Boundary spanning roles and related intellectual capital factors accomplishing innovations within and between public sector organizations

A boundary spanned explorative case study

Wouter R.B. Drion
June 2021

Study
Business Administration (MSc BA),
Human Resource Management (HRM), Technology & Innovation

Faculty
Behavioral Management and Social Sciences (BMS)

Graduation committee

Dr. A.C. Bos-Nehles	University of Twente
Dr. M. Renkema	University of Twente
E. Willemsen	Instituut Fysieke Veiligheid

UNIVERSITY OF TWENTE.

Acknowledgements

Allereerst, Anna, enorm bedankt voor de tijd en moeite die je genomen hebt om mij te begeleiden met deze masterthesis in de vreemde Corona-tijd. Van het introduceren van mij bij het IFV, tot de vele suggesties en feedback die je gaf op mijn thesis; ze hebben samen geleid tot een resultaat waar ik erg trots op ben. Laura, Carly en in het bijzonder Ester, enorm bedankt voor het faciliteren van dit project binnen het IFV, de open-houding, het mij verbinden aan veiligheidsprofessionals en het meedenken! Jullie zijn echt een top programma aan het neerzetten op het gebied van innovatie. Gelukkig vind ik dat niet als enige, en hebben verschillende geïnterviewden dit ook benoemd tijdens de interviews. Uiteraard wil ook hen bedanken die deel hebben genomen aan mijn onderzoek en mijn afstuderen mogelijk hebben gemaakt. Hierbij horen ook de docenten van de master BA en in het bijzonder de vakgroep HRM, waarbij ik door het jaar heen mijn academische vaardigheden heb leren te verbeteren.

Maarten, bedankt dat je bereid bent om samen met Anna mijn academisch begeleider te zijn geweest, en ook de tijd en het geduld dat je nam om twee keer het gesprek te voeren, wat mij in staat stelde om voor de extra mile te gaan. Helaas is de visualisatie geen Picasso geworden zoals je suggereerde, maar ik hoop dat dit ook voldoende soelaas biedt.

Paps, mams en Anne, ook enorm bedankt voor de support!

Ik wens jullie allen veel leesplezier met het lezen van deze thesis!

Wouter Drion

Den Haag, Juni ’21

Table of contents

1. INTRODUCTION 4

2. THEORETICAL BACKGROUND 7

2.1 Boundary spanned innovations, social capital and types of boundaries 7

2.2 Boundary spanning actors and roles 9

2.3 Human -and organizational capital factors 11

3. METHODOLOGY 13

4. RESULTS 20

4.1 Boundary spanned innovations at the investigated PSOs 20

4.2 Social capital and innovations 21

4.3 Boundaries 21

4.4 Boundary spanning tasks, roles, responsibilities and actors 23

4.5 Human capital success factors 25

4.6 Organizational capital success factors 27

4.7 Reconciling boundaries, strategies and roles 30

5. CONCLUSIONS AND DISCUSSION 32

5.2 Practical implications and recommendations 35

5.3 Limitations and further research 37

REFERENCES 37

APPENDICES 40

Abstract

Prior research teaches that public sector organizations (PSOs) utilize social capital to innovate, in order to anticipate on societal challenges and increasing complex demands. However, the usage of this (potential) social capital is disturbed through the presence of several boundaries. Organizations depend on individual actors known as boundary spanners to use this (potential) social capital. This study aims to find what roles boundary spanners employ to foster social capital within (intra-)and between (inter-)PSOs, which boundaries they encounter, and which related human and organizational capital factors are deployed to cope with these boundaries. By conducting a rich qualitative case study at the Netherlands Fire Service and its supporting Institute for Physical Safety, it was found that they act as *entrepreneur/innovator*, *messenger*, *reticulist* and *facilitator*. While they all encounter cultural and organizational boundaries, the latter two also encounter institutional boundaries. The utilization of intellectual capital theory allowed us to provide unique theoretical contributions to both boundary spanning -as innovation management literature. Practically, these findings can be used by these and other PSOs aspiring to cultivate both intra- as inter-organizational innovations.

1. Introduction

To respond adequately to the complex nature of today's problems and provide innovative solutions, the imperative of innovative cooperation and collaborations across professional, organizational and sectoral boundaries has become increasingly important (Chen, Walker & Sawhney, 2020; Van Meerkerk & Edelenbos, 2018; Nederhand, Van der Steen & Van Twist, 2019; Williams, 2013). Such boundary spanning arrangements can manifest as strategic alliances, joint ventures, (in)formal coalitions and partnerships which all, to some extent, pursue a collective purpose and synergetic effect (Williams, 2013). While these arrangements can be considered as a phenomenon on organizational level, they thrive on the knowledge sharing activities of individual actors (Van Meerkerk & Edelenbos, 2020; Schotter et al., 2017; Williams, 2013). Prior research teaches that pivotal stakeholders can be identified who possess crucial positions determining both the internal and external organizational knowledge flow (Cross & Parker, 2004; Haas, 2015, Leifer & Delbecq, 1978). These stakeholders are referred to as *boundary spanners*, which refers to their ability to span the boundaries between groups or between organizations and their environment (Haas, 2015). Through boundary spanned interactions, they appeal to the utilization of social capital (Ryan & O'Malley, 2016; Williams, 2002) which refers to the value and knowledge that is incorporated in and available through the networks of relationships with those inside and outside the (sub)organizational boundary (Kianto, Saenz & Aramburu, 2017; Nahapiet & Ghoshal, 1998). In other words, prior research points out that boundary spanners can foster the utilization of social capital which leads to boundary spanned innovations (Ryan & O'Malley, 2016).

Given the pivotal functions of boundary spanners, it is no surprise that prior research extensively elaborated on their functions and factors that determine their success. A number of studies focused on the macro- and micro-organizational factors that comes along with boundary spanning functions (e.g. Nederhand et al., 2019; Schotter et al., 2017; Riege, 2005; Williams, 2013). To illustrate, scholars reveal that several natural difficulties emerge within boundary spanned arrangements, relating to socio-economical, cultural and environmental contexts, institutional and organizational configurations and agential factors such as leadership, management and personal capabilities (Schotter et al., 2017; Williams, 2013). While such factors have extensively been investigated in private-private cooperative and collaborative settings (e.g. Haas, 2015; Keszey, 2018; Ryan & O'Malley, 2016; Schotter et al., 2017) and in public-private ones (e.g. Jones & Noble, 2008; Van Meerkerk & Edelenbos, 2014), research on boundary spanning functions in public-public configurations is rare (Williams, 2013). This is remarkable, as the earlier described researches underline that understanding of contextual factors and processes determine the effectiveness of boundary spanning practices. To illustrate, Schotter et al. (2017) describe boundary spanners as individuals who "integrate activities across multiple cultural, institutional and organizational contexts" (p. 404). These contexts are unique for every boundary spanned function and although communalities can be found between boundary spanners (Williams, 2013), further insights in specific configurations are required to understand which enabling factors are inherent to an individual or function, or can be developed (Schotter et al., 2017).

Besides the described knowledge gap on public-public configurations, even less is known about the innovative collaborative role of boundary spanners within and between public sector organizations. Although a research substream focuses on the boundary spanning functions regarding innovations (Brogaard, 2021; Tushman, 1977; Williams, 2013), we know too little about private-public configurations (Keszey, 2018), and even less about innovative public-public configurations. To be specific, Williams (2013) argued that only two prior studies focused on the innovative role of boundary spanners in public-public settings (i.e. Williams, 2002, 2012). While they provide unique insights on the necessary competencies of such boundary spanners, they only focus on inter-organizational boundary spanners. However, prior research shows boundaries can also exist within organizations, i.e. intra-organizational (Schotter et al., 2017). Although these boundaries have been separately investigated explaining their relevance, no empirical research on the comparison and combination of internal and external boundary spanners was found. Still, both inter- as intra-organizational boundaries need to be spanned to utilize the innovation potential of organizations. Also, Williams (2002, 2013) only focused on the competencies i.e. individual factors, while boundary spanning literature in the private sector endorses the importance to understand both individual as contextual organizational factors. Here, prior research shows that public sector organizations (PSOs) substantially differ from private organizations and that several factors complicate innovations, while public employees are not less innovative (Bysted & Rosenberg Hansen, 2015). To elaborate, Bos-Nehles, Bondarouk and Nijenhuis (2017) reveal the presence of a unique set of such characteristics in PSOs. They show that the hierarchy present in such

organizations contributes to “loosely coupled top-down and bottom-up innovation streams” (p. 392), resulting in a minimized realization of especially innovation streams initiated by employees. Furthermore, public organizations are exposed to a larger extent of accountable pressures (Jain & Jeppesen, 2013) as they serve a public interest (Bysted & Rosenberg Hansen, 2015). As a consequence, decisions that are made in such organizations are subject to a high extent of public legitimacy, i.e. managers must legitimize their choices and are often negatively exposed when projects do not provide the intended results (Borins, 2001). Further, Bos-Nehles et al. (2017) indicate that innovation requires risk-taking behaviours, as the costs and benefits of innovative projects cannot completely be clarified beforehand. Because decision makers in the public sector are subject to strict agency control and public legitimization, this required behaviour is severely complicated. Also, due to hierarchical and complex organization structures, Nederhand et al. (2019) identifies a lack of ownership, resulting in slow-decision processes. Despite these complicating factors, which can according the latter also be considered as boundaries, the need of PSOs to cooperatively and collaboratively innovate increases to remain their public value in modern society (Van Meerkerk & Edelenbos, 2018).

Congruent with boundary spanning literature, studies focused on innovation also emphasized the importance to understand both individual as contextual factors. They are explained by intellectual capital theory, implicating that organizations require knowledge-related resources to create (innovative) value (Kianto et al., 2017; Nahapiet & Ghoshal, 1998). These resources are stocked and embedded in both individuals, social and organizational (network) structures, which are theorized as human, social and organizational capital as described by Subramaniam and Youndt (2005). Through the application of this theory, they found that organizations should use all three capitals in order to unfold their innovation potential. By reconciling these literature streams, it is presumed that boundary spanners utilize human and organizational capital to employ boundary spanning roles. Consequently, they foster the mobilization and utilization of social capital (Ryan & O’Malley, 2016), on turn leading to innovations (Subramaniam & Youndt, 2005).

To advance our understanding on boundary spanning functions in both inter- and intra-PSOs, we aim to provide a holistic view on boundary spanning by focusing on both individual and contextual factors of inter- as well as intra-organizational boundary spanners. To be specific, we attempt to understand the roles of boundary spanners in their aim to foster inter- and intra-organizational innovations by mobilizing and utilizing social capital in the setting of PSOs. By utilizing intellectual capital theory as theoretical lens, human and organizational capital are integrated aiming to understand the needed individual and organizational contextual factors necessary to employ these roles. Through conducting a qualitative case study, we attempt to find empirical evidence to find a comprehensive answer on the following research question: *Which roles and corresponding human -and organizational capital factors do boundary spanners utilize to foster social capital that leads to inter- and intra-organizational innovations in the public sector?*

By mapping the factors related to boundary spanning functions, we empirically elaborate on their moderating effect on social capital leading to inter- and intra-organizational innovations and boundary spanning literature. To our best knowledge, we are the first to explore their roles and underlying factors regarding innovative public-public sector configurations, while prior research evidently underlines the increasing need to investigate them in specific settings. This endorses both our theoretical as practical contributions. Elaborating on the latter, it is widely accepted that understanding of factors attributed to intellectual capital is needed for organizations to implement effective policies aimed to achieve predetermined organizational outcomes. Therefore, we argue that exploring these related to boundary spanning functions can support PSOs in their increasing innovative need to cross boundaries, anticipating the increasing complex societal needs. PSOs that have similar aspirations as our sample case can adopt and may develop the found boundary spanning roles and the necessary antecedents. Furthermore, by exploring the factors attributed to social capital, empirical evidence is provided on the necessary ingredients required for the concerned innovations. To conclude, we provide unique insights needed to formalize a strategic toolbox PSOs can utilize to improve their innovative performance across boundaries, which can be decisive on the future-resilience of PSOs and hence, the public sector as a whole.

The structure of this paper can roughly be distinguished in two parts; a theoretical review and the case study itself. In order to find out which roles and corresponding factors are needed, we first attempt to understand which social capital is required for boundary spanned innovations and what boundaries complicate the utilization of social capital in the given settings. Subsequently, the corresponding boundary spanning roles will be explored and substantiated with a review on expected human -and organizational capital factors related to boundary spanning functions in the public sector. Next, we focus on the case study itself and we follow the classical sectional outline, i.e. a description of the methodology, results and the conclusions and discussion. Finally, the practical implications and limitations are described.

2. Theoretical background

2.1 Boundary spanned innovations, social capital and types of boundaries

2.1.1 Boundary spanned innovations

To define innovation, we follow Chen et al. (2020), who defined public service innovations as "*the development and implementation of a novel idea by a public sector organization to create or improve public value within an ecosystem"* (p.1677). Here, public value refers to a desired outcome serving societal needs, e.g. enhancing civilian safety by developing a forest fire spreading model anticipating on climate change. Also, the ecosystem element refers to a closed system of interdependent multi-actors

across organizations (e.g. boundary spanners), excluding open innovations. Note that although scholars point out that different types of innovations exist focusing on services, processes, strategies, technologies and management (Jamali, Yianni & Abdallah, 2011), PSOs do ultimately innovate to improve their public value. Therefore, public service innovations can be used as an umbrella concept for public sector innovations (Chen et al., 2020). Additionally, boundary spanned innovations are described as innovations in which knowledge that is needed to innovate is located outside the boundaries of the original group in which the innovation takes place (Kianto et al., 2017). Such boundaries exist both intra-organizationally, e.g. between sub-units or subsidiaries and headquarters (Schotter et al., 2017), and inter-organizationally, e.g. between sectors, industries and organizations (Brogaard, 2021; Keszey, 2018; Van Meerkerk & Edelenbos, 2018; Nederhand et al., 2019; Ryan & O'Malley, 2016).

2.1.2 Innovative social capital

Scholars nowadays consider innovation as interactive exchange, convergence and mobilization of different forms of knowledge (Jamali et al., 2011) that is increasingly received from sources outside the (sub)organizational boundary (Chen et al., 2020; Jamali et al., 2011; Williams, 2013). This emphasizes the importance of understanding of social capital, as social capital expresses the value that can be extracted from knowledge that resides in networks and alliances. Because these interactions can be considered as a social exchange of knowledge, we argue that the principles of the social exchange theory (Blau, 1964) also apply to innovative knowledge sharing. This means that the social costs and benefits in boundary spanned innovations should be balanced between the two parties in order to acquire a reciprocal cooperation in which both parties want to invest. This social exchange features on several factors that need to be present, which are also highlighted in literature on knowledge sharing. Scholars claim the need of mutual trust as major antecedent on knowledge sharing (Riege, 2005; Zhao & Anand, 2013), which also holds true for public sector organizations (Jones & Mahon, 2012). Nooshinfard and Nemati-Anaraki (2014) point out that trust influences the willingness to cooperate and thus the knowledge sharing capabilities. Besides trust, Jamali et al. (2011) explain several other concepts that can be conceived as "a common set of ingredients" according "general alliance literature" (p. 380). These 'ingredients' include incentives for knowledge sharing, strong connectivity, common objectives and institutional support entailing a clarity on the available resources from the involved institutions as well as a clarity of agreement. In addition, they highlight the need of clear communication and coordination to safeguard proper knowledge sharing at the proper time. Furthermore, based on their literature analysis, they underline the need of partner diversity, regular interactions and exchange of conventions. Here, the role of the boundary spanner is evident as they have the abilities to facilitate and organize the described ingredients (Hsu, Wang & Tzeng, 2007; Williams, 2002).

2.2.3 Type of boundaries

To advance understanding on the exact roles enhancing social capital, we first need to elaborate on the different types of boundaries as they are interrelated. Schotter et al. (2017) describe boundaries as the result of division and identification of groups that manifest themselves through cultural, institutional and organizational factors. From a sociological perspective, such boundaries can result into a strong connectivity i.e. 'we-can-do mentality', while they also lead to complicated collaborations inherent to the "problematic nature of collaboration" (Williams, 2013, p.18).

We follow boundary typology of Schotter et al. (2017) to express boundaries which may also be present in PSOs. Firstly, organizational boundaries emerge as indicated before, which can be hierarchical, functional and geographical oriented. Boundaries regarding the first two can lead to lose coupled organizational units (Van Meerkerk & Edelenbos, 2018), complicating innovations (Bos-Nehles et al., 2017). Although geographical boundaries created from spatial dispersion still exist, scholars point out that the emergence of technology can significantly ease the spanning of this boundary (Nooshinfard & Nemati-Anaraki, 2014). Secondly, cultural boundaries can be the result of conflicting norms and routines between cultures. These cultural differences can be devoted to demographic differences, as well as to organizational ones, such as different organizational cultures (Keszey, 2018; Riege, 2005; Schotter et al., 2017). Lastly, from an institutional context, Nederhand et al. (2019) point out that institutional logics needs to be aligned which they call the 'art of boundary spanners' (p. 223). Here, institutional logics refer to a set of norms, routines and sanctions that individual actors (re)create, enabling regulated and predictable behaviours (Jackall, 1988). Such logics can conflict each other which underlines the reserved role for the boundary spanner. To illustrate, the found PSOs characteristics can be attributed to a bureaucratic logic (Nederhand et al., 2019), conflicting the also present innovative logic referring to the need to provide adequate solutions to modern societal challenges (Nederhand et al., 2019; Van Meerkerk & Edelenbos, 2018).

2.2 Boundary spanning actors and roles

2.2.1 Boundary spanning actors

Although scholars provided many definitions on boundary spanners (e.g. Cross & Parker, 2004; Leifer & Delbeck, 1978), we use the definition of Van Meerkerk and Edelenbos (forthcoming) as they include boundary spanning activities as well and therefore concretizes their function. They define boundary spanners as those "*who pro-actively scan the organizational environment, employ activities to collect information and to gain support across organizational or institutional boundaries, disseminate information and coordinate activities between their 'home' organization or organizational unit and its environment, and connect processes and actors across these boundaries*" (p. 2). Hence, they are pivotal in enabling cross-boundary cooperative or collaborative arrangements (Van Meerkerk & Edelenbos, 2018; Nederhand et al., 2019; Williams, 2013). Many scholars elaborated on who possesses these

boundary spanning roles in today's organizations. To illustrate, Schotter et al. (2017) indicates that boundary spanning roles can either be formally appointed as organizational function, or that boundary spanners just act informally. Hierarchically, boundary spanning occurs at different levels of the organization. Haas (2015) argues that boundary spanners can either be middle-managers, top-managers or board executives. However, in the public sector, Williams (2013) argued that due to "interrelated and complex policy issues" public servants need to deal with, boundary spanning activities have become an "integral part of their job functions" (p. 19). Therefore, they are described as 'collaborative public managers' (O'Leary & Bingham, 2009).

2.2.2 Boundary spanning roles

Williams (2002, 2013) argues that dedicated boundary spanners have an assembly of four different profiles, each containing its own focus. These profiles are the *reticulist*, the *entrepreneur*, *the interpreter/communicator* and the *coordinator*. The reticulist refers to the boundary spanner as social networker and enabler of inter-personal relationships. Here, the boundary spanner builds understanding and support by coupling (political) strategical players through networking. The entrepreneur refers to the opportunistic component that includes coupling problems and solutions. Williams (2002) emphasizes that this entrepreneurial component goes beyond innovations and also incorporate political entrepreneurs, who opportunistically couple politics and policies. The interpreter/communicator component refers to a gatekeeper role, determining the knowledge in- and outflow of organizations. This includes understanding and appreciation of different cultures, interests and motivations. In order to sustain, the collaborative process requires coordination which is also executed by the boundary spanner.

Aligned with early and recent studies, Van Meerkerk and Edelenbos (2020) utilize a more pragmatic view and clarified four roles of boundary spanners: (1) information collection and knowledge exchange, (2) relational activities, (3) coordinating and negotiating with internal and external actors, and (4) mediation and facilitating cooperation. The first activity refers to pro-active behaviour of scanning the horizon and filter relevant information and bring the parties together. The second refers to the networking activities needed to be able to create both internal as external linkages by connecting relevant actors. Accordingly, coordination, negotiation and alignment are necessary to tightly coupling and smoothening cross-boundary collaboration. Fourthly, the authors elaborate on the mediation and facilitation of cooperation by mediating different interests and bring unlikely partners together.

The above-mentioned roles are comparable which allows to explain the kind of activities on how boundary spanners appeal to social capital, fostering innovations. While the entrepreneur role focuses on information collection on the innovative content by scanning horizons aiming to couple problems and initiate solutions, the communication role focuses on the actual knowledge exchange. Simultaneously, the reticulist is mainly focused on relational activities, whereas the coordinator in

addition focuses on negotiating and mediation of both external and internal actors in order to facilitate cooperation.

Inspired by the role typology of Williams (2002, 2013) and corresponding activities derived from Van Meerkerk and Edelenbos (2020), we elaborate on the roles of boundary spanners in PSOs to fill the knowledge gap in the specified configuration.

Besides these roles of boundary spanners, Nederhand et al. (2019) concretize the boundary spanning functions by clustering them into three main strategies based on institutional boundaries in PSOs. Firstly, the entrepreneurial strategy is focused on avoiding boundaries by working around contacts and rules. Secondly, a hierarchical strategy can be used by appealing to the power of managers to "pave the way" (p. 234). Thirdly, a mediating strategy can be utilized, attempting to make compromise between multiple partners, both avoiding as overcoming boundaries. While Nederhand et al. (2019) include all roles as found by the described researches, the degree to which and the involvement of actors varies as the corresponding activities do. Here, activities related to the entrepreneurial strategy include seeking opportunities i.e. by the usage of political knowledge and agendas to frame ideas to the interest of the receiver and avoiding inflexible colleagues. Activities related to the hierarchical strategy focus on involving hierarchical power plays and bring ideas towards higher managerial levels, whereas activities related to the mediating strategy entail a combination of both.

2.3 Human -and organizational capital factors

2.3.1 Human and organizational capital to employ boundary spanning roles

Human capital refers to the value derived from attributes of organizational employees, i.e. knowledge, competences, skills, experience and commitment (Kianto et al., 2017; Schultz, 1961). Not surprisingly, scholars as Subramaniam and Youndt (2005) elaborated on these human capital factors to advance understanding on innovation. They found that human capital needs to interact with social capital in order to accomplish innovations. Regarding boundary spanning functions, Williams (2013) discusses the work life of boundary spanners and conclude that the nature of the job is to build, develop and utilize networks. In addition, they have the ability to manipulate participants and agendas (Williams, 2013). Therefore, networking can be considered as their main priority (Williams, 2002). Besides corresponding social competences, Van Meerkerk and Edelenbos (2020) also cluster emotional and cognitive competences, stressing this threesome is needed to be an effective boundary spanner.

Boundary spanners can use three main strategies to span boundaries and cope with institutional boundaries as indicated by Nederhand et al. (2019). They distinguished corresponding competences, based on the strategy and activities. They stressed that those who appeal to an entrepreneurial strategy focused on avoiding barriers, need to be creative, political sensitive and courageous. On the other hand, those who utilize a hierarchical strategy, focussed on overcoming boundaries, need specifically to be perseverance, prioritising and results-oriented. Lastly, those who possess a mediating strategy include

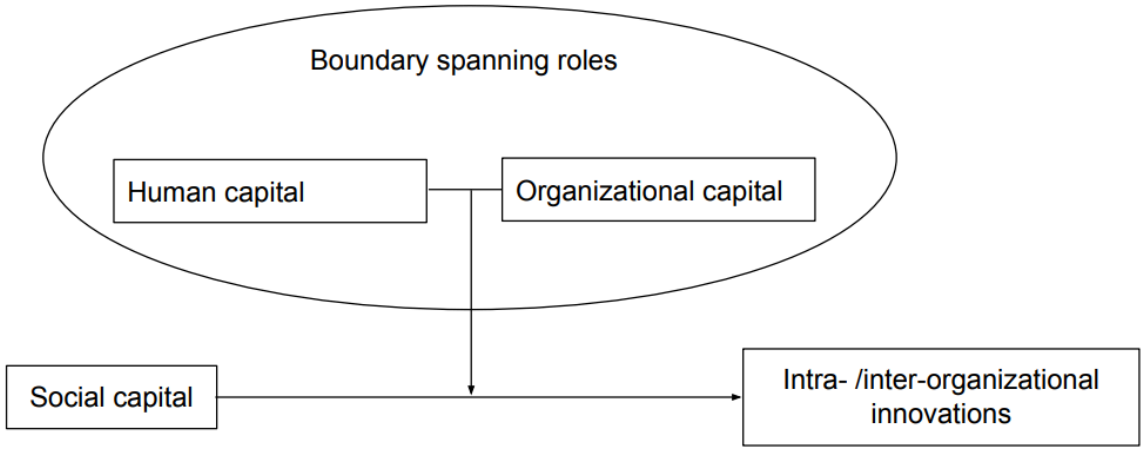
competences related to openness, listening, negotiating and persuading. In addition, Williams (2002) describes a range of competences to cope with various boundaries, emphasizing that the exact competences depend on the role they have. Regarding boundary spanned innovations, the following factors may be required, which are discussed by Williams (2002) as follows. Firstly, knowledge, experience and empathy can be needed to understand subjective norms and interdependencies. Secondly, transdisciplinary knowledge may be supportive to acquire a 'seat at the table'. Here, two views emerge; one indicating that boundary spanners need to be knowledgeable in a certain field of expertise acting as a "passport of legitimacy", and one indicating that boundary spanners needs to be "a jack of all trades and master of none", again depending on the role to fulfil (p. 119). Lastly, a cognitive capability i.e. the ability to be creative, innovative and entrepreneurial seems also to be useful. This includes opportunistic attitudes as well as the drive to work together and solve problems by utilizing an analytical ability to analyse problems from a holistic lens.

Organizational capital refers to the (utilization of) institutional knowledge residing in organizational cultures, systems, structures, manuals and processes (Kianto et al., 2017). While Subramaniam and Youndt (2005) found that organizational capital does not need to interact with social capital to foster innovations, we follow another research stream focused on boundary spanning that implicates that boundary spanners actually use organizational capital to employ their roles (Van Meerkerk & Edelenbos, 2018, 2020; Williams, 2013). Here, organizational capital indirectly interacts with social capital through boundary spanning roles. In terms of culture, Williams (2013) argued (the development of) a collaborative culture based on interdependency (e.g. between or within organizations) would be supportive to provoke boundary spanning. They argued that such collaborative processes can be cultivated in organizational structures and systems. Also, Kang and Snell (2009) argued that through rules and norms, organizations attempt to coordinate interdependency that may result in the development of such cultures. They argued that coordination would lead to a common framework of reference that would foster organizational efficiency, omitting reinvention of processes that were found useful in the past. Similarly, Van Meerkerk and Edelenbos (2018) argued organizations can cultivate executive commitment and facilitative management from (top) managers, fostering boundary spanning behaviours. This includes the allocation of needed resources and mandate. From a broader perspective, Nooshinfard and Nemati-Anariki (2014) argued that recognition and reward can be used to stimulate knowledge sharing, which may also stimulate boundary spanning behaviours. In addition, organizations can formalize education and training programs to develop non-inherent boundary spanning competences (Van Meerkerk & Edelenbos, 2020).

While the described factors seem promising in terms of explaining and predicting boundary spanning roles, they are very generally described as further empirical evidence (in typical public-public configurations) regarding innovations is still missing. Additionally, Williams (2002) stressed that while communalities can be found between organizations that utilize boundary spanning functions, related success factors are "deployed in different permutations depending on particular circumstances" (p. 115).

This articulates the academic consensus to further investigate PSOs in an innovative context, as the prior conducted studies are contingent. The research model as depicted in Figure 1 conceptualizes the incorporated factors of this study; the methodology of which will be described in the subsequent section.

Figure 1: Research model



3. Methodology

To elaborate on the roles of boundary spanning functions and clarify their facilitating factors, an qualitative exploratory case study has been conducted as this is suitable to find an in-depth understanding of a certain phenomenon observed in a particular contextual situation (Yin, 2002) and can be used to derive theories from (Siggelkow, 2007). This fits our research aim, as we attempt to acquire in-depth understanding of boundary spanning behaviours to build upon boundary spanning theory in the particular context of public sector organizations. As case, the Netherlands Fire Services (NFS) and its supporting Institute Physical Safety (*Dutch:* Instituut Fysieke Veiligheid, IFV) were selected as they meet the characteristics of PSOs (Bos-Nehles et al., 2017). Here, the NFS and IFV are subject to a rule-controlled organization, illustrating strict agency control and public legitimization which are considered as typical factors for public organizations (Borins, 2001; Bos-Nehles et al., 2017; Jain & Jeppesen, 2013). Furthermore, they proactively put both inter -as intra-organizational innovation on their national agenda 'to respond efficiently and effectively to the rapidly changing society' (IFV, 2020, p.1), which is aligned with the practical need and trend of such organizations to stimulate innovations (Van Meerkerk & Edelenbos, 2018). Meeting these characteristics, both organizations fit our intended research target group perfectly.

To concretize on the inter- and intra-organizational research side, further attention is needed on the architecture of the NFS and IFV. As being part of 25 Regional Safety Units (RSUs), the 25 autonomous fire service units together form the NFS. On the other hand, the IFV acts as supportive

organ fostering the prioritizing of topics that deserve attention of multiple RSUs by pro-actively cooperating with the NFS. These two organizations are eminently attractive to incorporate in this case study, as they shelter both intra-organizational (i.e. between the RSUs) as inter-organizational (i.e. between the IFV and NFS) boundary spanned innovations.

3.1 Data collection methods

As being recognized by academia to conduct in-depth qualitative exploratory case studies, in-depth interviews and archival data were used as data source for our study (Eisenhardt & Graebner, 2007). First, to create selection criteria concerning the interviewees, we follow the argument of Schotter et al. (2017) that understanding of both explicitly and informally appointed boundary spanning functions is necessary to unlock the full potential of the research agenda on these functions. Therefore, we include both in this research. In order to do so, contacts at the IFV and NFS were asked to involve colleagues that seemed to conduct boundary spanning functions. In addition, we used the organizational newspaper called *De Brandweerkrant* to identify possible innovative projects in which cross-boundary cooperation was present. Three criteria were used to assure relevance regarding this study; (1) the projects needed to rely on cross-boundary knowledge sharing between at least two RSUs and/or one RSU and the IFV, (2) they needed to have been started not longer than 8 years ago, avoiding that project details could have been forgotten and (3) they needed to concern the realization of innovative ideas. These projects were discussed based on these criteria with members from the IFV and NFS, which lead to a sample of a total number of 6 potential innovation projects and 24 interviewees.

3.1.2 Preliminary interviews

Preliminary interviews took place with the project managers of the initial sample of innovative projects. Here, the aim of the preliminary interviews was to (1) check the conditions for participation in the study, and (2) identify the boundary spanners of the projects. Thus, by applying a snowball sampling method, the initial selected project managers from the approached contacts and *De Brandweerkrant* identified other potential projects and stakeholders (i.e. boundary spanners).

3.1.3 Interviews

The used techniques resulted in a total of 5 projects and 13 affiliated boundary spanners as showed in Table 1.[1] Besides the 14 boundary spanners, 7 boundary spanners were interviewed who were involved in multiple projects and structurally employed boundary spanning activities, e.g. program -and innovation managers and leading innovation advisors/researchers. This resulted in a total of 20 interviewed boundary spanners. The interviews were conducted semi-structured, aiming to provide

[1] Although the participants are depicted in table 1, no interviewee id is provided on purpose to limit traceability and safeguard anonymity.

enough space to go into details if necessary while simultaneously provide structure based on prior research on boundary spanning. To secure internal validity as discussed by Burnard (1991), the interview protocol was reviewed and discussed with fellow researchers. The interviews lasted between 45 – 60 minutes and accounted for 15 hours and 18 minutes of interview. Probing techniques, i.e., asking for explanation, follow-up questions and clarification, were used to create an open atmosphere and enable in-depth understanding. All interviews were conducted in Dutch contributing to a 'natural setting' for the interviewees and were executed on distance by using Microsoft Teams. With permission of the participants, all interviews were recorded. Once the interviews were conducted, the interviews were transcribed at verbatim to reduce interpretation bias by using Amberscript. Although this transcribing software was used, further human attention was necessary and therefore, every transcript was manually edited to safeguard the at verbatim texts. Subsequently, they were anonymized by leaving out names of individuals, organizations and projects, aiming to create psychological safety and thus transparency. Additionally, a validation with all interviewees was done by sending them the verbatim transcripts by mail. By implementing validation, asking fellow researchers to revise the interview protocol, incorporating multiple voices in the analysis and making use of different sources, trustworthiness was secured (Burnard, 1991; Tracy, 2010).

Table 1: Overview of interviewees, corresponding innovation project and length of interview.

Innovation project	Function	Organization(s)	Interview duration (minutes)
Digital simulations	Project leader	RSU	43.34
Digital simulations	Project manager	IFV	59.44
Drones	Project leader / advisor	IFV	47.44
Drones	Officer	RSU	59.08
Early Warnings / wildfire dispersal model	Project leader / researcher	IFV	49.58
Early Warnings / wildfire dispersal model	Project leader	IFV/RSU	43.40
Early Warnings / wildfire dispersal model	Project coordinator	RSU	34.59
Early Warnings / wildfire dispersal model	Officer	RSU	37.04
Extinguishing robot	Project leader	RSU	30.07
Extinguishing robot	Officer	RSU	48.47
Extinguishing robot	Officer	RSU	36.46
Logistic database	Project manager	RSU	95.14*
Logistic database	Project leader	IFV	*
Various	Officer	RSU	54.31
Various	Officer	RSU	48.38
Various	Manager	IFV	57.42
Various	Manager	IFV	29.17
Various	Manager	IFV	42.04
Various	Advisor / Researcher	IFV	71.42
Various	Advisor	RSU	64.02

*One interview was conducted with two participants due to scheduling and time constraints. They concerned the same innovative project.

3.3.3 Document analyses

Document analyses have been conducted aiming to determine the organizational visions and missions about boundary spanned innovations and the implementation of these visions throughout the organizations. To do so, formal documents were provided by personal contacts of the authors at the IFV/NFS and analysed to find out how communications were organized. For our study, it was important to investigate whether (1) formal boundary spanning function(s) were recognized as strategic asset and (2) whether the documents have the tendency stimulating both (in)formal boundary spanning functions by the organizations and if so, which common factors underlie.

3.2 Data analysis

After the approximately 75 hours of transcribing, the interviews were coded to structure and make sense out of textual data (Basit, 2003). On this way, statements were categorized (Dey, 1993), enabling to find patterns, differences and similarities (Seidel & Kelle, 1995), and advance understanding

on boundary spanning roles and the facilitating influential factors. The transcripts were imported to the software program ATLAS.TI, enabling to attach codes to the text chunks from the transcripts. A palette of coding techniques was used to conduct the analysis and build towards theoretical contributions as depicted in Figure 2. First, deductive coding was used to categorize relevant text chunks, based on the categories of the interview script and prior definitions. These 6 deductive codes were *social capital, boundaries, boundary spanning roles, human* -and *organizational capital*. Second, inductive open coding was used within the already created subcategories, i.e. concepts were labelled enabling the development of categories based on their properties and dimensions (Khandkar, 2009). On this way, it was attempted to leave space for new concepts that were not covered yet by prior literature. Subsequently, the found codes were filtered and axially coded, identifying relationships between and enabling categorizing of the codes (Corbin & Strauss, 1990).

Through an iterative process, a codebook with ultimately 119 open -and 48 axial codes was created. This iterative process was characterized by re-reading prior transcribed interviews to reorganize and categorize codes in the axial coding process. Finally, selective coding was used to attribute the categories obtained by axial coding to key categories forming the base of our theoretical contributions (Corbin & Strauss, 1990), resulting in 26 final codes. The latter two steps were done in Microsoft Excel by merging the codebooks into an Excel sheet. Enabling to find differences between inter- and intra-organizationally spanned boundaries, this was done while keeping track of the origin of the code (i.e. whether the code was derived from an interviewee from the IFV or RSU), also depicted in Figure 2.

Figure 2: Data structure of this study

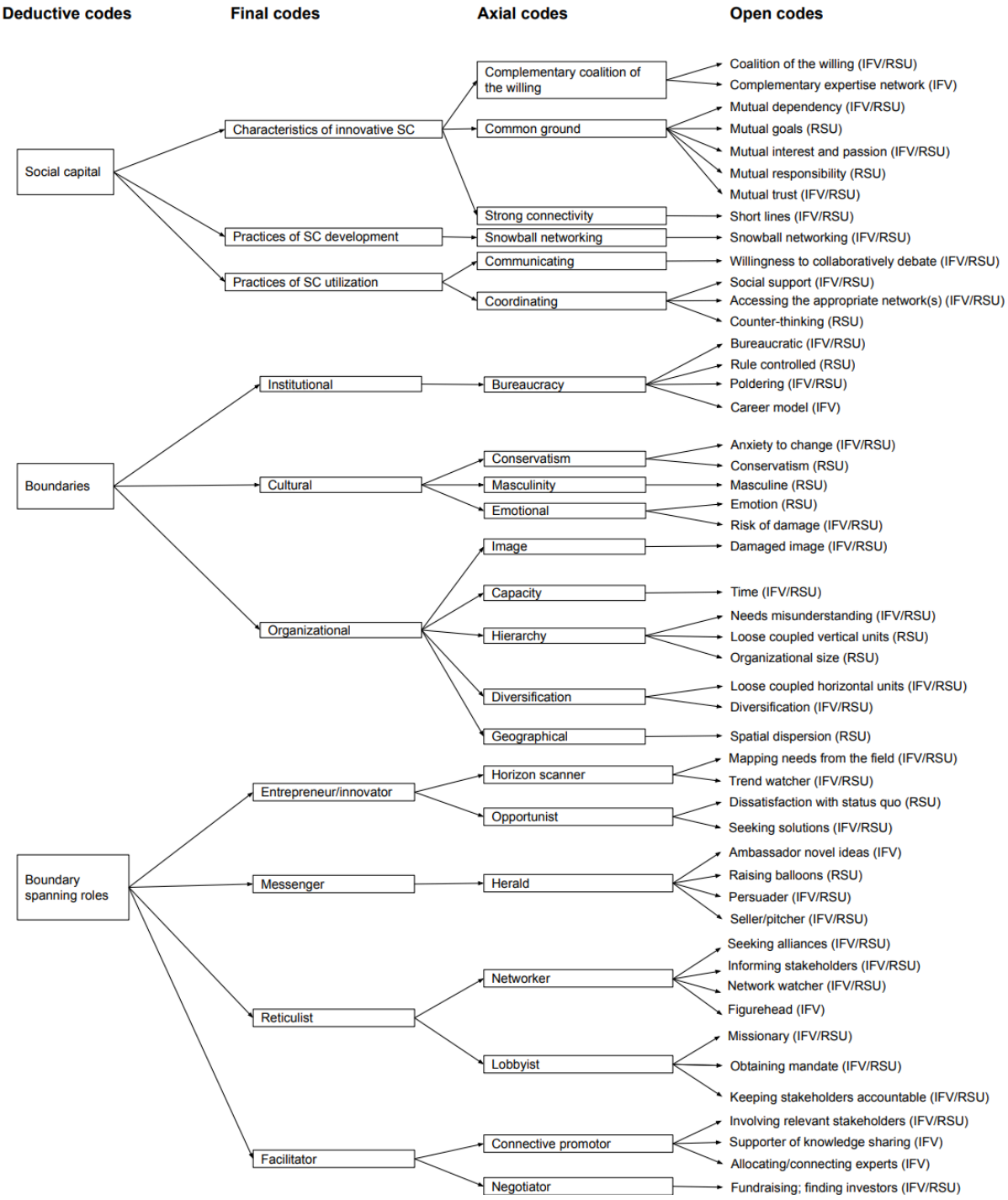


Figure 2 (continued)

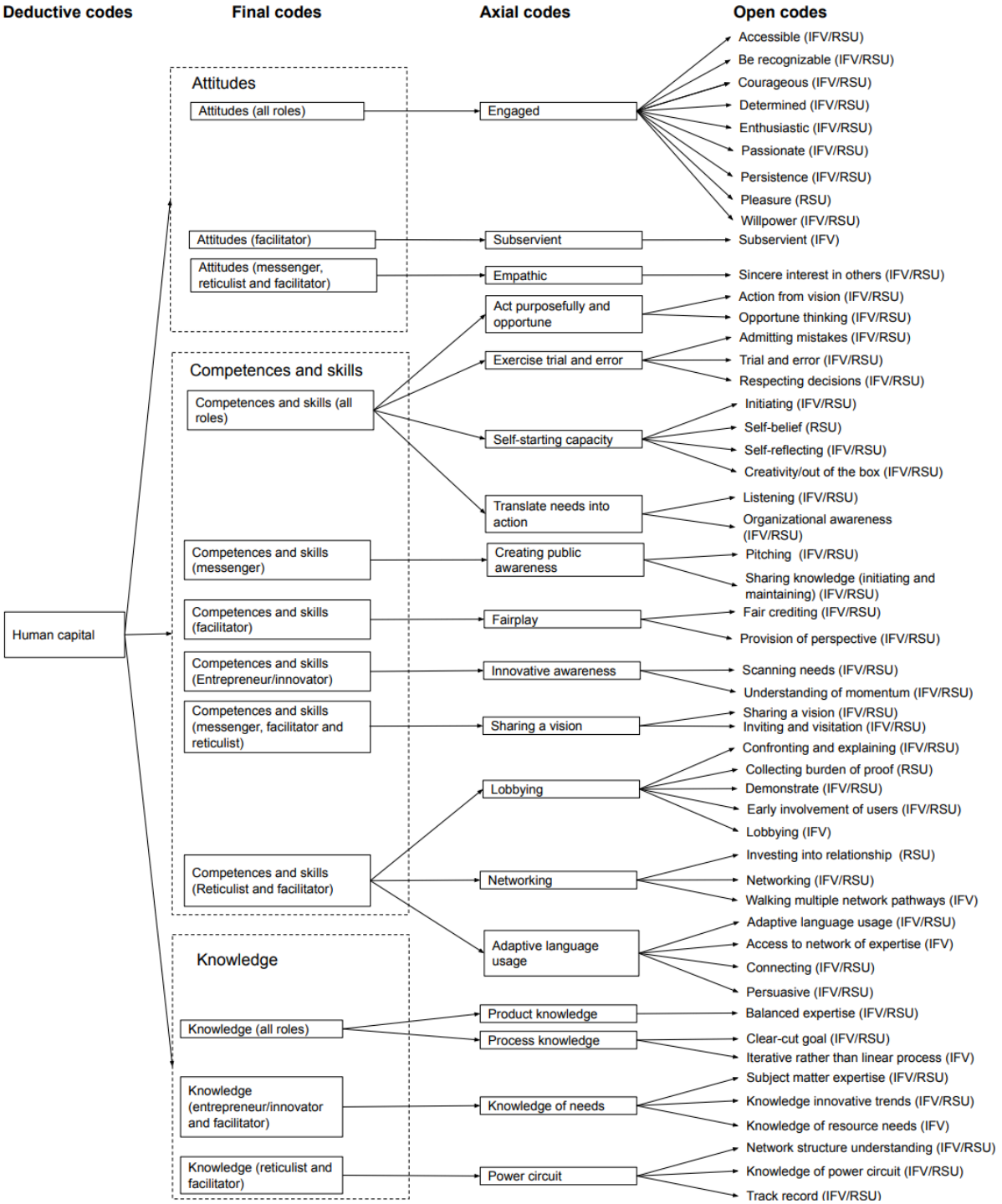
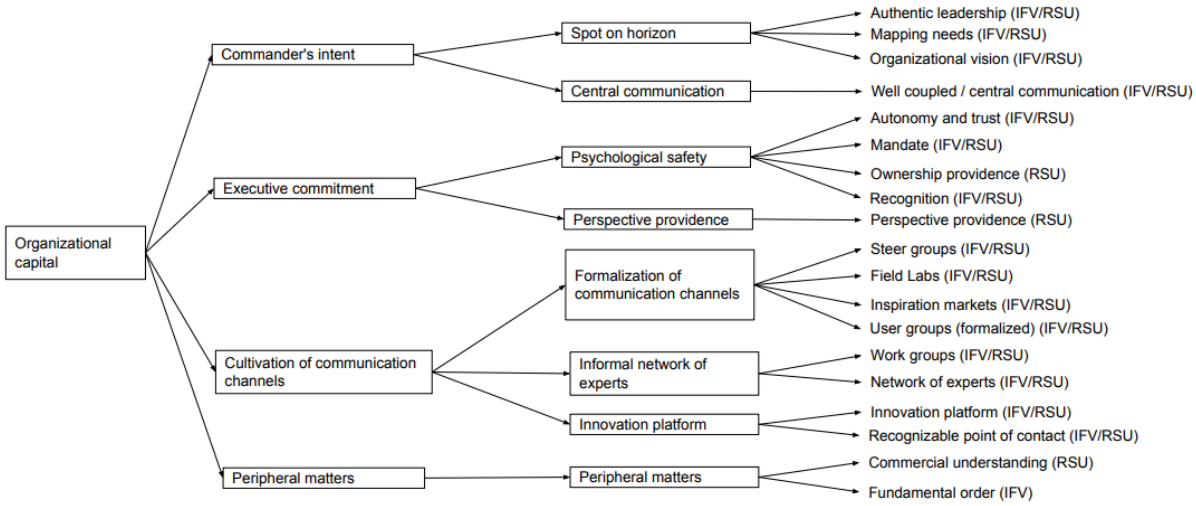


Figure 2 (continued)



4. Results

4.1 Boundary spanned innovations at the investigated PSOs

Since 2010, the NFS exists of 25 RSUs, which major task is to repress, i.e. 'firefighting and providing help to humans and animals' (Brandweer Nederland, 2021, n.d.). The NFS is nationally supported by the IFV, aiming to reinforce the tasks executed by the NFS and support them with disaster relief and crisis management. To accomplish, the IFV exists of multiple departments, including a fire service academy (*Dutch*: Brandweeracademie) and facilitative service centre.

The analysed documents reveal that the IFV/NFS embrace the urgency to mutually innovate. Being legally defined, the IFV profiles itself as incubator and accelerator of innovation and closely cooperates with the council of commanders and directors (*Dutch:* Raad van Commandanten & Directeuren Veiligheidsregio's, RCDV) to map needs from RSUs. This resulted in the anchoring of innovation in the organizational capital structure through an innovation program launched in 2020, including the assembly of fragmented innovative ideas over the country and their thematization, driven by four innovation managers. Aligned, a digital innovation platform and fund will be launched nationally, aiming to centrally determine the strategic innovation agenda of both organizations. By including an innovation board, the IFV aims to quickly fund and resource potential innovation projects. Also, training and education will be provided towards middle managers situated at the involved organizations. Through the utilization of this program, the IFV intends to create an innovative ecosystem incorporating all 25 RSUs and chain partners, e.g. the Ministry of Justice and Security. While these incentives are very promising, they entail a long-term path and hence need to be interpreted carefully as success factor.

4.2 Social capital and innovations

The interviewed innovators indeed appeal to social capital that is characterized by a common ground, including mutual trust, interest, responsibility and dependency. Together, they result in strong connectivity pursuing a common objective. In general, they aim to achieve the best possible innovative solutions driven by a common passion to enhance both their own professional and civilian safety. Here, they acknowledge that they appeal more often to informal networks than formal ones: "*I think that in general the informal networks are stronger for these kinds of things than the formal networks... Because you actually approach the right person directly within your network, the enthusiasm is also immediately there... and and the enthusiasm is often the breeding ground to start something"* (Interview 5)

The interviewees indicated they aim to proceed with a relatively small (self-initiated) work group that shares a common ground, which is identified by some interviewees as a *coalition of the willing*. By compiling such coalitions, boundary spanners surround themselves with a network of experts and decision-makers on the strategic level, i.e. respectively a group of people who possess complementary expertise on the regarding innovations and can provide the necessary resources. More importantly, such coalitions enable to progress with projects instead of getting tangled in endless decision-making processes: *"It is very complex to start with 25 partners. Especially because you sometimes get stuck for a long time in the 'what do we want to achieve' phase. That slows down a lot. So, it is easier to depart with a coalition of the willing. Then of course you don't have to put in that much effort for those who come along […] at least on a strategic level someone must really want to go for it…*" – (Interview 4).

Two practices emerge to help the utilization of social capital: communicating and coordination. Both are needed to realize access to the appropriate networks, approach the right individuals and obtain sufficient social support, needed to acquire required resources for innovations. The interviewees indicated that through snowball networking, potential participants of an innovative project find each other to form such coalitions.

4.3 Boundaries

It turns out that the utilization of social capital is disturbed by the presence of cultural, institutional and organizational boundaries.

Culturally, it appears that conservatism is cultivated in the nature of the organizations, while they also admitted a transition was observed over the past few years; "*maybe there was less development in the past, eh. […] we always extinguished fires with water.*" – (Interview 10). Furthermore, since the organizations drive on a passion to enhance civilian safety, participants are highly emotionally involved leading to a risk of damage that is culturally grounded. However, interviewees also point out that once being coordinated well, this emotionally involvement can also lead to an, even stronger, common passion to realize new ideas; "*I notice that people are very enthusiastic and can't wait for structure to finally come, so that a) you don't have to reinvent the wheel, sometimes just as beautiful things happen*

in Zeeland as in Drenthe, only they don't know about each other, and b) as a separate region ... or as a couple, you often cannot make it financially and in terms of capacity to realize a brilliant idea up to implementation. – (Interview 2). Lastly, traditionally the organizational culture is masculine: *"we are a masculine organization, eh, quite rank-driven, authoritarian… and they [top managers] are traditionally not very used to share influence and power"* – (Interview 18). Noticeable, a transition was observed to a more transparent organization, although it still happens that some commit to a conservative masculine vision, referred to as the *'grey gentlemen'* – (Interview 6).

Institutionally, a bureaucratic boundary was indeed present. Interviewees experienced a rule-controlled organization, which is formalized through standard procedures and practices. Furthermore, they identified that sometimes, decisions are pushed forwards leading to slow decision making and endless discussions frustrating the innovative process; *"what happens now, they do not want to say yes or no immediately [....] And actually, you end up with the term what is called bureaucracy, and that is just a killer for everyone within an organization. If that, if that could be streamlined better, then you can do much faster and separate the wheat from the chaff."* – (Interview 1). This behaviour is fuelled by the career model of the NFS, implicating one can better become a manager instead of acquiring field expertise enabling quick decision-making; *"most fire officers, are not in a substantive position, but they are in managerial positions. […] Just as you want to become something at the NFS and you want to earn more, then you should not be concerned with the content of the profession. […] I often find it incomprehensible that so many people can work at the top of an organization, who have so little capacity to connect with the people they lead."* – (Interview 15).

Lastly, organizational boundaries are indicated. Firstly, while the interviewed managers do actually present themselves approachable, others do indicate a misunderstanding of needs between organizational levels still exists through a hierarchical rapport. Secondly, diversification is indicated between the RSUs, i.e. only intra-organizationally. Still, over the recent years, rapprochement is observed; "*we have just been very much on our own island [...] But I have noticed that in recent years we have seen, say, just two years, that we are seeing more regions starting to cooperate with each other and that there are examples of innovations that happen together."* – (Interview 13). Similar observations were made concerning inter-organizational innovations. It became clear that the image of the IFV was damaged due to wrong decision-making in the past, while also improvement is mentioned: *"the IFV has sometimes punching way above their weight ... And said, we will arrange that for you ... and then they failed, so you end up with a piece of image damage [...] you do occasionally see that with innovation affairs... There are also new people on it, and they are doing very well, and that [change] is also noticed in the country"* – (Interview 6). Thirdly, capacity issues emerged as innovators are not necessarily planned free by their supervisors while others are: "*most of my colleagues just have to run production. They have to make training schedules, or they have to assess plans, or put together a technical network... [...] And my production is in fact building a network."* (Interview 13)

Finally, organizational boundaries are observed due to geographical dispersion, which complicates physical consultations while interviewees also admitted it is partly absorbed by technology.

4.4 Boundary spanning tasks, roles, responsibilities and actors

4.4.1 Boundary spanning tasks and roles

The tasks that were executed by the boundary spanners could adequately be clustered into four roles, which are the (1) *entrepreneur/innovator*, (2) *messenger*, (3) *reticulist* and (4) *facilitator*. They all stimulate social capital, although from different tasks and objectives.

The *entrepreneur/innovator* role focuses on coupling problems and initiate innovative solutions and is characterized by two subordinate roles; the horizon scanner and opportunist. By scanning horizons, boundary spanners enable to map needs from the field and watch innovative trends, both focused on collecting information. Simultaneously, by possessing an opportunistic role, they are able to combine these needs and trends to provide adequate solutions to complex issues: "*... a bit of alertness [...] so you also have a kind of radar on, I think, to notice things like this, to implement it in your own organization."* – (Interview 12). From the opportunistic mindset, they exercise trial and error to enhance their innovations. They get inspired by others and subsequently, appeal to the social capital of their home-organisation to develop an innovation: *"We as a team purchased such an extinguishing robot for ourselves. We believed that it was just useful for us, and that we really wanted to experiment with it and gain experience... maybe that you're going to hear the name someday, but if you're talking about an innovator, it was him...he designed such a robot himself"* (Interview 5)

The *messenger* role is focused on the actual knowledge exchange by communicating to others. It is separated from the innovator role as this one can also be conducted by someone else than the actual innovator. This role aims to pro-actively acquire social support from both decision makers and others and to obtain knowledge on novel trends: "*We all have networks... And in those networks, you can of course perfectly release those balloons."* (Interview 5). The subordinate role is the herald, i.e. the one who conveys messages to create public awareness and shares and absorbs innovative knowledge of ongoing trends; "*the colleagues on the work floor are not like that difficult to get involved in this kind of thing [...] You just need to have a team that will also believe in it and then it will expand like an oil slick"* – (Interview 14). This can be done by inviting and visiting others: *"it was decided to enter the country from the project [...] if we did not, we really gone actively from the big project to the regions, that reputation would have been a lot less"* – (Interview 6).

The *reticulist* role is in fact a broadening of the communicating role and attempts to convince the environment to join innovations, while the messenger only focuses on creating public awareness and sharing knowledge on innovative trends. These activities can be captured as relational activities. Through networking, they seek alliances and inform stakeholders fuelled the ability to identify where in the organization relevant decisions are made. They also act as figurehead regarding the specific topic,

enabling to be a point of contact for others. Through lobbying, the reticulist is able to influence others in prioritizing their novel ideas to their (political) agendas, aiming to bring their ideas to the table and find the appropriate facilitator. To acquire social support that is necessary to convince others to join the innovations, boundary spanners involve potential users at an early stage of their innovation, substantiating their tests case; *"The end users, that's just crucial to include them in your project, um, so that you don't suddenly deliver a ready-made package of well hey please and good luck with it. You start in the development process that it is really going to be their thing. And with that you actually create your oil slick automatically."* – (Interview 7)

Lastly, the *facilitator* role goes one step further than the reticulist and aims to facilitate the necessary resources to unfold the novel idea. This role can be subordinated into a promotor and negotiator role, connecting relevant stakeholders dynamically i.e. based on the need. Besides focused on resources, a promotor can also be supportive to expend the network of the reticulist and therefore promote the inclusion of stakeholders; *"you have to get space and confidence from your supervisor ... you have to be covered […] there are so many 'Gyro Gearlooses' [inventors] in the NFS, who are innovating and thinking up other things .... so, all you have to do is rake it together"* – (Interview 12). Furthermore, through negotiating and finding investors, the boundary spanner is able to acquire the necessary financial resources to innovate: "*In fact, you are looking for investors, sometimes it is a bit of start-/scale-up type of discussions […] those investors are of course the other regions, or the ministry. […] If you want to, you will look for all the possibilities, not only lend your hand to the safety region again"* – (Interview 4).

Individually, it depends on the expertise level and (in)formal network position of the boundary spanner whether (s)he employs one or multiple roles. To illustrate, as a project leader at the IFV, one interviewee acted both as messenger and facilitator of the innovative project, while another interviewee, as officer at an RSU, acted as innovator/entrepreneur and messenger expanding the projects.

4.4.2 Boundary spanning responsibilities and actors

The sequence of tasks executed by the boundary spanners inherit comparable steps that were undertaken to realize innovation. This can be described as an innovation roadmap, which needs to be understood first to understand the allocation of boundary spanning functions. Although a sequence is found as the name roadmap suggest, the process must be considered as non-linear, including initiating novelty and (pre)enthusing and finding the appropriate stakeholders. Concretely, four subsequent but iterative steps were found; (1) coupling problems and initiate innovative solutions, (2) communicate to get public awareness on the topic needed to acquire social support, (3) convincing the environment to onboard the innovation and (4) acquiring the facilitative conditions needed to further develop and implement the innovation; *"show that you are there [...] At first I was alone with that **** [innovation] ... and then I convinced a group of people and assembled a team to who also thought it was a good story and wanted to participate [...] then we applied for a subsidy"* – (Interview 10).

We found that the indicated roles are either expert or managerial oriented; while expertise is needed for the substantive side of innovations, managerial power is needed to realize the facilitative conditions. However, it turns out that the success of innovations is driven by complementary social capital. This means that while all steps need to be executed in order to realize innovation, it is not a necessity that boundary spanners deploy all steps. In some cases, they be executed by employees from the 'home' organization and hence no boundary spanning is necessary (anymore). For example, while a partnership was established, interviewees related to the extinguishing robot showed that they got their mandate from inside their own region and hence only acted as innovator/entrepreneur, to further develop the robot, and messenger, to communicate their findings to the other regions involved in this partnership. On the other hand, one robot was provided from a boundary spanner at the IFV, who therefore acted as facilitator. Thus, it depends on the innovation itself, e.g. the scale, present level of expertise and resources and origin of mandate for the particular project, which stakeholders need to be involved and hence, which boundaries need to be spanned. Here, the general implicit role of the boundary spanner is to determine who needs to be included in the coalition of the willing to span the boundary, cq. which social capital is needed, what boundary is present and what strategy is needed to bring the innovation one step further: *"See where the resistance is ... do I have to get over it ... do I have to get around it ... or should I pass it?"* – (Interview 14).

Furthermore, the interviewees showed that roughly three kind of boundary spanners are present, either informally or formally appointed. Informally, the interviewees mentioned the wild dogs; safety professionals who intrinsically desire to use their expertise to innovate. Formally, there are innovators who are included in the line, and those who are not, both being employed to seek for opportunities, shifting the status quo.

4.5 Human capital success factors

To employ the found roles, boundary spanners appeal to human capital which can be linked to the roles, while some factors are overlapping multiple or all roles as depicted in Table 2. The factors are clustered into either attitudes, knowledge, competences and skills.

4.5.1 Engaged attitude

Overall, the majority of the interviewees indicated that innovations are driven by a personal motivation to enhance the status quo, a self-reflecting and-starting ability and alertness. The personal motivation is reflected by an engaged attitude concerning all roles, which show that these are driven by intrinsic motivation and belief that is expressed through passion, enthusiasm, persistence, determination and willpower; *Twelve times a year we get paid our salary neatly and very exaggerated, and I don't have to take an extra step; I get that salary. And what is the reason that I take that step harder… well, I call it craftmanship idiocy*" – (Interview 5)

4.5.2 Self-starting capability, exercising trial and error

In addition, boundary spanners do act from a self-starting capacity and possess the courage to claim their role(s) by persuading their superiors, arising from a dissatisfaction with the status quo. They possess the ability to scan horizons, signal opportunities and bring them into action by appealing on this capability. This self-starting capacity is fuelled by a generated vision regarding the futureproofing of the organizations and hence, they act purposefully. They utilize trial and error and self-reflection by incorporating pilot groups and thereby early involve users to test their innovations and expertise. By doing so, they substantiate their argument to join their innovation, and therefore understand that finally, they need to be harnessed with a clear-cut goal responding a clear urgency regarding their innovation to acquire the needed publicity: *"Do you really want to be successful, now also just have a clear picture of what you really ask people [...] You must be able to make it clear when it is finished. An exploratory report, a functioning prototype or something like that."* – (Interview 4).

4.5.3 Process and product knowledge

Inherently to trial and error, boundary spanners are resilient and flexible in dealing with setbacks because they understand and acknowledge that an innovation process is rather iterative than linear. Once a setback happens, they aim for continuing with the development and trials of the innovation, substantiating argumentations to implement their idea later on when the momentum is there, e.g. when larger projects can be used to link their project to formalize an *innovation package*: "*Well, choose your battles ... then*, *I will continue to develop, making the final report even bigger, even better and even better substantiated and uhm... yes, you go on... And you try to find your supporters."* – (Interview 14). Furthermore, they acknowledge they need subject matter expertise to some extent which is captured as (innovative) product knowledge. Still, it depends on the role whether this is superficial, just enough to convince others to join the project, or in-depth knowledge, to develop novel ideas.

4.5.4 Role specific human capital

Besides the described competences regarding all boundary spanning roles, other competences can be related to specific roles. Although the innovator needs subject matter expertise and understanding of innovative trends conceptualized as innovative awareness, the other roles have several communalities attributed to the earlier described associated activities. Firstly, in order to effectively network, lobby and create public awareness, boundary spanner feature an adaptive language usage, meaning that they can adapt their language to the participants. Therefore, boundary spanners are master in understanding and mapping the information need of the receiver to enable fruitful conversations, appealing to their empathetic ability; *"I think that with knowledge sharing, you especially have to find the balance in what knowledge there is and how can you share it ... I can imagine that not everyone is waiting for a total package of information and research that has been done. So, you have to ensure a good implementation of the knowledge, but convinced."* – (Interview 7). Especially for the facilitator who can act as a

facilitative manager, interviewees argued that they need to comply to a subservient attitude characterized by fair crediting of ideas and fair explanation on perspective towards the innovation.

Here, they also have the courage to confront and explain why someone has to join their innovation, sometimes pointing out responsibilities, while also need to accept decisions from others to remain their trust. Finding this balance is also done through trial and error and admitting mistakes; *"but sometimes it is also that you point out to managers their risks and responsibilities ... like 'yes ... you do not run that many risks you do, but if you don't and accidents will happen, then you do have a risk'. So, you also try to use all kinds of ways of communicating and use different networks. Ehm, what I have noticed is, you have to accept that sometimes it is not accepted, if you press too hard there you lose the people"* – (Interview 8)

The acknowledgement that the innovation process is rather iterative than linear resonates especially with roles associated with lobbying, networking and negotiating to acquire social support. Understanding of this phenomenon leads to the understanding that the entire playing field and a symbiotic effect of human, social and organizational capital are a as a necessity to realize intra- and inter-organizational innovations:*" If you want to achieve this, you have to see a total game, and and and you pre-cook and you let us slip it. And you - and you call a few people in advance, say: "dude what do you do in that meeting, are you for or against" ... and so it is a ... it is a whole combination of things that eventually make something work very sometimes [...] you have the content and the game..." –* (Interview 4)

This playing field also consists of the deployment of resources, including the ability to utilize technologies as WhatsApp groups and a digital innovation platform, enabling strong connectivity on (in)formal network structures. Concretely, interviewees indicated that by using such technologies, they can update each other on the latest trends. Lastly, specially attributed to the facilitator role, they have the ability to set up events to enhance the communicating role and create public awareness.

To conclude, boundary spanners indeed appeal to human capital factors in order to span boundaries. In the end, it appears that intrinsic motivation, the ability to adapt to the environment and finding the appropriate allies are the main success factors.

4.6 Organizational capital success factors

Although the findings indicate boundary spanners utilize several organization capital factors as explained below, we found they mostly apply to all roles while the extent in which differs. In general, the communicating and coordinating aspects of social capital resonate at organizational level in order to foster the boundary spanned innovativeness of the investigated PSOs. These were seized by boundary spanners to fulfil their roles.

4.6.1 Commander's intent

The organization needs to cultivate an organizational vision on the innovation agenda by putting a spot on the horizon, exposing urgency and providing guidelines to innovations. Consequently, such a clear *commanders' intent* enables middle managers to quickly respond once mandate is requested. This supports the facilitator enabling the quick providence on perspective towards innovative projects, and the reticulist to substantiate arguments with; " *I believe that the profession should be safeguarded from top to bottom, with some sort of top officer [...] that should be people with authority in the field, who are also top of the fire service. And they should in fact determine that strategic innovation agenda. [..., e.g.] 'in fifteen years, we will no longer go inside, that is our goal. We do not know whether we will achieve the goal, but that is where we are now and that means that we will take so and so those steps in the coming years.'"* – (Interview 15).

4.6.2 Executive commitment

In line with a commander's intent, boundary spanners indicated they need ownership based on trust and expertise, enabling psychological safety to exercise trial and error that is needed for all roles. Both appeal to executive commitment, i.e. the degree of willingness from the (top) managers of the organization to understand the needs, endorsing the imperative of strong connectivity; *"Now things like that from the fire brigade are supported by the council of commanders ... and they must have the will to do that kind of thing"* – (Interview 14). Interviewees indicated this asks for authentic leadership capacities, including a strong organizational vision that is entangled with communication practices investigating the needs from the actual work floor.

It appeared that boundary spanners are able to enforce this executive commitment as indicated before with lobbying, networking and confronting and explaining their ideas to (top) managers. However, interviewees also indicated that improvements can still be made on the commander's intent by a general vision propagated by higher management and ultimately the RCDV. Although we found that with some projects such a commander's intent was actually used by boundary spanners, other interviewees argued this could be more structurally cultivated: "*There's no one up there at all who said; this [innovation direction] is a must-have…, this comes bottom-up... So apparently there are a lot of people working on this subject in their own region, thinking it's fantastic to share knowledge with other regions [...] I still think that the fire service management still hasn't really said 'we want this'… so that asks them not to come up with one solution but actually to create space for the work floor, for multiple solutions, [saying] we want you to start thinking about how we can do that in the future."* – (Interview 15)

4.6.3 Cultivation of communication channels

The NFS and IFV use various ways to formalize communication practices, benefiting to all roles. These communication channels can be formalized at individual level, which is actually done with

the employment of national coordinators. By the deployment of such national coordinators, a commander's intent and executive commitment can be cultivated and formalized: *"We now work with national coordinators [...] It is someone who comes from the field, who is from that field, who has all that respect from the field, and who will fulfil this role, which also means that once a kind of single point of contact"* – (Interview 12).

Also, such information channels are formalized at organizational level. Interviewees indicated that the IFV uses steer groups, consisting of multiple experts who together act as decision-maker on an innovative project, while both the IFV and NFS utilize work groups or departments, i.e. a collection of subject matter experts. Additionally, the NFS uses delegates from districts, representing multiple RSUs and providing them all a seat at the table to discuss relevant developments. By doing so, both organizations formalize network structures and provide work structures to connect experts; "*And what is powerful about that is that this is of course a club that is supported by the safety region, these are people from the workplace ... These are people with a great deal of knowledge, and that is always very much appreciated within the fire service."* – (Interview 5). In addition, a digital platform that maps the innovations across the entire organizations is planned, meaning that it incorporates all innovations as initiated by the RSUs and IFV. Also, both organizations facilitate Field Labs, brainstorm sessions and inspiration markets, creating a breeding ground to demonstrate and discuss innovations. In terms of social capital, the strong connectivity element reoccurs; participants indicated that by utilizing short cyclic innovations, stakeholders can continuously be informed. They indicated this can be reinforced by keeping track of such innovations through an innovative platform, institutionalizing organizational learning.

This means that the NFS and IFV – and especially their entanglement – can also be considered as organizational capital, while their architecture and interdependency are considered extraordinary. Although the NFS presents itself as an organization, it is actually a trademark consisting of 25 autonomous RSUs connected through the RCDV. In addition, the fire service academy (*Dutch*: Brandweeracademie) plays a pivotal role in the information provision on the actual need identification of these safety professionals, based on their field investigations. The IFV facilitates assembling of RSUs and relevant safety professionals and acts as a knowledge hub. In some cases, the knowledge workers from RSUs are formalized as knowledge directors (*Dutch:* kennisregisseurs) that are connected through boundary spanners at the IFV; "*Yes, there too there is a national network of what is controlled from the IFV ... So, there you see that knowledge hub again. [...] regions are actually islands, and the IFV connects those islands…"* – (Interview 15).

In sum, boundary spanners indeed benefit from organizational capital to employ their roles. The described factors can contribute towards a system, what ultimately, according to the document analyses, would lead to an innovative ecosystem characterized by interdependency.

4.7 Reconciling boundaries, strategies and roles

By analysing the roles in the context of the interviews, they were coupled to the boundaries, as depicted in Table 2. Also, the corresponding strategies (i.e. to overcome or avoid a boundary or do both) was coupled towards the different boundaries. Likewise, the human -and organizational capital factors were related to these strategies, which are described as follows (see Appendix A).

In order to cope with cultural boundaries, they utilize an avoiding strategy to deal with conservatism and masculinity while they attempt to overcome and avoid the emotional boundary. To overcome this boundary, they appeal to a strong belief in their innovative idea and stay determined to continue, expressed by an engaged attitude. In order to cope with organizational and institutional boundaries, boundary spanners utilize both strategies. To deal with boundaries related to image, they utilize their self-reflecting ability and process knowledge to assess whether they or someone else should be the messenger. Repairing this image damage needs a regain trust, which needs time. Though, they attempt to turn the tide by fair crediting innovators and create public awareness on their innovative and supportive intentions. To deal with diversification and the geographical boundary, they aim to contact others utilizing and elaborating on social capital by connecting, visiting and inviting others, for example by organizing inspiration markets. Also, they use technologies to connect relevant stakeholders, e.g. WhatsApp-groups and discussion platforms as social media. Additionally, they convince their superiors to overcome capacity issues, while they also work around this boundary by working harder to realize their desired innovation. In order to cope with hierarchy, which goes hand in hand with bureaucracy, they use both an overcoming as avoiding strategy. To overcome, they network and lobby, explain and confront others to convince them to join their innovations while they adapt their language usage to the receiver. On the other hand, they walk multiple pathways to avoid this boundary, e.g. by involving multiple (top) managers and avoiding others, appealing on their knowledge about the power circuit.

Regarding the innovation roadmap, the found boundaries can be coupled to the steps to take and hence, to the roles. It appears that the entrepreneur/innovator and messenger often encounter cultural and organizational boundaries, while the reticulist and facilitator encounters all three kind of boundaries as depicted in Table 2.

Table 2: Overview of success factors and boundaries attributed to the four identified roles.

Roles	**Entrepreneur/ innovator**	**Messenger**	**Reticulist**	**Facilitator**
Aim	Coupling problems and initiating innovative solutions	Creating public awareness of novel ideas and knowledge gathering on novel trends	Convincing environment to aboard certain innovations	Facilitating resources, enabling innovations

Table 2 (continued)

Focus	Finding opportunities and corresponding solutions enhancing the status quo	Storytelling and knowledge gathering	Finding allies and mandate	Resource based, mediation and facilitation, e.g. provision of mandate
Orientation	Content, information collection	Cooperation, knowledge exchange	Cooperation, politics, relational activities	Politics, relational activities
Boundaries				
Cultural	Emotion, conservatism and masculinity	Emotion, conservatism and masculinity	Emotion, conservatism and masculinity	Emotion, masculinity and conservatism
Organizational	Geographical, diversification, capacity	Geographical, image, capacity diversification	Image, hierarchy, diversification, capacity	Image, hierarchy, diversification, capacity
Institutional	-	-	Bureaucracy, capacity	Bureaucracy, capacity
Human capital				
Knowledge	Product knowledge (e.g. balanced expertise depending on role), process knowledge (e.g. iterative rather than linear), knowledge of needs (e.g. knowledge of resources needed)			
		Knowledge of power circuit (e.g. network structure understanding)		
Attitudes	Engaged attitude (e.g. accessible, passionate, determined, willpower and courageous)			
				Subservient
		Empathic (e.g. sincere interest in others)		
Competences and skills	Act purposefully and opportune (e.g. action from vision), exercising trial and error (e.g. self-reflecting), self-starting capacity (e.g. initiating, self-belief and creativity), translate needs into action (e.g. having organizational awareness)			
	Innovative awareness (e.g. scanning needs, understanding of momentum)	Lobbying (e.g. confronting and explaining), networking (e.g. walking multiple pathways), adaptive language usage, sharing a vision		
		Create public awareness (e.g. sharing knowledge)		Fair play (e.g. provision of perspective)
Organizational capital				
Commanders intent	Central communication, spot on horizon, organizational vision			
Executive commitment	Provision of ownership, trust, mandate and at least perspective towards innovators			
Formalization of communication channels	Steer groups, work groups, study groups, specialistic departments, innovation platform*, Field Labs and inspiration markets			
Peripheral matters	Psychological safety, discussion platforms and recognition			

*The innovation platform was indicated promising, although it still needs to be implemented.

5. Conclusions and discussion

Through utilizing intellectual capital theory as theoretical lens, this explorative case study allowed us to provide a unique look behind the scenes on which factors boundary spanners deploy to cope with different boundaries. From an innovation perspective, a range of boundaries were found disturbing the innovation potential that resides in social networks. To anticipate, boundary spanners indeed fulfil one or multiple roles, depending on the relevant stakeholders of the innovation itself (i.e. who needs to be involved) and expertise level and (in)formal network position. The deployment of these roles enables communication to and coordination of relevant stakeholders, leading to complementary coalitions of the willing. Thus, by creating and using such coalitions, boundary spanners are capable of unlocking potential social capital. These coalitions are characterized by a mutual ground and are in line with the prior 'ingredients' description of Jamali et al. (2011, p.380).

Once sequenced, the roles revealed an iterative roadmap of conditions needed to accomplish innovations. We found that each innovative step from this roadmap encounters different boundaries, and that boundary spanners deploy different human and organizational capital factors to cope with them as expected. While we found that these factors are in line with previous findings of Williams (2002, 2013), Nederhand et al. (2019), Van Meerkerk and Edelenbos (2018) and Kang and Snell (2009), we elaborated on them by relating these factors to the different boundaries that needs to be spanned.

To our knowledge, we are the first to link them together, providing a holistic overview of which human and organizational resources are necessary to limit or devastate the effect of boundaries as displayed in Figure 3. By doing so, PSOs can, through the deployment of boundary spanners, utilize the synergic innovative potential residing in (potential) social capital, bundle knowledge and improve organizational learning while simultaneously avoid reinvention. On turn, this can be determining for the futureproofing of their contributions to public value anticipating changing societal needs, i.e. sustaining and improving civilian safety in this case.

5.1.1 Roles, boundaries and strategies

The identified roles were the innovator/entrepreneur, messenger, reticulist and facilitator, each pursuing its own objective as showed in Figure 3. While we inspired them on the work of Williams (2002, 2013), the communicator and coordinator roles as identified by Williams were replaced by the messenger and facilitator to create distinction, because we found that communicative and coordinative aspects also resonate with the other roles. Similarly, the associated activities as described by Van Meerkerk and Edelenbos (2020) are indeed employed by the roles as anticipated. Moreover, by employing these roles, they foster social capital although it depends on the needed complementary resources whether they utilize intra-organizational social capital or inter-organizational social capital. On turn, these complementary resources depend on the character of the innovation, foremost whether an innovation needs to be mandated from inside or outside the organization.

On the other hand, the boundaries were clustered by using the typology of Schotter et al (2017), although we deepened them taking into account the specific context of public organizations as also displayed in Figure 3.

Subsequently, the roles and boundaries were coupled, as the different roles encounter different kind of boundaries that need to be spanned. It appeared that the entrepreneur/innovator and messenger mainly span organizational and cultural boundaries, while the reticulist and facilitator need to span all three kind of boundaries. An explanation is that the latter two roles enter and operate in a political arena, characterized by institutional factors as illustrated by Nederhand et al. (2019). In addition to their findings on institutional boundaries, it appeared that their identified strategies are also useful to span organizational and cultural boundaries and that boundary spanners characterize themselves appropriately capable to identify which strategy is needed, learned through trial and error. Still, a distinction can be made between the so-called 'wild-dogs' (i.e. those who exceed standards), who more often appeal the entrepreneurial strategy, and the formalized boundary spanners who frequently use a hierarchical or at least a mediating strategy.

5.1.2 Technology and boundary spanning

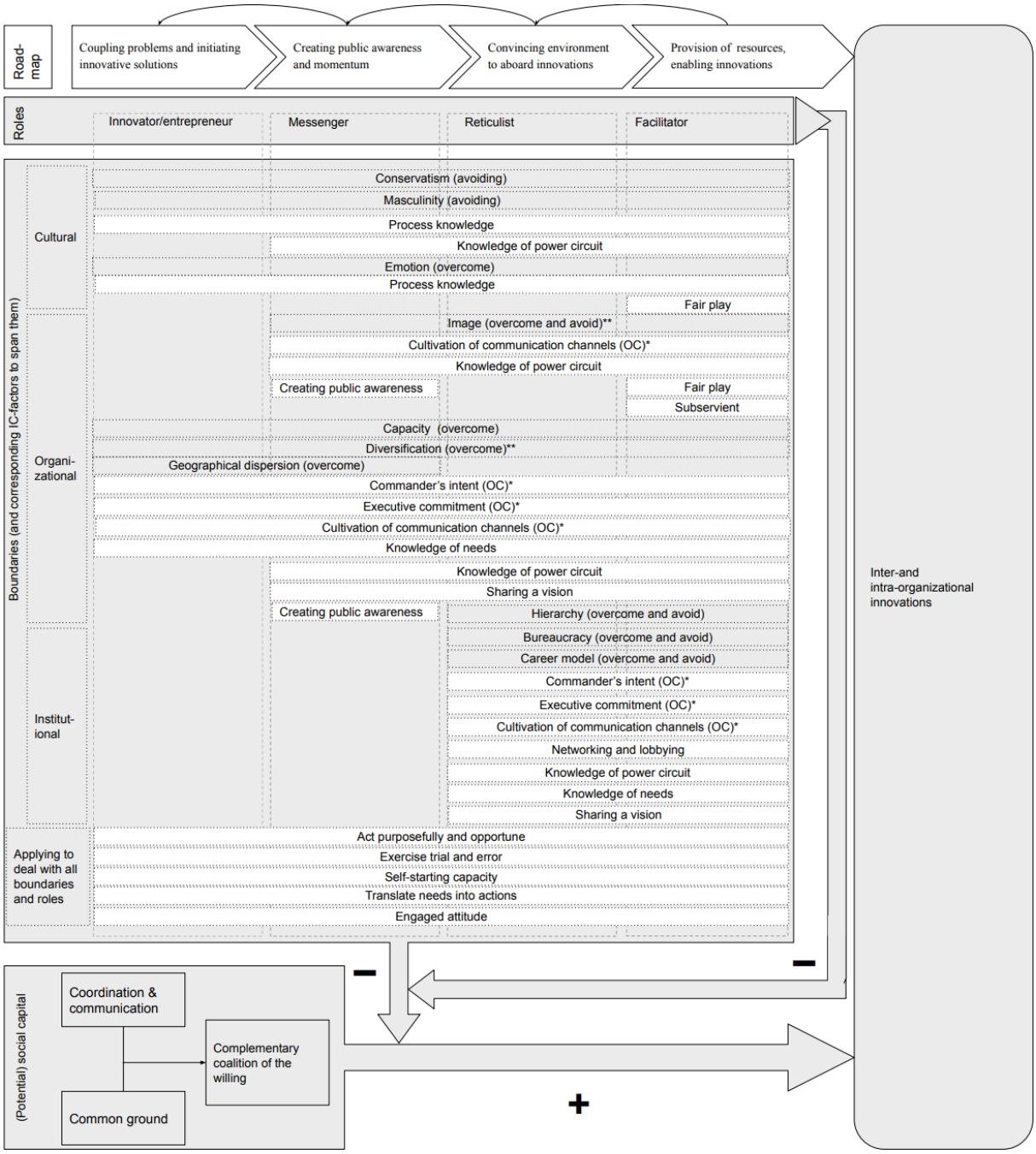
In line with Nooshinfard and Nemati-Anaraki (2014), we found that technology can ease boundary spanning behaviours. Concretely, participants indicated that emerging technologies as an innovation platform enable to bypass the traditional hierarchical standards and procedures hence, significantly easing the collection of a coalition of the willing. This also implies that, in line with earlier findings (O'Leary & Bingham, 2009; Williams, 2013), boundary spanning functions can be adopted by an increasing range of actors varying from (top) executives to regular safety professionals due to the incorporation of technology and hence, facilitated network accessibility. Still, for the reticulist and facilitator, substantiate access to a power network – and hence experience – remains very helpful. Here, boundary spanners seem capable to build their own network by proactively connect with others.

5.1.3 Similarities between boundary spanning -and innovation management literature

The found roles can be attributed to an innovative roadmap, which is consistent with the well-academic grounded innovation process. To illustrate, Veenendaal and Bondarouk (2015) subdivides idea generation, championing and application. While idea generation and application are straightforward, championing refers to the coalition building of potential allies and support from powerful agents aiming to "move the idea into practice" (p. 141). This reflects the especially the facilitator and, in some cases, the reticulist roles, whereas idea generation evidently reflects the entrepreneur/innovator role. In addition, Mansfeld, Hölzle and Gemünden (2010) stressed the importance to promote both expertise, processes, power and relationships in order to successfully innovate. In conclusion, the found boundary spanning roles do not differ from the earlier described

innovative roles attributed to the three-dimensional process of innovations. This implies that a range of innovation management literature may also be applicable for boundary spanned innovations, although further empirical research is needed to validate the applicability of such practices.

Figure 3: Comprehensive overview of study results



*OC stands for organizational capital. **The diversification boundary was only observed intra-organizationally (between RSUs), while the image boundary was only inter-organizationally (between the IFV to RSUs).

5.1.4 Theoretical contributions

The above-described discussion leads to the theoretical contributions of this paper. First, by exploring which boundaries are present, we expand existing literature and provided a detailed overview of which boundaries disturb the utilization of social capital in PSOs. Second, these boundaries were related to the different innovator roles. By providing a holistic overview on which factors boundary spanners appeal to in order to span them, we provide unique empirical evidence exposing which human and organizational resources are needed. In other words, this study advances academic understanding on how these roles are complicated, while simultaneously provides the corresponding solution on how these complications are remedied. Hence, besides boundary spanning literature, our findings can be adopted by (strategic) innovation management literature as well.

5.2 Practical implications and recommendations

5.2.1 Practical implications

The insights of this study enable PSOs with similar aspirations to cultivate intra-and inter-organizational innovations. They can focus their (human resource management, HRM) policies and practices on the deployment and development of the found roles, explained underneath through the required underlying human and organizational resources. In general, we found that boundary spanning roles can be employed by both managerial as non-managerial employees as long as (s)he has the drive to span the boundary.

Concerning the trainability of human capital factors, we adopt the implications of Van Meerkerk and Edelenbos (2020) as their roles resonate at our findings. They indicate that while empathy, self-efficacy and the capability to process information is cannot easily be trained, related competences can. These include self -and environmental awareness, listening and communication skills, endorsing the importance of gaining experience. In addition, managers in PSOs inherently become collaborative public managers (O'Leary & Bingham, 2009), confirming their crucial function to champion innovators, as also indicated by Veenendaal and Bondarouk (2015). They stress that supportive supervision and providence of adequate resources is necessary, although employees should not get resourced too comfortably as this would decrease the urgency to look for new opportunities.

Regarding organizational resources, PSOs need to implement organizational capital structures to set frameworks in which individuals can generate ideas and become championed, fuelled by an innovative organizational vision including a strategic innovation agenda. The latter should originate from the innovative needs indicated by the field. Here, PSOs can cultivate several human resource (HR) practices (Bos-Nehles & Veenendaal, 2019) that provide signals to employees attempting to foster desired behaviours (Connelly, Certo, Ireland, & Reutzel, 2011) as boundary spanning. These include training and development programs, supportive supervision and a clear mission and vision statement shared among employees (Veenendaal & Bondarouk, 2015; Bos-Nehles & Veenendaal, 2019), the latter of which can be conceived as the commander's intent. In addition, such an intent eases decision making on resourcing innovations by middle managers, which when absent seems to get pushed forward

severely frustrating innovators. Still, the implications remain dependent on executive commitment, emphasizing their pivotal role.

Additionally, the utilization of communication technologies as social media and WhatsApp-groups enable 'regular innovators' to become boundary spanners themselves. Indeed, they become the ones who share their innovative knowledge across boundaries. Furthermore, facilitators benefit by attaining media exposure to e.g. inspiration markets, inspiring others.

5.2.2 Practical recommendations

The above-mentioned implications lead to several recommendations for the NFS/IFV in particular, and similar organizations in general, serving the practical aim of this study. This aim was to map what both individuals as these organizations can do in order to foster boundary spanning, fulfilling their aspiration to cultivate boundary spanned innovations. By doing so, the NFS/IFV can expand their organizational capital by implementing this map in their collective memory.

Firstly, the innovative roadmap enables the provision of process knowledge and hence perspective towards innovations. In terms of expectation management, this map needs to be translated to the field and be distributed among RSUs and the IFV. This should include a clear overview of which boundaries can be expected at each innovative step and how to deal with them. Secondly, (top) managers (currently represented by the RCDV) needs to put a spot on the horizon to provide direction on the innovative agenda. This can either be done by the RCDV itself or committee to be appointed, as long as it has the mandate and support from the RCDV. This agenda should originate from innovative needs from the field and society. Such a framework provides a clear commanders' intent and specifically enables innovators to comply their innovations to organizational needs. However, a caveat emerges here. The commanders' intent requires a strong understanding and connectivity with the field. However, the current career growth model of the NFS signals and thus implies to immediately become a manager instead of specializing, not being equipped with necessary field knowledge. Hence, an important improvement can be made through demanding that leaders first need to earn their stripes in the field through specialization, a successful example of which is currently practiced by the formalized national coordinators.

The third recommendation concerns the planned innovation platform. As this instrument cultivates a clear communication channel, this platform is most welcome. Initially, we expect that the platform mainly influences the messenger role, as the obtainment of public awareness is facilitated. Consequently, it also affects managers, as mapping needs from the field becomes centralized and therefore, strategic choices can be made on the innovation agenda and providence of corresponding resources. However, this could lead to capacity challenges as the accessibility to those managers who need to provide mandate is significantly eased. Because the competences related to the reticulist and facilitator are inherent or need at least time to be trained (Van Meerkerk & Edelenbos, 2020), it requires investments to find and train boundary spanners possessing these roles. To remain advantage of

technology, PSOs need to carefully cultivate this emergence in their organizational capital avoiding capacity issues.

5.3 Limitations and further research

Although our findings can be useful to enhance the innovativeness of the public sector, our implications must be interpreted carefully, implying opportunities for future research as follows.

Firstly, the sample selection inherits mainly managers and is therefore asymmetric, not necessarily representing the entire workforce of the investigated organizations. This is well explainable, as the IFV/RSU recently started with boundary spanned innovations and hence, limited organizational capital was focused on fostering them. Practically, it makes sense that only those who already got access to a substantiate network spanned those boundaries. However, this may influence our findings and attribution of boundaries. While we did not find institutional boundaries on the innovator/entrepreneurial role, previous research indicates that employees 'from the field' may experience bureaucratic logics and thus institutional boundaries suppressing their innovativeness (Bos-Nehles et al., 2017). Secondly, while being autonomous organizations, the IFV/NFS inherit a unique interdependency affecting the generalizability of this study. While these organizations provide us a unique opportunity to investigate inter-and inter-organizational boundary spanning in a relatively short time frame, the implications must be interpreted carefully. As the bureaucracy, hierarchy, geographical dispersion and conservatism boundaries are also observed by other scholars, especially the other boundaries need to be interpreted with care.

Still, our findings do provide unique insights and explore possible relevant success factors for (similar) PSOs and these findings do imply interesting follow-up studies. We suggest to further investigate the found factors using multivariate analyses to validate whether they are generalizable for similar organizations. In addition to the factors we found, other factors from innovation management literature may be tested as well in boundary spanned contexts, as they seem applicable because significant similarities were observed.

References

Allen, T. J., & Cohen, S. I. (1969). Information flow in research and development laboratories. *Administrative science quarterly, 14*(1), 12-19.

Basit, T. (2003). Manual or electronic? The role of coding in qualitative data analysis. *Educational research, 45*(2), 143-154.

Blau, P. M. (1964). Exchange and power in social life. New York: Wiley.

Bos-Nehles, A. C., Bondarouk, T., & Nijenhuis, K. (2017). Innovative work behaviour in knowledge-intensive public sector organizations: the case of supervisors in the Netherlands fire services. *The International Journal of human resource management, 28*(2), 379-398.

Bos-Nehles, A. C., & Veenendaal, A. A. (2019). Perceptions of HR practices and innovative work behavior: the moderating effect of an innovative climate. *The International Journal of Human Resource Management, 30*(18), 2661-2683.

Borins, S. (2001). Encouraging innovation in the public sector. *Journal of intellectual capital, (2)*3, 310-319.

Brandweer Nederland (2021). Brandweertaken. Retrieved June 10th, 2021, from https://www.brandweer.nl/utrecht/werken-bij/brandweertaken

Brogaard, L. (2021). Innovative outcomes in public-private innovation partnerships: a systematic review of empirical evidence and current challenges. *Public Management Review, 23*(1), 135-157.

Burnard, P. (1991). A method of analysing interview transcripts in qualitative research. *Nurse education today, 11*(6), 461-466.

Bysted, R., & Hansen, J. R. (2015). Comparing public and private sector employees' innovative behaviour: Understanding the role of job and organizational characteristics, job types, and subsectors. *Public Management Review, 17*(5), 698-717.

Chen, J., Walker, R. M., & Sawhney, M. (2020). Public service innovation: a typology. *Public Management Review, 22*(11), 1674-1695.

Connelly, B. L., Certo, S. T., Ireland, R. D., & Reutzel, C. R. (2011). Signaling theory: A review and assessment. *Journal of management, 37*(1), 39-67.

Corbin, J. M., & Strauss, A. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. *Qualitative sociology, 13*(1), 3-21.

Cross, R. L. & Parker, A. (2004). The hidden power of social networks: Understanding how work really gets done in organizations. *Harvard Business Press*.

Dey, I. (2003). Qualitative data analysis: A user friendly guide for social scientists. Routledge.

Eisenhardt, K. M., & Graebner, M. E. (2007). Theory building from cases: Opportunities and challenges. *Academy of management journal, 50*(1), 25-32.

Haas, A. (2015), "Crowding at the frontier: boundary spanners, gatekeepers and knowledge brokers", *Journal of Knowledge Management, Vol. 19* No. 5, pp. 1029-1047. https://doi.org/10.1108/JKM-01-2015-0036

Hsu, S. H., Wang, Y. C., & Tzeng, S. F. (2007). The source of innovation: boundary spanner. *Total Quality Management, 18*(10), 1133-1145.

Instituut Fysieke Veiligheid, IFV. (2020) Interne memo innovatieprogramma.

Jackall, R. (1988). Moral mazes: The world of corporate managers. *International Journal of Politics, Culture, and Society, 1*(4), 598-614.

Jain, A. K., & Jeppesen, H. J. (2013). Knowledge management practices in a public sector organisation: The role of leaders' cognitive styles. *Journal of Knowledge Management, 17*(3), 347-362.

Jamali, D., Yianni, M., & Abdallah, H. (2011). Strategic partnerships, social capital and innovation: accounting for social alliance innovation. *Business Ethics: A European Review, 20*(4), 375-391.

Jones, N. B., & Mahon, J. F. (2012). Nimble knowledge transfer in high velocity/turbulent environments. *Journal of knowledge management, 16*(5), 774-788.

Jones, R., & Noble, G. (2008). Managing the implementation of public–private partnerships. *Public Money and Management, 28*(2), 109-114.

Kang, S. C., & Snell, S. A. (2009). Intellectual capital architectures and ambidextrous learning: a framework for human resource management. *Journal of management studies, 46*(1), 65-92.

Keszey, T. (2018), "Boundary spanners' knowledge sharing for innovation success in turbulent times", *Journal of Knowledge Management, Vol. 22* No. 5, pp. 1061-1081. https://doi.org/10.1108/JKM-01-2017-0033

Khandkar, S. H. (2009). Open coding. University of Calgary. Retrieved from http://pages.cpsc.ucalgary.ca/~saul/wiki/uploads/CPSC681/opencoding.pdf, accessed January 4th, 2021.

Kianto, A., Sáenz, J., & Aramburu, N. (2017). Knowledge-based human resource management practices, intellectual capital and innovation. *Journal of Business Research, 81*, 11-20.

Leifer, R., & Delbecq, A. (1978). Organizational/environmental interchange: A model of boundary spanning activity. *Academy of Management Review, 3*(1), 40-50.

Mansfeld, M. N., Hölzle, K., & Gemünden, H. G. (2010). Personal characteristics of innovators—an empirical study of roles in innovation management. *International Journal of Innovation Management, 14*(06), 1129-1147.

Van Meerkerk, I., & Edelenbos, J. (2014). The effects of boundary spanners on trust and performance of urban governance networks: findings from survey research on urban development projects in the Netherlands. *Policy Sciences, 47*(1), 3-24.

Van Meerkerk, I., & Edelenbos, J. (2018). Facilitating conditions for boundary-spanning behaviour in governance networks. *Public Management Review, 20*(4), 503-524.

Van Meerkerk, I., & Edelenbos, J. (2020). Becoming a Competent Boundary Spanning Public Servant. The Palgrave Handbook of the Public Servant, 1-15.

Van Meerkerk, I., & Edelenbos, J. (forthcoming). Towards an interdisciplinary and integrative understanding of boundary spanners: a systematic review. (In review)

Nahapiet, J., & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *Academy of management review, 23*(2), 242-266.

Nederhand, J., Van Der Steen, M., & Van Twist, M. (2019). Boundary-spanning strategies for aligning institutional logics: a typology. *Local Government Studies, 45*(2), 219-240.

Nooshinfard, F., & Nemati-Anaraki, L. (2014). Success factors of inter-organizational knowledge sharing: a proposed framework. *The Electronic Library, 32*(2), 239-261.

O'Leary, R., & Bingham, L. B. (Eds.). (2009). The collaborative public manager: New ideas for the twenty-first century. Georgetown University Press.

Riege, A. (2005). Three-dozen knowledge-sharing barriers managers must consider. *Journal of knowledge management, (9)*3, 18-35.

Ryan, A., & O'Malley, L. (2016). The role of the boundary spanner in bringing about innovation in cross-sector partnerships. *Scandinavian Journal of Management, 32*(1), 1-9.

Schotter, A. P., Mudambi, R., Doz, Y. L., & Gaur, A. (2017). Boundary spanning in global organizations. *Journal of Management Studies, 54*(4), 403-421.

Schultz, T. W. (1961). Investment in human capital. *American Economic Review, 51*(1), 1-17.

Seidel, J., & Kelle, U. (1995). Different functions of coding in the analysis of textual data. Computer-aided qualitative data analysis: *Theory, methods and practice*, 52-61.

Siggelkow, N. (2007). Persuasion with case studies. *Academy of management journal, 50*(1), 20-24.

Subramaniam, M., & Youndt, M. A. (2005). The influence of intellectual capital on the types of innovative capabilities. *Academy of Management journal, 48*(3), 450-463.

Tushman, M. L. (1977). Special boundary roles in the innovation process. *Administrative science quarterly, 22*(4), 587-605.

Tracy, S. J. (2010). Qualitative quality: Eight "big-tent" criteria for excellent qualitative research. *Qualitative inquiry, 16*(10), 837-851.

Veenendaal, A., & Bondarouk, T. (2015). Perceptions of HRM and their effect on dimensions of innovative work behaviour: Evidence from a manufacturing firm. *Management revue, 26*(2), 138-160.

Williams, P. (2002). The competent boundary spanner. *Public administration, 80*(1), 103-124. https://doi.org/10.1111/1467-9299.00296

Williams, P. (2012), Collaboration in Policy and Practice: Perspectives on Boundary Spanners. Policy Press: Bristol, U.K.

Williams, P. (2013). We are all boundary spanners now?. *International Journal of Public Sector Management, (26)*1, 17-32.

Zhao, Z. J., & Anand, J. (2013). Beyond boundary spanners: The 'collective bridge' as an efficient interunit structure for transferring collective knowledge. *Strategic Management Journal, 34*(13), 1513-1530.

Appendices

Appendix A: Supporting quotes of boundaries combined to strategies and IC factors

Boundary	Strategy	Example
Conservatism	Avoid	*"Because the fire brigade is very conservative [...] And if you don't get the people on board, it's almost impossible...."* (Interview 5)
Masculinity	Avoid	*"Then they are not prepared to think along. Then they are not in a receiving position. People who don't want to listen, it's hard to get something done"* (Interview 18)
Emotional	Overcome	*"Passion [...] is actually special that it works like this, because, because there is also a risk of harm [...] and also the realization that we have to continue anyway, because in the end it is about meeting that goal to keep our people safe. For me that is really the mother of all motivation and passion, so to speak."* (Interview 5)

Image	Overcome and avoid	*"Then I come back to the favour factor..., being able to take people along, get more enthusiastic, really on the soft side. Because if I have to say the IFV has come up with something, then well… […] And um, I'm not in uniform ... **** is ... And that is, firefighters are more likely to assume it ... Well, you have to respond to that. I can tell it all very nicely and I can do everything nice, but that's not going to land…"* (Interview 6)
Diversification	Overcome	*"Because we are 25 autonomous regions... autonomous kingdoms, so you can see where the problems will arise, because we are so autonomous, we have 25 Bokitos […] Well, you're going to call again, then you're going to talk again, then you're going to explain it again ... and so I'm constantly trying to keep everyone on board, in order to finally be able to complete this assignment."* (Interview 18)
Capacity	Overcome	*"Maybe just the hectic pace of everyday life is just a big factor. You can have a lot of very good ideas, but if you are busy solving a problem every day at work, then you just don't have the peace to go there for a while to share knowledge"* (Interview 4)
Geographical	Overcome	*"Because if I'm going to do something like a consultation at the ****** region, we'll meet there or meet here... because all of that is easily accessible... But if you have to go to Groningen then lost a day... now everything goes through [Microsoft] Teams"* (Interview 10)
Hierarchy	Overcome and avoid	*"It is actually a reflection of an old official organization that we call municipalities or regional fire brigades. A fairly official organization, where you only move when you get the green light, or receive an assignment – formal hierarchy [...] I can see the differences when I worked at the municipality... yes that had to be done via the line… Initials on everything... Sealing wax and piles everywhere and if that wasn't there it didn't count. We are now showing the opposite by simply getting to work actively. Of course, within the broad lines, but we are not afraid to color outside the plate for once."* (Interview 6)
Bureaucracy	Overcome and avoid	*"The progress is there, that is possible, that can be done much faster... But then you run into all kinds of bureaucratic walls again... And then you have to go around or through them. [...] Influencing... then it is a matter of… well, what we have done in the past with the robot, is with the head of business operations, who is also concerned with budgets, just for the sake of convenience, sit down and show some videos."* (Interview 14)

Boundary	Human capital example	Final code	Organizational capital example	Final code
Conser-vatism and masculine-ity	*"That in the main structure there were a few people, let me put it this way, they weren't the kind of people I needed... [...] But there were some bad apples in there and I've learned in the past that if you see that there are rotten apples, then you better throw them away before the whole basket gets contaminated."* (Interview 9)	Process knowledge / Engaged attitude	N/A	
Emotional	*"Hey, so there's that emotion too. So there was a political risk of harm there.. [...] just very black and white, so especially that trust and fun, ensure that there is perspective"* (Interview 9)	Process knowledge	N/A	

Image	*"By being very clear about this, especially in your communication and by setting it up right from the start in a project plan […] it is a joint investigation or joint development process of the fire service"* (Interview 3)	Engaged attitude	*"You can also choose to have someone from the fire service give a response to that, a quote, and therefore also to give it a role in media expressions."* (Interview 3)	Cultivation of communication channels
Diversi-fication	*"Then you also have a face with a product [...] The lines suddenly became shorter, like oh, I've seen it; you like it, can I ask you a question ... or do they email or call ... lines were suddenly very short and the distance was gone... The threshold was low ...."* (Interview 6)	Creating public awareness	*"So, if I can bring in the brilliant idea based on demand and need, so listening to the field, then a whole battelion of colleagues must rise behind me who will take the idea further as a project, starting with a research or exploration. And eventually it becomes an assignment, and this is included in the line of project management."* (Interview 2)	Cultivation of communication channels
Geograph-ical	*"I read that somewhere else, because of course I have my antennas everywhere, so I read or hear something… There has been a fire in *** [region] [...] Okay, so, then I think, hey, this fits the project, because this is learning from practice. So I'm going to call them."* (Interview 15)	Knowledge of needs / Translate needs into action	*"Well, we just have an informal app group.. And when you see what is shared there.. you think well.. and those short lines. That also gives the feeling that said that they are actually directly your colleagues, actually have the feeling that you are actually all in one room, and work for the same employer"* (Interview 6)	Cultivation of communication channels
Capacity	*"And what is the reason that I might take that step harder.... Yes, that might be more that, well I call it professionalism or call it more involvement"* (Interview 5)	Engaged attitude	*"what we always did in the past was that the 25 directors met very often... but that their management team members... yes, they were often more internally focused.. [...] they didn't have much time to go outside to go. And the new concept is actually to see if they can also get those management layers across the country a bit more."* (Interview 17)	Executive commitment / commander's intent
Hierarchy	*"we do not allow ourselves to be hindered by lines… We have found each other, short lines, and that works like a train.. Yes and why does it work.. yes I don't know.,. a*	Engaged attitude	*Then of course you don't have to put in that much effort for those who come along […] at least on a strategic level someone*	Executive commitment

	certain favour factor maybe..." (Interview 6)		*must really want to go for it*..." – (Interview 4).	
Bureau-cracy	*"The bureaucracy...., lists.... I'll go crazy... I do need colleagues next to me who can think well in structures to be able to set the right wheels in motion internally to arrive at the ultimate realization of the brilliant idea."* (Interview 2)	Engaged attitude / networking and lobbying	*"And then it is actually said, at some point, yes, we should finally do something with that.... And then it is ***** also a very important key figure... Is someone who says OK, we're going to do that, and we're going to do it this way. [...] we have indicated that robotization within the fire service is really the future"* (Interview 5)	Executive commitment / commander's intent