policy*. Policies are formulated and enacted through the *steer* relationship. In turn, *Policy* is responsible for regulating (*regulate*) suppliers and transforming (*transform*) the
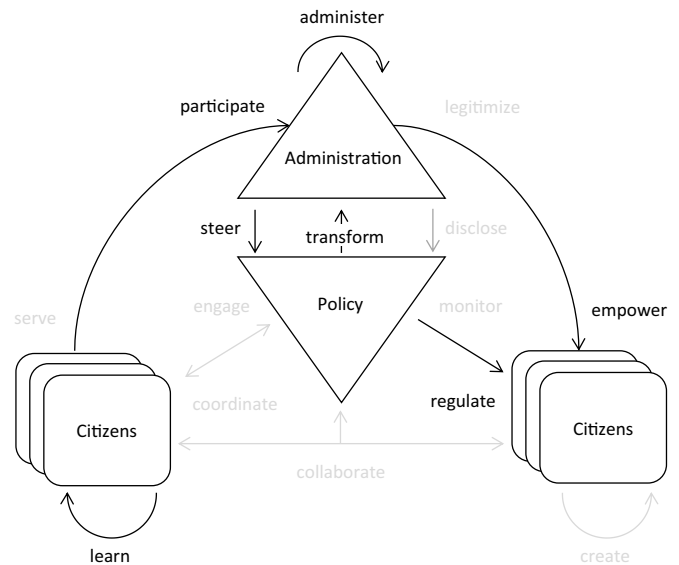
administration's procurement practice. Digital technology facilitates the interaction within *Administration* to reduce the risk of selecting non-performing suppliers and helping suppliers *learn*.

4.5. Case 5 – Cross-departmental collaboration

In the case (Liu & Zhang, this issue), the authors address the problem of understanding the factors, strategies and effectiveness of cross-departmental collaboration in the Chinese context. In a bid to improve efficiency and effectiveness, governments around the world are encouraging and facilitating government departments to work together to share roles, information and resources, enhance capabilities and solve complex problems together. However, while considerable research has been carried out on cross-departmental collaboration, few in-depth studies have been conducted in the Chinese context.

In order to address this gap, the authors present the factors that could influence cross-departmental collaboration in the Chinese context, strategies that have been adopted to promote collaboration, and the level of effectiveness of collaboration observed. This analysis is based on a case of a one-stop Administrative Service Centre (ASC) of Xintai city in East China. The main factors found to influence collaboration include: requirements for better service delivery by collaborating departments; avoiding uncertainty by providing agencies with a platform to work together; the adoption of new technologies; and administrative reforms. Strategies adopted to promote collaboration include: support from political leadership and resource allocation; institutional arrangements; formal and informal coordination; managerial rules and standards; reengineering service processes; and ensuring system compatibility and security. Challenges that limit the effectiveness of collaboration include: departments above the city level still work separately; some applications are still paper-based, and some agencies are yet to join ASC. As the case involves transformation of government collaboration arrangements but not government-citizen relationships, it is classified to belong to the transformation stage.

The instantiation of the framework to this case is depicted in Fig. 6. The Xintai city government and the ASC are represented by *Administration* while citizens of Xintain are represented by *Citizens*. The establishment of the ASC is an outcome of the *transform* relationship, with the relevant laws and policies established by *Administration* through the *steer* relationship, to be part of *Policy*. The operations of the ASC includes the provision of one-stop services and regulation to *Citizens* through the *serve* and *regulate* relationship respectively, and
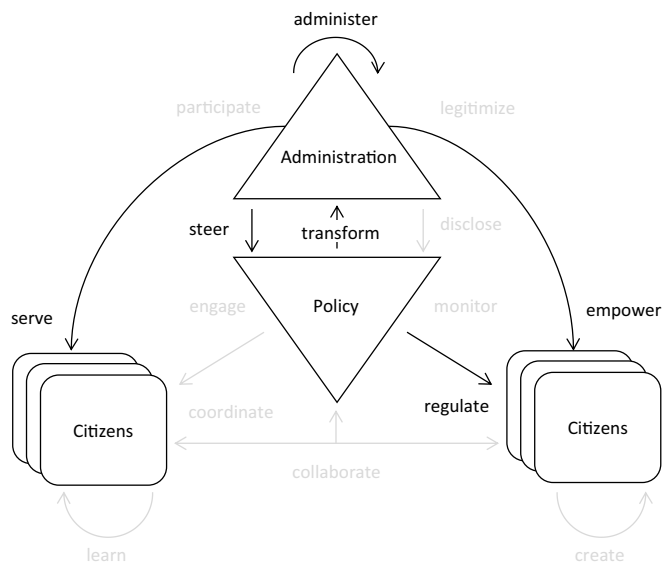
Fig. 6. Framework instantiation, "Cross-departmental collaboration" case.
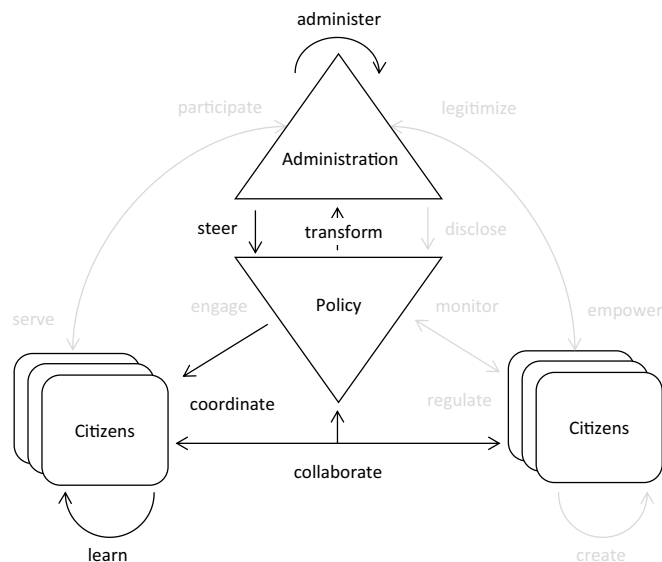

Fig. 7. Framework instantiation, "Adoption of interoperability standards" case.

improvement in such services and regulations as a measure of empowerment (*empower*). Cross-departmental collaboration falls under internal government performance, i.e. the *administer* relationship, and so is the regulation and coordination of administrative entities, e.g. setting managerial rules and standards according to ASC's policies.

4.6. Case 6 – Adoption of interoperability standards

In the case (Henning, this issue), the author addresses the problem of interoperability in Government Information Networks (GINS), multi-organizational networks supported by digital capacities for storing, processing and sharing information. GINS enable collaboration, sharing of information and resources, and standardizing information and knowledge exchanges. However, for this to happen, organizational systems must be compatible (interoperable) with each other, i.e. adhere to common technical, semantic and organizational standards. However, many GINS fail to interoperate because of the failure by some organizations to adopt and comply with the necessary standards.

To address this problem, the author offers a theoretical framework for the determinants of interoperability standards adoption in GINS. The author identifies relevant determinants and conceptually groups them into a conceptual framework comprising: interoperability governance, network characteristics, results, adoption efforts, organization-specific determinants, network-external environment and interoperability standards characterization, and several sub-constructs. The framework is then enriched by identifying additional determinants from two case studies in the Netherlands. Interoperability governance has emerged as the most significant determinant for standards adoption, followed by network characteristics. As the case involves transformation of government to adopt interoperability standards but not transformation of the relationships with citizens or businesses, it is classified to belong to the transformation stage.

The instantiation of the framework to this case is depicted in Fig. 7. GINS are represented as *Administration* while the interoperability standards comprising laws, regulations and policies enacted by *Administration* through the *steer* relationship are represented by *Policy*. Standards enable *Administration* to interoperate (*administer*) and *transform* by integrating its disconnected parts. Standards also enable *Administration* to *coordinate* the activities of *Citizens*, e.g. private companies collaborating with government and each other in the delivery of public services. Such entities adopt interoperability standards (*learn*) and interoperate on this basis (*collaborate*).

4.7. Case 7 – Proactive e-governance

In the case (Linders et al., this issue), the authors address the lack of a blueprint on how to realize the transformation in government through the use of digital technology. Although the focus of research and practice in digital government has moved beyond digitizing government services to how to use digital technology to drive transformative change in government and governance, traditional maturity models of digital government do not provide sufficient guidance on what to do after digitizing government functions.

To address this gap, the authors examine the implementation of proactive e-governance in Taiwan using three case studies: service excellence (e-Housekeeper), operational efficiency (Taipei 1999) and digital inclusion (Door-to-Door e-Services). e-Housekeeper is aimed at proactively pushing information and services to citizens. Taipei 1999 empowers call centre employees with access to information and systems to proactively address citizen issues. Door-to-Door e-Services aim at empowering frontline civil servants to provide services to citizens through the use of e-government-connected tablets. The authors used the case studies to develop an Integrated Model for Proactive e-Governance. The model relies upon: national e-government platform and network infrastructure, mobile technologies and ubiquitous connectivity, and advances in data analytics; and applies three principles to realize proactive e-governance: citizen centeredness, data drive and context-sensitivity, and empowerment of frontline civil servants with technology. As the case involves building government capacity to respond to citizen needs but not transforming government-citizen relationships, it is classified to belong to the transformation stage.

The instantiation of the framework to this case is depicted in Fig. 8. The Taiwan National Development Council, the three case studies and the national e-government portal are represented by *Administration* whereas citizens targeted by the case studies are represented by *Citizens*. The national e-Government Strategic Plan that is the basis for the three case studies as well as other national ICT laws, policies, strategies and plans are represented by *Policy*. The Council holds the primary responsibility for e-government development and related instruments through the *steer* relationship. The policies facilitate the transformation and operation of *Administration* through the *transform* and *administer* relationships respectively. The three case studies and the portal provide services to *Citizens* through the *serve* relationship and indirectly empowers them through the *empower* relationship.
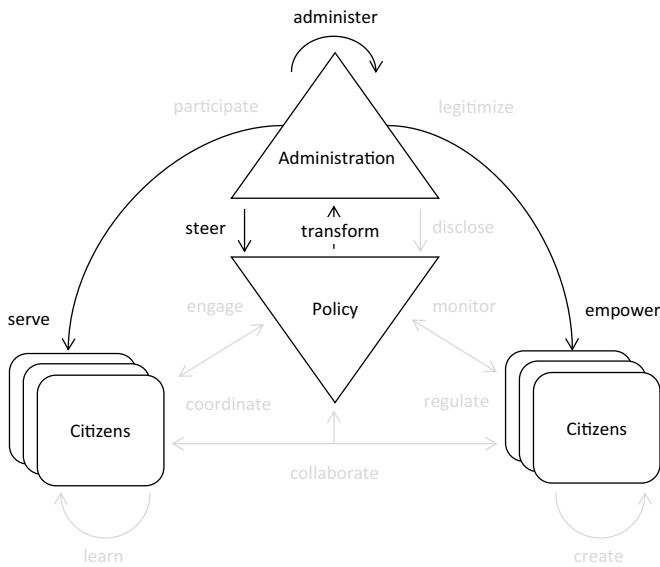
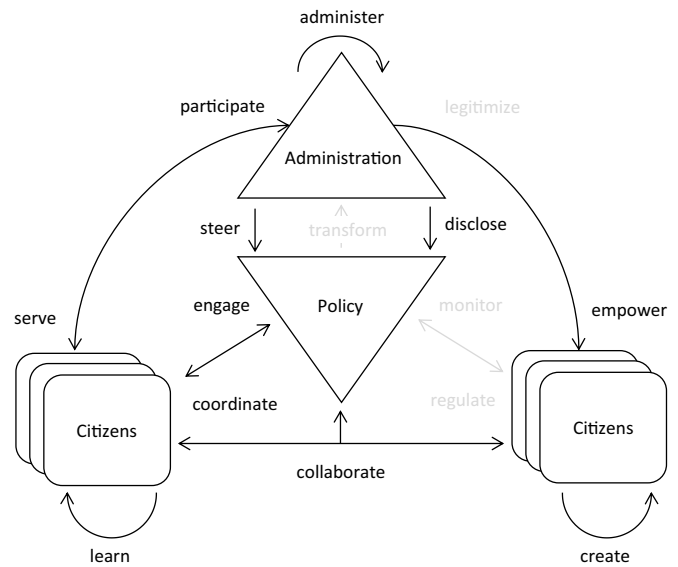**Fig. 8.** Framework instantiation, "Proactive e-governance" case.

Fig. 9. Framework instantiation, "Open governance systems" case.

4.8. Case 8 – Open governance systems

In the case (Millard, this issue), the author outlines the future of the public sector and how digital technology can help respond innovatively to the effects of the economic crisis, inequalities, poverty, corruption, climate change, and other development challenges. The paper revises the sharing movement that started with the non-profit and for-profit sectors, threatening current market actors, legal and regulatory systems, and frameworks of trust and ethics. Critical to these innovations is the necessity to meet social needs in a way that involves beneficiaries. To the public sector, digital technologies transform government's ability to play a new government-as-a-platform role.

To address this problem, a conceptual framework is proposed for open governance system enabled by digital technology. The framework comprises five types of roles for government. The first is an open collaboration platform, supported by digital technology, which actors can use to co-produce public value. Secondly, government should act as an enabler, arbiter, facilitator, regulator and coordinator for others' pursuit of public value. The third role is providing tools, guidance, and incentives for collaboration so that service co-creation can happen. Fourth, identifying and deploying assets and resources available in the society that are underused, and using digital technology to identify, broker, match, orchestrate and coordinate assets that can be shared and converted into public value. Fifth, government needs to play the oversight role, taking responsibility for the overall quality, regulation and standards for resource sharing. As the case involves building government capacity and transforming government-citizen relationships, but not creating conditions for territories and sectors to develop themselves, it is classified to belong to the engagement stage.

The instantiation of the framework to this case is depicted in Fig. 9. The government is represented as *Administration* whereas entrepreneurs, citizens and other entities taking part in the open government system are represented as *Citizens*. Created by *Administration* through the *steer* relationship, *Policy* includes laws and policies on the development and use of open assets, open services and open engagement. The enabling role of government concerning the provision of open assets and open services is implemented through *serve* and *empower* relationships; while the coordinating role is played through the *disclose* and *coordinate* relationships. Additionally, the open governance system calls *Citizens* to *collaborate* by sharing their resources, to *engage* in service co-design and delivery, and to *participate* in public policy and decision-making. By taking part in the system, *Citizens* co-produce

public value and benefit individually through the *create* and *learn* relationships respectively. Collaboration within Administration for effective open governance is part of the *administer* relationship.

4.9. Case 9 – Software infrastructure for e-participation

In the case (Porwol et al., this issue), the authors address the problem of the lack of guidance in existing e-participation models on how to combine traditional e-participation and citizen discussions on social media. Due to this gap, many e-participation platforms lack support to the duality of e-participation, i.e. the combination of citizen-led and government-led e-participation channels. To realize such duality, there is a need for a technical solution that can provide access to government decision makers to relevant information about ongoing citizen discussions on social media platforms.

To address this problem, the authors propose the Social Software Infrastructure (SSI) system which facilitates the duality of e-participation by enabling the stakeholders to harness the potential of citizen-led and government-led e-participation. The design of the SSI is based on a framework that identifies key e-participation capabilities required for integration of government-led and citizen-led e-participation, such as: empowering citizens to participate and influence decision-making; processing data from different e-participation channels; facilitating government-to-citizen interactions and government feedback to citizens; and monitoring deliberations and acknowledging citizen contributions. The SSI automatically processes textual contents from social media platforms to generate useful information about citizen comments, opinions and sentiments on public services and government policies. As the case involves transformation of government-citizen relationships but not creating conditions for territories or sectors to develop themselves, it is classified to belong to the engagement stage.

The instantiation of the framework to this case is depicted in Fig. 10. Government agencies are represented as *Administration* whereas citizens are represented as *Citizens*. Government-led e-participation is part of the *administer* relationship. Traditionally, citizen contributions are part of the *participate* relationship. Citizen-owned e-participation is part of the *collaborate* relationship, which enables *Citizens* to deliberate (*learn*) as well as share opinions, knowledge and information between themselves and with *Administration* via *Policy*. The integration of government-led and citizen-led e-participation realized through the SSI system is part of *Policy*. Government adopts *Policy* through the *steer* relationship and provides feedback and disclosure to citizens via the *disclose*
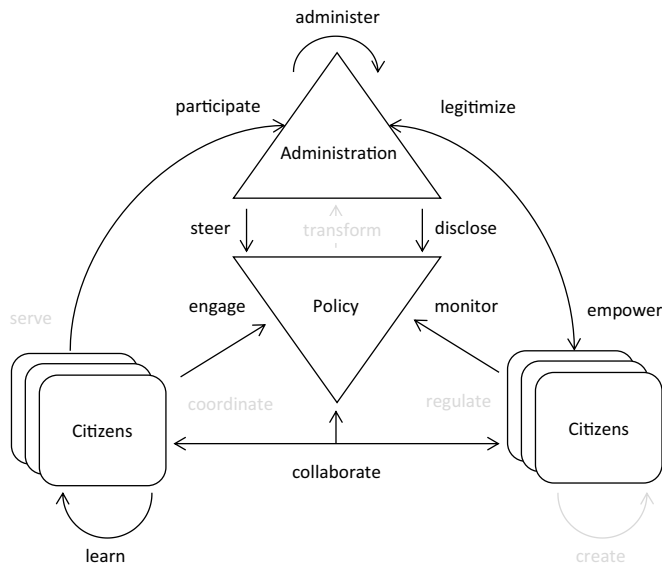
Fig. 10. Framework instantiation, "Software infrastructure for e-participation".

Fig. 11. Framework instantiation, "Digital innovations in policy-making" case.

relationship. In turn, citizens use *Policy* to *engage* and *monitor* government decisions. This contributes to empowering (*empower*) *Citizens* to participate in government decision-making and to legitimizing (*legitimize)* government to act on their behalf.

4.10. Case 10 – Digital innovations in policy-making

In the case (Janssen & Helbig, this issue), the authors address lack of government capabilities to respond to the impact of digital technology on how policy makers and citizens engage in policy-making processes. Developments in ubiquitous civic engagement using social media and mobile devices, open and big data, data analytics, crowdsourcing, visualization, gaming, etc. are motivating new forms of e-democracy and e-participation. However, the impact of such developments on the roles and capabilities of policy makers is unclear.

To address this problem, the authors carry out literature review on various technological developments and their impact on policy making, and analyze two case studies of policy making in the digital age. The case studies are: citizen self-organization responding to the impact of earthquakes in the Netherlands caused by the extraction of natural gas and the implementation of the pro-extraction energy policy; and pilot experiments using digital platforms by the Mayor's office in Boston, Massachusetts to reduce barriers to participation in the urbanization, clicks and bricks, and education areas. The case studies show that traditional roles of policy makers are changing and new ones are emerging. The latter include: coordination of policy-making to ensure consistency and meaningful engagement; assuring engagement quality; assuring legitimacy of the process and usability of data and information; and aggregating and reporting collected data to draw conclusions and recommendations. The required capabilities include: checking calculations, carrying out complex simulations, falsifying arguments, and validating and verifying models. As the case involves building policymaking capacity and transforming government-citizen relationships but not creating conditions for sectors, territories or communities to develop themselves, it belongs to the engagement stage.

The instantiation of the framework to this case is depicted in Fig. 11. Government and policy makers are represented as *Administration* whereas citizens are represented as *Citizens*. Policies created and implemented through interactions between policy makers and citizens are represented as *Policy*. *Policy* also includes technologies and tools used throughout the agenda setting, development, implementation and enforcement stages of the policy process. *Administration* adopts (*steer*) and
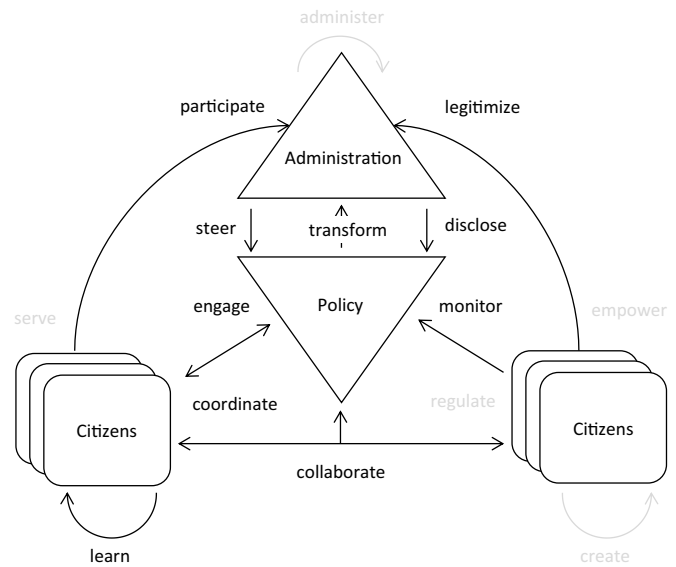
populates (*disclose*) *Policy* in response to feedback and inputs from citizens (*engage*), who can also *participate* in the policy processes directly and *legitimize Administration* to act on their behalf. *Administration* also applies *Policy* to *coordinate* citizen behaviour, who in turn can *monitor* policy performance. Self-organization by citizens relies on sharing information, opinions, knowledge and experiences with each other and with *Administration* (*collaborate*) and on collective deliberation (*learn*). Based on innovations in policy processes, the roles and capabilities of policy makers are transformed (*transform*).

4.11. Case 11 – Governance networks for societal challenges

In the case (Ojo & Mellouli, this issue), the authors discuss the difficulties involved in obtaining a shared understanding about networked governance as a form of governance innovation. The way public organizations address societal problems is dramatically changing due to the changing nature of such problems and the ongoing digital revolution. With the widespread availability and use of digital tools, non-state actors have moved to being active actors in governance networks through which they contribute to finding solutions to dynamic needs of the digitally-enabled society. However, governance networks are composed of diverse participants from all levels of society, economy and government, which makes their management problematic.

To address this problem, the authors present a conceptual framework for governance networks comprising: the strategy of the network which includes the shared and individual objectives of the participating actors, and the structure of the network which defines the components and relationships required for implementing the strategy. The framework is applied to describe and analyze six case studies. The key finding is that governance networks are still largely steered by government entities. Based on this, the authors provide recommendations towards improving such networks: government entities should clearly demonstrate their commitment to governance networks; a communication strategy for social and traditional media and identification of champions are critical for government-citizen partnerships; governments should build trust and remain accountable for the outcomes; and mobile social media platforms are central for citizen inclusion in governance networks. As the case involves transformation of the relationships between government and various non-state actors but not creating conditions for sectors, territories or communities to develop themselves, it is classified to belong to the engagement stage.

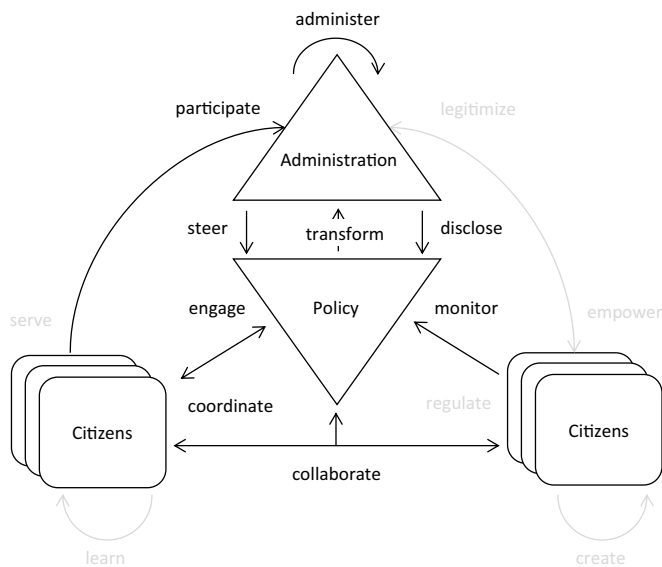The instantiation of the framework to this case is depicted in Fig. 12.

Fig. 12. Framework instantiation, "Governance networks" case.

Government agencies that are part of the governance networks are represented by *Administration* whereas citizens, businesses and the civil society are represented as *Citizens*. The goals, strategies and structures adopted by individual governance networks and all relevant laws and policies are part of *Policy*. When networks are integrated within administration, their performance is represented by the *administer* relationship. Otherwise, government owners adopt relevant network and other policies through the *steer* relationship, and engage *Citizens* and target communication strategies at them through *coordinate* and *disclose*. Thanks to their participation (*participate*) in the networks, *Citizens* contribute by informing *Policy* (*engage*), sharing their opinions, knowledge and resources with each other and with *Administration* (*collaborate*), and monitoring network performance (*monitor*).

5. Cross-case analysis

This section carries out cross-case analysis of the case studies developed in Section 4 concerning the instantiation of the *Platform Governance for Sustainable Development* framework introduced in Section 3.

As shown in Table 3, the case studies cover the entire spectrum of 15 citizen-administration relationships introduced. The case study with the largest number of 11 or 73% of the relationships is *Case 8* (Millard, this issue), followed by *Case 9* (Porwol et al., this issue) and *Case 10* (Janssen & Helbig, this issue) with 10 or 67% of the relationships each, and followed by *Case 11* (Ojo & Mellouli, this issue) with 9 or 60% of the relationships. Next, *Case 4* (Klabi et al., this issue) has 7 or 47% of the relationships, followed by *Case 5* (Liu & Zheng, this issue) and *Case 6* (Henning, this issue) with 6 or 40% of the relationships each, and followed by *Case 2* (van Dijk et al., this issue) with 5 or 33% of the relationships. The least number is covered by *Case 7* (Linders et al., this issue), *Case 1* (Rykowski & Cellary, this issue) and *Case 3* (Kumar & Rawat, this issue) with 4 or 27% of the relationships each.

Table 3 also summarizes the presence of citizen-administration relationships in the case studies across different stages of the digital government evolution. Three case studies, i.e. *Case 1* (Rykowski & Cellary, this issue), *Case 2* (van Dijk et al., this issue) and *Case 3* (Kumar & Rawat, this issue) belong to the Digitalization stage; four, i.e. *Case 4* (Klabi et al., this issue), *Case 5* (Liu & Zheng, this issue), *Case 6* (Henning, this issue) and *Case 7* (Linders et al., this issue) to the Transformation stage; four, i.e. *Case 8* (Millard, this issue), *Case 9*

(Porwol et al., this issue), *Case 10* (Janssen & Helbig, this issue) and *Case 11* (Ojo & Mellouli, this issue) to the Engagement stage; and none belongs to the Contextualization stage.

Out of 76 citizen-administration relationships instantiated by the case studies in total, 40 or 53% belong to the Engagement-stage case studies, 23 or 30% belong to the Transformation-stage case studies, and 13 or 17% belong to the Digitalization-stage case studies. This is consistent with the coverage of citizen-administration relationships by individual case studies. As noted earlier, Engagement-stage case studies like *Case 8* (Millard, this issue), *Case 9* (Porwol et al., this issue) or *Case 10* (Janssen & Helbig, this issue) have the largest coverage, while Digitalization-stage case studies like *Case 7* (Linders et al., this issue), *Case 1* (Rykowski & Cellary, this issue) or *Case 3* (Kumar & Rawat, this issue) have the lowest coverage.

The coverage of the *Administration*, Citizens and *Policy* entities by the case studies is 11 instances or 100%. The citizen-administration relationship that is most often instantiated in the case studies is *steer* with 10 or 91% of the instantiations, followed by *administer* with 9 or 82% of the instantiations, followed by *transform*, *empower* and *collaborate* with 6 or 55% of the instantiations each, and followed by *serve*, *engage*, *participate* and *learn* with 5 or 45% of the instantiations each. The relationships with the least number of instantiations are *disclose*, *monitor* and *coordinate* with 4 or 36% of the instantiations, followed by *regulate* and *create* with 3 or 27% of the instantiations each, and followed by *legitimize* with 2 or 18% of the instantiations.

Table 3 also summarizes the presence of citizen-administration relationships across different governance paradigms. Relationships from all paradigms – Bureaucratic, Consumerist, Participatory and Platform – are present in the case studies. Out of the total of 76 citizen-administration relationships instantiated, 26 or 34% belong the Bureaucratic Paradigm, 13 or 17% belong to the Consumerist and Participatory Paradigms each, and 24 or 32% belong to the Platform Paradigm.

Based on the earlier analysis, the 11 case studies cover all entities and relationships introduced by the *Platform Governance for Sustainable Development* framework. However, this coverage is unequal. The analysis of 12 stage-paradigm pairs, i.e. the coverage of the citizen-administration relationships that belong to a given paradigm, by the case studies that belong to a given evolution stage, is depicted in Table 4. For each pair, the table provides the number of instances of the case studies (Instances), the maximum number of instances possible for a given stage-paradigm pair (Area) and the percentage of the number of instances against the maximum number (Coverage).

According to Table 4, the highest coverage is for citizen-administration relationships under the Participatory paradigm and Engagement-stage case studies, at 11 out of 12 or 92% of all possible instances; followed by the Bureaucratic paradigm and Transformation-stage case studies, at 12 out of 16 or 75% of all possible instances; followed the Consumerist paradigm and Engagement-stage case studies at 8 out of 12 or 67% of all possible instances; followed by the Platform paradigm and Engagement-stage case studies at 13 out of 20 or 65% of all possible instances; followed by the Bureaucratic paradigm and Digitalization-stage case studies at 7 out of 12 or 58% of all possible instances; and followed by the Bureaucratic paradigm and Engagement-stage case studies at 8 out of 16 or 50% of all possible instances. The lowest coverage is for citizen-administration relationships under the Platform paradigm and Transformation-stage case studies at 7 out of 20 or 35% of all possible instances; followed by the Consumerist paradigm and Transformation-stage case studies at 4 out of 12 or 33% of all possible instances; followed by the Platform paradigm and Digitalization-stage case studies at 4 out or 15 or 27% of all possible instances; followed by the Participatory and Consumerist paradigms and Digitalization-stage case studies at 1 out of 9 or 11% of all possible instances each; and followed by the Participatory paradigm and Transformation-stage case studies at 1 out of 12 or 8% of all possible instances.

Table 3
Comparative analysis of the case studies.

CASE STUDIES AND STAGES	ENTITIES			RELATIONSHIPS AND PARADIGMS																			
	Administration	Citizens	Policy	administer	steer	regulate	serve	Bureaucratic Paradigm	engage	transform	legitimize	Consumerist Paradigm	disclose	monitor	participate	Participatory Paradigm	empower	learn	coordinate	create	collaborate	Platform Paradigm	All
				1	2	3	4		5	6	7		8	9	10		11	12	13	14	15		
1	x	x	x		x		x	2				0				0	x				x	2	4
2	x	x	x	x			x	2	x			1		x		1				x		1	5
3	x	x	x	x	x	x		3				0				0				x		1	4
Digitization	3	3	3	2	2	1	2	7	1	0	0	1	0	1	0	1	1	0	0	2	1	4	13
4	x	x	x	x	x	x		3		x		1			x	1	x	x				2	7
5	x	x	x	x	x	x	x	4		x		1				0	x					1	6
6	x	x	x	x	x			2		x		1				0			x	x	x	3	6
7	x	x	x	x	x		x	2		x		1				0	x					1	4
Transformation	4	4	4	4	4	2	2	11	0	4	0	4	0	0	1	1	3	2	1	0	1	7	23
8	x	x	x	x	x		x	3	x			1	x		x	2	x	x	x	x	x	5	11
9	x	x	x	x	x			2	x		x	2	x	x	x	3	x	x			x	3	10
10	x	x	x		x			1	x	x	x	3	x	x	x	3		x	x		x	3	10
11	x	x	x	x	x			2	x	x		2	x	x	x	3			x		x	2	9
Engagement	4	4	4	3	4	0	1	8	4	2	2	8	4	3	4	11	2	3	3	1	4	13	40
All	11	11	11	9	10	3	5	26	5	6	2	13	4	4	5	13	6	5	4	3	6	24	76

Table 4
Coverage of the stage-paradigm pairs by the case studies.

Stages	Paradigms											
	Bureaucratic			Consumerist			Participatory			Platform		
	Instances	Area	Coverage	Instances	Area	Coverage	Instances	Area	Coverage	Instances	Area	Coverage
Digitalization	7	12	58%	1	9	11%	1	9	11%	4	15	27%
Transformation	12	16	75%	4	12	33%	1	12	8%	7	20	35%
Engagement	8	16	50%	8	12	67%	11	12	92%	13	20	65%

6. Conclusions

This article explored how the challenge of public governance for sustainable development gives rise to the platform paradigm as a successor of the bureaucratic, consumerist and participatory governance paradigms. Theoretical and conceptual underpinnings for platform governance for sustainable development were explored through the analysis of research literature. The analysis uncovered three entities – *Administration*, *Citizens* and *Policy* – and 15 types of relationships under different governance paradigms: *administer*, *steer* and *regulate* under the bureaucratic paradigm; *serve*, *engage*, *transform* and *legitimize* under the consumerist paradigm; *disclose*, *monitor* and *participate* under the participatory paradigm; and *empower*, *learn*, *coordinate*, *create* and *collaborate* under the platform paradigm. These elements were used to build the *Platform Governance for Sustainable Development* framework, which was subsequently used to structure, analyze and compare 11 case studies representing 11 articles included in the current issue.

The analysis found out that: three case studies belong to the digitalization stage, four each to the transformation and engagement stages and none to the contextualization stage of the digital government evolution (Janowski, 2015); more than half of the relationships belong to the engagement-stage case studies, one out of three to the transformation-stage case studies and one out of five to the digitalization-stage case studies; among the case studies, the most common relationship is *steer*, followed by *administer*, followed by *transform*, *empower* and *collaborate*, the least common is *legitimize*, followed by *create* and *regulate*; all paradigms are represented but one third belongs to the bureaucratic paradigm, one third to the platform paradigm and jointly one third to the consumerist and participatory paradigms; and the strongest coverage is provided by the participatory paradigm through engagement-stage case studies while the weakest by the same paradigm through transformation-stage case studies.

The framework could be used as a modelling construct to help deconstruct instances of the platform governance for sustainable

development, identify their elements, and map them into abstract entities and relationships provided by the framework, as in Section 3. Such representation views platform governance for sustainable development as a system with structure and behavior enacted through a series of relationships. For example, a path of connected relationships could be traced from the administration's decision to disclose a change in policy (disclose), through citizens monitoring such disclosures (monitor) and discussing views on them on social media (collaborate), to citizens influencing administration's position on this change (participate). This representation could facilitate better understanding of governance arrangements and particular outcomes resulting from such arrangements through visualization, simulation and analysis. In turn, gaining better understanding could lead to better (top-down) design or better control of (bottom-up) emergent growth of platform governance for sustainable development. Another application scenario is using the framework to compare instances of platform governance in different contexts in order to facilitate successful transfer between contexts. Yet another scenario is using the framework as a common structure for archiving cases of platform governance to facilitate discovery and learning. Exploring such applications is part of our future work.

The limitation of this research is the presence of a limited number of pre-selected case studies to test the framework, which were not chosen for this particular task. This pre-selection may imply some bias and lack of representativeness among cases. In addition, the case study authors were not asked to confirm the accuracy of the analysis. Another limitation is the absence of precise definitions of the relationships in the framework, which makes the task of mapping the case studies to the structure of the framework to some extent subjective. Due to the abstract nature of the framework, it covers external relationships between entities but ignores institutional elements within such entities and their influence on such relationships. Also, the organizational, personnel, financial and other resources required for various relationships are not covered. Finally, the absence of the citizen-administration relationships uncovered by the case studies includes: the *regulate* relationship from *Policy* to *Administration* highlighted by *Case 3* (Kumar & Rawat, this issue); the *learn* relationship for *Administration* itself uncovered by *Case 4* (Klabi et al., this issue); and the *empower* relationship targeting *Administration* uncovered by *Case 7* (Linders et al., this issue).

We plan to advance this research in a number of directions. First, we plan to formalize the framework, particularly by adding precise definitions of the citizen-administration relationships and limiting the subjectivity of the case-to-framework mapping. Second, we intend to develop guidelines to carry out the mapping of the case studies to match the structure of the framework. Third, we intend to validate the framework through a larger number of case studies, selected to test various aspects of the framework. In particular, we plan to test the framework on the case studies that belong to the contextualization stage of the digital government evolution. Fourth, we plan to test the suitability of the framework to various local or sectoral contexts. Finally, we plan to explore how the framework could enhance existing policy measures for advancing sustainable development. In particular, how *Platform Governance for Sustainable Development* could become one of the implementation means for Sustainable Development Goals.

Acknowledgments

References

Adams, B. E. (2007). *Citizen lobbyists: local efforts to influence public policy*. Temple University Press. Retrieved from https://www.jstor.org/stable/j.ctt14bt304.

Alcaraz-Quiles, F. J., Navarro-Galera, A., & Ortiz-Rodríguez, D. (2014). Factors influencing the transparency of sustainability information in regional governments: an empirical study. *Journal of Cleaner Production, 82*, 179–191.

Anttiroiko, A.-V., Valkama, P., & Bailey, S. J. (2014). Smart cities in the new service economy: building platforms for smart services. *AI & SOCIETY, 29*(3), 323–334.

Bäckstrand, K. (2006). Multi-stakeholder partnerships for sustainable development: rethinking legitimacy, accountability and effectiveness. *European Environment, 16*(5), 290–306.

Barrutia, J. M., & Echebarria, C. (2012). Greening regions: the effect of social entrepreneurship, co-decision and co-creation on the embrace of good sustainable development practices. *Journal of Environmental Planning and Management, 55*(10), 1348–1368.

Benington, J. (2009). Creating the Public In Order To Create Public Value? *International Journal of Public Administration, 32*(3–4), 232–249.

Bevir, M. (2012). *Governance: A Very Short Introduction*. Oxford University Press. Retrieved from https://books.google.pl/books?id=ozjcWIfhoO8C&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false.

Biermann, F., Abbott, K., Andresen, S., Bäckstrand, K., Bernstein, S., Betsill, M. M., ... Zondervan, R. (2012). Transforming governance and institutions for global sustainability: key insights from the Earth System Governance Project. *Current Opinion in Environmental Sustainability, 4*(1), 51–60.

Bogdanor, V. (Ed.). (2005). *Joint-Up Government*. Oxford University Press.

Brundiers, K., Wiek, A., & Redman, C. L. (2010). Real-world learning opportunities in sustainability: from classroom into the real world. *International Journal of Sustainability in Higher Education, 11*(4), 308–324.

Casado-Asensio, J., & Steurer, R. (2014). Integrated strategies on sustainable development, climate change mitigation and adaptation in Western Europe: communication rather than coordination. *Journal of Public Policy, 34*(03), 437–471.

Castell, N., Kobernus, M., Liu, H.-Y., Schneider, P., Lahoz, W., Berre, A. J., & Noll, J. (2015). Mobile technologies and services for environmental monitoring: The CitiSense-MOB approach. *Urban Climate, 14*, 370–382.

Connelly, S., Richardson, T., & Miles, T. (2006). Situated legitimacy: Deliberative arenas and the new rural governance. *Journal of Rural Studies, 22*(3), 267–277.

van Dijk, J., Kalidie, S., & Choenni, S. (this issue). Smart monitoring of the criminal justice system. Government Information Quarterly.

Emerson, K., Nabatchi, T., & Balogh, S. (2012). An Integrative framework for collaborative governance. *Journal of Public Administration Research and Theory, 22*(1), 1–29.

Espinosa, A., & Porter, T. (2011). Sustainability, complexity and learning: insights from complex systems approaches. *The Learning Organization, 18*(1), 54–72.

Folke, C., Carpenter, S., Elmqvist, T., Gunderson, L., Holling, C. S., & Walker, B. (2002). Resilience and sustainable development: building adaptive capacity in a world of transformations. *AMBIO: A Journal of the Human Environment, 31*(5), 437–440.

Geijzendorffer, I. R., Cohen-Shacham, E., Cord, A. F., Cramer, W., Guerra, C., & Martín-López, B. (2017). Ecosystem services in global sustainability policies. *Environmental Science & Policy, 74*, 40–48.

Geissel, B. (2009). Participatory governance: hope or danger for democracy? A case study of local agenda 21. *Local Government Studies, 35*(4), 401–414.

Glasbergen, P. (2011). Understanding partnerships for sustainable development analytically: the ladder of partnership activity as a methodological tool. *Environmental Policy and Governance, 21*(1), 1–13.

Goldsmith, S., & Eggers, W. D. (2004). *Governing by network: the new shape of the public sector*. Brookings Institution Press.

Grubnic, S., Thomson, I., & Georgakopoulos, G. (2015). New development: Managing and accounting for sustainable development across generations in public services—and call for papers. *Public Money & Management, 35*(3), 245–250.

Gupta, A., & Mason, M. (2016). Disclosing or obscuring? The politics of transparency in global climate governance. *Current Opinion in Environmental Sustainability, 18*, 82–90.

Gupta, J., Pouw, N. R. M., & Ros-Tonen, M. A. F. (2015). Towards an elaborated theory of inclusive development. *The European Journal of Development Research, 27*(4), 541–559.

Häikiö, L. (2007). Expertise, representation and the common good: Grounds for legitimacy in the urban governance network. *Urban Studies, 44*(11), 2147–2162.

Hamari, J., Sjöklint, M., & Ukkonen, A. (2016). The sharing economy: Why people participate in collaborative consumption. *Journal of the Association for Information Science and Technology, 67*(9), 2047–2059.

Hawkins, C. V., & Wang, X. (2012). Sustainable development governance. *Public Works Management & Policy, 17*(1), 7.

Heinrichs, H., & Laws, N. (2014). Sustainability State in the Making? Institutionalization of sustainability in German Federal policy making. *Sustainability, 6*(5), 2623–2641.

Hendriks, C. M., & Grin, J. (2007). Contextualizing reflexive governance: The politics of Dutch transitions to sustainability. *Journal of Environmental Policy & Planning, 9*(3–4), 333–350.

Henning, F. (this issue). A theoretical framework on the determinants of organizational adoption of interoperability standards in government information networks. Government Information Quarterly.

Hurlbert, M., & Gupta, J. (2015). The split ladder of participation: A diagnostic, strategic, and evaluation tool to assess when participation is necessary. *Environmental Science & Policy, 50*, 100–113.

Janowski, T. (2015). Digital government evolution: from transformation to contextualization. *Government Information Quarterly, 32*(3), 221–236. 1.

Janowski, T., Holm, J., & Estevez, E. (2013). *Proceedings of the 7th International Conference on Theory and Practice of Electronic Governance*. ACM Press International Conference Proceedings Series.

Janssen, M., & Estevez, E. (2013). Lean government and platform-based

governance—Doing more with less. *Government Information Quarterly, 30*(1), S1–S8.

Janssen, M., & Helbig, N. (this issue). Innovating and changing the policy-cycle: Policy-makers be prepared Government Information Quarterly.

Janssen, M., & van der Voort, H. (2016). Adaptive governance: Towards a stable, accountable and responsive government. *Government Information Quarterly, 33*(1), 1–5.

Jarvis, D., Berkeley, N., & Broughton, K. (2012). Evidencing the impact of community engagement in neighbourhood regeneration: the case of Canley Coventry. *Community Development Journal, 47*(2), 232–247.

Kemp, R., Parto, S., & Gibson, R. (2005). Governance for sustainable development: Moving from theory to practice. *Alternatives Journal, 8,* 12–30.

Klabi, H., Mellouli, S., & Rekik, M. (this issue). A reputation based electronic government procurement model. Government Information Quarterly.

Kumar, S., & Rawat, S. (this issue). Future e-waste: standardization for reliable assessment. Government Information.

Kusakabe, E. (2013). Advancing sustainable development at the local level: The case of machizukuri in Japanese cities. *Progress in Planning, 80,* 1–65.

Lange, P., Driessen, P. P. J., Sauer, A., Bornemann, B., & Burger, P. (2013). Governing towards sustainability—Conceptualizing modes of governance. *Journal of Environmental Policy & Planning, 15*(3), 403–425.

Linders, D. (2012). From e-government to we-government: Defining a typology for citizen coproduction in the age of social media. *Government Information Quarterly, 29*(4), 446–454.

Linders, D., Liao, C. Z.-P., & Wang, C.-M. (this issue). Proactive e-Governance: Flipping the Service Delivery Model in Taiwan. Government Information Quarterly.

Liu, X., & Zheng, L. (this issue). Cross-departmental Collaboration in One-Stop Service Center for Smart Governance in China: Factors, Strategies and Effectiveness. Government Information Quarterly.

Lozano, R. (2007). Collaboration as a pathway for sustainability. *Sustainable Development, 15*(6), 370–381.

Lundqvist, L. J. (2001). *Implementation from above: The ecology of power in Sweden's environmental governance. vol. 14,* 319–337.

Macnaghten, P., & Jacobs, M. (1997). Public identification with sustainable development. *Global Environmental Change, 7*(1), 5–24.

Mc Lennan, A., & Ngoma, W. Y. (2004). Quality governance for sustainable development? *Progress in Development Studies, 4*(4), 279–293.

Meadowcroft, J. (2004). Participation and sustainable development: modes of citizen, community and organizational involvement. *Governance for Sustainable Development: The Challenge of Adapting Form to Function* (pp. 162–190). Edward Elgar.

Meadowcroft, J. (2007). 'Who is in charge here? Governance for sustainable development in a complex world'. Journal of Environmental Policy and Planning, 9, 299–314.

Midin, M., Joseph, C., & Mohamed, N. (2017). Promoting societal governance: Stakeholders' engagement disclosure on Malaysian local authorities' websites. *Journal of Cleaner Production, 142,* 1672–1683.

Millard, J. (this issue). Open governance systems: Doing more with more. Government Information Quarterly.

Moss, M. L., Kaufman, S. M., & Townsend, A. M. (2006). The relationship of sustainability to telecommunications. *Technology in Society, 28*(1–2), 235–244.

Ojo, A. K., & Mellouli, S. (this issue). Deploying governance networks for societal challenges. Government Information Quarterly.

Ortiz-Fournier, L. V., Márquez, E., Flores, F. R., Rivera-Vázquez, J. C., & Colon, P. A. (2010). Integrating educational institutions to produce intellectual capital for sustainability in Caguas, Puerto Rico. *Knowledge Management Research & Practice, 8*(3), 203–215.

Porwol, L., Ojo, A., & Breslin, J. (this issue). Social software infrastructure for e-participation. Government Information Quarterly.

Rexhepi, A., Filiposka, S., & Trajkovik, V. (2018). Youth e-participation as a pillar of sustainable societies. *Journal of Cleaner Production, 174,* 114–122.

Roberts, D., & Diederichs, N. (2002). Durban's Local Agenda 21 programme: tackling sustainable development in a post-apartheid city. *Environment and Urbanization, 14*(1), 189–201.

Rykowski, J., & Cellary, W. (this issue). Challenges of Smart Industries - Privacy and Payment in Visible versus Unseen Internet. *Government Information Quarterly*.

Schomaker, R. (2014). *Institutional quality and private sector participation: Theory and empirical findings. vol. 3,* 104–118.

Sharma, R., Fantin, A.-R., Prabhu, N., Guan, C., & Dattakumar, A. (2016). Digital literacy and knowledge societies: A grounded theory investigation of sustainable development. *Telecommunications Policy, 40*(7), 628–643.

Sinclair, A. J., Diduck, A., & Fitzpatrick, P. (2008). Conceptualizing learning for sustainability through environmental assessment: critical reflections on 15 years of research. *Environmental Impact Assessment Review, 28*(7), 415–428.

Sipos, Y., Battisti, B., & Grimm, K. (2008). Achieving transformative sustainability learning: engaging head, hands and heart. *International Journal of Sustainability in Higher Education, 9*(1), 68–86.

Smith, W. (2004). The Role of Monitoring in Cutting Crime. *Journal of Sustainable Forestry, 19*(1–3), 293–317.

Söderholm, K., & Wihlborg, E. (2016). Striving for sustainable development and the co-ordinating role of the central government: Lessons from Swedish housing policy. *Sustainability, 8*(8), 827.

Steurer, R. (2007). From government strategies to strategic public management: an

exploratory outlook on the pursuit of cross-sectoral policy integration. *European Environment, 17*(3), 201–214.

Steurer, R. (2010). The role of governments in corporate social responsibility: characterizing public policies on CSR in Europe. *Policy Sciences, 43*(1), 49–72.

Steurer, R. (2013). Disentangling governance: a synoptic view of regulation by government, business and civil society. *Policy Sciences, 46*(4), 387–410.

Steurer, R., & Hametner, M. (2013). Objectives and indicators in sustainable development strategies: similarities and variances across Europe. *Sustainable Development, 21*(4), 224–241.

Thurston, A. (2015). Access to reliable public records as evidence for freedom of information in commonwealth Africa. *The Round Table, 104*(6), 703–713.

Trivellato, B. (2017). How can 'smart' also be socially sustainable? Insights from the case of Milan. *European Urban and Regional Studies, 24*(4), 337–351.

Van den Hove, S. (2006). Between consensus and compromise: acknowledging the negotiation dimension in participatory approaches. *Land Use Policy, 23*(1), 10–17.

Van der Hel, S., & Biermann, F. (2017). The authority of science in sustainability governance: A structured comparison of six science institutions engaged with the Sustainable Development Goals. *Environmental Science & Policy, 77,* 211–220.

Van Stigt, R., Driessen, P. P. J., & Spit, T. J. M. (2013). Compact city development and the challenge of environmental policy integration: A multi-level governance perspective. *Environmental Policy and Governance, 23*(4), 221–233.

Villeneuve, J. (2017). Citizen-administration relationships. *Global encyclopedia of public administration, public policy, and governance* (pp. 1–4). .

Voegtlin, C., & Scherer, A. G. (2017). Responsible innovation and the innovation of responsibility: Governing sustainable development in a globalized world. *Journal of Business Ethics, 143*(2), 227–243.

Volkery, A., Swanson, D., Jacob, K., Bregha, F., & Pintér, L. (2006). Coordination, challenges, and innovations in 19 national sustainable development strategies. *World Development, 34*(12), 2047–2063.

Voß, J.-P., Newig, J., Kastens, B., Monstadt, J., & Nölting, B. (2007). Steering for sustainable development: a typology of problems and strategies with respect to ambivalence, uncertainty and distributed power. *Journal of Environmental Policy & Planning, 9*(3–4), 193–212.

Walker, G., & Shove, E. (2007). Ambivalence, sustainability and the governance of socio-technical transitions. *Journal of Environmental Policy & Planning, 9*(3–4), 213–225.

World Commission on Environment and Development (1987). Our Common Future. Retrieved from http://www.un-documents.net/our-common-future.pdf.

Xenias, D., & Whitmarsh, L. (2013). Dimensions and determinants of expert and public attitudes to sustainable transport policies and technologies. *Transportation Research Part A: Policy and Practice, 48,* 75–85.

Zhang, J., Liu, H., Sayogo, D. S., Picazo-Vela, S., & Luna-Reyes, L. (2016). Strengthening institutional-based trust for sustainable consumption: Lessons for smart disclosure. *Government Information Quarterly, 33*(3), 552–561.

Tomasz Janowski is the Head of the Department of Applied Informatics in Management at the Gdańsk University of Technology, Poland; Invited Professor at Danube University Krems, Austria; and Co-Editor-in-Chief of Government Information Quarterly, Elsevier. Previously, he was Invited Professor at University of Lugano, Switzerland and University of Minho, Portugal. During 2004-2016, he founded and directed a digital government program at the United Nations University in Macao and Portugal, which conducted activities in 61, mostly developing countries. He also carried out multiple projects and consultations for the Commonwealth Secretariat, European Commission, IDRC, ITU, Macao Foundation, Microsoft, OSCE, UNDP, UNESCO and the World Bank, and for governments in Africa, Asia and Latin America. His research, policy and education work focus on digital government and development informatics.

Elsa Estevez is an Independent Researcher at the National Council of Scientific and Technical Research, Full Professor at the National University of La Plata, and Assistant Professor at the National University of the South, all in Argentina. She is also a consultant for Inter-American Development Bank and for Organization for Economic Cooperation and Development. Previously, she was Senior Academic Program Officer and Academic Program Officer at the United Nations University in Macao and Portugal; Visiting Professor at the National University of Rio Negro, Argentina and University of Minho, Portugal; and head of Information Technology (IT) departments in financial and pharmaceutical sectors in Argentina. Her research interests include institutionalization of the IT function in government, transformation of government-citizen relationships through IT, and the impact of such transformation on public policy and development.

Rehema Baguma is a Senior Lecturer and Researcher in Information Systems at the School of Computing and Information Technology, Makarere University, Uganda. She is also a part-time Associate Professor at Uganda Technology and Management University (UTAMU), and a consultant for information and communication technology for development, particularly for the East African region. Previously, she was the Director for Academic Affairs at UTAMU and Head of the Information Systems Department at Makerere University. Her research interests include usability and accessibility of e-governance systems, information technology policy and strategy development, and capacity building in information technology-enabled governance.