Conceptualizing public innovative capacity: A framework for assessment

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ABSTRACT

Different bodies of literature deal with the question what constitutes innovation capacity of organizations and of inter-organizational collaborative arrangements or networks. These different streams highlight different aspects of innovation capacity. Within the literature on business administration, the issue of ambidexterity is emphasized: the capacity to combine both explorative and exploitative activities. Within the literature on collaboration and governance, connecting or boundary spanning activities are underlined as being vital for innovation. And finally, within the literature on innovation and creativity, the capability to absorb new information, to learn and to alter existing insights is highlighted.

In this paper we bring these different insights together and conceptualize the concept of innovative capacity. We distinguish three layers of determinants of innovative capacity: actors, organizations and networks. Per level we distinguish three dimensions of innovative capacity with which we can assess the innovative capacity of public organizations: combinative or connective capacity; ambidextrous capacity; and learning capacity.

We conclude this article with a critical reflection upon the applicability of the framework presented in the paper.

Key Words: innovation, innovative capacity, learning capacity, ambidextrous capacity, connective capacity

Introduction

Due to political and societal demands public sector organizations are in a constant process of adapt to changing circumstances in order to remain effective, efficient and legitimate in dealing with societal problems and delivering public services. Accompanying changes may be incremental, when improvements can be achieved by relatively small adjustments within a dominant policy paradigm, or new technologies fit with existing regulations, but may also be larger, when fundamental change is needed to maintain, improve or alter the service level of the public sector organization. The call to foster and fasten innovations in the public domain is expressed by many think tanks and governmental organizations like the World Bank and the OECD. This raises the question what capacities public sector organizations need to be able to deal with the different challenges of realizing incremental change as well as radical innovation

In this article, we consider innovation in the public sector as the implementation of a new (technical, organizational, policy, institutional or other) concept that changes and substantially improves the functioning and outcomes of the public sector, thereby creating public value (Moore, 2005). This idea, practice, or object is perceived as new by an individual or other unit of adoption (Rogers, 2003: 12). As Van de Ven (1986) states, innovation may be defined as the development

and implementation of new ideas by people who over time engage in transactions with others in an institutional context. Moore and Hartley (2008) formulate concisely: "innovations are new ideas and practices brought into implementation". Osborne and Brown (2005: 4) define innovation as the introduction of new elements into a public service, which represent a discontinuity with the past, as opposed to incremental change, which concerns gradual improvement or development, representing continuity with the past. We recognize four important aspects in these definitions: the fact that public organizations may be faced, due to internal or external pressures, with the necessity to innovate to be able to realize their task of rendering high quality services to society, that to this end new ideas are only the start of the process, implementation is the final goal and test, that both people and institutional context are important, and that innovation concerns radical, discontinuous change.

Public sector organizations are embedded in policy subsystems or regimes (Geels, 2002; Loorbach, 2010) with a societal function which are often rather stable during longer periods of time and becomes change-resistant due to the development of routines and institutional patterns (Baumgartner and Jones, 1991, Sabatier and Jenkins-Smith, 1993, Rip and Kemp, 1998). This presents a challenge to the involved organizations and individuals when internal or external developments require a radical change of policy, practices or technology, while at the same time other developments can be dealt with in more continuous change processes. For public organizations it is important to combine the ability to radically transform and to gradually adjust in order to ensure public value and maintain legitimacy.

In this article we present an integrative framework of the capacities public organizations need to be able to innovate while at the same time continuously improving their services and processes. Although several reviews on innovation in the public sector are available (Osborne and Brown, 2011, Sørensen and Torfing, 2011, De Vries et al., 2015) this is not the case for public sector innovative capacity. This framework synthesizes three different bodies of literature dealing with the issue of innovation and brings together their main insights on what constitutes innovative capacity. In the next sections (2 – 6) we discuss a multilevel and multidimensional framework for innovative capacity. Finally we discuss some challenges related to this framework and reflect upon its added value.

Introduction to the theoretical framework

Several authors have elaborated on what is needed for effective innovation within the public sector, thereby acknowledging that we have to take into account the multi-level character of innovation processes. Many contributions however focuses on one or two levels only, the individual, the organizational and/or the inter-organizational (network) level (Crossan and Apaydin, 2010). In our approach we will try to conciliate these three (Innes and Booher, 2003).

Innovation capacity as a multi-level construct

Individuals play an important role. Entrepreneurial activities of civil servants have long been recognized as crucial for policy change (Kingdon, 1995) and innovation (Kanter, 1985). And also managers (Moore, 1995; Borins, 2002; Pablo et al., 2007) and political leaders (Borins, 2002; Scholten, 2011; Kaats and Opheij, 2008; Huxham and Vangen, 2005) are important players in public innovation processes.

However, also *organizations* and their capabilities are important. Organizational characteristics explain for example whether these organizations are able to facilitate entrepreneurial behavior which is a necessary precondition to develop innovations (Kim, 2010). Dependent on their specific capabilities, organizations are able to balance exploitation and exploration (March, 1991; Jansen, 2005), i.e. improvement and innovation, or incremental and radical change (Crossan et al., 1999).

Finally, the inter-organizational or *network* level has to be taken into account when we analyze public sector innovation. Public organizations operate within complex networks of organizations and their possibilities for developing and applying innovations depends highly upon the characteristics of these networks (Bland et al., 2010). From an innovation perspective, on the network level different concepts are used for the same phenomenon, like open innovation (von Hippel, 2005), or networked (Swan en Scarbrough, 2005) or collaborative innovation (Sørensen and Torfing, 2011), whereby public sector organizations cooperate, innovate and learn in networks with other governmental organizations, knowledge institutions, private sector organizations, NGO's, and other actors.

We thus assume that to assess the innovative capacity of a public sector organization in more depth we need to look at capacities at the individual level, at the level of the organization and at the inter-organizational level (Nooteboom et al., 2007) of governance networks (De Bruijn and Ten Heuvelhof, 2007; Kickert et al., 1997) within the context of the societal regime (Geels, 2002) the public organization is part of. In table 1 we describe these three levels.

Table 1: Levels of capacity

Individual level	Characteristics and capabilities of involved individuals and their relationships
Organizational level	Organizational policies, rules and strategies and managerial activities that structure (intra- and inter-)organizational behavior
Network level	Characteristics of inter-organizational arrangements, provisions for network collaboration and institutional rules that structure interaction between actors within a certain regime

Innovation capacity as a multi-facetted construct

Different disciplinary bodies of literature deal with the concept of innovative capacity differently. Within the literature on private and public sector innovation the ability to arrive at new combinations ('neue Kombinationen', Schumpeter, 1934) is emphasized. New ideas, knowledge and actors, that share their resources and risks need to become connected (von Hippel, 2005; Dyer and Singh, 1998; Sørensen and Torfing, 2011; Bekkers et al, 2011). The first component of innovative capacity we distinguish thus is *connective capacity*, encompassing the skills and provisions (Fenger et al. 2012; Ansell and Torfing, 2014) that are needed to facilitate collaboration and to establish and maintain meaningful and novel connections between actors and between content.

From a resource-based view of the firm the capacity of firms to build upon, recombine and renew current knowledge and practices is seen as vital for the capacity to innovate, an ability often referred to as dynamic capacity (Teece et al., 1997; Piening, 2013). We concur with March (1991) and many others that balancing exploitation and exploration, continuity and change, improvement

and innovation, i.e. ambidextrous capacity (Andriopoulos and Lewis, 2009; Jansen, 2005) is a major capability. Ambidextrous capacity is the ability of an organization to combine both exploitation and exploration, improvement of existing routines or services based on existing knowledge and innovation (March, 1991; Jansen et al, 2005) and to manage the paradoxes between improvement and innovation processes (Andriopoulos and Lewis, 2009; Jansen, 2005). It poses challenges to individuals within the organization (Lin and Donough, 2014). At the network level balancing exploration and exploitation supports innovative outcomes (Gilsing et al., 2008). In order to sustain and balance ways of improving current qualities and developing new ones a public sector organization must be able to install and maintain ambidextrous policies and management styles as well (Piening, 2013). Therefore we suppose that *ambidextrous capacity* is a second dimension of innovative capacity.

Finally, from studies focusing on individual, organizational and social learning, and on the *learning economy* or *learning regions* and the relation between (regional) economic development and innovation, we can discern the notion that learning is a crucial element of innovation (Glynn, 1996; Lundvall & Johnson, 1994; Nonaka & Takeuchi, 1995; Crossan et al., 1999; Morgan, 1997, 2007). People and organizations have to be able to adjust their ideas, practices and routines due to new knowledge and experience, i.e. to learn. The third dimension thus is the *capability to learn*, that is to absorb new knowledge, experiment, reflect, adapt and implement (Cohen and Levinthal, 1990; Kolb, 1984, Duijn; 2009), in a continuous process of reflecting on experiences, knowing and acting (Duijn, 2009: 198-199). The capacity to learn is strongly entwined with other issues relevant for innovation, like creativity and knowledge creation.

Thus, when we look into the nature of the capabilities necessary to innovate three dimensions can be singled out: connective capacity, ambidextrous capacity and learning capacity. In the reminder of this paper we develop a framework for the assessment of innovative capacity based on these three constitutive capabilities at the individual, organizational and network level.

Connective capacity

Fragmentation is a dominant characteristic of modern societies. It is the consequence of ongoing processes of modernization and specialization (Fenger et al. 2012) which necessitates more collaborative forms of governance (Sorensen & Torfing, 2011). The capacity to establish and maintain connections is an important building block of governance capacity (Edelenbos et al. 2013; van Meerkerk et al., 2014), but is also vital to realize innovation. Therefore, connective capacity is the first element we distinguish within innovative capacity.

Individual level

In our search for the main connective capacities at the individual level we draw on literature on the strategies and activities of policy entrepreneurs (Kingdon, 1995), boundary spanners (Williams, 2002), network managers (Klijn et al., 2010) and political leadership (Scholten, 2011; Huxham and Vangen, 2005). In addition we recognize that these strategies and activities cannot always be attributed to a single person, but are often divided over several roles. Policy entrepreneurs display different strategies, e.g. idea generation (Huitema and Meijerink, 2010), attention and support-seeking strategies, linking strategies, relational management strategies, and arena strategies (Brouwer, 2013). Williams (2002), arguing that wicked, cross-boundary societal issues calls for

inter-organizational connective capacities, describes the features of competent boundary spanners. These are able to operate effectively in networks, by building sustainable relationships, manage interdependency through influencing and negotiation and have innovative and entrepreneurial skills. According to Van Meerkerk et al. (2014) boundary spanners manage information exchange between external networks and their own organization, build and sustain relationships, connect developments in the external network to their parent organization, have a feeling for the interests of other organizations and mobilize their own organization timely.

It is also useful to pay some attention to the role of formal administrative and political leadership. We tentatively concur with Scholten (2011) who states that a transformative style of political leaders, connecting content and process, is helpful in furthering innovations in a multi-actor context. According to Huxham and Vangen (2005) connective leaders use strategies aimed at connecting and facilitating different actors, while at the same time 'manipulating the collective agenda's' and 'playing the politics'.

However, these strategies and activities are not necessarily attributable to single individuals. Voets and de Rynck (2011: 168, building on Agranoff, 2003 and 2007) distinguish several complementary roles within networked innovation processes, i.e. vision keeper, creative thinker, promoter, champion and network operator. Sørensen and Torfing (2011) state that the roles of convener, mediator and catalyst are important in collaborative innovation. Aalbers and Valk (2013) put forward that within an organization complementary roles contribute to its innovative capacity, which they describe as scouts, connectors and sponsors. Notwithstanding the exact definitions of these roles, this illustrates that the necessary competences and strategies are often too much for the ability of just one person and should rather be understood as the combined action of different influential individuals – informal or formal leaders - in a network. The presence and successful combination of these roles (Borins, 2002) and strategies contributes to intra- and inter-organizational connective capacity (Bekkers et al., 2013).

We thus come to the following set of main attributes for individual connective capacity. We draw on the strategies that network managers, boundary spanners, entrepreneurs and political leaders apply. The strategies have in common that they aim to link content, link actors, in sense of establishing a network and in the sense of inclusiveness and adding social capital to the network, and link roles, including administrative and political leadership roles (Voets and de Rynck, 2011: 167). We group these strategies under linking of content (idea generation and connecting content), linking of actors (within and between organizations), and linking of roles. These individuals do this with a keen eye on opportunities of timing in selecting venues and arena's and utilizing policy windows. They can do so in different complementary roles, and it should be checked if the combination of connective capacities is sufficiently covered and complete in the collaborative network.

The attributes of connective capacity at the level of individuals are thus:

1. Linking of content (ideas, insights – 'new combinations')
2. Linking of actors and roles within and between organizations by building meaningful relations in terms of trust, social capital and reciprocity and overcoming institutional, organizational and socio-cultural borders.

Organizational level

To operate effectively, organizations must be both internally and externally collaborative because of the importance of shared skills and information (Innes and Booher, 2003). Considine and Lewis (2007) found that internal and external networks significantly constitute political power and influence policy choices and are more important than hierarchical positions of individual actors in explaining innovation. Intra-organizational connectedness mediates the development of trust among the members of an organization, which supports the adoption and legitimacy of an innovation (Adler and Kwon, 2002; Hansen, 2002; Jansen et al., 2006). Intra-organizational connectedness is also favorable for knowledge-sharing, which is crucial for innovation (Lin, 2007). Although dense intra-organizational networks may support the diffusion of shared norms and behavioral expectations, which may constrain innovation, Jansen et al. (2006) found a positive effect of dense social relations on exploratory as well as on exploitative innovation.

Sørensen and Torfing (2011) state that inter-organizational connectedness in networks of interdependent public and private actors facilitates collaborative innovation efforts by knowledge-sharing, risk-sharing and resource exchange. Linking capabilities of public sector organizations to engage in meaningful interactions therefore are an important asset, and include network management of more institutionalized as well as of informal networks (Bekkers et al., 2013). Network management is an important factor in achieving successful outcomes in governance networks (Klijn et al., 2010; Van Meerkerk et al., 2014). Seeking collaborative advantage however is a resource-consuming activity (Huxham and Vangen, 2005) and investments in building the external networks of individuals, teams, or organizations need to be balanced by investments in internal networks (Adler and Kwon, 2002).

At the organizational level skills and routines are needed to build and sustain both internal and external networks (Innes and Booher, 2003). Building internal networks can be supported by socialization (e.g. teambuilding activities) and coordination tactics (e.g. establishing cross-functional teams) (Jansen, et al., 2005; Zahra and George, 2002). Building and sustaining external networks requires networking skills and network management (De Bruin and Ten Heuvelhof, 2007). Organizations may support their members in acquiring those skills and design routines to support network management. It also requires that networking roles or tasks are assigned to organization members.

Main attribute of internal and external connective capacity on organizational level is therefore the presence of skills, policies and practices for creating and sustaining internal and external networks which facilitate making meaningful connections:

1. Provisions to create and sustain intra-organizational networks:
    a. Socialization tactics;
    b. Coordination tactics.
2. Provisions to create and sustain inter-organizational networks:
    a. Training and support on networking skills for organization members;
    b. Attributing networking roles or tasks, e.g. relation or account managers
    c. Policies to support networking and network management

Network level

For regime actors, including public sector organizations, networked relationships have become more and more important (Castells and Hall, 1994; Cooke, 2001). Public sector

organizations participate in or initiate networks, either as a part of their regular public tasks, or in pursuit of improvement or renewal. Networks of multiple actors, public and private, are potentially better capable of addressing wicked societal problems (Weber and Khademian, 2008). In networks actors collaborate through formal and informal negotiation, jointly creating rules and structures governing their relationships and ways to act or decide on the issues that brought them together; developing shared norms and mutually beneficial interactions (Thomson et al., 2009) and social capital (Adler and Kwon, 2002). As the structure and content of these networks differ, creating and sustaining appropriate networks is an important capacity (Adler and Kwon, 2002). Brugnach et al. (2008) stress the importance of inclusiveness and a shared problem definition: which actors are included in the problem definition and formulating solutions, and how are these being framed? Effective collaborations engage diverse interests and allow their decisions to be informed by the knowledge of these differing stakeholders, but should also take power issues into account (Huxham and Vangen, 2005). According to Innes and Booher (2003) vital collaborative relations are characterized by free exchange of information and constructive dialogue rather than debate and argument. Trust is an important asset of networks as it reduces uncertainty due to interest conflicts or opportunistic and strategic behavior (Klijn and Koppenjan, 2012). In the same line, Sørensen and Torfing (2011) stress the importance of collaboration throughout the innovation cycle of generating ideas, selection, experimentation and implementation.

Main attributes and indicators of connective capacity at the regime level thus have to do with provisions that enable collaboration throughout the innovation process, i.e. the ability of regime actors to:

1. Create and sustain networks, alliances, cooperative programs and the like, i.e. the *reticulation* of networks.
2. Create and sustain social capital, by collaborative dialogue, trust-building, inclusiveness and reciprocity.

Ambidextrous capacity: balancing exploration and exploitation

Many authors emphasize the importance of balancing exploration and exploitation as a key to innovative capacity (March, 1991; Andrioupolis and Lewis, 2009; Nooteboom and Stam, 2008). Exploration or innovation includes search, uncertainty, risk taking and experimentation, while exploitation includes refinement, efficiency, and implementation (March, 1991). Ambidextrous individuals, organizations or networks are able to pursue both incremental (exploitative) and discontinuous (explorative) innovation (Tushman and O'Reilly, 1996), of exploring new opportunities and at the same time enhance the efficiency of their current operations. Ambidextrous organizations perform better (Junni et al., 2013) and show more innovative capacity (He and Wong, 2004; Janssen, 2005) compared to organizations that favor one of the two approaches, as they are able to respond better to internal or external developments.

Individual level

The individuals who have an important role in this respect are public managers. Public managers manage issues in situations of ambiguity and potential public exposure. The ability of managers to deal with the tension between exploration and exploitation is a key predictor of organizational performance (Tushman et al., 2011). A manager's ambidexterity can be referred to as

a manager's behavioral orientation toward combining exploration and exploitation related activities (Mom et al., 2015). Ambidextrous managers host contradictions, are multitaskers, and both refine and renew their knowledge, skills, and expertise (Mom et al ., 2009). In order to balance change and continuity, innovation and incremental improvement public managers need to apply different leadership styles (Rosing et al., 2010). Whereas transformational leadership emphasizes experimentation, risk taking, punctuated change and multiple alternatives, and supports exploration, transactional leadership is aimed at incremental change, efficiency, and continuity and supports exploitation (Bass and Avolio, 1993; Vera and Crossan, 2004). Transformative leadership is more supportive during the idea generation and selection phases of innovation processes and transactional leadership is more suitable during implementation and institutionalization (Vera and Crossan, 2004). An ambidextrous (or dynamic, Volberda, et al., 2011) management style, that combines a transformational with a more transactional, hierarchical style supports the adaptation of new ideas, the linkage to existing knowledge and routines, and the implementation of innovation.

Ambidextrous capacity at the individual level thus mainly relates to capabilities of managers to balance exploration and exploitation, renewal as well as incremental improvement.

1. Balancing autonomy and experimentation versus control and efficiency: i.e. aware and capable of applying and balancing transformative and transactional styles of management.
2. Linking innovation process to regular organizational routines: i.e. capable of connecting the innovation process to the goals of the organization, its regular knowledge base and to the regular decision making processes.

Organizational level

Ambidextrous organizations combine exploration and exploitation and are capable of simultaneous, yet contradictory, knowledge management processes, exploiting current competencies and exploring new domains by a mix of integration and differentiation tactics. They take advantage of the paradoxes between exploration and exploitation rather than resolve them (Andriopoulos and Lewis, 2009). Ambidextrous organizations are aligned and efficient in achieving predefined goals, while also adapting effectively to changes in the environment and future challenges (Hodgkinson et al., 2014; Gibson & Birkinshaw, 2004). Organizations have several mechanisms to combine innovation and efficiency. Formal mechanisms include centralization or decentralization, formalization and standardization, (strategic) planning and control. Informal mechanisms include lateral or cross-departmental relations, temporary teams, integrating roles, informal communication and socialization techniques such as inculcating organizational culture through training and reward systems (Chen and Kannan-Narasimhan, 2014). Organizations need to support the individuals who face ambidextrous cognitive orientations due to contradictory activities, such as efficiency-oriented versus variability-increasing tasks (Bonesso et al., 2014) and apply supportive human resources management practices. HRM practices that support ambidextrous learning and firm performance are high-involvement practices, i.e. ability-, motivation-and opportunity-enhancing HR practices (Prieto and Pérez Santana, 2012).

Both exploration and exploitation are important for an organization, but they compete for scarce resources (March, 1991). Ambidexterity can only be achieved by applying balanced strategies, policies and routines aiming at using the organizations' resources in such a way that both innovation and efficiency are achieved (Sarkees and Hulland, 2009) and connect explorative processes to regular routines.

Main attributes of ambidextrous capacity at the organizational level are strategies, policies and routines to balance exploration and exploitation and support seemingly contradictory roles and tasks, and a balanced resource allocation:

1. Balanced strategies, policies and routines supporting both innovation and efficiency:
    a. Presence of strategies analyzing present or future needs for innovation or improvement to maintain or improve public value;
    b. Presence of policies and routines supporting the innovation process and connecting the innovation process to regular routines.
    c. Supportive HRM policies that enhance employee ability, motivation and opportunity.
2. Balanced resource allocation:
    a. Provisions to secure a balanced allocation of resources to exploration and exploitation.

Network level

Research on socio-technical or societal transitions has shown that innovation at the level of a societal regime often requires changes in dominant structures, processes, paradigms and actors (a.o. Geels, 2002; Olsson et al., 2006). However, regime actors may strive for collaborative innovation in more temporal inter-organizations networks (a.o. Sørensen and Torfing, 2011; Bommert, 2010; Swan en Scarbrough, 2005), and join forces in developing, experimenting and implementing innovative solutions. Collaboration between private firms, governments and knowledge producers – the triple helix – enhances the innovative capacity of economic regions (Etzkowitz and Leydesdorff, 2000). An important characteristic of successful innovative regions is the embeddedness of their actors, i.e. the extent to which a social community operates in terms of shared norms of cooperation, trustful interaction and 'untraded interdependencies', which are more likely to develop via partnership relations in networks (Cooke, 2001; Vangen and Huxham, 2003). Nooteboom et al. (2007) put forward that in inter-organizational cooperation there is an optimal cognitive distance. Exploitation is supported by a strong familiarity and mutual understanding between organizations, while for exploration a larger cognitive distance is needed. Strong ties encourage knowledge-sharing and building of trust and social capital, while weaker ties may support new connections between ideas and actors (Granovetter, 1973). It is therefore in the mix of strong and weak ties, by combining what is already known and what is new, that novelty is created. Ambidextrous alliances, featuring weak ties for the creation of novel combinations as well as strong ties to validate and exploit the new knowledge, e.g. a configuration in which novelty originates from new combinations of ties and where selection and exploitation is endogenous to the network through a dense core of strong ties, have shown to be effective (Gilsing and Duysters, 2008). Attributes of ambidextrous capacity at the inter-organizational or network level thus have to do with balancing openness and closeness for new ideas, issues and actors, and cognitive diversity and consensus between the involved actors (Van Buuren & Loorbach, 2009).

Attributes of ambidextrous capacity at the regime level are the ability to create and sustain appropriate networks:

1. Balanced structure of the network, balancing weak (bridging) and strong ties: less variety in actors and a higher network density for exploitation, more diversity in actors and unusual linkages and looser coupling for innovation.
2. Balanced content of the network: balancing openness and closeness, consensus and cognitive diversity.

Learning capacity

Learning is an individual and cognitive process, in the minds of people, where knowledge and experiences are internalized and ideas originate (Kolb, 1984). It is also a social and interactive process of interpretation and sense-making on the level of groups, organizations or society as a whole (Weick, 1995). Learning is an ongoing process of action and reflection through which knowledge is acquired, combined, and applied (Argote and Miron-Spektor, 2001). Learning in itself does not always lead to progress, improvement or advancement (Duijn, 2009: 200), but is a pre-requisite to innovation. Innovation is an outcome of learning (Jansen, 2005). Learning that takes place within existing mind sets, assumptions and norms is referred to as 'single loop' or first order learning, whereas transformative or "double-loop" learning involves reflecting on and possibly changing of underlying assumptions, values and norms of individuals and organizations (Argyris, 1976, Mezirow, 1995, Fiol and Lyle, 1985). In the domain of regional studies, much effort is devoted at unraveling the determinants of (collective) learning as an important prerequisite for innovation (Morgan, 2007).

Individual level

In the literature a huge variety of characteristics of innovators can be found. Crossan and Apaydin (2010) describe leadership characteristics associated with innovation, based on an extensive literature review. We presume, building on their findings, that tolerance of ambiguity and change, openness to experience and unconventionality are important characteristics of individual learning capacity. Innes and Booher (2003) list several characteristics of individuals that are crucial for learning in collaborative processes, such as self-reflectiveness and self-awareness, and the willingness to experiment and learn from mistakes. While first order learning supports incremental change, for transformative second order learning a reflective attitude towards one's own norms, values and practices and those of the organization is necessary (Merkx, 2012; Duijn, 2009). Reflection can be seen as a mental tool for transforming individual and collective experience into new thinking and acting (Mezirow, 1990, Hilden et al., 2014).

Main attributes of transformative learning capacity at the individual level thus are:

1. Reflective attitude towards own norms and values;
2. Tolerance to ambiguity and change;
3. Openness to experience, a diversity of ideas, new knowledge and expertise and contexts.

Organizational level

Organizations store knowledge in their strategies, culture, procedures, rules, systems and structure. They accumulate such knowledge over time, learning from their members. At the same time, individuals in an organization are socialized to organizational beliefs. Thus, in mutual learning, an organization learns from its members and vice versa.

Crossan et al. (1999) present a framework for the process of the mutual learning of an organization and its members, by describing organizational learning as four socio-psychological processes - intuiting, interpreting, integrating, and institutionalizing - linking the individual, group, and organizational levels. At the individual level innovative insights and ideas originate in the minds of individuals (intuiting). At the group level these insights are shared and interpreted with others, and at the organizational level integrated in the activities of the organization. By

institutionalizing they become part of the routines of the organization. The feed-forward loop from the individual and group level to the organizational level allows exploration, the feedback loop allows exploitation of what is learned. An organization's deliberate learning efforts allow codification of collective knowledge, and improving managerial skills, through which the organization can improve its strategic and operating routines (Zollo and Winter, 2002; Agarwal and Selen, 2009). To support the four socio-psychological processes of organizational learning it is helpful to apply routines that enable them and to mitigate the barriers that hinder them (Lawrence et al., 2005; Schilling and Kluge, 2009; Berends and Lammers, 2010). Idea generation of individuals can be supported by stimulating creativity (Amabile et al., 1996, 2005) and supporting the absorption of new knowledge (Cohen and Levintal, 1990). The interpretation and integration of new ideas, concepts, technologies, etc. is stimulated by the informal and formal sharing of knowledge and experiences by socialization and coordination tactics (Jansen et al., 2005) and by experimentation. Codification efforts through formalization support institutionalization as they enhance the ability to transform and exploit knowledge (Jansen et al., 2005) and the adaptation of incumbent policies and practices. In addition, reflection on the continuity or discontinuity of the organizational learning process should be a regular organizational routine (a.o.. Merkx, 2012; Duijn, 2009; Hilden et al., 2014).

The main attributes of organizational learning ability are therefore:

1. Provisions supporting organizational learning processes related to exploration and exploitation by deliberate learning efforts, i.e.:
    a. the idea generation of individuals, by stimulating creativity and supporting the absorption of new knowledge;
    b. sharing and improving ideas at the group level by coordination and socialization tactics;
    c. experimentation for the integration (implementation) of innovations.
    d. support adaptation and institutionalization by codification of new knowledge and adaptations of routines and regular reflection on the organizational learning process
2. Support reflection on the continuity or discontinuity of organizational learning

Network level

For innovation at the network level inter-organizational or social learning is needed (Benz & Fürst, 2002; Hagedoorn and Duysters, 2002; Hall, 1993). Reed et al. (2010) define social learning as a change in understanding that goes beyond the individual to become situated within wider social units or communities of practice through social interactions between actors within social networks. Learning in networks is defined by Klijn et al. (2000) as the sustainable increase in knowledge, insights and methods, shared by the actors involved. Innes and Booher (2003) state that learning is central to governance capacity: an adaptive learning system is one which is well-networked and where authentic dialogue increases the quality and acceptance of information and the building of trust and social capital, where jointly developed objectives and solutions can emerge, and innovative approaches can be developed. Through learning how to collaborate, and in the flow of ongoing thinking, acting, and interacting, collective transformative approaches may emerge (Healey, 1999). Collaborative governance networks need ways to examine experiments and strategies, and to test and evaluate them and select the most effective for a given purpose and context (Innes and Booher, 2003). Collaborative innovation thus is supported by flexible institutions (Healey, 2004) that allow for experimenting and learning. Experimenting with innovations is fostered by temporary arrangements, such as 'niches' (Geels, 2002), pilots, 'milieux of innovation'

(Castells and Hall, 1994), etc. Informal networks, in the shadow of formal hierarchies, play an important role (Nooteboom, 2006). Through informal networks tacit knowledge can be distributed across different institutions and disciplines. In these 'third spaces' innovation can flourish, because agents feel free to exchange knowledge and ideas, between disciplines and organizations, without the correction mechanisms of formal hierarchies and organizational mandates. Rijke et al. (2013) have shown that, while informal networks and decentralized and informal governance approaches are favorable during early stages of the innovation process, centralized policy decisions can stimulate the acceptance of innovations and enhance the efficient use of resources by creating synergies through sharing relevant knowledge. At the final stages centralized and formal approaches are also effective to adjust or establish legislative frameworks and coordinate capacity building. Thus, arrangements for experimentation and learning should be embedded in the incumbent formal institutions (Bekkers et al., 2011), and be connected to learning processes at the organizational level (Gieske and Van Buuren, 2015; Vreugdenhil et al., 2010; Camison and Fores, 2010).

Main attributes of learning at the regime level are conditions allowing a diversity of actors with different knowledge, perspectives and interests to increase the understanding of the others' view points, engage in a dialogue on problems and experiment with possible solutions, by inter-organizational coordination and arrangements to collaborate during the entire innovation cycle, e.g. via joint innovation programs, dedicated networks, etc., thereby anticipating on the implementation and institutionalization by the relevant actors in their incumbent policies and routines.

1. Collaborative innovation arrangements for experimentation and learning, e.g. pilots, niches, 'milieux of innovation'.
2. Connecting and embedding these localized learning processes in organizational learning processes, policies and routines.

Towards a comprehensive framework

In the sections above we described innovative capacity as composed of connective capacity, ambidextrous capacity and learning capacity. These three dimensions are present at three levels: the individual, the organizational and the network level. In table 2 we summarize the indicators per dimension and level as presented in the sections above.

Innovative capacity: discussion and conclusion

In the former sections we have formulated attributes and indicators for three dimensions of innovative capacity on three levels, based upon an extensive literature review. The issue of innovative capacity is studied in rather different bodies of knowledge, which all have their own focus and locus. In this article we have tried to bring together building blocks from the broad literature on innovation in public administration as well as the private sector, from governance studies, organizational sciences and (regional) innovation studies. By bringing together these different bodies of knowledge, we were able to present a rather comprehensive framework to assess the concept of innovative capacity. In addition, by distinguishing three levels on which innovative capacity can be postulated, we do justice to the multi-level characteristics of innovation processes (Gieske & Van Buuren, 2015).

Table 2: Overview of the attributes of innovative capacity in the public sector

Capacity *Level*	**Connective capacity**	**Ambidextrous capacity**	**Learning capacity**
Individual	Linking capabilities: (mainly administrators and politicians) 1. Linking of content (idea generation – new combinations) 2. Linking of actors within and between organizations 3. Establishing and connecting complementary roles	Managing exploration and exploitation processes : (mainly managers) 1. Balancing autonomy and experimentation, and control and efficiency, i.e. applying transformative and transactional styles 2. Linking innovation process to regular organizational routines	Transformative learning capability: (all actors) 1. Reflective attitude 2. Tolerant to ambiguity and uncertainty 3. Open to diversity of ideas, new knowledge and expertise and contexts
Organization	Organizational provisions for collaboration: 1. Supporting internal networks by socialization and coordination tactics 2. Supporting external networks, by improving network skills, assigning roles, supportive policies.	Provision for balancing innovation and improvement: 1. Balanced strategies, policies and routines 2. Balanced resource allocation	Provisions for organizational learning: 1. Support organizational learning processes related to exploration and exploitation 2. Support reflection on organizational learning
Network	Inter-organizational capacity to: 1. Create and sustain networks, alliances, cooperative programs, etc, i.e. the *reticulation* of networks 2. Create and sustain social capital, by collaborative dialogue, trust-building, and reciprocity	Inter-organizational capacity to establish and maintain: 1. Dual structure of networks 2. Dual content of networks	Inter-organizational capacity to establish and maintain: 1. Collaborative arrangements for learning and experimentation 2. Connecting and embedding localized learning with organizational learning processes

As such, the framework can help to come to more comprehensive, but also more nuanced assessments of what makes public sector organizations innovative. Public sector innovativeness not only has to do with the ability to make 'new combinations' or to facilitate second order learning among diverse people. It is also about balancing between exploration and exploitation, i.e. innovation and improvement, within and between organizations. Improving the innovative capacity of public organizations thus requires a multifaceted approach that takes into account the different appearances and building blocks of public innovation processes. Such an approach has to acknowledge that – for example – collaborating and learning has to be accompanied with provisions to connect exploring activities with the normal or standard operating procedures. Within the different bodies of literature there is mutual borrowing of concepts and ideas are used in more or less the same way, or similar concepts are used by different

authors in quite different ways. By distinguishing between the three categories of connective, ambidextrous and learning capacity we were able to unravel this conceptual diffusion and to bring them together in a framework that is both concise and comprehensive.

At the same time, it is important to notice that the concepts we use are linked to each other. For example, when we treat inter-organizational networks at the regime level we describe connective capacity in terms of constructing the actual links between actors – 'reticulation'– as well as building relationships, while the ambidextrous dimension adds to this the aspect of balancing between openness (for innovation) and closeness (for improvement) and the learning dimension adds specifically the aspect of arranging experimentation. Obviously also the levels are interrelated, ultimately it is the individual that acts, embedded in the context of his or her organization which is embedded in the regime the organization is part of. The levels are thus nested and cannot be separated from each other. However, the capacity of organizations to develop routines to enable their members to establish meaningful connections, to balance improvement and innovation and to learn, is a specific and distinguishable ability of organizations. And the ability of collective actors to establish inter-organizational networks or alliances, to select more familiar or more unusual partners and to create space for experimentation is a capacity at the inter-organizational level.

Our framework shows that enabling and stimulating innovative public organizations is a multifaceted challenge, which requires that on multiple levels provisions are made and actions are taken that together build up innovative capacity. It also shows that public organizations have to take into account that innovation does have both an internal and an external component. Further research is necessary to see to what extent these factors actually explain the innovative performance of public organizations and how these factors also influence each other. That can help to find out what the crucial parameters are that can be influenced to strengthen public innovative capacity.

The reverse side of the coin (of having a comprehensive framework) thus is that concepts are related and that not only the relationships between the independent variable, innovative performance, but also the mutual relationships between the various building blocks have to be singled out. Do they reinforce each other for example, or does one mediate or moderate the others, and can we assess their relative importance or contribution of innovation versus gradual improvement to performance? Answering these questions is important to come to prescriptions how to purposefully improve the innovative capacity of public sector organizations. The next step in our research will be the application and evaluation of the framework and investigating the relationship between the dimensions, and the contribution of the different levels and dimensions to innovation and improvement of public performance.

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