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Shaping public sector innovation theory: an interpretative framework for ICT-enabled governance innovation

Gianluca Misuraca[1] · **Gianluigi Viscusi**[2]

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Abstract The paper discusses from a conceptual standpoint the need for renewing the lenses through which looking at the phenomenon of ICT-enabled innovation in governance and policy-making, suggesting that a possible 'new theory of public sector innovatioń should be advanced. In doing this, it should be considered the specific networked structure of governance systems, the policy-making goals of public value, as well as the various constituencies and stakeholders' relationships that characterize the public sector. For this purpose, the paper first presents the key findings of an extensive literature review conducted to support the quest for renewing ICT-enabled innovation in the public sector and the manner in which it is measured and evaluated. Then, building on recent research conducted by the authors an interpretative framework to assess how ICT-enabled innovations produce changes in governance processes is proposed and discussed. The paper ends with conclusions and indications on future research.

Keywords Innovation · ICT · Public sector · Governance · Policy-making

✉ Gianluca Misuraca
gianluca.misuraca@ec.europa.eu

Gianluigi Viscusi
gianluigi.viscusi@epfl.ch

[1] Joint Research Centre, Institute for Prospective Technological Studies (JRC-IPTS), European Commission, Edificio EXPO c/Inca Garcilaso, 3 – E, 41092 Seville, Spain

[2] Ecole Polytechnique Fédérale de Lausanne, College of Management of Technology, CDM-EPFL – ODY 1 16 (Odyssea) Station 5, 1015 Lausanne, Switzerland

1 Introduction

In the last two decades national and local governments worldwide have invested heavily in introducing ICT-enabled services. Nevertheless, until now the results of these investments have not met the expectations, particularly in the public sector, where the take-up of ICT-enabled public services has been relatively low and the anticipated transformation of the administrations not as rapid and radical as it was anticipated [1]. It seems that the public sector is experiencing an endemic difficulty in the adoption of much needed innovations. Applications that have proven their value on a limited scale, for example in healthcare and education, are not deployed on a wide scale. This is not due to technical limitations but rather as a result of the way public services are organized. Key factors limiting the adoption and spread of innovations are barriers such as organizational fragmentation, institutionalized distrust and misalignment of financial incentives.

These factors are now coming to the surface and taken into account in particular when analyzing impact and trends in public sector service development. Thus, further analysis and more clear and tested indicators to assess the impacts ICT-enabled innovation can have on the public sector and its implications on governance and policy-making are required. As a part of ICT trends in the public services, public sector institutions in fact recognized the need to turn to services that are closer to people's everyday life, to use innovative tools to reach and engage citizens and to better share information and knowledge within and between organizations. Thus, the role of government is shifting towards providing reliable data or regulating how data are handled, data that will be then reused by individuals or other organizations through web application hybrids (*mashups*) eventually personalized and contextualized to specific needs. This lateral approach would in principle empower users to express their needs, choices and shape service delivery tools. Also, public institutions are increasingly making use of "collective intelligence" (*crowdsourcing*) and user-generated content to encourage real-time interaction and facilitate participation. At the same time, ICT-enabled governance mechanisms can enhance collaboration within government agencies and interaction with stakeholders, transforming processes into more user-centric, cost-effective solutions and bringing added value to end-users [2]. This calls for further research to better understanding the implications of changes deriving from emerging *ICT-enabled innovations for governance,*[1] especially considering that it seems there is no evidence yet of: (i) the direct intervening effects of ICT-enabled innovations on governance systems; (ii) the indirect intervening effects of ICT-enabled innovations on the institutional settings themselves; and (iii) the causal connection (if any) with policy outcomes and socio-economic impacts.

[1] In this paper we consider´ICT-enabled innovation for governancé as an umbrella term for a number of ICT-based applications that are used in order to achieve the target of participative, evidence-based governance and improve policy-making [1, 2]. These applications can be mapped into several overlapping areas: Web Technologies, Systems and Services Technologies, Social Informatics and Management tools, visual analytics, innovative interfaces, user-friendly context aware systems, etc. the boundaries among which are not well defined.

2 Objectives and methodological approach

The aim of this article is to provide an interpretive framework for analysis of ICT-enabled innovation initiatives and the resulting digital governance [3] configurations (integrating a conceptual model proposed in [4]). To this end, it is our point that the development of such a theoretical perspective requires an important effort of systematization of the state of art in diverse disciplines and it should build on existing theoretical frames, especially in the area of innovation studies, but also be complemented by insights from recent developments of network science, especially due to the specific characteristics of public governance and policy-making in the current 'networked society'. To support our claim, in first instance we conduct a literature review in the broad area of ICT-enabled innovation for governance, looking not only at the traditional e-Government and e-Governance research, but analyzing as well the theoretical foundations from innovation and management research that surround the diverse theories that can be applied to study and experiment ICT-enabled innovation, thus, attempting to transpose them on the specific area under investigation. For this purpose, the selection of references has been guided by the need to connect classical arguments for concepts such as innovation and network analysis, to recent contributions from academic as well as policy oriented literature.

The article advances as follows. In Sect. 3 we discuss the key findings of our literature review to support our quest for renewing ICT-enabled innovation in the public sector. In Sect. 4, building on recent research conducted by the authors [5], an interpretative framework to assess how ICT-enabled innovations produce changes in governance processes is proposed and discussed. Section 5 provides conclusions and indications on future research.

3 Literature review

3.1 The quest for renewing ICT-enabled public sector innovation

A significant part of the innovation in the public sector has been linked to the uptake of ICTs. However, after over 20 years of research and practical implementation it is widely recognized by both the scientific and the practice communities that despite the potential of using ICTs for improving government operations, the evidence of its impact is still limited and the promised productivity gains seem not having been achieved yet [6, 7].

Furthermore, although there is evidence from the literature that ICTs have the potential to increase innovation [8, 9] it is worth noting that most of the available studies do not focus on the link between ICT use and innovation in public governance and do not consider potential network's effects on institutional settings and society at large. Within this background, it is our assumption, that the introduction of ICT-enabled innovation has different effects according to different governance mechanisms adopted in specific policy domains and contexts; thus, we

aim at better understanding how governance processes and policy-making mechanisms change due to the application of ICT-enabled innovation. In this connection, if we attempt to transpose the innovator's dilemma [10] to the public sector as the "Policy-makeŕs innovation dilemma" we could envision a government that doing everything by the book (following the rule of law, managing by facts, being disciplined about costs and quality, etc.), it may probably fails in listening to citizens and is not able to engage properly with them, not being capable of anticipating unexpected situations. Consequently, this government gets blindsided by an "innovation" that rapidly takes away its sphere of power in the governance space, because it was doing everything right, but not coping with the transformations happening in the society surrounding its machinery [2]. A radical innovation can instead occur, for example, if the government is not democratic (or recognized to be so by a large majority of its constituency) in its governance system and thus innovations could happen changing substantially the way it operates, transforming the policy-making mechanisms in a substantial manner.[2] Here, the key point to remember is that disruption is a market/business (societal/governance we could add) phenomenon and may not represent a major technical breakthrough. Major breakthroughs, called 'radical' in Christensen's model [10], may or may not be disruptive, while minor, or 'incremental' innovations can be massively disruptive.

Another element to consider, especially if we look at it from a public sector perspective, is that an important barrier to successful radical innovation initiatives is that the real driver of innovation is culture, and culture is the most difficult layer of the business and governance pyramid to change [11]. Also, state of the art indicates that corporate culture, not national culture, has the greatest impact on radical innovations [11, 12]. So it can be argued that innovation ask for an appropriate corporate culture. This is of relevance for public governance as it entails the need for political leadership to engage in innovation and the role of *organizational innovativeness* to be further understood. Furthermore, as for the public sector innovation, it implies a consideration of frameworks, models, and methods for policy-making and governance [13]. In this regard, while at the state of the art an organization's ability to innovate is recognized as one of the determinant factors for organizations to survive and succeed [14, 15], few are the authors that address the concern of effectively measuring organizational innovativeness [16, 17]. In fact, innovation may be present in various forms. Schumpeter suggested a range of possible innovative alternatives, namely developing new products or services, developing new methods of production, identifying new markets, discovering new sources of supply, and developing new organizational forms [18].

In this connection, and for the purpose of attempting to assess the innovation potential of ICT-enabled applications for public service, a crucial aspect concerns the dimension of *service innovation*, investigated by a strand of studies emerged within the last two decade [19]. This has, among other things, resulted in the development of new, service-specific innovation concepts. However, these concepts

[2] But of course this can be disputed as the concept of democracy itself may be challenged and have different meaning in different contexts. And indeed changes per se are not innovation, and actually innovations can cause changes that could be problematic, as the case of the Arab spring has demonstrated [2].

imply a merging of actual innovation with activities such as *learning* and *codification of knowledge* [20, 21]. Whereas learning and codification of knowledge are closely related to innovation, the inclusion of activities that require or result in learning, but neither result in new products, processes, markets nor organizational structures, in the definition of innovation, implies that the meaning of innovation as an economic concept becomes unclear. The need for the development of a '*synthesis approach*' to innovation thus emerged. This has a broad and conceptually solid perspective on innovation, whether this is carried out in manufacturing, in services, or in an area not necessarily market oriented as the one that characterize public sector innovation [22]. Consequently, different avenues for studying service innovation have been explored, ranging from approaches that view services from a manufacturing perspective, to approaches that treat service activities as something distinctly different from other types of economic activity [23]. For instance, Coombs and Miles [24] distinguish between three different approaches for defining and studying innovation in services: (i) an *assimilation* approach, which treats services as similar to manufacturing; (ii) a *demarcation* approach, which argues that service innovation is distinctively different from innovation in manufacturing; and (iii) a *synthesis* approach, which suggests that service innovation brings to the forefront neglected elements of innovation relevant to both manufacturing and services.

Nevertheless, a key reference for assessing the service specific innovation concepts is Schumpeter's original notion of innovation [18]. Indeed, the role of innovations in promoting development is articulated in the focal shifts that they produce [25]. Furthermore, in his later work [26], Schumpeter, on the one hand, puts less importance on the role of the entrepreneur in the process of innovation; on the other hand, he argues that innovation does not have to be radical and unpredictable to be considered a true innovation [23]. As a matter of fact once the technological progress is in charge to trained specialists, it may become easier to do things that lie outside the familiar routine, and innovation itself can be perceived as routine [26]. Consequently, Schumpeter describes innovation as a process of industrial mutation that incessantly revolutionizes the economic structure from within [26]. The reason for putting such emphasis on Schumpeter's notion of innovation in the context of this article is that the Schumpeterian perspective on the innovation process recognizes that innovation does not have to be radical and unpredictable to be considered a true innovation appears appropriate to interpret the changes we are interested in: the paradigm shifts in the public sector [27].

It is this focus on how innovation is carried out in services that contributed to the 'synthesis approach', such as Gallouj and Weinstein [22] define it: *to develop new concepts in their effort to illustrate how traditional innovation studies are too limited in their focus*. The contribution from the new innovation concepts launched in relation to the service studies lies in the attention they direct toward the multiplicity of ways through which innovations can be carried out. More important, the concepts also distinguish between different types of innovation in relation to their degree of newness—and to their degree of being a true innovation.

Considering the innovation focus and the key dimensions in Table 1, a possible '*theory of public sector innovation*' should look both at the dimensions described

Table 1 Innovation focus, key dimensions per domains considered in the literature

Innovation focus	Key dimensions	Considered domain
Organizational	National culture [28]	Public sector
	Corporate culture [11, 12]	Private sector
	Political leadership [28]	Public sector
	Risk taking [29]	Private sector
Service	Learning [20, 21]	Public and private sector
	Codification of knowledge [20, 21]	Public and private sector
Technology-enabled innovation	Focal shifts [25]	Private sector

above in terms of organizational innovativeness (what in the model proposed in the following Sections are called *Governance models' characteristics*, see also the Figs. 1, 2) and at the categories of service innovation outlined in literature, as well as other more public-service specific elements (*value drivers* in Fig. 2), contributing to the focus shifts in digital governance systems configurations promoted by ICT-enabled innovation.

3.2 Trends and limitations in assessing ICT-enabled innovation in the public sector

The opportunities provided by ICTs to renew governance processes and policy-making mechanisms are in line with experts' visions of future public services and emerging trends [1, 30] (see a summary in Table 2), seeing the former increasingly delivered by a plurality of private and not for profit intermediaries.

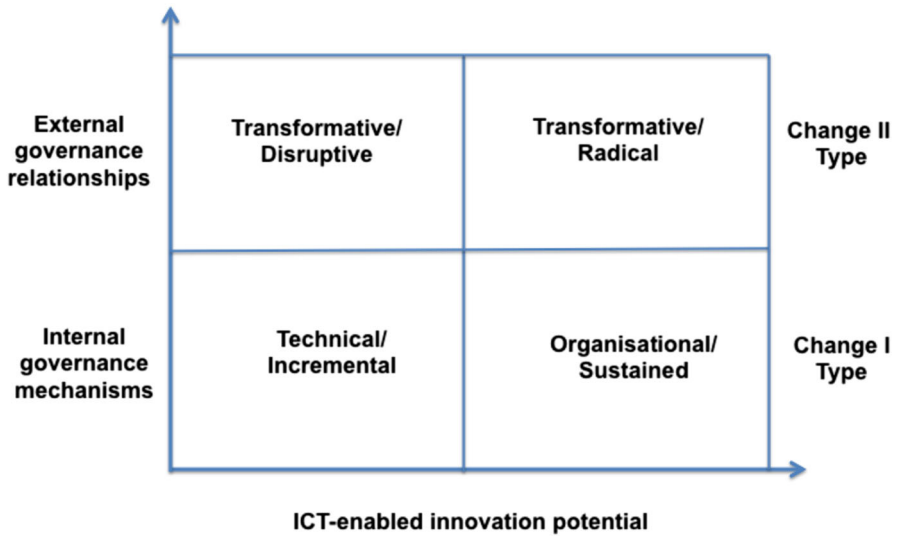

Fig. 1 Interpretative framework for assessing ICT-enabled innovation for governance

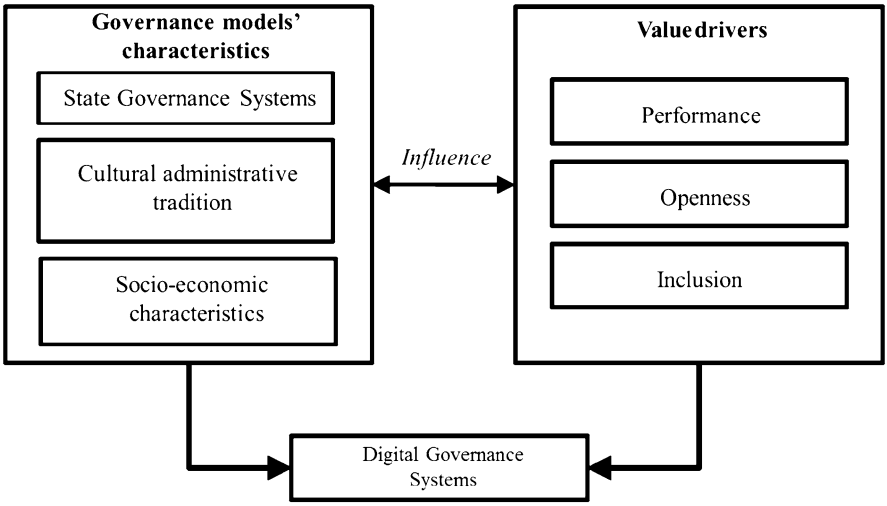

Fig. 2 Conceptual model for assessing ICT-enabled innovation for governance

Table 2 Trends, challenges, and relevant dimensions for innovation targets

Trends	Challenges	Innovation target	Relevant dimensions
The diffusion of pervasive, always on Internet connection.	Increased amount of services and content consumed and produced by users.	Service	Accessibility
The 'democratization of software through a combination of web-based and open source software	Lowered barriers to entry in providing web-based services	Service/ Organization/ Legal framework	Openness
New expectations of citizens about government services and policy making	Co-decision making and co-production of public services	Organization	Openness/ Inclusion
Innovative ICT-based simulation and modeling techniques.	Interpretation issues for unplanned outcomes of complex interaction	Technology/ Organization	Accountability/ Transparency

In this context, the role of collaborative technologies is recognized as a crucial aspect and potential driver for ICT-enabled innovation, both in terms of organizational empowerment and with regard to the reshaping of the relations and communication channels with citizens and businesses [31]. In this connection, a wealth of ICT-based applications emerged showing the potential they represent as enablers for developing new models of governance and participatory mechanisms of policy-making.[3] However, despite there are already many ICT-supported

[3] For further details we refer the reader to the CROSSROAD project (*A Participative Roadmap for ICT Research on Electronic Governance and Policy Modelling, 2010*, European Commission, FP7 Support Action, ICT Work Programme 2009-2010).

experiences which are raising the level of the political discussion, solid evidence and scientific validation of the positive correlation between (a) on the one hand increased ICT-enabled participation and (b) on the other hand, better decision-making, is still to be proved. At the same time, while there is an expectation that ICTs shall improve various forms of citizen participation in the social and political process of shaping tomorrow's society, one important clue is to examine how this can be possibly done. In particular, we are interested in exploring if the outcomes and indicators to measure the impacts produced by such innovations are weighting in favor of introducing new and innovative ICT-enabled governance mechanisms which in turn shall transform the business of the government, and at the same time analyze which are the implications of these impacts on policy-making.

In this regard, the effects of ICTs on public administration and the services it delivers have commonly been debated by looking at what technologies and their applications enable governments to do. Consequently, ICT enabled innovation has been discussed as development processes which mimic the evolving nature of ICTs [32]. Accordingly, we find literature which debates these reforms as a phenomenon that can be described in terms of its development phases [33, 34] to highlight how new ICT-enabled functionalities changes the nature and organization of governments' activities. However, it is now well established that the adoption of ICTs in governments transforms the way in which public administrations organize and deliver services. These changes affect the nature or the means through which services are provided and therefore have political and societal consequences [35, 36] that should not be overlooked. These effects are directly related to the public value that governance and policy-making is expected to produce and that is far from being clearly addressed with regard to the changed evaluation paradigm it requires.

It is also evident that in spite of the efforts made by many institutions and the considerable resources invested in supporting innovation in public administration through ICTs, there still not exists consensus about how to evaluate the results of the investments in e-Government projects. On the one hand this is due to the fact that not all the results of the e-Government innovation processes, which have been put into action, are visible yet. On the other hand, the complexity itself of the concept of e-Government makes it difficult to define an evaluation system that can be applied to all the areas covered by that concept (e-Administration, e-Services, e-Inclusion, e-Participation, etc.). Adopting a broad definition of e-Government, and following that suggested by the OECD [37], the evaluation of an e-Government system must be referred to its capacity of improving on the whole the performance of the organization adopting it.

In this perspective, the concept of public value can provide an interesting point of view for the evaluation of the performances of Public Administration [38, 39]. In a broad sense, *public value* refers to *the ´value created by government through services, law regulations and other actionś* [40]. Public value provides a broader measure than is conventionally used within the new public management literature, covering outcomes, the means used to deliver them as well as trust and legitimacy. Furthermore, it addresses issues such as equity, ethos and accountability [40]. These can be considered as elements generating value also as regards the internal stakeholders involved in the management of innovation processes. Generating

public value for citizens through services depends on the level of quality with which they are delivered in terms of: service availability; satisfaction levels; importance; fairness of provision; cost. The close relationship between the concept of public value and e-Government has been pointed out first of all by Kearns [41]. In a critical discussion about the excessive emphasis given to online services as the central element of e-Government systems, Kearns applies the work of Kelly, Mulgan and Muers [40] directly to the evaluation of e-Government. In this connection, the use of ICTs to improve governance, as implied by e-Government policies, can be considered as a means to increase the public value produced by public administration. Hence, the policies for e-Government can be evaluated according to their ability to increase the public administration capacity of producing public value [41]. In general, a public value-based evaluation must be performed by considering the value that citizens perceive in their interactions with the public administration [42].

For instance, discussing the value of ICTs for public administration, Bannister [43] underlines that the definition of value reflects the fact that citizens interact with public administration playing different roles. Thus, public value can be measured both from an external point of view (*citizens as users*) and from an internal point of view *(citizens as operators*). In the first case, the policies for e-Government can be evaluated with respect to the quality of the services delivered to citizens; in the latter case they can be evaluated with respect to their ability to improve the governance system at various levels of implementation [44]. As observed by Castelnovo and Simonetta, [44] the evaluation of the governance system as regards achieving the desired outcomes concerns first of all the impact of policies on the related context on which they are applied. In a broader meaning of the concept, the context is referred also to the notion of *constitutive environment*, which could be intended also as a multi-level governance system. Finally, trust is considered a crucial source of public value [40], evaluating the capability of government to increase through its activity the citizens' trust towards public administration, or activities that are set up by governments to make their members willing to make increasing and irreversible commitments towards cooperation [45].

In this perspective, several attempts have been put forward to evaluate the public value of e-Government. For instance, a pragmatic approach to assess the return on investment of e-Government through a public value framework has been proposed by the Centre of Technology in Government (CTG) of the University of Albany [46]. This framework addresses one basic question about public value assessment: *What constitutes good evidence of public value impacts?* Then, the applied approach consists of a way to identify, collect, and interpret a variety of evidence, both quantitative and qualitative, that can be used to assess public value. In this regard, considering a wider perspective on change in the public sector, Cordella and Bonina [39] actually pointed out the public value paradigm as an alternative approach for studying ICT-enabled public sector reforms. In particular, it suggests that the qualities of public sector organizations are assessed on the basis of their ability to deliver the expected value to the citizens and not only by their value-for-money ratio.

However, the challenges associated with measuring outputs, outcomes and impacts of ICTs policies and contribution of ICTs to other policy areas go beyond the difficulty to develop valid indicators that truly measure the outputs and outcomes of public service delivery. Indeed, despite the "measurement paradigm" is now becoming consolidated also in the public sector, there are still profound differences between countries, mainly due to the cultural and organizational diversity of various governance models and the diverse role and types of networks of stakeholders [7]. The latter is further analyzed in the subsequent Section.

3.3 Networks and governance in public sector innovation

In order to interpret innovation dynamics in public governance, it is required to extend our analysis to a mix of theories and approaches that could serve to address the phenomenon from a multi-level organizational/network perspective. Actually, the idea that networks are crucial in spurring innovation has been widely applied at national innovation system level [47–49]. Proceeding from a network model of innovation, Freeman [48] defined the national innovation system (NIS) as "*a network of institutions in the private and public sector whose activities and interactions engender, modify and spread new technologies*". NIS has since become the categorical framework for analyzing innovations and the theoretical foundation for governmental innovation policy. Furthermore, with "triple helix" Etzkowitz [50] described a tight linkage between the government, academia and the economy—particularly industry—as a necessary precondition for successful economic growth.

On a different perspective, social network analysis has been first developed and applied to the study of individuals' action and later in organizational and management studies focusing on inter-organizational networks [51–54] and network externalities to understand how exchange of information between organizations impacts their rates of innovation [51, 54]. Networks are in particular studied to identify nodes enabling organizations to share information and knowledge [52]. Elements of knowledge that reside in the environment are important for the innovative process and it has been empirically shown that innovative organizations search for external knowledge in their environment [55–57]. In this regard, most research on organizational networks can be broadly characterized by two basic approaches: the *network analytical approach* and the *network as a form of governance approach*, both of which are limited when it comes to analyzing multi-level networks functioning and governance [2].

The *Network analytical approach* focuses mainly on micro-level aspects of networks, building largely on work done by sociologists studying networks of individuals, considering network structural characteristics using such concepts as density, centrality, and structural holes [58–60]. In network analytical approaches, the main objective can be either to describe, explain, or compare relational configurations or to use these configurations to explain certain outcomes. Apart from some notable exceptions (for example, [61–64]), the unit of analysis in this literature is not the complete network but a node (ego) or a dyad. In these studies, findings are related to questions of whether or not the way an actor is embedded in a

network has an effect on the outcomes of the actor (such as level of innovation, performance, and learning), or on describing and explaining the birth, death, effectiveness, etc. of dyadic relationships.

The *network as a form of governance approach*, in contrast, does treat networks as the unit of analysis. Network is viewed as a mechanism of coordination, or what has often been referred to as network-governance. Starting with Williamson's "Markets and Hierarchies" [65], a rich literature has developed on different forms of governance. Consequently, a discussion unfolded as to whether networks are simply a combination of elements of market and hierarchy and could, therefore, be placed on a continuum between market and hierarchy, or whether they would be better understood as unique forms of governance in their own right [66]. This literature moved towards treating networks as discrete forms of governance, characterizing them as having unique structural characteristics, modes of conflict resolution, bases of legitimacy, etc. [67]. Although the governance approach considers networks as the unit of analysis, the tradition has been for networks to be treated as undifferentiated forms, as if they were all characterized in the same general way [66, 67]. This may be due to the fact that for the most part, networks were seen as a 'new' and 'positive' mode of coordination that needed to be distinguished from markets and hierarchies.

Considering the summary shown in Table 3, what we propose in our approach is to combine the network analytical and governance perspectives, focusing specifically on the enabling networking role played by ICTs in support of the functioning of the governance system intended as a network (ICT-enabled governance as networked governance). Thus, networks are considered to vary with regard to their structural patterns of relations and according to the use of ICT-enabled innovations to trigger network effects. Consistent with this logic, we hold that ICT-enabled governance networks with different configurations have different network-level effects. This can be considered also our main research hypothesis and the basis for establishing a rationale for contributing developing multi-level network theories in the area of ICT-enabled innovation in the public sector and the further development of an interpretative framework to examine the conditions for the effectiveness of different configurations of governance networks enabled by ICT innovations.

Table 3 Focus, characteristics, and units of observation for networks analytical and governance approach

Approaches	Focus	Characteristics	Units of observation
Network analytical approach	Individuals (Micro-level)	Density, centrality, structural holes	Nodes, positions, actors
Network as a form of governance approach	Networks (Meso-Macro level)	Legitimacy, Coordination, Structure, Conflict	Networks

4 An interpretative framework to assess ICT-enabled innovation in the public sector

Within this context, as we anticipated above (see Sect. 3), it is our assumption that the introduction of ICT-enabled innovations in the public sector has different effects according to different governance mechanisms adopted in specific policy domains and governance settings. In our view, ICT-enabled innovations can produce changes in governance processes in various ways (see Fig. 1 and [2, 5] for further details): *technical/incremental change* through the use of ICTs to facilitate automation of administrative routines tasks and thereby improvement of efficiency of governance processes; *organizational/sustained change* through the use of ICTs to support, facilitate or complement existing efforts to improve governance mechanisms (e.g., social computing in connecting decision-makers with their constituencies); *transformative/disruptive change*, by using ICTs to create new mechanisms for service delivery or policy-making (e.g. providing direct access to the same information to all individuals through websites or other collaboration tools); *transformative/radical change* with substantial use of ICTs outside the recognized institutional setting, thus changing the governance systems in power, or radically transforming the existing policy-making mechanisms (e.g. use of ICTs for mobilizing protests).

The first and second typologies of change are traditionally incremental forms of innovation, characterized by a gradual process of adaptation and sustained technological change. The third and fourth typologies of change could produce instead disruptive or radical innovation effects, depending on the specific socio-political context and cultural tradition, as well as the governance organizational and knowledge capabilities. It is evident that we are particularly interested especially to the third form of change, when ICT-enabled innovations have a disruptive effect (but also to a certain extent to the fourth category of radical change that could occur in some cases).

As a result of our exploration, in fact, and building on the extensive literature review carried out, it appears clear that in order to assess the potential of ICT-enabled innovation for governance and policy-making it is required to further advance on the theoretical understanding of the impacts ICTs have on governance processes and policy-making mechanisms. In particular, as we have discussed in previous sections, there is a limited literature and empirical evidence showing the effects ICT-enabled innovation is producing on public governance. More in general a *theory of public sector innovation* is far from being consolidated, despite some attempts made in that direction (e.g. the Public Sector Innovation—PUBLIN—research project, funded under the EU 5th Framework Programme, 1998–2002; the ICT-NET research network funded by the EU, specifically focusing also on ICT-enabled innovation; and the OECD Observatory of Public Sector Innovation launched in 2014). Moreover, when focusing on the specific role ICT-enabled innovation play, the various concepts that can be defined as forming an 'ICT-enabled governance complex' [2] should be considered so to better understand the potential amplifying role of ICTs. In particular, if we apply the interpretative framework proposed to assess the potential of ICT-enabled innovation in the public

sector, it becomes evident that ICTs are changing the governance landscape in many respects. In most cases, however, we assist to technical changes that are driven by incremental innovations and that a continuous effort, in organizational change, training and knowledge management, as well as political leadership, is needed for such innovations to be sustained over time. Our claim is that, despite the progresses that are made and the benefits that can be gained, especially in terms of reform of internal governance processes, it is still a change of 'first order' or 'Type I' [2].

However, it is becoming recognized that more recent user-driven ICT-enabled innovations in the area of Mobile ICTs and Social Computing, and especially their integrated forms, are already producing *transformative changes* impinging in several cases on disruptive innovations. These innovations are 'slowly' but strongly supporting (or in certain cases guiding) changes that can be defined of a 'second order' or 'Type II' [2], as they are likely to modify substantially the way governance and policy-making is exercised, at least in more advanced societies, but in an increasing way also in emerging and developing economies. Several examples exist of new and innovative ways of engaging citizens and reshape the external relationships of governments, with increasing options for policy-makers to build on evidence and insights generated outside the sphere of action of institutionalized governance actors. To a certain extent, but yet to be proven, some ICT-enabled innovations have the potential to cause transformations that are radical in nature. The case of the role of ICT-enabled innovations in support to social movements and in particular the Arab Spring in 2011, seemed providing some signals that this may be the case, if not yet today, in the future [2].[4] Whereas it is worth noting the effects of ICTs on public administration and the services it delivers have commonly been debated by looking at what technologies and their applications enable governments to do [32], it is now well established that the adoption of ICTs in governments changes the way in which public administrations organize and deliver services. These changes affect the nature or the means through which services are provided and therefore have political and societal consequences (e.g. [35]) that should not be overlooked. These effects are directly related to the public values that governance and policy-making is expected to produce. As we have seen above, approaches to study the impact of ICTs on public value creation have already been proposed and discussed in literature. All these approaches are based, however, on indicators defined to measure the direct or indirect impact of ICTs adoption in public sector administrative and economic performances. Hence, the social and political impacts of public value creation are measured in terms of improvement of administrative or economic performances in public administration offices [39].

In parallel to efforts conducted by other scholars (see for instance [38, 39, 44, 46, 68]), we therefore propose a comprehensive interpretative framework to assess ICT-enabled innovation for governance and policy-making, based on three key value drivers, *Performance*, *Openness*, and *Inclusion* and their relationship with *Governance model characteristics*, i.e., state governance system, cultural

[4] Even though in this regard the recent developments of the Arab spring revolutions in certain countries are showing the limitations and high risks linked to radical changes in governance and policy-making that are also ICT-enabled or supported [2].

administrative tradition and socio-economic characteristics of the context of intervention (see Fig. 2).

The conceptual model represented in Fig. 2 aims to support the elicitation of different configurations of ICT-enabled innovation for governance on the basis of the diverse relationships between its factors (see also [4, 5]). Thus, the model aims to provide an interpretative instrument to deal with the multiple facets and layers of ICT-enabled governance and in particular, the duality of influence of the above factors. Our conceptualization points to the public value paradigm as an approach for assessing ICT-enabled innovation for governance and policy-making, looking at the nature of the challenges faced when ICT-enabled innovations are initiated and studied. The framework suggests that the qualities of governance and policy-making should be assessed on the basis of their ability to deliver the expected value to the citizens and not only by their value-for-money ratio. The latter can be an expected value, but not necessarily the only and prevailing one. By putting the creation of public value at the center of government objectives, it becomes clear that the collective expectations, and the policies needed to accomplish these expectations, are complex in nature and not predefined.

Considering *governance model characteristics* it is worth noting that for welfare state type, we have actually adopted the Esping-Andersen typology and its extensions [69, 70]. Accordingly, it is important for a given state to identify the following issues (see Fig. 2): the *state governance system*, which includes *vertical dispersion* (varying from unitary state to federal state) and *executive power features* (varying from *coordinated* to *fragmented*); the *cultural administrative tradition* (varying from *civil law* to *common law* and *islamic law*); the *Socio-economic characteristics*, including the *welfare state type* (varying from liberal to conservative and social-democratic) as well as *demographics and quality of life indicators* such as, e.g., employment, education, income, housing, political freedom, connectivity and technology infrastructure, gender equality, etc.

As for *value drivers* and related characteristics they can be evaluated in terms of quality dimensions associated with the considered value drivers. Thus, we provide a set of quality dimensions for each driver, following a systemic perspective on quality assessment to support strategic planning of ICT-enabled innovations in governance. In the following we briefly discuss them, while we refer the reader to [4, 5] for further details and examples.

Performance can be evaluated through efficiency and effectiveness dimensions at three level of analysis, for legal framework, services, and technology. Besides *efficiency* considered under an economic perspective at service and technology level, we believe it is worth to point out the effects of efficiency at legal framework level on administrative procedures. Considering then *effectiveness*, reliability is relevant at service level, including accuracy and completeness of information requested for the service provision. As for the *openness* dimensions we first consider accessibility at technological level, in terms of diffusion of standards and technological infrastructures and systems for interoperability, and information level as the ability of administrations to access data by means of the shared back office, and the possibility for external users to access administrative data via, e.g., open data portals or apps. As for *transparency* we are interested in service and

organizational levels in terms of the volume of information that the public administration provide to users describing their internal functioning and informing them on what they can expect or claim while using the service. Moreover, *accountability* dimensions refer to legal framework and organization as the levels to be considered to evaluate the degree to which, for example, users' opinions and feedback influences service policies and decision-making.

Finally, *Inclusion* includes accessibility dimensions for the service and technology levels (for example the existence of different channels for service access and delivery); whereas *equity* dimensions are considered at organization and information levels to evaluate, for example, the ease of access for minority or disadvantaged groups. It is worth noting that accessibility in this case relate to capabilities [71] enabled by the services and technologies from a welfare oriented perspective; whereas accessibility in the openness case allows to identify how interoperable is a public administration digital initiative, thus accessibility refers to an administrative perspective rather than to a social one. It is worth noting that in [5] an extension of the conceptual model has been proposed, integrating the network governance configurations as a digital governance systems resulting from ICT-enabled innovation. The extension allows considering the impact the latter produces to the governance configuration of the stakeholders' networks. Consistent with this logic, we suggest applying multi-level network theories in the area of ICT-enabled innovation in the public sector through the further development of our interpretative framework.

5 Conclusion

As a conclusion of our analysis and discussion, it should be mentioned that, from a theoretical perspective, our proposal intends to contribute advancing the understanding of the application of innovation and network theories to the governance phenomenon in the public sector. Moreover, through the review of a set of diverse theoretical approaches and scientific disciplines relevant to the discussion on the effects of changes driven by ICT-enabled innovations on governance and policy-making, we wish to contribute to the current debate on the assessment of the socio-economic impacts generated by ICT-enabled services, and the co-evolution of technological advancement and societal changes. From a methodological standpoint, the interpretative framework proposed to assess both ICT-enabled innovation potential and the policy impacts of ICT-enabled governance based on a public value paradigm, aims to provide a systemic perspective and an instrument to elicit the links between ICT-enabled innovation and public governance, outlining the various challenges that this poses. The framework in fact attempts to capture those governance changes which are strongly conditioned by transformations in society's underlying values and organizational models, suggesting to be analyzed by looking at the public value drivers that underpin ICT-enabled governance and which include the dimensions of Performance, Openness, and Inclusion.

However, the interpretative framework to test the model proposed should be applied in real life contexts, either through conducting specific survey and case

studies, so to demonstrate the usefulness and validity of the principles and various dimensions identified, focusing in particular on the service level. This implies that further research is required to better understand the interrelations between the various dimensions of the model, as well as to test on a larger scale and with a more depth its validity. This would require for instance to setting up a 'social experiment' to observe and evaluate the changes that ICT-enabled innovation is generating on governance and policy-making related contexts. In this regard, the explosion of new mobile platforms and social media channels for example, and especially their convergence, represents another layer of technology with which public organizations and policy makers must keep pace and could be the object of specific investigation.

Further research is therefore required also to monitor constantly the evolution of ICT-enabled innovations and the emerging challenges they bring about from a technical, governance and public policy perspective, and at the same time, dealing with a more fundamental challenge that can be identified as a crucial element for the future, that of a data/knowledge driven policy-making that could explode in the wake of a new 'digital-networked era', where citizens and public administrations push out their own content, and policy-makers and public organizations engage with large audiences to solicit or share information and data giving birth to a new way of making policies. However, we should not forget that governance and policy-making are above all a matter of institutional and quasi-institutional settings that cannot be radically changed only as a result of new ICT possibilities. Indeed, with the exception of few successful cases of joined up delivery entailing institutional restructuring, governments and public administration in Europe and worldwide are by an large still designed and functioning in exact the same way as the 19th century model of Weberian Bureaucracy. The reason being that in a democratic system this remains so far the only codified manner of assigning accountability and responsibilities along well-defined vertical jurisdictions.

In conclusion, while it is evident that ICTs are challenging existing governance models, it is however difficult to envisage what new institutional, quasi-institutional, and legal provisions may actually define and codify the new governance models that ICTs could indeed make possible. In principle it is expected that the role of government will shift from being a central steering entity to that of a moderator of collective decision-making processes [2]. However, in order to perform this role effectively, all stakeholders should be able to contribute to the policy directions commonly agreed, and especially the new mantra of evidence based policy-making. Governments would require being capable of setting up a 'shared platform for policy intelligence', where ICT-based modeling techniques could be crucial for improving governance and policy-making processes. But before such 'platform for policy intelligence' is set up many other important issues are still unclear and even little researched. For instance, the rhetoric of 'openness' is always addressed as a 'must to'. But an open question remains, whether 'open' is actually the right channel for addressing and possibly solving the major societal challenges we are facing, and if so, what are the criteria and path to follow for this to become a reality?

For example, it would be dangerous not to consider the risks and vulnerabilities involved in the expansion of ICTs, mobile and fixed systems altogether. The various

types of digital divides are an example of this problematic dimension: socio-economic and geographical divides of the 'first or second order', but also dynamic divides (e.g. the risk of marginalization constraining everybody to constantly invest in time, effort and knowledge to update his or her understanding and skills in the ICT domain). Other types of risks have to do typically with security, privacy, digital rights and other political rights regarding ICTs, legal responsibility when dealing with *mashups* of increasingly responsive, self-organized, 'intelligent' or at least 'context-aware' systems and overall dependency and vulnerability schemes involving divergent communities and even nations, on economic and on political grounds.

In this perspective, the need for increasing regulation capabilities and policy-making scope, anticipation efforts and outreach possibilities in the real world has become a critical challenge. The fact that for many of the issues concerned in the governance and policy-making arena the stakeholders are multiple and vary in status, size, territorial level of significance and belonging suggest something which is a slightly different 'art', in which regulation and policy-making are only tangentially linked to service delivery, what we can define in short: the art of governance of ICTs (not to be confused with governance with ICTs). Governing ICTs requires an increase in the expertise not just of scientists, practitioners and policy-makers, but of all socio-economic actors likely to provide, contribute, or benefit from ICTs and their innovation potential.

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Disclaimer The views expressed in this article are purely those of the authors and may not in any circumstances be regarded as stating the official position of the organizations they are affiliated to.

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