The Governance of Organizational Networks

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Born on 22 February 1988
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For my parents and Sjaak. I carry you with me always, everywhere I go.

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Setting the stage

To explain the need for a dissertation on the governance of organizational networks, I first set the stage by introducing the case of Daniëlla. This case was introduced to me by my supervisors in 2014 and has become an integral part of my thinking and teaching on the governance of organizational networks.

> Daniëlla, an intellectually disabled girl, grew up in a care facility in Groningen, the Netherlands. When she reached adolescence by 18, she returned to her family home, where she lived with her mother, stepfather, and two brothers. On the 20th of July 2013, the police were notified that a girl had fallen from the stairs. Upon arrival, the police witnessed a scene of a girl brutally tortured. This girl was Daniëlla, and a day later, it was reported that she died of her injuries.
>
> During the police investigation, it became known that her stepfather had a history of child rape—violating his two daughters from another family. Also, it turned out that Daniëlla did not fall off the stairs but instead was tortured to death by her stepfather, all witnessed by her mother. The stepfather of Daniëlla was sentenced to jail for 18 years and placed under a hospital order by the Dutch court. A treatment imposed in the Netherlands on people who have committed serious offenses and suffer from a psychiatric illness or disorder. The mother of Daniëlla was judged to be a passive accomplice in the murder of Daniëlla and was sentenced to eight years in jail (Algemeen Dagblad, 2013; 2014; 2015).
>
> The collaborative agency of inspections investigated the case of Daniëlla (cf. Samenwerkend Toezicht Jeugd, 2015). It concluded that the care and support to this family were never tailor-made to the family's needs (Samenwerkend Toezicht Jeugd, 2015). In particular, the chronic problems of the family have not been adequately addressed by the organizations responsible, nor have caregivers taken sufficiently into account that the family avoided treatment, care, and support (Samenwerkend Toezicht Jeugd, 2015).
>
> Furthermore, the collaborative agency of inspections judged that an overview of all issues was lacking. Family issues were dealt with ineffectively and in a fragmented manner. The various organizations concerned with the care and support of the family failed to develop a joint approach in which efforts were integrated (Samenwerkend Toezicht Jeugd, 2015).

> Following the reconstruction of the family timeline, the collaborative agency of inspections determined that at a particular moment in 2002, 27 different organizations were involved in the care and support of the family. Nevertheless, the collaborative agency of inspections did not find any alerts, records, or signs of follow-up actions by professionals involved despite the informal network of Daniëlla made three notifications of child abuse (Samenwerkend Toezicht Jeugd, 2015).
>
> Based on all this, the collaborative agency of inspections concluded that the safety of the children in the family was never guaranteed because none of the involved organizations and agencies took up the responsibility of focusing on the interests and needs of the children of Daniella's family (Samenwerkend Toezicht Jeugd, 2015).

The case of Daniëlla, in general, and the evaluation of the collaborative agency of inspections, in particular, describes why achieving integration of effort among 27 different organizations over time is challenging. By working together, organizations can get things done in ways that are more effective and responsive to a target population than when organizations act independently or compete (Provan & Milward, 1995; Provan et al., 2001; Provan et al., 2004a). In the case of Daniëlla and her family, the collaborative agency of inspections mentioned the absence of a "coordinator" that could establish the integration of services and build consensus on case management. The case of Daniëlla describes not only the task uncertainty, that is, the difficulty and variability of promoting and sustaining the health and well-being of Daniëlla and her family (Van de Ven et al., 1976), but also shows the need for integration as needs and demands change over time (cf. Samenwerkend Toezicht Jeugd, 2015).

In providing services to Daniëlla and her family, organizations are confronted by their limited capacity for accessing and processing information distributed among Daniëlla, her family, and other organizations (cf. Samenwerkend Toezicht Jeugd, 2015). Most organizations that provide health and welfare services deal with multiple clients like Daniëlla, who experience various problems. Only through collaboration can information, skills, professionals, and resources be brought together in ways that are likely to have a meaningful impact on the health and well-being of clients. The issue, however, is that organizations are legally autonomous, meaning they have their own goals, leadership, employees, methods of service delivery, and resources (Provan et al., 2004a).

Although organizations may have a stake in promoting the health and well-being of clients like Daniëlla, organizations have only partially overlapping goals (at best), making integration of effort problematic. Thus, organizations must be compensated for their monetary or non-monetary actions to ensure that they collaborate (Provan & Kenis, 2008). Yet this is only half the story since merely bringing organizations together in a network does not guarantee they collaborate effectively. The other half of the story is that the network needs to plan and control action, address conflict, and

acquire and utilize resources efficiently and effectively to achieve the network's purpose (Provan & Kenis, 2008). Despite that, most organizations may agree that working together benefits clients. Finding the means to develop a goal-directed organizational network that integrates various services is difficult.

Research problem statement

From prior research, we know that organizations that consciously work together as a goal-directed organizational network are more effective at delivering a complex array of services than the same organizations can do when they go their separate ways (Alter & Hage, 1993; Provan & Milward, 1995, 2001; Provan et al., 2007; Isett et al., 2011; Raab et al., 2015; Lemaire & Provan, 2018; Lemaire, 2020; Smith, 2020; van der Weert et al., 2022). The underlying logic here is that by combining their efforts, organizations can address collective action problems (Olson, 1965) or joint production problems (Provan & Milward, 2001) that they otherwise are not capable of achieving by themselves independently (Provan & Kenis, 2008).

Yet a complication occurs to getting things done. This organizational form places greater importance on cooperation and coordination beyond the boundaries of organizations (Provan & Kenis, 2008; Gulati et al., 2012). Organizational networks are groups of three or more organizations working together to achieve their own and collective goals (Provan et al., 2007; Provan & Kenis, 2008). The defining feature of organizational networks is the absence of formal authority from employment relationships between organizations participating in the network (Gulati et al., 2012). They are characterized by no unity in ownership and command (Provan & Kenis, 2008; Vangen et al., 2015), and as such organizational networks are not governed by a "boss" who has the legal right or who can exercise direct authority over others, but instead by network members employing informal authority based on expertise, reputation, status, and gatekeeping privileges (Gulati et al., 2012). Consequently, network members often use bargaining power stemming from control over critical resources or technologies to actively shape the governance of organizational networks (Gulati et al., 2012).

Fundamental to Provan and Kenis's contingency theory of network governance is the premise that all organizational networks need a mode of governance (Provan & Kenis, 2008). Governance is a term used to refer to how social systems establish goals, policies, and procedures, and explains how actions are coordinated, controlled, and regulated (Sydow et al., 2016). One way to understand a network governance mode is to recognize it as Mintzberg's equivalent of an organization's superstructure (Mintzberg, 1983). In such network governance modes, network members use institutions and structures of authority and collaboration to develop the processes and conditions that give rise to rules, understandings, and associated (network) practices (Scott, 2008).

Provan and Kenis (2008) suggested three ideal network governance modes to shape organizational networks: shared-participant governance, governance by a lead organization, and

governance by a network administrative organization (NAO). Shared-participant governance and governance by a lead organization are one-tier network governance modes in which the network represents a one-tier layer (or board) consisting of network members acting as managers and supervisors. In a shared-participant governance mode, all or a majority of network members fulfill this role. In contrast, in the lead-organization governance mode, only one network member is tasked with this responsibility. Governance by an NAO is a two-tier mode in which there is a separation between management and supervisors. The NAO, often an administrative entity, is responsible for the day-to-day management of the network, while the network members supervise the NAO. In each of these network governance modes, network members use 'institutions and structures of authority and collaboration to allocate resources and to coordinate and control joint action' (Provan & Kenis, 2008: 231). These institutions and structures are important because it is through them that network members are grouped, the notion of authority is established, and joint efforts can be aligned and adjusted effectively (Gulati et al., 2012).

A systematic examination of network governance mode adoption and how networks govern themselves has been lacking (Provan et al., 2007; Provan & Kenis, 2008; Provan & Lemaire, 2012; Raab et al., 2015). This is of concern because assessing network governance as an explanatory factor of network effectiveness is critical for understanding whether organizational networks are effective in attaining network-level outcomes that organizations could not usually achieve independently (Provan & Milward, 2001; Provan & Kenis, 2008; Turrini et al., 2010; Smith, 2020). Although much progress has been made since Provan and Kenis's (2008) publication on network governance, many issues and topics are not well understood (Provan & Lemaire, 2012). One topic that has received scant attention is what governance modes networks select under what conditions and, in turn, what institutions and structures of authority and collaboration networks are used to allocate resources and coordinate and control joint action across the network. The dissertation's topic is, therefore, on the governance of organizational networks to test some of the critical aspects of Provan and Kenis's (2008) contingency theory of network governance to enhance it.

Research question

Provan and Kenis (2008) outlined a rationale by developing a network-level approach explaining why organizational networks as distinct entities vary regarding their governance and structural pattern of relations. Such a rationale was deemed necessary because the dominant view back then was that networks were an alternative governance mode[1] compared to market and hierarchy (Powell, 1990; Sydow et al., 2016). Based on a transaction cost economic logic, networks exist because they can mediate economic transactions between their members at lower costs than a market or hierarchy can

[1] Not to be confused with a "network governance mode."

(Ouchi, 1980). In this line of reasoning, 'the network represents a governance structure, a set of relationships that promotes trust and fills an institutional void that enables economic activity (Ahuja et al., 2012: 442).'

Provan and Kenis's contribution to this debate was that they bridged the network analytical approach and the network as a form of governance approach. In doing so, they proposed that network scholars in management and organization sciences must move away from examining networks from an ego-centric or dyadic point of view and instead use the whole network perspective (cf. Provan et al., 2007). Adhering to this whole network perspective, they also suggested that organizational networks must be treated as entities like "markets and hierarchies" that can differentiate in their structural and relational characteristics. By combining these two approaches, the central idea they put forward was that if "we treat networks seriously" (O'Toole, 1997), then networks are organizational forms that are considered to vary regarding their properties and outcomes—one of them being the choice of a network governance mode (Provan & Kenis, 2008).

Not surprisingly, the first review of the empirical literature on organizational networks by Provan, Fish, and Sydow (2007) found a gap to exist in the literature in understanding network governance mode adoption. Taking stock of the empirical literature on organizational networks, Provan et al. (2007) found that the governance of networks was neglected or only implicitly addressed by network studies reviewed. Based on their review, Provan et al. (2007: 508) identified four key issues that future studies need to address:

(1) What are the primary forms of network governance? What are their key characteristics, and how do they operate?
(2) To what extent are certain forms of network governance more effective for whole networks than others, and if so, under what specific conditions will one form be best?
(3) How do network governance forms emerge, and how do they become institutionalized?
(4) When, how, and under which circumstances will the governance form of organizational networks change? And what is the track of this change?

Network governance has since then become a topic of interest mainly because both networks and governance have received much more attention from scholars and practitioners in the last two decades. While much more is known today about what constitutes effective organizational networks in terms of their governance, we still lack empirical evidence on the four critical issues listed above, nor do we fully understand how organizational networks govern themselves after a network governance mode is adopted. This dissertation responds to these concerns, and I aim to theoretically and empirically examine the governance of organizational networks.

To guide my research efforts, I have formulated the following research question:

How do organizational networks govern themselves, and what conditions explain the governance of goal-directed organizational networks?

The course of action, dissertation outline, and contributions

The course of action is to understand better network governance. I thereof set out to enhance the contingency theory of Provan and Kenis (2008). By doing so, this dissertation seeks to help remedy the mismatch between practice and theory on network governance by shedding light on how organizational networks govern themselves and what conditions explain the governance of organizational networks.

The outline of the dissertation is as follows. In chapter 1, I introduce the reader to network management language. This is necessary because organizational networks are not business as usual and require a language that reflects how they function and emphasizes the relational aspects of this organizational form (Mandell et al., 2017). I establish common ground, define core concepts, and position myself in the literature on goal-directed organizational networks. Specifically, I address what organizational networks are, determine from what perspectives I analyze this organizational form, and briefly introduce network-level theory to develop a conceptual framework for goal-directed organizational networks. I employ this framework to explain the dissertation's focus and position in the literature on goal-directed organizational networks.

After the introduction to network management, I present the findings of a systematic literature review in chapter 2. In this chapter, we take stock of the empirical literature citing Provan and Kenis (2008) and provide insights into how their network governance contingency theory has been developed in an established and recognized research agenda in the last ten years. The systematic literature review elucidates the four crucial gaps Provan et al. (2007) found. It offers means to summarize and synthesize key findings on the modes of network governance, contingency factors, and network-level tensions as initially developed by Provan and Kenis.

Having established the empirical evidence on Provan and Kenis's contingency theory of network governance, I will present two case studies. In the first case study (chapter 3), I describe and illustrate a network of networks perspective and map the development of a lead network for the Antwerp Port Authority that governed organizations and networks in the port community before and during the COVID-19 pandemic. The case study findings inform that a collective focus and selective integration are crucial in adequately creating and reproducing an effective system to deal with a wicked problem like the COVID-19 pandemic. This is followed by the second case study (chapter 4) on how network leadership recognizes and responds to network-level tensions. The case study outlines how network leadership dealt with network-level tensions by showing with whom the

leadership team of the Antwerp Fire Service and the fire chief affiliated during the COVID-19 pandemic and what network-level tensions arose in the larger, complex organizational field of the province of Antwerp.

In the final study (chapter 5), I propose to use Gaming and Simulation as an alternative methodological approach to study network governance. I developed with others a network game to examine the coordination of service delivery to people with chronic illnesses. The findings suggest that appointing a network governance form is necessary to coordinate and integrate interactions among and between networks. With this study, we develop a stance on how Gaming and Simulation can be used to study organizational networks in Public Administration and Management.

In conclusion, the upcoming chapters of the dissertation set out to identify (1) the conditions that explain network governance and (2) determine how organizational networks govern themselves. Specifically, I aim to address three concerns and, in doing so, help further remedy the mismatch between practice and theory on goal-directed organizational networks.

The first concern I aim to address involves the conceptual development of scoping and bounding the network governance (Carboni et al., 2019). I aim to contribute by systematically reviewing which network governance modes have been identified, what explains the differences in these network governance modes, and what are network governance modes' consequences. Based on the evidence of the empirical literature citing Provan and Kenis (2008), I substantiate the current theoretical view of network governance and extend its dimensions and boundary conditions. Practically, this contribution matters because it provides insights into what the primary forms and characteristics of network governance are under which circumstances and enhance our understanding of under what specific conditions a particular network governance mode performs best.

The second concern I aim to address is the implicit assumption of goal-directed organizational networks as closed systems isolated from their environment. I aim to contribute by further advancing the external network perspective proposed by Nowell et al. (2019), in which organizational networks are treated as open systems that are weaved in a social context of organizations and networks and their environments, and which adapt to interactions between the system and its environment. By doing so, I specify under what specific conditions network governance modes emerge, operate, and become institutionalized. For practitioners this is relevant because it elucidates how goal-directed organizational networks are governed and what conditions matter under which circumstances. By viewing organizational networks as open systems, the practically contribution is that network governance modes can either shape or constrain how goal-directed organizational networks establish fit between the network and environmental conditions to act as effective organizational forms.

The third concern I aim to address is how we study goal-directed organizational networks in general and their governance in specific. The final theoretical contribution I propose is thereof methodological in nature. To complement traditional research designs and methods, I suggest

network scholars and practitioners consider the promise of Gaming and Simulation (quasi-experiments) on goal-directed organizational networks to help advance our understanding of behavior and outcomes. A gaming simulation emulates a controlled context in which participants operate in a model of reality (they play a role in a game) and thus provides a repeatable (quasi-)experiment. This enables causal inference through randomization, offering a promising area of research to test and build network theory and overcoming some of the methodological challenges that whole network research presents. I aim to contribute by developing a game simulation to simulate the governance of goal-directed organizational networks offering scholars and practitioners a proof of concept.

References

Alter, C., & Hage, J. (1993). *Organizations working together* (Vol. 191). SAGE Publications, Incorporated.

Alvesson, M., & Sandberg, J. (2011). Generating research questions through problematization. *Academy of management review*, *36*(2), 247-271. https://doi.org/10.5465/amr.2009.0188

Bryson, J. M., Crosby, B. C., & Stone, M. M. (2015). Designing and implementing cross-sector collaborations: Needed and challenging. *Public administration review*, *75*(5), 647-663. https://doi.org/10.1111/puar.12432

Donaldson, L. (2001). *The contingency theory of organizations*. Sage.

Eisenhardt, K. M. (1989). Agency theory: An assessment and review. *Academy of management review*, *14*(1), 57-74. https://doi.org/10.5465/amr.1989.4279003

George, G., Howard-Grenville, J., Joshi, A., & Tihanyi, L. (2016). Understanding and tackling societal grand challenges through management research. *Academy of management journal*, *59*(6), 1880-1895. https://doi.org/10.5465/amj.2016.4007

Gulati, R. (1995). Does familiarity breed trust? The implications of repeated ties for contractual choice in alliances. *Academy of management journal*, *38*(1), 85-112. https://doi.org/10.5465/256729

Gulati, R., Puranam, P., & Tushman, M. (2012). Meta-organization design: Rethinking design in interorganizational and community contexts. *Strategic management journal*, *33*(6), 571-586. https://doi.org/10.1002/smj.1975

Head, B. W. (2019). Forty years of wicked problems literature: Forging closer links to policy studies. *Policy and Society*, *38*(2), 180-197. https://doi.org/10.1080/14494035.2018.1488797

Human, S. E., & Provan, K. G. (2000). Legitimacy building in the evolution of small-firm multilateral networks: A comparative study of success and demise. *Administrative science quarterly*, *45*(2), 327-365. https://doi.org/10.2307%2F2667074

Huxham, C., & Vangen, S. (2005). *The Theory and Practice of Collaborative Advantage*. Routledge.

Isett, K. R., Mergel, I. A., LeRoux, K., Mischen, P. A., & Rethemeyer, R. K. (2011). Networks in public administration scholarship: Understanding where we are and where we need to go. *Journal of public administration research and theory*, *21*(suppl_1), i157-i173. https://doi.org/10.1093/jopart/muq061

Kenis, P., & Provan, K. G. (2009). Towards an exogenous theory of public network performance. *Public administration*, *87*(3), 440-456. https://doi.org/10.1111/j.1467-9299.2009.01775.x

Kenis, P., & Raab, J. (2020). Back to the future: Using organization design theory for effective organizational networks. *Perspectives on Public Management and Governance*, *3*(2), 109-123. https://doi.org/10.1093/ppmgov/gvaa005

Lemaire, R. H. (2020). What is our purpose here? Network relationships and goal congruence in a goal-directed network. *The American Review of Public Administration*, *50*(2), 176-192. https://doi.org/10.1177%2F0275074019879506

Lemaire, R. H., & Provan, K. G. (2018). Managing collaborative effort: How Simmelian ties advance public sector networks. *The American Review of Public Administration*, *48*(5), 379-394. https://doi.org/10.1177%2F0275074017700722
Litwak, E., & Hylton, L. F. (1962). Interorganizational analysis: A hypothesis on co-ordinating agencies. *Administrative Science Quarterly*, 395-420. https://doi.org/10.2307/2390723
Mandell, M., Keast, R., & Chamberlain, D. (2017). Collaborative networks and the need for a new management language. *Public Management Review*, *19*(3), 326-341. https://doi.org/10.1080/14719037.2016.1209232
Olson, M. (1965). *The Logic of Collective Action. Public Goods and the Theory of Groups.* Harvard University Press.
Oliver, C. (1991). Strategic responses to institutional processes. *Academy of management review*, *16*(1), 145-179. https://doi.org/10.5465/amr.1991.4279002
O'Toole Jr, L. J. (1997). Treating networks seriously: Practical and research-based agendas in public administration. *Public administration review*, 45-52. https://doi.org/10.2307/976691
Ouchi, W. G. (1980). Markets, bureaucracies, and clans. *Administrative science quarterly*, 129-141. https://doi.org/10.2307/2392231
Powell, W.W. (1990). Neither Market nor Hierarchy. Network forms of Organization. In Godwyn, M. & Gittell, J.H. (Eds.). *Sociology of Organizations: Structures and Relationships* (pp. 30-40). Sage.
Provan, K. G., Fish, A., & Sydow, J. (2007). Interorganizational networks at the network level: A review of the empirical literature on whole networks. *Journal of management*, *33*(3), 479-516. https://doi.org/10.1177%2F0149206307302554
Provan, K. G., & Kenis, P. (2008). Modes of network governance: Structure, management, and effectiveness. *Journal of public administration research and theory*, *18*(2), 229-252. https://doi.org/10.1093/jopart/mum015
Provan, K. G., Lamb, G., & Doyle, M. (2004b). Building legitimacy and the early growth of health networks for the uninsured. *Health Care Management Review*, *29*(2), 117-128. Retrievable at: https://journals.lww.com/hcmrjournal/toc/2004/04000
Provan, K. G., & Lemaire, R. H. (2012). Core concepts and key ideas for understanding public sector organizational networks: Using research to inform scholarship and practice. *Public Administration Review*, *72*(5), 638-648. https://doi.org/10.1111/j.1540-6210.2012.02595.x
Provan, K. G., & Milward, H. B. (1994). Integration of community-based services for the severely mentally III and the structure of public funding: A comparison of four systems. *Journal of Health Politics, Policy and Law*, *19*(4), 865-894. https://doi.org/10.1215/03616878-19-4-865
Provan, K. G., & Milward, H. B. (1995). A preliminary theory of interorganizational network effectiveness: A comparative study of four community mental health systems. *Administrative science quarterly*, 1-33. https://doi.org/10.2307/2393698
Provan, K. G., & Milward, H. B. (2001). Do networks really work? A framework for evaluating public-sector organizational networks. *Public administration review*, *61*(4), 414-423. https://doi.org/10.1111/0033-3352.00045
Provan, K. G., Veazie, M. A., Teufel-Shone, N. I., & Huddleston, C. (2004a). Network analysis as a tool for assessing and building community capacity for provision of chronic disease services. *Health promotion practice*, *5*(2), 174-181. https://doi.org/10.1177%2F1524839903259303
Puranam, P. (2018). *The microstructure of organizations*. Oxford University Press.
Puranam, P., Alexy, O., & Reitzig, M. (2014). What's "new" about new forms of organizing?. *Academy of management Review*, *39*(2), 162-180. https://doi.org/10.5465/amr.2011.0436
Raab, J., & Kenis, P. (2009). Heading toward a society of networks: Empirical developments and theoretical challenges. *Journal of management inquiry*, *18*(3), 198-210. https://doi.org/10.1177%2F1056492609337493
Raab, J., Mannak, R. S., & Cambré, B. (2015). Combining structure, governance, and context: A configurational approach to network effectiveness. *Journal of public administration research and theory*, *25*(2), 479-511. https://doi.org/10.1093/jopart/mut039

Redactie (2013). Gehandicapte Daniëlla uit Groningen stierf 'gruweldood'. *Algemeen Dagblad.* Retrieved from https://www.ad.nl/binnenland/gehandicapte-daniella-uit-groningen-stierf-gruweldood~aa1ff586/
Redactie (2013). Inspectie onderzoekt gruwelmoord op Daniëlla. *Algemeen Dagblad.* Retrieved from https://www.ad.nl/binnenland/inspectie-onderzoekt-gruwelmoord-op-daniella~a3e95cb2/
Redactie (2014). Moeder wijst moordenaar van gehandicapte dochter aan. *Algemeen Dagblad.* Retrieved from https://www.ad.nl/binnenland/moeder-wijst-moordenaar-van-gehandicapte-dochter-aan~a4f7e205/
Redactie (2015). 18 jaar cel en tbs voor moord gehandicapte Daniëlla. *Algemeen Dagblad*. Retrieved from https://www.ad.nl/binnenland/18-jaar-cel-en-tbs-voor-moord-gehandicapte-daniella~a3daa166/
Samenwerkend Toezicht Jeugd (2015). *Gezinnen met Geringe Sociale Redzaamheid. Casuïstiek Groningen.* Ministerie van Volksgezondheid, Welzijn en Sport. Retrieved from https://www.inspectie-jenv.nl/Publicaties/rapporten/2015/04/07/gezinnen-met-geringe-sociale-redzaamheid---casuistiek-groningen
Saz-Carranza, A., & Ospina, S. M. (2011). The behavioral dimension of governing interorganizational goal-directed networks—Managing the unity-diversity tension. *Journal of Public Administration Research and Theory*, *21*(2), 327-365. https://doi.org/10.1093/jopart/muq050
Saz-Carranza, A., Salvador Iborra, S., & Albareda, A. (2016). The power dynamics of mandated network administrative organizations. *Public Administration Review*, *76*(3), 449-462. https://doi.org/10.1111/puar.12445
Scott, W. R. (2008). *Institutions and organizations: Ideas, interests, and identities*. Sage publications.
Smith, J. G. (2020). Theoretical advances in our understanding of network effectiveness. *Perspectives on Public Management and Governance*, *3*(2), 167-182. https://doi.org/10.1093/ppmgov/gvz032
Stoker, G. (1998). Governance as theory: five propositions. *International social science journal*, *50*(155), 17-28. http://dx.doi.org/10.1111/1468-2451.00106
Sydow, J., Schüßler, E., & Müller-Seitz, G. (2016). *Managing inter-organizational relations: Debates and cases*. Bloomsbury Publishing.
Turrini, A., Cristofoli, D., Frosini, F., & Nasi, G. (2010). Networking literature about determinants of network effectiveness. *Public administration*, *88*(2), 528-550. https://doi.org/10.1111/j.1467-9299.2009.01791.x
Vangen, S., Hayes, J. P., & Cornforth, C. (2015). Governing cross-sector, inter-organizational collaborations. *Public Management Review*, *17*(9), 1237-1260. https://doi.org/10.1080/14719037.2014.903658
van den Oord, S., Vanlaer, N., Marynissen, H., Brugghemans, B., Van Roey, J., Albers, S., ... & Kenis, P. (2020). Network of networks: preliminary lessons from the Antwerp Port Authority on crisis management and network governance to deal with the COVID-19 pandemic. *Public Administration Review*, *80*(5), 880-894. https://doi.org/10.1111/puar.13256
Van de Ven, A. H., Delbecq, A. L., & Koenig Jr, R. (1976). Determinants of coordination modes within organizations. *American sociological review*, 322-338. https://doi.org/10.2307/2094477
van der Weert, G., Burzynska, K., & Knoben, J. (2022). An integrative perspective on interorganizational multilevel healthcare networks: a systematic literature review. *BMC health services research*, *22*(1), 1-17. https://doi.org/10.1186/s12913-022-08314-6
Williamson, O. E. (1981). The economics of organization: The transaction cost approach. *American journal of sociology*, *87*(3), 548-577. https://doi.org/10.1086/227496

Introduction to network management language

This chapter introduces policy planners and managers to a network management language for goal-directed organizational networks. First, I establish common ground on what organizational networks are. Second, I determine from what perspectives I analyze this organizational form, and third, I introduce network-level theory to develop a conceptual framework for goal-directed organizational networks. This framework explains the dissertation's focus and position in the goal-directed organizational network literature. By establishing a language for goal-directed organizational networks, policy planners and managers can adequately reflect or explain what organizational networks are, how they work, and how to improve them by emphasizing the important role of network governance.

Keywords: network management language, network effectiveness; network governance; goal-directed organizational networks

The phenomenon of organizational networks

Organizational networks are 'groups of three or more organizations working together to achieve goals that could not normally be achieved by organizations acting independently (Provan et al., 2007; Provan & Kenis, 2008: 231).' They are [often] formally established, governed [in some particular manner], and goal-directed [by an explicitly recognized goal] rather than occurring serendipitously (Kilduff & Tsai, 2003). A common feature of this type of network is that relationships among network members are [multilateral and primarily horizontal in nature], which means that participating organizations have substantial operating autonomy (Provan et al., 2007: 482, brackets added; See also Nowell & Milward, 2022).

Organizational networks as a phenomenon are nothing new, and their importance is evident from their popularity in business, management, and public administration literature alone (Berry et al., 2004; Provan et al., 2007; Turrini et al., 2010; Isett et al., 2011; Provan & Lemaire, 2012; Lecy et al., 2014; O'Toole, 2014; Bryson et al., 2015; Hu et al., 2016; Nohrstedt et al., 2018; Killduff & Brass, 2010; Shipilov et al., 2014; Tasselli et al., 2015; Smith, 2020; Nowell and Milward, 2022). Some scholars even suggest that we are amid a transition towards a society of networks in which the organization as the predominant form of organizing is slowly being complemented by the network as an organizational form (Castells, 1996; Raab & Kenis, 2009). The rise of the organizational network is built upon two pillars of innovation (Prahalad & Krishnan, 2018). The first pillar of innovation is that 'value is based on unique, personalized experiences of people (Prahalad & Krishnan, 2018: 11).' In many public,

nonprofit, and private sectors, this drives the organizations toward customer or client centricity—meaning providing one customer experience at a time (Prahalad & Krishnan, 2018). Over the years, organizations have abandoned the idea that individuals can be aggregated into undifferentiated groups of clients, causing a global revolution in business, government, and society (Prahalad & Krishnan, 2018). Consequently, we have been witnessing a dramatic surge in the frequency with which organizations enter various types of collaborative relationships (Oliver, 1990; Gulati, et al., 2012) because no single organization has the innate ability to deal with the scope and scale to satisfy such unique, personalized demands (Prahalad & Krishnan, 2018).

The second pillar of innovation that drives the rise of organizational networks is that organizations can access resources from various suppliers and producers worldwide (Prahalad & Krishnan, 2018). Globalization and digitalization have forged this, causing organizations to shift their focus from a (business) model of ownership to a model that emphasizes access to resources (Prahalad & Krishnan, 2018). Not only has this initiated a change in the relational architecture of organizations globally (Gulati & Kletter, 2005), but it also reinvented how organizations create and capture value (Porter & Kramer, 2011).

Since the dawn of the Internet, we have been observing how organizations increasingly place greater importance on coordination and control beyond their boundaries, giving rise to new organizational phenomena and challenges in the way how organizations work (together) and are governed (Provan & Kenis, 2008; Gulati, Puranam, & Tushman, 2012; Puranam, Alexy, & Reitzig, 2014). Although markets and organizations are still today the preferred way of getting *most* things done, networks of organizations have increasingly become an alternative strategy by policy planners and managers to address complex issues, solve problems, or provide products and services that by nature are too difficult, costly, and seemingly intractable for any organization to handle on its own, or to be solely purchased on the market (Powell, 1990; Raab & Kenis, 2009; Provan & Lemaire, 2012).

Network fundamentals

To establish common ground on organizational networks, it is essential to differentiate them from social networks and inter-organizational relationships, especially since both are building blocks of organizational networks.

The notion of a social network—often tied to Moreno's sociograms in the early 1930ties and scientifically by Barnes in 1954—can be understood from either a metaphorical or conceptual point of view. From a metaphorical point of view, a social network emphasizes the social links of individuals in any given societal context. In contrast, from a conceptual point of view, social networks refer to how people's behavior in the network is influenced and vice versa (Mitchell, 1974: 280). Often social networks go hand in hand with a conceptualization that has been operationalized in social network analysis terminology using terms like nodes and ties (Mitchell, 1974). Nodes refer to observation units

in the network, such as individuals, organizations, or other actors/agents. Ties denote types of relationships or kinds of flow between nodes. Combined, they define what we commonly describe as a social network: 'a set of actors/agents, or other entities (i.e., machines), and a set of or sets of relations defined on them (Knoke & Yang, 2020: 1).'

Social networks, according to Knoke and Yang (2020), rest on three main assumptions of social network analysis:

(1) The first assumption is that structured relationships are often more important for understanding observed behavior than are such characteristics or attributes of actors or other entities (: 8).
(2) The second assumption is that social networks affect actor perceptions, beliefs, and actions through diverse structural mechanisms socially constructed by relations among entities (: 9).
(3) The third assumption is that structural relationships should be viewed as dynamic processes. Social networks are not static structures but continually change through interactions (: 10).

Researchers use social network analysis to develop various theoretical and empirical explanations of the origins of social action by seeking to uncover the mechanisms through which social relations affect social entities and to identify the contingent assumption under which mechanisms operate in specific empirical contexts (Knoke & Yang, 2020). Because social network analysis simultaneously encompasses both entities and structures, it provides conceptual and methodological tools for linking changes in actors' microlevel choices to macrolevel structural alterations and vice versa (Knoke & Yang, 2020). The latter has also been addressed as Coleman's bathtub or boat, referring to the micro-to-macro problem in social action theory (Coleman, 1986).

Following the definition and assumptions of social networks, an inter-organizational relationship (IOR) is a specific kind of relationship between two or more organizations. Conceptually, IORs are defined as 'relatively enduring transactions, flows, and linkages that occur among or between an organization and one or more organizations in its environment (Laumann et al., 1978; Aldrich & Whetten, 1981; Galaskiewicz, 1985; Oliver, 1990: 241).' In a metaphorical sense, however, IORs can be understood as to how organizations connect, depicted by terms such as partnership, alliance, and networks, adjectives that describe inter-organizational entities, or other phrases that capture the act of inter-organizational interactions such as collaboration or cooperation (Cropper et al., 2008: 4). The study of IORs is concerned with understanding the character and patterns, origins, rationale, and consequences of such relationships (Cropper et al., 2008). IORs can either be directed or undirected and may differ in their properties, pointing toward the quality and characteristics of the relationship (Knoke & Yang, 2020). This means IORs are not an attribute of a single organization but a joint dyadic property that exists only so long as both organizations maintain their association (Knoke & Yang, 2020).

Network perspectives

In the previous section, I briefly demarcated the difference between social networks and inter-organizational relationships. Although the unit of observation for relationships and networks may often be similar, the unit of analysis used to understand their features, behaviors, and outcomes may vary. For example, Sydow, Schüßler, and Müller-Seitz (2016: 15) distinguish six levels of analysis when examining networks: the individual, the group, the organization (or subsystem), the dyad or network, the organizational field, and the broader societal context (cf. Brass et al., 2004). Depending on the unit of analysis and the relationship of interest, we focus on social networks, inter-organizational relationships, or organizational networks.

Traditionally four units of analysis are used to examine organizational networks (Provan et al., 2007; Raab et al., 2013; Nowell et al., 2019): (1) the egocentric network perspective that focuses on an organization and its relationships within a network, (2) the dyadic network perspective that centers on the (inter-organizational) relationship(s) between two or more organizations in a network, (3) the whole network perspective that views the network holistically as a distinct entity, and (4) the external network perspective that emphasizes the network-environment relationship to explain network behavior and outcomes. In Table 1, I have summarized these perspectives in a typology of organizational network research (Provan et al., 2007; Raab et al., 2013; Nowell et al., 2019).

Of importance is then to elucidate what perspective I employ to study organizational networks since this provides a way to position the dissertation and demarcate different types of network research (Provan et al., 2007). Theorizing on networks has been divided into an actor- or network-level analysis (Provan et al., 2007). The distinction between these levels has also been addressed as a micro-level versus macro-level network focus (Galaskiewicz & Wasserman, 1994) or an egocentric network versus a whole network level of analysis (Kilduff & Tsai, 2003).

In this dissertation, I use two perspectives: (1) the whole network perspective focusing on features of organizational networks as an explanatory factor of network effectiveness, and (2) the external network perspective to explain how environmental uncertainty of an organizational field and population dynamics shape and constrain organizational networks and their members. By choosing this scope, I inherently employ a multilevel perspective with the focal unit of analysis being the organizational network and the organizational field at one level up and the organization at one level down (Sydow et al., 2016).

Table 1

Independent variable or input focus	**Dependent variable or outcome focus**			
	Individual organizations	Interorganizational relationships	Organizational networks (collectivities of organizations)	Organizational field (collectivities of network domains)
Organizational variables	Impact of organizations on other organizations through dyadic interactions	Impact of individual organizations on an interorganizational relationship	Impact of individual organizations on a whole network	Impact of individual organizations on a field or network domains
Relational variables	Impact of interorganizational relationships on other organizations through dyadic interactions	Impact of interorganizational relationships on other interorganizational relationships	Impact of interorganizational relationships on whole network	Impact of interorganizational relationships on field or network domains
Network variables	Impact of a network on individual organizations	Impact of a network on interorganizational relationships	Whole network or network-level interactions	Impact of a network on field or network domains
Field or network domain variables	Impact of a field or network domain on individual organizations	Impact of field or network domains on interorganizational relationships	Impact of field or network domains on network-level interactions	Impact of field or network domains on organizational networks

Table 1. A typology of organizational network research based on Provan et al. (2007) and Raab et al. (2013).

An organizational field is defined as 'sets of organizations that, in the aggregate, constitute a recognized area of institutional life (DiMaggio & Powell, 1983: 148)' and those patterns of interaction are defined by shared systems of meaning (Scott, 2013). My interest is in 'the configuration of inter-organizational relations among all the organizations that are members of an organizational field (Kenis & Knoke, 2002: 275).' The organizational field represents a system at the level of the whole field composed of organizations and their interrelationships (Trist, 1977). The character of this system becomes the object of inquiry and serves as an explanatory factor of network behavior and outcomes (Nowell et al., 2019). Recently, organizational fields are defined as 'richly contextualized spaces where disparate organizations involve themselves with one another to develop collective understandings regarding matters that are consequential for organizational and field-level activities. They represent meeting places like a port or city where organizations have opportunities and constraints to involve themselves with one another (Wooten & Hoffman, 2016).' Organizations are then understood as 'social entities that are goal-directed and designed as deliberately structured and coordinated activity systems, governed by a hierarchy based on formal authority and are linked to the external environment (Daft, 2009; Sydow et al., 2016).' 'Organizations exhibit a certain degree of

institutionalized reflexivity, which for their very reason, allows it to sustain at least some degree of autonomy from the environment (Sydow et al., 2016: 16).'

The Provan school

Based on this scope, I position myself within the "Provan school" because I adhere to the macro-level network perspective (Provan et al., 2007; Raab et al., 2013). The Provan school is a discipline within the management and organization sciences that has examined whole, goal-directed organizational networks for over 25 years (Nowell et al., 2019). Originated with the seminal work of Keith Provan and Brint Milward in the eighties and nineties, today, a community of network scholars from different fields has been systematically examining how 'networks evolve, how they are designed, how they are governed, and how collective outcomes are generated (Provan et al., 2007).'

The Provan school has its roots in management and organization sciences but also in collaborative and policy literature (cf. Provan & Milward, 1995; Kickert et al., 1997; Berry et al., 2004; Provan et al., 2007; Isett et al., 2011; Provan & Lemaire, 2012; Lecy et al., 2014; Popp et al., 2014; Nowell & Milward, 2022). Historically, it focuses on collaborative networks; that is, 'collections of governmental agencies, nonprofits, and for-profits that work together to produce a public good, service, or value when a single [public] agency is unable or unwilling to provide the goods or services in the desired quantities (Isett et al., 2011: i158; brackets added).' As such, the Provan school clearly differentiates itself from the policy network tradition that 'mainly has an interest in public decisions within a particular area of policy or public resource allocation (Isett et al., 2011: i158).'

By focusing traditionally on collaborative networks, the school often bridges two different research traditions on networks: research on service delivery and policy implementation and managing networks (Klijn & Koppenjan, 2012; Milward & Provan, 2006). In addition, the Provan school is often conflated with the (newer) research stream on governance networks that focuses on 'entities that fuse collaborative public goods and service provision with collective policymaking (Isett et al., 2011: i158).' In this stream, the focus is on networks that focus on 'the coordination of organizations towards a common goal rather than the policies or products that the networks produce (Isett et al., 2011: i158).' The main reason why there is overlap between the Provan school and governance networks tradition is that historically the Provan school applies networks in a utilitarian sense—employing them as an instrument or organizational form to get something done (Isett et al., 2011; cf. Kickert et al., 1997).

Up until 2008, it was only necessary to position the Provan school in different network research traditions. But, with the publication of two seminal articles in JPART by Ansell and Gash and Provan and Kenis, two new modes of governance were introduced; these were respectively collaborative governance (Ansell & Gash, 2008) and network governance (Provan & Kenis, 2008). From that point onward, it was required that the Provan school became more explicit on how

networks are positioned in the collaborative governance literature, making the boundaries among network research traditions even fuzzier.

Collaborative governance is defined as 'a governing arrangement where one or more public agencies directly engages non-state stakeholders in a collective decision-making process that is formal, consensus-oriented, and deliberative and that aims to make or implement public policy or manage public programs or assets (Ansell & Gash, 2008: 544)', while network governance focuses on 'the use of institutions and structures of authority and collaboration to allocate resources and to coordinate and control joint action across the network as a whole (Provan & Kenis, 2008).' One way to separate these two governance traditions is that Ansell and Gash's tradition describes patterns of government and governing, while Provan and Kenis's tradition is interested in the governance of organizational networks (Vangen et al., 2015). This means network governance is a dimension of the broader concept of collaborative governance since the concept of network governance used in the Provan school is limited by the mechanisms or means of governance of the network. In scholarship, however, this positioning is often not very clear. For instance, collaborative governance is used to explain the governance, leadership, and management of networks to achieve a collaborative advantage (i.e., governance networks). In contrast, network governance is employed to study the governance of other collaborative entities than networks like collaboratives or partnerships.

Working assumptions

In line with the Provan school, I understand organizational networks as unique, multiorganizational social systems based on present or absent relationships among three or more organizations working together to achieve a purpose that none of them individually can achieve independently (Provan et al., 2007: 483). Hence, I adopt the school's historical utilitarian view and amalgamate Provan and Kenis's definition of network governance (: 231), Gulati, Puranam, and Tushman's concept of meta-organization (: 573), and Phanish Puranam's microstructure theory of organization (: 4) into a formal definition of organizational networks.

I define organizational networks as an organizational form that shares five common features:

> An organizational network is a (1) multiagent system of three or more legally autonomous organizations that is (2) not bound by authority based on employment relationships but characterized by (3) a distinct identity derived from a particular boundary and membership arrangement and (4) network-level goals toward (5) which the constituent organizations' efforts are expected to contribute.

Any approach to examining goal-directed organizational networks is built on specific assumptions about the nature of organizational networks and how they are designed and function. Seven

assumptions underlie my approach and clarify the logic on which the various studies in this dissertation are based.

A distinctive trait that differentiates the Provan school from others is by focusing on the whole network as the unit of analysis; 'Groups of three or more legally autonomous organizations that work together to achieve not only their own goals but also a collective goal (Provan & Kenis, 2008: 231).' As explained above, this means the Provan school adheres to the whole network perspective that views the network holistically as a distinct entity.

The first assumption is thereof that organizational networks are composed of three or more organizations. This means I am interested in the triad as the basic building block to describe a group of three organizations working together. The reason for this is we assume that the behavior observed in a triad can be applied to larger groups (Simmel, 1950; Axelrod, 1990). In the case of two organizations or dyads, we are dealing with an inter-organizational relationship e.g., an alliance or joint venture (Oliver, 1990), while a network cannot be composed of a single organization unless we are interested in a different unit of analysis e.g., relationships within the organization itself. Perhaps an often-overlooked distinction of the Provan school is that whole network research does not limit itself to the public sector. This provides an alternative way of distinguishing the Provan school from other traditions by considering whether the emphasis is broader than public policy or administration (Vangen et al., 2015; Sydow et al., 2016).

The second assumption is that the group of organizations working together must exist within identifiable network boundaries (Puranam et al., 2014; Puranam, 2018). These boundaries demarcate the network as a system from the context in which it is embedded. Based on what I defined previously, three aspects need to be considered. The first aspect is a recognizable identity of the network that specifies to in- and outsiders "who we are as a network", "what makes our network distinct", and "why we need a network" (Raab & Kenis, 2009). The second aspect refers to the membership arrangement of the network. Network members actively shape the design of the network. According to Gulati et al., (2012), the essential aspects of the strategic deliberation about the extent and limits of the network are (1) who chooses members; (2) the criteria for membership; and (3) the duration and exclusivity of membership. The existence of a boundary arrangement based on identity and membership, however, does not imply that organizational networks are closed systems, nor does it suggest that the boundary arrangement is constant (Puranam, 2018). In addition, network members can belong to more than one organizational network (Gulati et al., 2012; Nowell et al., 2019). The third aspect that demarcates the network as a system from its context is that a purpose can be ascribed to the organizational network. A network purpose provides an additional means to recognize the network and its boundary arrangement through our understanding of its purpose (Puranam, 2018), whether intended or emergent (Puranam et al., 2014).

Related to this is the third assumption that organizational networks are goal-directed or purpose-oriented. Organizational networks come into being when organizations have common problems or clients that they can better address with one another rather than by themselves (Carboni et al., 2019). This general idea of a shared purpose (to some degree) that organizations intend to achieve by working together overlaps with other networks and collaborative governance traditions. The distinctive feature of the Provan school, however, is that the purpose is a 'collective cognitive construct' of the network (Carboni et al., 2019: 212). The raison d'être is tied to the network, indicating a desirable, ultimate end-state that can be factored into a decomposition of subs-goals through means-ends linkages (Puranam, 2018). Although, a purpose does not necessarily mean that goals among network members are shared or aligned (Provan & Kenis, 2008; Bryson et al., 2016), it does pertain to the reason why the network exists (Carboni et al., 2019). This suggests that networks must be defined in terms of what they aim to attain, as this provides more understanding of network similarities and differences (Lemaire et al., 2019).

According to Nowell and Kenis (2019), a network purpose can be conceived as a boundary object that 'represents the foundational logic around which [organizing] takes place (Nowell & Kenis, 2019: 193; bracket added).' They define such an orientation as 'a socio-cognitive translation of the network operating context into a bounded problem space (Nowell & Kenis, 2019: 193).' Typically, then a network purpose is defined in terms of the continued existence and, to some degree, understood in terms of exploiting some form of gains from a joint effort that cannot be achieved by organizations acting in isolation (Puranam, 2018). But this creates a fundamental problem of autonomy versus control in the network as organizations participating in the network 'tend to make choices that, in their representations, increase the possibility of attaining goals that are currently important to them (Puranam, 2018: 23).'

The challenge is thereof 'to structure a goal-directed action system to provide appropriate incentives for integration with adequate monitoring and control and to avoid imposing strong constraints that might limit organizations working together or minimize their autonomy (Provan & Milward, 1994: 867).' Hence, the fourth assumption is that the efforts of the organizations participating in the network, in aggregate, must contribute toward the network's goal (Puranam, 2018) even if 'the preference is for optimization of the network and comes at the cost of local [satisfaction] for any organization participating in the network (Provan et al., 2007: 485; bracket added).' Networks must thereof formulate some mode of governance – the fifth assumption – to ensure that they act as a goal-directed system of coordinated action. Because without such a mode, participants will not engage in collective and mutually supportive action, conflict cannot be addressed, and network resources will not be acquired and utilized efficiently and effectively (Provan & Kenis, 2008). As a result, what sets apart the Provan school from other network and collaborative governance traditions is its focus on how the use of institutions and structures of authority and collaboration to allocate

resources and to coordinate and control joint action across the network is carried out without unity in ownership or command. This means network governance contrasts with hierarchical and bureaucratic authority based on employment relationships (Gulati et al., 2012; Vangen et al., 2015). As such, organizational networks can be classified as "meta-organizations" since their defining feature is the absence of formal authority arising from an employment relationship between network members (Gulati et al., 2012).

Another assumption is that organizational networks, in contrast with Puranam's microstructural approach, are not an aggregate of smaller, simpler, and recurring patterns of lower units of analyses. They are irreducible. Only by examining the network as a goal-directed system of coordinated action can we understand such issues as how networks evolve, how they are governed, and, ultimately, how collective outcomes might be generated (Provan et al., 2007). This point is salient, especially for understanding how networks govern themselves, because it requires a perspective beyond the performance of individual organizations participating in the network. But this also means that our focus needs to shift toward the network's behavior, functions, and properties, which derive from the interactions of its organizations that are part of the network (Provan et al., 2007) and environment-network interactions (Nowell et al., 2019).

The latter brings us to the final assumption that organizational networks are systems embedded in a larger environment conceptualized as 'any feature of a network's operating context that influence either what can be brought into the network and the kind and degree of influence the network can have within this operating environment (Nowell et al., 2019: 173).

Network-level theory

In the last two decades, Keith Provan, in collaboration with others, left us with a rich theoretical and empirical legacy in which he developed a system of ideas, both informed by organization theories as well as experience, insights, and knowledge of network practices about how to create, develop, manage, govern, and evaluate effective goal-directed organizational networks. I aim to integrate three of his seminal theorems (figure 1) to produce a coherent theoretical framework (figure 2) that—I believe, both encapsulates and explains three necessary conditions of network effectiveness.

A preliminary theory of network effectiveness

Provan and Milward (1995) outlined in their article: "A Preliminary Theory Of Interorganizational Network Effectiveness: A Comparative Study Of Four Community Mental Health Systems" the contours of a preliminary network theory of network effectiveness. Their seminal study compared four organizational networks (systems of mental health care delivery) to show that network effectiveness can be explained by network integration, external control, system stability, and environmental

resource munificence. Since integration is an ill-defined concept, they focused on the interconnectedness among network members (density) and how they are integrated and coordinated through a central authority (centralization). Raeymaeckers and Dierckx (2012) provide another take on integration and suggest employing a broader view using four dimensions of integration: communicative, cultural, normative, and functional integration (for measurement, see Landecker, 1951). The latter refers to the traditional take on structural characteristics of the network. A third manner to integrate the network is through clique overlap. By having small cliques of organizations in the network overlap various relationships, network effectiveness can be enhanced (Provan & Sebastian, 1998).

Related to network integration is direct, non-fragmented external control (Provan & Milward, 1995). This aspect of network structure refers to whether an organization outside the network controls the network (Provan & Milward, 1995). Kenis and Provan (2006: 228) defined 'control of networks (the object of control) as the use of mechanisms by actors to monitor the actions of activities of organizational networks to enhance the likelihood that network-level goals can be attained.' Typically, fiscal control and regulatory control are employed as tools of formal control (Smith, 2020). However, Kenis and Provan (2006) consider network control as a dimension of the broader concept of network governance, suggesting five control mechanisms. Their study concluded that 'networks can lead to improved system-level outcomes, but only when network integration is centralized, external control is direct and non-fragmented, the system is stable, and resources adequate (Provan & Milward 1995: 30).'

This conclusion has guided whole network research since its publication. First, their original premise was 'that integration among organizations providing multiple services to a common client group would be positively related to network effectiveness (Provan & Milward 1995: 23).' Their study aimed to challenge and test the link between services integration and effectiveness regarding client outcomes. But integration among the four cases was found not alike. It showed different relationships with their aggregated construct of network effectiveness. Provan and Milward (1995: 24) found that 'networks integrated and coordinated centrally—through a single core agency, are likely to be more effective than dense, cohesive networks integrated in a decentralized manner among the organizations participating in the network.'

Furthermore, they found that 'when systems in which external fiscal control by the state was direct, and to a lesser extent not fragmented, this would be more effective than indirectly controlled systems in which allocation and control of state funding were delegated to a local funding authority (Provan & Milward 1995: 25).' They ascribed this finding as resonating well with the principal-agent logic (cf. Eisenhardt 1989); direct and non-fragmented relationships between a principal and agent allow better control and monitoring.

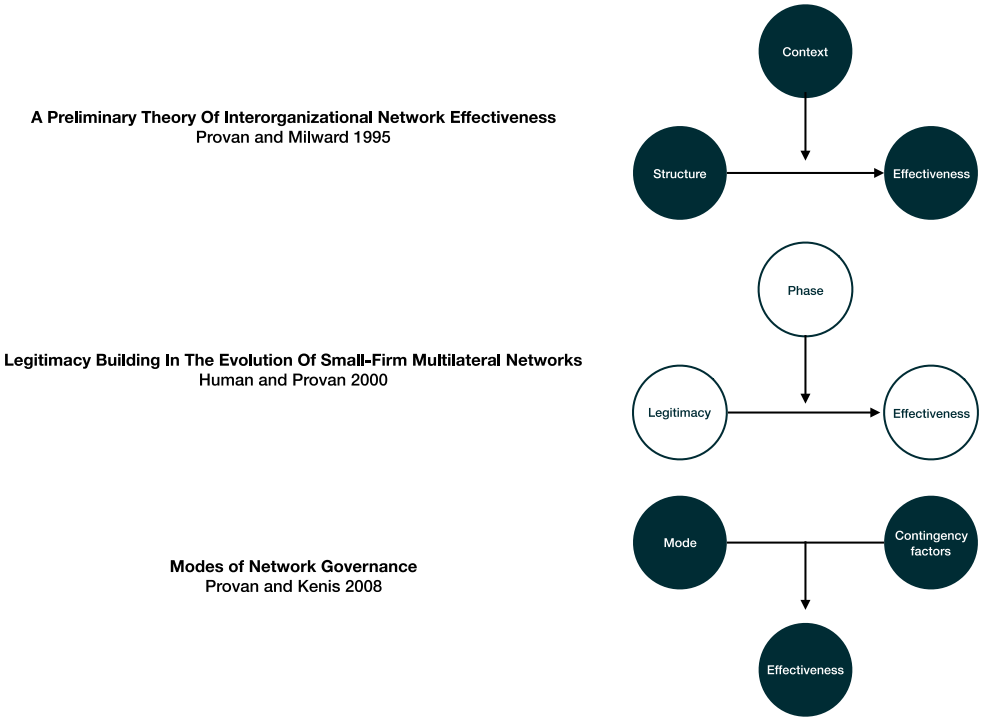


Figure 1. An overview of three seminal theoretical ideas of Keith Provan in collaboration with Brint Milward, Sherrie Human, and Patrick Kenis. Only concepts are displayed.

Third, Provan and Milward (1995) found that substantially induced system change in the short-term—i.e., alternations to the circumstances or conditions of the environment in which the network is embedded, had an impact on network-level outcomes. Connecting these results with the likes of Hebert Simon, Mark Granovetter, and Karl Weick, the rationale they put forth was that given the type of network, a coordinated joint action system would benefit from being stable depending on their requisite need for integration and coordination of collaborative efforts to attain the network purpose. Hence, system stability was found to be a necessary but insufficient condition for network effectiveness in the context of the severely mentally ill (Provan & Milward 1995). On the contrary, this system stability could be detrimental in contexts requiring flexibility and adaption (cf. Powell et al., 2005).

Finally, they found indications that networks embedded in scarce resource environments would likely not produce effective network-level outcomes (Provan & Milward 1995). However, their study was less clear on the impact of resource munificence on network effectiveness because they found mixed results for both well-funded cases. Provan and Milward (1995) implicitly regarded

resource munificence as an INUS condition; that is, a network embedded in a resource munificence environment is an insufficient but non-redundant part of a condition that is itself unnecessary but sufficient for the occurrence of an effect (Fiss et al. 2013). They stated that in service delivery to the severely mentally ill, a recipe of conditions for effective networks would more likely include network integration and system stability, rather than resource munificence to explain why some networks are effective while others are not.

Network legitimacy and evolution

Five years after the publication of Provan and Milward, Keith Provan published with Sherrie Human the article: "Legitimacy Building In The Evolution Of Small-Firm Multilateral Networks: A Comparative Study Of Success And Demise." This study examined two multilateral networks of SME firms in the U.S. wood-products manufacturing industry on how each network developed legitimacy over their early evolution from initial inception to sustainment (Human & Provan 2000). Based on the findings of this study, they concluded that:

> 'Networks tend to have similar patterns of evolution and develop similar legitimacy requirements across three dimensions: network-as-form, network-as-entity, and network-as-interaction. Despite the similarities across networks, however, each network went about building network legitimacy differently, developing either an inside-out or outside-in strategic orientation in response to the demands and expectations of key stakeholders just before its founding. While network legitimacy during network formation can be attained using either strategy, network sustainment, on the other hand, appears to depend on adopting both strategic perspectives (Human & Provan 2000: 359).'

This study highlights that network legitimacy is not a monolithic concept but a conception of in and outsiders of the network that 'perceive the actions and structure of it as desirable and appropriate (Suchman 1995: 574).' They were the first to raise awareness of how legitimacy needs to be established and managed at different stages of network development (cf. Kenis & Provan, 2009; Provan, Kenis, & Human, 2014). They link previous insights on network integration, external control, system stability, and resource munificence. Still, they also presented the first glimpse of different concerns of network governance by linking inside-out and outside-in network strategies per phase of network development. The center of attention shifted from network structure towards preliminary ideas on network governance as the ability of institutions and structures of authority and collaboration to work closely together to establish a recognizable network identity (cf. Rometsch & Sydow, 2007; Raab & Kenis, 2009).

Having established the importance of legitimacy for networks, Human and Provan (2000) formally stated that organizational networks build legitimacy along three key dimensions: network as form, entity, and interaction. Network as a form refers to 'the network as an acceptable form of organizing, which requires credibility both to network members and its outsiders (Human & Provan 2000: 339).'

A network as entity involves developing 'a recognizable identity that would allow both network members and outsiders to perceive the network as a legitimate entity (Human & Provan 2000: 339).' Interestingly, Human and Provan (2000) found that, albeit the network can collectively build the legitimacy of the network as an entity, the cases studied suggested the idea that a lead organization took a critical role in creating and developing the legitimacy of the network as a whole.

Network as interaction focuses on effective collaborations, essential to developing all types of inter-organizational relationships (Human & Provan 2000: 339). They refer to this as 'a process that requires legitimizing, so that network members and outsiders are willing to work together to build and maintain the requested participation that is critical for holding the network together (Human & Provan 2000: 340).'

Although many may see the article's main contribution being the introduction of network legitimacy as a polylithic concept with three key dimensions, perhaps less attention is given to the contribution to network evolution. The article paved the way for addressing network evolution throughout various developmental phases. Using the term network strategies, Human and Provan (2000) initiated the debate that efforts of building and maintaining legitimacy are strategically crucial since they found in their cases that these strategies tend to be either internally or externally oriented, but not both.

Network legitimacy can be differentiated by two legitimacy-building strategies—"outside-in" and "inside-out". The former refers to a strategy that focuses on building credibility with outsiders of the network, whereas the latter denotes a strategy that concentrates on developing credibility internally. This distinction is important as it reflects what the primary orientation was for building network legitimacy during its inception phase and how the network addressed both the internal and external legitimacy needs of the network over the stages of its evolution: pre-network, network formation, early growth, emerging legitimacy, and sustainment or demise (Human & Provan, 2000). Therefore, networks need to be sensitive about what strategy to develop and execute because, depending on the development phase a network is in—different requirements for each of the three dimensions can be present. The lack of legitimacy on one dimension can easily undermine the legitimacy of the other two, eventually resulting in a deficiency of credibility and support by network members and outsiders.

Network governance modes

More than a decade after the seminal publication of Provan and Milward (1995), Keith Provan coauthored with Patrick Kenis to publish their article "Modes of Network Governance: Structure, Management, and Effectiveness." Network governance is defined by Provan and Kenis (2008: 231) as 'the use of institutions and structures of authority and collaboration to allocate resources and to coordinate and control joint action across the network.' It thereof 'entails the design and use of a structure and processes that enable the network to direct, coordinate and allocate resources for the collaboration as a whole and account for its activities' (Vangen, Hayes, Cornforth, 2015: 1244, italics added). Network governance involves 'a select, persistent and structured set of autonomous [organizations] engaged in created products or services based on implicit and open-ended contracts to adapt to environmental contingencies and coordinate and safeguard exchanges. These contracts are social—not legally—binding (Jones, Hesterly, & Borgatti, 2007: 914, brackets altered).'

The article of Provan and Kenis (2008) further develops the preliminary theory of network effectiveness by introducing a typology of three ideal-type network governance modes—each mode conceptualized as a different configuration of structural and relational characteristics. They conceptualized three modes of network governance: the shared-participant, the lead-organization, and the network administrative organization, using two dimensions that are important for coordination, control, and allocation in the network. The first dimension involves the extent to which the network governance mode is brokered or not. Brokerage refers to organizations or individuals that span boundaries and exploit structural holes by purposively connecting or disconnecting actors in the network (Burt 1992). A broker can be considered an intermediary or agent that is differentiated from the other network members in the management of the network (Milward & Provan 2006; Provan & Kenis 2008). For instance, such agents can enact various roles, including coordinator, itinerant, gatekeeper, representative, and liaisons (Gould & Roberto 1989). Brokered modes of governance involve organizational networks in which one or a few network members occupy a role in which they purposively act as a broker to facilitate activities among network members and outsiders (Marsden 1982). In contrast, a non-brokered network governance mode is designed in a way that most network members participate in the management of the network and are consequently expected to work closely with one another to coordinate activities among the network and with outsiders to attain network-level goals (Milward & Provan 2006).

Consequently, Provan and Kenis (2008) made a distinction between two types of brokered network governance modes using a second dimension, specifically whether brokered network governance arrangements are participant governed (i.e., by network members) or externally governed (i.e., by outsiders in the form of a specific set up association, administrative entity, or recruited manager). Following these two dimensions, a network governance mode can be established and

maintained, allowing institutions and structures of authority and collaboration to allocate resources and coordinate and control joint action across the network.

The network theory of network governance by Provan and Kenis is by origin a structural contingency theory. The underlying idea of this theory is that network effectiveness is enhanced by an external fit between the demands of a network's environment and the design of its internal governance arrangement, as well as an internal fit among four crucial contingency factors (Miller 1992; Donaldson 2001; Provan & Kenis, 2008). The underlying theoretical mechanism is systemic fit which refers to a feasible set of equally effective, internally consistent patterns of the network environment and the network governance arrangement (Drazin & van de Ven 1985).

Structural contingency theory posits that there is no one best way to organize, but not all ways are equally effective (Galbraith, 1974; Donaldson, 2001). In network governance, this translates to the underlying theoretical idea that the network needs to fit certain crucial contingencies. These contingencies moderate the network effects on network effectiveness. The theory makes three assumptions: (1) there is an association between the contingencies and the network configuration, (2) contingencies determine the network configuration because a network that changes its contingencies—in turn, changes its configuration; (3) there is a fit of some level of the network configuration to each level of the contingencies. A fit leads to higher network effectiveness, whereas a misfit lowers network effectiveness. This fit-performance relationship between the network configuration and its effectiveness distinguishes structural contingency theory from other organization theories, which is the core challenge of network governance (Donaldson 2001; Provan & Kenis 2008).

Following the classical view of structural contingency theory, network governance is then an issue of constrained optimization that entails maximizing network effectiveness by minimizing the misfit between the diverse environmental demands and the internal network governance arrangement, which in turn requires maximizing the benefits of network differentiation and minimizing the cost of integration (Lawrence & Lorsch 1967; Saz-Carranza & Ospina 2011; van de Ven et al., 2013; Vangen et al., 2015; Toubiana et al., 2017).

An often-heard critique of structural contingency theory is the simplification of the underlying core elements, viewing fit between these elements as static rather than a dynamic equilibrium or suggesting singular association and linear relationships between, i.e., the network environment and the network governance arrangement (van de Ven et al., 2013). This critique may also hold to Provan and Kenis' theorem in some regard. However, a part of their success for a broad adoption by scholars was that they formulated a parsimonious rather than a comprehensive network governance model.

Consequently, they laid the groundwork in Public Administration and Management for how scholars and practitioners may approach and theoretically understand organizational network

governance across various public administration and management subdomains. In the last 5-to-10 years, (network) scholars in Public Administration and Management have been responding to these critiques by employing either advanced social network methodologies (i.e., see the work of Koliba or Bodin) or configurational approaches (i.e., Willem & Gemmel 2013; Raab et al., 2015; Wang 2015; Lucidarme et al., 2016; Cristofoli & Markovic 2016) to examine the network theories of Provan and Milward (1995) and Provan and Kenis (2008).

Building forth on structural contingency theory, Provan and Kenis (2008) formulated propositions on network effectiveness conditions for each network governance mode. Specifically, they argued that:

> 'As trust becomes less densely distributed throughout the network, as the number of participants gets larger, as network goal consensus declines, and as the need for network-level competencies increases, brokered forms of network governance, like lead organization and NAO, are likely to become more effective than shared-governance networks' (Provan & Kenis 2008: 237).'

Following structural contingency theory's basic premise, they adopted a systems approach toward fit, developing a rationale between modes and contingency factors that were expressed as:

> 'The greater the inconsistency between critical contingency factors and a particular governance [mode] (both in terms of the number of inconsistent factors and the extent to which these factors are inconsistent with characteristics of the governance [mode]), the less likely that that particular [mode] will be effective, leading either to overall network ineffectiveness, dissolution, or change in governance [mode]' (Provan & Kenis 2008: 241, brackets added).'

Provan and Kenis (2008) provided us with the equivalent of Mintzberg's superstructure for organizational networks. Not only did this enrich the debate on what situational factors determine when one or a combination of network governance modes are used, but also did it instigate an empirical research agenda on 'the use of institutions and structures of authority and collaboration to allocate resources and to coordinate and control joint action across a network as a whole' (Provan & Kenis 2008: 231) 'to attain positive network-level outcomes that could not normally be achieved by individual network participants independently' (Voets et al., 2008; Turrini et al., 2010).

Building forth on Provan and Milward (1995) and Human and Provan (2000), their conceptual paper also provided two additional contributions. A crucial factor in the network theory of network governance is how the network "manages" (cf., Milward & Provan 2006) or "cultivates" in Saz-Carranza

& Ospina's terms, network-level tensions arising from a (mis)fit (Saz-Carraza & Ospina's 2010; 2011; Vangen et al., 2015; Saz-Carranza et al., 2016; Toubiana et al., 2017). In their words:

> 'Once a [mode] is in place, network managers must still manage and lead the network. Success is by no means assured, regardless of which [mode] is adopted. [We] propose that network managers operating within each [mode] must recognize and respond to three basic tensions, or contradictory logics, inherent in network governance. Although these tensions apply to all three [modes] of governance, the unique properties of each [mode] mean that they differ concerning which side of each tension is most likely. How these tensions are managed will be critical for network effectiveness (Provan & Kenis 2008: 242, brackets added).'

Subsequently, they revitalized "network management" and "network leadership" as a research topic in which the predominant focus on structural and relational attributes of the network shifted towards management and leadership activities and processes (for the difference between network executive functions of governance, management, and leadership see Robin Lemaire's dissertation).

By introducing the tensions of efficiency-inclusiveness, internal-external legitimacy, and flexibility-stability, Provan and Kenis attempted to bridge the predominant network analytical focus on network structure and relational features with network-level processes and dilemmas of managing public networks as previously addressed by the likes of Kickert et al., (1999), Agranoff and McGuire (2003), and Huxham and Vangen (2005). Moreover, by introducing a typology with three modes of governance, four contingency factors, and three network-level tensions, Provan and Kenis (2008) presented a vocabulary for not only public policy planners and practitioners on network governance but also layout an empirical research agenda on the design and governance of organizational networks.

The third contribution of their article was that they underlined the importance of network evolution by calling for attention to how the governance of networks emerges and may change over time. Provan and Kenis (2008: 247) outlined that:

> 'Assuming network survival over time, as network governance changes, it is likely to evolve in a predictable pattern from shared governance to a more brokered form and from participant governed to externally (NAO) governed. Evolution from shared governance to either brokered form is significantly more likely than evolution from one to another. Once established, evolution from an NAO to another form is unlikely (i.e., inertia is strongest when the governance form is more formalized).'

Given that network research is often criticized for being static in its theoretical and empirical

approach, they aimed to encourage scholars to examine network governance both from systems and dynamic points of view to shed light on 'the various forms of governance that exist, the rationale for adopting one form versus another, and the impact of each form on network outcomes' (Provan & Kenis 2008: 231).

Developing a conceptual framework

Previously, I presented three seminal network theorems of Keith Provan and colleagues to explain network outcomes, behaviors, and properties. Based on this theoretical common ground, I will develop in this section a conceptual framework for goal-directed organizational networks. The framework is presented in figure 2 and shows the constitutive conditions of goal-directed organizational networks (conditions are shown in circles). The framework aims to explain network effectiveness using three main explanatory factors: network structure, governance, and legitimacy, given three boundary conditions: context, phase, and contingency factors. I will now briefly assert their relationships and boundary specifications to explain gaps in our knowledge of goal-directed organizational networks.

Effective goal-directed organizational networks

Altogether an encompassing working definition of effective goal-directed organizational networks can be delineated as:

> *An effective goal-directed organizational network structures three or more autonomous organizations that work together in terms of combining the actions of their members in a joint effort toward a common purpose.*

Network effectiveness is generally defined as 'the attainment of positive network-level outcomes that could not normally be achieved by organizational participants acting independently (Provan & Kenis, 2008: 230).' Although network-level outcomes depend on the constituency assessing how organizations participating in the network work in terms of aggregating the actions of the network members towards network-level goals, the review of Turrini et al., (2010) suggests that typical network-level outcomes are increasing efficiency, client satisfaction, increased legitimacy, resource acquisition, and reduced costs.

According to Provan and Milward (2001), networks should be evaluated on multiple levels, from the organizational, network, and community levels. Simply because a network is determined to be effective at one level does not imply that a network is evaluated as effective at other levels (cf. Provan & Milward, 1995). Kenis and Provan (2009) pointed out that evaluating network

effectiveness—the purpose for which the network exists is foremost an issue of developing appropriate criteria that can determine if the action for which the network exists is successfully conducted. They favored a multi-constituency approach and argued that multiple criteria can have a valid viewpoint on whether "the network" is getting something done (cf., Cameron & Whetten 1996). Hence, evaluating network effectiveness is not a question of creating a single statement on what we mean with effectiveness or for whom. But one of gathering, describing, and explaining information on principles and criteria by which the network can be judged and ultimately decided on to be effective—at a particular moment (Human & Provan 2000; Provan & Milward, 2001; Provan et al., 2007; Kenis & Provan 2009).

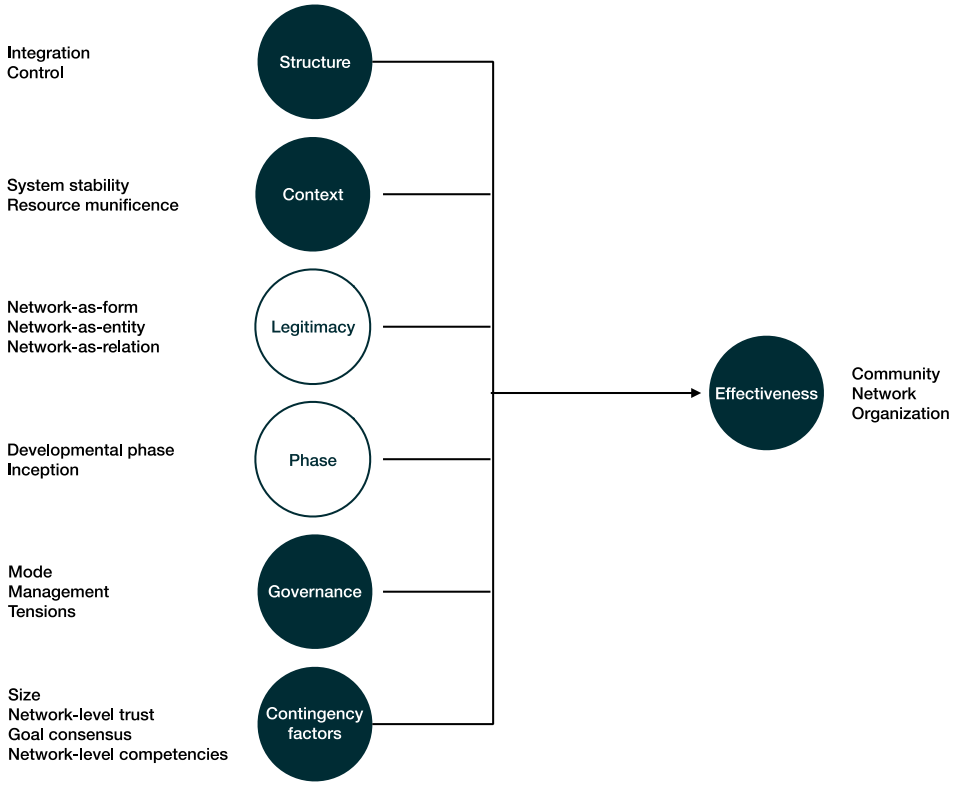


Figure 2. A conceptual framework for goal-directed organizational networks based on an integration of Provan and Milward (1995), Human and Provan (2000), and Provan and Kenis (2008). Concepts and dimensions are displayed. ***Note***: Dimensions of network effectiveness refer to levels of analysis and are adopted from Provan and Milward (2001). Inception as a dimension of the network phase is based on Kenis and Provan (2009).

Relationships in the framework

Returning to the framework in figure 2, I identify three necessary conditions of effective goal-directed organizational networks: network structure, network legitimacy, and network governance. These conditions must be present to have an effective goal-directed organizational network. Consequently, the absence of network structure, legitimacy, or governance means we are not dealing with a case of an effective goal-directed organizational network.

Network structure refers to having three or more organizations linked through multilateral ties to constitute a network. The underlying mechanism is that network effectiveness can be significantly enhanced through meaningful involvement by multiple organizations participating in the network. This implies that 'network links must be targeted and appropriate, so that those organizations that need to work closely together do so, while others do not (Provan & Lemaire, 2012: 644).' Building targeted and appropriate links mean emphasis should be placed on selective integration based on a mix of close, dense ties (closure) among some organizations and structural holes (brokerage) that are effectively brokered among others, so that information and resources can be shared throughout the network (Provan & Lemaire, 2012). In addition, mechanisms must be employed to monitor the actions and activities of the organizational network to enhance the likelihood that network-level goals can be attained (Kenis & Provan, 2006). According to Kenis and Provan (2006: 228) 'not addressing the issue of control is undesirable since some form of control is necessary to ensure that network-level goals, and not just organization-level goals, are achieved.'

Network legitimacy is the necessity to be credible as a network. This refers to the quality of being trusted by in- and outsiders. Without establishing legitimacy, a network cannot become an effective instrument to get something done and is doomed to fail. Network legitimacy represents the expressed consent regarding the network form, entity, and interactions and can empirically be defined as concerned stakeholders' support of the decisions made by the network (Sandström et al., 2016). Defined as recognition in terms of its form, entity, and interactions, network members must cope with variations in stakeholders' perceptions of how the network functions (Ghere, 2011).

Following this, the assessment of network legitimacy contends with a multi-stakeholder perspective in which a network must satisfy three legitimacy pressures. The first pressure involves the need to legitimize the basic form like, i.e., a start-up. This involves building trustworthiness among network members in this new form of organizing while simultaneously getting accepted in an industry or sector that has minimal external acceptance of new forms of organizing (Provan et al., 2008)

Another pressure that networks must face is to be seen as a viable entity (Provan et al., 2008). This means networks need to establish an identity derived from a boundary and membership arrangement, so that network members act as a network and outsiders recognize the network as an

entity rather than a collection of individual autonomous organizations (Provan et al., 2008; Gulati et al., 2012).

A third pressure that networks must contend with is establishing cooperative interactions among in- and outsiders to pursue a common goal together rather than independently. The problem, however, is that network members and other stakeholders only have partially overlapping goals driving networks to build trust to establish cooperative relationships among in- and outsiders (Provan & Milward, 2001; Provan et al., 2008).

As such, networks face legitimacy challenges that are both more complex and different than those faced by organizations. Unless its form, entity, and interactions are legitimized, the network will not be effective (Human & Provan, 2000).

Network governance refers to how networks make decisions to steer and direct joint efforts and goal achievement. In essence, networks must find solutions to the universal problems of organizing: the division of labor and the integration effort given the network context (Puranam, 2018). Each goal-directed organizational network must decompose its goals into different tasks performed by organizations that differ in preferences, interests, or knowledge. They then need to coordinate this group of organizations to produce a joint effort to attain their goals. Network governance is driven by informal authority based on 'expertise, reputation, status, gatekeeping privileges, or control over key resources or technology (Gulati et al., 2012: 573)' rather than administrative fiat derived from a formal authority like in a single organization. Various modes of network governance exist, but without an arrangement, it becomes challenging 'to ensure that network members engage in collective and mutually supportive action, that conflict is addressed, and that network resources are acquired and utilized efficiently and effectively (Provan & Kenis, 2008: 231).'

Boundaries of the framework

Now that we have the main concepts and their relationships identified, we must specify their boundary conditions. This is crucial as they determine the limitations in applying the framework (Bacharach, 1989; Fry & Smith, 1987; Barreto, 2010). We focus on the network context and phase as place and time can impact the theoretical rationale for the relationships between network effectiveness and the explanatory factors of network structure, legitimacy, and governance.

Network context

The findings of Provan and Milward (1995) have informed our fundamental understanding of networks and network effectiveness in the public sector (cf. O'Toole 1997). Focusing on system stability and resource munificence, they found that in environments with scarce resources, networks can be considered a means for increasing administrative efficiencies while enhancing the level of

services provided to clients (Provan & Milward 1995). Moreover, Provan and Milward (1995) found that system changes can be another source of uncertainty.

Networks are apt to pool resources through reciprocal, preferential, and mutually supportive actions (Powell 1990). However, integrating these actions among network organizations will not have an effective organizational network. Instead, they, among others, found that when network integration is centralized, external control is direct and non-fragmented, the system is stable, and resources are adequate—a network could lead to improved system-level outcomes (Provan & Milward 1995; cf. Vollenberg et al., 2007; Raab et al., 2015; Wang 2016).

While the context of the networks studied by Provan and Milward (1995) favored an approach toward stability and network structure, Powell et al. (2005) favored flexibility and network management by core organizations in the life sciences. Their study explained that different affiliation rules shaped the structure and dynamics of inter-organizational collaboration in biotechnology. Based on a logic of attachment that included accumulative advantage, homophily, follow-the-trend, and multi-connectivity, Powell et al. (2005) elaborated that a small core of perhaps one or two dozen organizations over time is routinely placed in the core of the network during its evolution. This highlights that a network structure over time develops and varies in its interconnections by expanding new entrants or reducing network numbers by consolidation through mergers and acquisitions. In addition to changes in its structure and diversity, the network developed a multi-vocal logic over time, which dominated the biotechnological field in which the network is embedded.

Network phase

Kenis and Provan (2009) recommend the importance of evolution as a factor that explains what a network can and cannot accomplish. They argued that different assessment criteria of network effectiveness could be appropriate at different development stages of a network.

Traditionally, we distinguish two trajectories of how networks form, each adhering to a different process (Kilduff & Tsai, 2003). The first network trajectory is driven primarily by serendipity—a tendency of events that occur or develop by chance. This means that 'organizational networks develop haphazardly from the interactions of individuals organizations and no network-level goals exist to drive this interaction process (Kilduff & Tsai, 2003: 89-90).' In serendipitous network processes, organizations choose whom to connect with and what to exchange without guidance from any central agency concerning goals or strategy (Kilduff & Tsai, 2003: 90).'

The second network trajectory is driven by the articulation and coherence of a specific network goal that organizations share. Contrarily to serendipitous networks, this means that in goal-directed network processes, organizations make choices about whom to connect with and what to exchange based on achieving a common goal (Kilduff & Tsai, 2003). Once such a system of coordinated action is established, it tends to assume an identity of its own, making it an independent entity of the

individuals and organizations who have founded it or of those who constitute its membership (Blau & Scott, 2003). This suggests that the choice made during the network's inception can impact its evolution.

Table 2. **Dissertation outline to summarize the course of action to fill gaps in the literature on goal-directed organizational networks**

Dissertation outline	Type of studies	Research questions	Gaps
Chapter 2. Modes of Network Governance Revisited.	Systematic literature review of the network governance concept	RQ1: Which network governance modes have been identified? RQ2: What explains the differences in these network governance modes? RQ3: What are the consequences of network governance modes?	Conceptual development of scoping and bounding the network governance concept
Chapter 3. Network of networks	Single case study of the Antwerp Port Authority in the Port of Antwerp	How did the Antwerp Port Authority manage the crisis throughout the COVID-19 pandemic?	Revisit the implicit assumption that goal-directed organizational networks are closed systems
Chapter 4. Network leadership and network-level tensions	Single case study of the Antwerp Fire Service in the province of Antwerp	With whom did the leadership team of the Fire Service and the Fire chief affiliate during the first wave of the pandemic, and what network-level tensions arose in the larger, complex organizational field of the province of Antwerp?	
Chapter 5. Taking a stance on gaming and simulation	Game simulation to simulate the governance of goal-directed organizational networks	How do network actors in goal-directed organizational networks coordinate and integrate the network, and what collaboration mechanisms do they use to replace hierarchy in a network context?	Understand under what conditions modes of network governance emerge and how organizational networks govern themselves

Organizational networks come into being through these two evolutionary patterns. Each pattern bears consequences for issues such as network identity, -development, -design, and -governance (Raab & Kenis 2009: Ahuja et al., 2012). The first evolutionary pattern by which an organizational network emerges is whenever there is some shared set of beliefs about a situation to

achieve something. In such cases, the network develops voluntarily through the efforts of these organizations. Organizations, groups of people, and individuals initiate participation to set up a division of labor among the people involved and establish a mode of organizing to coordinate the divided work. Over time, the network develops a distinct collective identity to become a goal-directed organizational network, separating it from a serendipitous (informal) social network (Raab & Kenis 2009).

The second evolutionary path of network inception is by policy dictate or strategic interest. In the context of the public sector, governmental agencies or the state can mandate the emergence of an organizational network to develop public policy or provide public service delivery (cf. Milward & Provan 1998; Milward & Provan 2000). On the contrary, in the private sector, an organizational network may be deemed appropriate to do something that an individual organization cannot achieve (Powell et al., 2005).

The critical difference between the two evolutionary paths is that the network is imposed on the organizations that must participate in the network in the second case. This may have consequences for network identity formation. While in organization identity formation, the organizational and individual levels interact—all three levels interact in network identity formation processes; that is a recursive process between the network, the organization, and the individual (Raab & Kenis 2009: 201). When a network is mandated, the answer to "who we are as a network" is exogenously provided, impacting how the network as a group becomes bounded, designed, and functions, while when a network is voluntarily incepted, the answer is endogenously offered by its network members and will most likely overlap to a considerable degree in the identity of its founding fathers (Raab & Kenis 2009).

Concluding remark and research gaps

This chapter aimed to introduce a network management language by establishing common ground on what organizational networks are, determining from what perspectives this organizational form can be analyzed, and introducing network-level theory. Based on this, I developed a conceptual framework for goal-directed organizational networks by summarizing the main network-level theorems, concepts, and relationships. The framework further allows us to refine the language for goal-directed organizational networks, aiding policy planners and managers to reflect on and explain what organizational networks are, how they work, and how to improve them. I conclude, however, that there are gaps in our understanding of (1) how network concepts and relations are related and, more specifically, (2) how combinations of conditions explain goal-directed organizational network outcomes. These gaps are of concern for our general knowledge of goal-directed organizational networks and, more specifically, hampers theory development and knowledge generation about goal-directed organizational networks. To position the dissertation in the literature, I have outlined the

research questions and gaps in Table 2. The upcoming chapters of the dissertation set out to identify (1) the conditions that explain network governance and (2) determine how organizational networks govern themselves.

References

Agranoff, R., & McGuire, M. (2003). *Collaborative public management: New strategies for local governments*. Georgetown University Press.

Ahuja, G., Soda, G., & Zaheer, A. (2012). The genesis and dynamics of organizational networks. *Organization science*, *23*(2), 434-448. https://doi.org/10.1287/orsc.1110.0695

Aldrich, H., & Whetten, D. A. (1981). Organization-sets, action-sets, and networks: Making the most of simplicity. In Nystrom, P.C. and Starbuck, W.H. (Eds). *Handbook of organizational design. Volume 1. Adapting organizations to their environments* (pp. 385-408). Oxford.

Ansell, C., & Gash, A. (2008). Collaborative governance in theory and practice. *Journal of public administration research and theory*, *18*(4), 543-571. https://doi.org/10.1093/jopart/mum032

Axelrod, R. (1990). *The Evolution of Cooperation*. Penguin, New York

Bacharach, S. B. (1989). Organizational theories: Some criteria for evaluation. *Academy of management review*, *14*(4), 496-515. https://doi.org/10.5465/amr.1989.4308374

Barreto, I. (2010). Dynamic capabilities: A review of past research and an agenda for the future. *Journal of management*, *36*(1), 256-280. https://doi.org/10.1177%2F0149206309350776

Berry, F. S., Brower, R. S., Choi, S. O., Goa, W. X., Jang, H., Kwon, M., & Word, J. (2004). Three traditions of network research: What the public management research agenda can learn from other research communities. *Public administration review*, *64*(5), 539-552. https://doi.org/10.1111/j.1540-6210.2004.00402.x

Berthod, O., Grothe-Hammer, M., Müller-Seitz, G., Raab, J., & Sydow, J. (2017). From high-reliability organizations to high-reliability networks: the dynamics of network governance in the face of emergency. *Journal of Public Administration Research and Theory*, *27*(2), 352-371. https://doi.org/10.1093/jopart/muw050

Blau, P.M., & Scott, W.R. (2003). *Formal organizations. A comparative approach*. Stanford University Press.

Brass, D. J., Galaskiewicz, J., Greve, H. R., & Tsai, W. (2004). Taking stock of networks and organizations: A multilevel perspective. *Academy of management journal*, *47*(6), 795-817. https://doi.org/10.5465/20159624

Bryson, J. M., Ackermann, F., & Eden, C. (2016). Discovering collaborative advantage: The contributions of goal categories and visual strategy mapping. *Public Administration Review*, *76*(6), 912-925. https://doi.org/10.1111/puar.12608

Bryson, J. M., Crosby, B. C., & Stone, M. M. (2015). Designing and implementing cross-sector collaborations: Needed and challenging. *Public administration review*, *75*(5), 647-663. https://doi.org/10.1111/puar.12432

Burt, R.S. (1992). *Structural Holes: The Social Structure of Competition*. Harvard University Press.

Burton, R. M., & Obel, B. (2018). The science of organizational design: fit between structure and coordination. *Journal of Organization Design*, *7*(1), 1-13. https://doi.org/10.1186/s41469-018-0029-2

Cameron, K. S., and Whetten, D. (1996). Organizational effectiveness and quality: The second generation. In: Smart, J. C. (Ed.), *Higher Education: Handbook of Theory and Research* (Vol. 11), Kluwer Academic Press, Dordrecht, The Netherlands, pp. 265– 306.

Carboni, J. L., Saz-Carranza, A., Raab, J., & Isett, K. R. (2019). Taking dimensions of purpose-oriented networks seriously. *Perspectives on Public Management and Governance*, *2*(3), 187-201. https://doi.org/10.1093/ppmgov/gvz011

Cartwright, T. J. (1987). The lost art of planning. *Long Range Planning*, *20*(2), 92-99. https://doi.org/10.1016/0024-6301(87)90011-2

Castells, Manuel (1996). *The Rise of the Network Society* (The Information Age: Economy, Society and Culture, Volume 1). Malden, MA: Blackwell Publishers.
Coleman, J. S. (1986). Social theory, social research, and a theory of action. *American journal of Sociology*, *91*(6), 1309-1335. https://doi.org/10.1086/228423
Cristofoli, D., & Markovic, J. (2016). How to make public networks really work: A qualitative comparative analysis. *Public Administration*, *94*(1), 89-110. https://doi.org/10.1111/padm.12192
Cropper, S., Ebers, M., Huxham, C., & Ring, R.S. (2008). In Cropper, S., Ebers, M., Huxham, C., & Ring, R.S. (Eds). *The Oxford Handbook of Inter-Organizational Relations.* Oxford University Press. DOI: 10.1093/oxfordhb/9780199282944.003.0001
Daft, R. L., & Weick, K. E. (1984). Toward a model of organizations as interpretation systems. *Academy of management review*, *9*(2), 284-295. https://doi.org/10.5465/amr.1984.4277657
Daft, R.L. (2009). *Organization Theory and Design. South-Western Cengage Learning*
Dill, W. R. (1958). Environment as an influence on managerial autonomy. *Administrative science quarterly*, 409-443. https://www.jstor.org/stable/2390794
DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American sociological review*, 147-160. https://doi.org/10.2307/2095101
Donaldson, L. (2001). *The contingency theory of organizations*. Sage.
Drazin, R., & Van de Ven, A. H. (1985). Alternative forms of fit in contingency theory. *Administrative science quarterly*, 514-539. https://doi.org/10.2307/2392695
Duncan, R. B. (1972). Characteristics of organizational environments and perceived environmental uncertainty. *Administrative science quarterly*, 313-327. https://doi.org/10.2307/2392145
Eisenhardt, K. M. (1989). Agency theory: An assessment and review. *Academy of management review*, *14*(1), 57-74. https://doi.org/10.5465/amr.1989.4279003
Fiss, P. C., Marx, A., & Cambré, B. (2013). Configurational theory and methods in organizational research: Introduction. In Fiss, P., Marx, A., & Cambré, B. (Eds). *Configurational theory and methods in organizational research*. Emerald Group Publishing Limited.
Fiss, P. C. (2007). A set-theoretic approach to organizational configurations. *Academy of management review*, *32*(4), 1180-1198. https://doi.org/10.5465/amr.2007.26586092
Fry, L. W., & Smith, D. A. (1987). Congruence, contingency, and theory building. *Academy of Management Review*, *12*(1), 117-132. https://doi.org/10.5465/amr.1987.4306496
Galaskiewicz, J., & Wasserman, S. (1994). Introduction: Advances in the social and behavioral sciences from social network analysis. In Wasserman, S. & Galaskiewicz (Eds.), *Advances social network analysis. Research in the Social and Behavioral Sciences*. Sage Publications.
Galaskiewicz, J. (1985). Interorganizational relations. *Annual review of sociology*, 281-304. https://www.jstor.org/stable/2083295
Galbraith, J. R. (1974). Organization design: An information processing view. *Interfaces*, *4*(3), 28-36. https://doi.org/10.1287/inte.4.3.28
Ghere, R. K. (2011). Network legitimacy and accountability in a developmental perspective: A case study. *Public Integrity*, *13*(2), 163-180. https://doi.org/10.2753/PIN1099-9922130205
Gould, R. V., & Fernandez, R. M. (1989). Structures of mediation: A formal approach to brokerage in transaction networks. *Sociological methodology*, 89-126. https://www.jstor.org/stable/270949
Granovetter, M. (1985). Economic Action and Social Structure: The Problem of Embeddedness. *American Journal of Sociology*, *91*(3), 4. https://www.jstor.org/stable/2780199
Granovetter, M. S. (1973). The strength of weak ties. *American journal of sociology*, *78*(6), 1360-1380. https://doi.org/10.1086/225469
Gulati, R., & Kletter, D. (2005). Shrinking core, expanding periphery: The relational architecture of high-performing organizations. *California Management Review*, *47*(3), 77-104.
Gulati, R., & Singh, H. (1998). The architecture of cooperation: Managing coordination costs and appropriation concerns in strategic alliances. *Administrative science quarterly*, 781-814. https://doi.org/10.2307/2393616

Gulati, R., Puranam, P., & Tushman, M. (2012). Meta-organization design: Rethinking design in interorganizational and community contexts. *Strategic management journal*, *33*(6), 571-586. https://doi.org/10.1002/smj.1975
Gulick, L. (1937). Notes on the Theory of Organization. In Gulick, L. & Urwick, L. (Eds.). *Papers on the Science of Administration*. Routledge.
Harrison, D. A., & Klein, K. J. (2007). What's the difference? Diversity constructs as separation, variety, or disparity in organizations. *Academy of management review*, *32*(4), 1199-1228. https://doi.org/10.5465/amr.2007.26586096
Head, B. W. (2008). The Rise of 'Wicked Problems'—Uncertainty, Complexity and Divergence. In Head, B.W. (Ed.). *Wicked problems in public policy. Understanding and Responding to Complex Challenges* (pp. 101-118). Palgrave MacMillan.
Hjern, B. (1992). Illegitimate Democracy: A Case for Multiorganizational Policy Analysis. Policy Currents 2: 1-5.
Hu, Q., Khosa, S., & Kapucu, N. (2016). The intellectual structure of empirical network research in public administration. *Journal of public administration research and theory*, *26*(4), 593-612. https://doi.org/10.1093/jopart/muv032
Human, S. E., & Provan, K. G. (2000). Legitimacy building in the evolution of small-firm multilateral networks: A comparative study of success and demise. *Administrative science quarterly*, *45*(2), 327-365. https://doi.org/10.2307%2F2667074
Huxham, C., & Vangen, S. (2005). *The Theory and Practice of Collaborative Advantage*. Routledge.
Isett, K. R., Mergel, I. A., LeRoux, K., Mischen, P. A., & Rethemeyer, R. K. (2011). Networks in public administration scholarship: Understanding where we are and where we need to go. *Journal of public administration research and theory*, *21*(suppl_1), i157-i173. https://doi.org/10.1093/jopart/muq061
Jones, C., Hesterly, W. S., & Borgatti, S. P. (1997). A general theory of network governance: Exchange conditions and social mechanisms. *Academy of management review*, *22*(4), 911-945. https://doi.org/10.5465/amr.1997.9711022109
Kenis, P., & Knoke, D. (2002). How organizational field networks shape interorganizational tie-formation rates. *Academy of management review*, *27*(2), 275-293. https://doi.org/10.5465/amr.2002.6588029
Kenis, P., & Provan, K. G. (2009). Towards an exogenous theory of public network performance. *Public administration*, *87*(3), 440-456. https://doi.org/10.1111/j.1467-9299.2009.01775.x
Kenis, P., & Raab, J. (2020). Back to the future: Using organization design theory for effective organizational networks. *Perspectives on Public Management and Governance*, *3*(2), 109-123. https://doi.org/10.1093/ppmgov/gvaa005
Kickert, W. J., Klijn, E. H., & Koppenjan, J. F. (1997). *Managing complex networks: Strategies for the public sector*. Sage.
Kilduff, M., & Tsai, W. (2003). *Social networks and organizations*. Sage.
Kilduff, M., & Brass, D. J. (2010). Organizational social network research: Core ideas and key debates. *Academy of management annals*, *4*(1), 317-357.
Klijn, E. H., & Koppenjan, J. (2012). Governance network theory: past, present and future. *Policy & Politics*, *40*(4), 587-606. https://doi.org/10.1332/030557312X655431
Knoke, D., & Yang, S. (2020). *Social network analysis*. SAGE publications.
Krishnan, R., Geyskens, I., & Steenkamp, J. B. E. (2016). The effectiveness of contractual and trust-based governance in strategic alliances under behavioral and environmental uncertainty. *Strategic Management Journal*, *37*(12), 2521-2542. https://doi.org/10.1002/smj.2469
Landecker, W. S. (1951). Types of integration and their measurement. *American Journal of Sociology*, *56*(4), 332-340 https://doi.org/10.1086/220757
Laumann, E. O., Galaskiewicz, J., & Marsden, P. V. (1978). Community structure as interorganizational linkages. *Annual review of sociology*, 455-484. https://www.jstor.org/stable/2945978
Lawrence, P. R., & Lorsch, J. W. (1967). Differentiation and integration in complex organizations. *Administrative science quarterly*, 1-47. https://doi.org/10.2307/2391211

Lecy, J. D., Mergel, I. A., & Schmitz, H. P. (2014). Networks in public administration: current scholarship in review. *Public Management Review*, *16*(5), 643-665. https://doi.org/10.1080/14719037.2012.743577

Lemaire, R. H., Mannak, R. S., Ospina, S. M., & Groenleer, M. (2019). Striving for state of the art with paradigm interplay and meta-synthesis: Purpose-oriented network research challenges and good research practices as a way forward. *Perspectives on Public Management and Governance*, *2*(3), 175-186. https://doi.org/10.1093/ppmgov/gvz010

Lemaire, R. H., & Provan, K. G. (2018). Managing collaborative effort: How Simmelian ties advance public sector networks. *The American Review of Public Administration*, *48*(5), 379-394. https://doi.org/10.1177%2F0275074017700722

Litwak, E., & Hylton, L. F. (1962). Interorganizational analysis: A hypothesis on co-ordinating agencies. *Administrative Science Quarterly*, 395-420. https://doi.org/10.2307/2390723

Lucidarme, S., Cardon, G., & Willem, A. (2016). A comparative study of health promotion networks: configurations of determinants for network effectiveness. *Public management review*, *18*(8), 1163-1217. https://doi.org/10.1080/14719037.2015.1088567

March, J. G., & Simon, H. A. (1993). *Organizations*. John wiley & sons.

Merriam-Webster's online dictionary (2021, 1b). Retrieved from https://www.merriam-webster.com/dictionary/govern

Merriam-Webster's online dictionary (2021, 2a) https://www.merriam-webster.com/dictionary/rule

Miller, D. (1992). Environmental fit versus internal fit. *Organization science*, *3*(2), 159-178. https://doi.org/10.1287/orsc.3.2.159

Milliken, F. J. (1987). Three types of perceived uncertainty about the environment: State, effect, and response uncertainty. *Academy of Management review*, *12*(1), 133-143. https://doi.org/10.5465/amr.1987.4306502

Milward, H. B., & Provan, K. G. (1998). Principles for controlling agents: The political economy of network structure. *Journal of Public Administration Research and Theory*, *8*(2), 203-222. https://doi.org/10.1093/oxfordjournals.jpart.a024378

Milward, H. B., & Provan, K. G. (2006). *A manager's guide to choosing and using collaborative networks* (Vol. 8). Washington, DC: IBM Center for the Business of Government. Retrieved from https://www.businessofgovernment.org/report/managers-guide-choosing-and-using-collaborative-networks

Mitchell, J. C. (1974). Social networks. *Annual review of anthropology*, *3*, 279-299. https://www.jstor.org/stable/2949292

Moretti, A., & Zirpoli, F. (2016). A dynamic theory of network failure: The case of the Venice Film Festival and the local hospitality system. *Organization Studies*, *37*(5), 607-633. https://doi.org/10.1177%2F0170840615613369

Nohrstedt, D., Bynander, F., Parker, C., & 't Hart, P. (2018). Managing crises collaboratively: Prospects and problems—A systematic literature review. *Perspectives on Public Management and Governance*, *1*(4), 257-271. https://doi.org/10.1093/ppmgov/gvx018

Nowell, B., Hano, M. C., & Yang, Z. (2019). Networks of networks? Toward an external perspective on whole networks. *Perspectives on Public Management and Governance*, *2*(3), 213-233. https://doi.org/10.1093/ppmgov/gvz005

Nowell, B. L., & Kenis, P. (2019). Purpose-oriented networks: The architecture of complexity. Perspectives on Public Management and Governance, 2(3), 169-173. https://doi.org/10.1093/ppmgov/gvz012

Nowell, B., & Milward, H. B. (2022). Apples to Apples: A Taxonomy of Networks in Public Management and Policy. *Elements in Public and Nonprofit Administration*. Cambridge University Press. https://doi.org/10.1017/9781108987646

Nowell, B., Steelman, T., Velez, A. L. K., & Yang, Z. (2018). The structure of effective governance of disaster response networks: Insights from the field. *The American Review of Public Administration*, *48*(7), 699-715. https://doi.org/10.1177%2F0275074017724225

O'Toole Jr, L. J. (1997). Treating networks seriously: Practical and research-based agendas in public administration. *Public administration review*, 45-52. https://www.jstor.org/stable/976691

O'Toole Jr, L. J. (2015). Networks and networking: The public administrative agendas. *Public administration review*, *75*(3), 361-371. https://doi.org/10.1111/puar.12281
Oliver, C. (1990). Determinants of interorganizational relationships: Integration and future directions. *Academy of management review*, *15*(2), 241-265. https://doi.org/10.5465/amr.1990.4308156
Ostrom, E. (1998). A behavioral approach to the rational choice theory of collective action: Presidential address, American Political Science Association, 1997. *American political science review*, *92*(1), 1-22. https://doi.org/10.2307/2585925
Pfeffer, J., & Salancik, G. R. (2003). *The External Control of Organizations. A Resource Dependence Perspective.* Stanford University Press.
Popp, J.K., Milward, B.H., MacKean, G., Casebeer, A., & Lindstrom, R. (2014). Inter-Organizational Networks. A Review of the Literature to Inform Practice. IBM Center for The Business of Government. Retrieved from https://www.businessofgovernment.org/report/inter-organizational-networks-review-literature-inform-practice
Porter, M.E., & Kramer, M.R. (2011). Creating Shared Value. How to reinvent capitalism—and unleash a wave of innovation and growth. Harvard Business Review, 89, nos. 1-2 (January–February 2011): 62–77. Retrieved from https://hbr.org/2011/01/the-big-idea-creating-shared-value

Powell, W. W., White, D. R., Koput, K. W., & Owen-Smith, J. (2005). Network dynamics and field evolution: The growth of interorganizational collaboration in the life sciences. *American journal of sociology*, *110*(4), 1132-1205. https://doi.org/10.1086/421508
Powell, W.W. (1990). Neither Market nor Hierarchy. Network forms of Organization. In Godwyn, M. & Gittell, J.H. (Eds.). *Sociology of Organizations: Structures and Relationships* (pp. 30-40). Sage.
Prahalad, C.K., & Krishnan, M.S. (2018). *The new age of innovation. Driving co-created value through global networks.* New York: McGrawHill.
Provan, K. G., Beagles, J. E., & Leischow, S. J. (2011). Network formation, governance, and evolution in public health: The North American Quitline Consortium case. *Health care management review*, *36*(4), 315. https://doi.org/10.1097%2FHMR.0b013e31820e1124
Provan, K. G., Fish, A., & Sydow, J. (2007). Interorganizational networks at the network level: A review of the empirical literature on whole networks. *Journal of management*, *33*(3), 479-516. https://doi.org/10.1177%2F0149206307302554
Provan, K. G., & Kenis, P. (2008). Modes of network governance: Structure, management, and effectiveness. *Journal of public administration research and theory*, *18*(2), 229-252. https://doi.org/10.1093/jopart/mum015
Provan, K.G., Kenis, P., & Human, S.E. (2008). In Bingham, L.B. & O'Leary, R. (Eds.). *Big Ideas in Collaborative Public Management* (pp. 131-147). Routledge. https://doi.org/10.4324/9781315706146
Provan, K. G., & Lemaire, R. H. (2012). Core concepts and key ideas for understanding public sector organizational networks: Using research to inform scholarship and practice. *Public Administration Review*, *72*(5), 638-648. https://doi.org/10.1111/j.1540-6210.2012.02595.x
Provan, K. G., & Milward, H. B. (1994). Integration of community-based services for the severely mentally III and the structure of public funding: A comparison of four systems. *Journal of Health Politics, Policy and Law*, *19*(4), 865-894. https://doi.org/10.1215/03616878-19-4-865
Provan, K. G., & Milward, H. B. (1995). A preliminary theory of interorganizational network effectiveness: A comparative study of four community mental health systems. *Administrative science quarterly*, 1-33. https://doi.org/10.2307/2393698
Provan, K. G., & Milward, H. B. (2001). Do networks really work? A framework for evaluating public-sector organizational networks. *Public administration review*, *61*(4), 414-423. https://doi.org/10.1111/0033-3352.00045

Provan, K. G., & Sebastian, J. G. (1998). Networks within networks: Service link overlap, organizational cliques, and network effectiveness. *Academy of Management journal*, *41*(4), 453-463. https://doi.org/10.5465/257084
Puranam, P. (2018). *The microstructure of organizations*. Oxford University Press.
Puranam, P., Alexy, O., & Reitzig, M. (2014). What's "new" about new forms of organizing?. *Academy of management Review*, *39*(2), 162-180. https://doi.org/10.5465/amr.2011.0436
Raab, J., & Kenis, P. (2009). Heading toward a society of networks: Empirical developments and theoretical challenges. *Journal of management inquiry*, *18*(3), 198-210. https://doi.org/10.1177%2F1056492609337493
Raab, J., Lemaire, R. H., & Provan, K. G. (2013). The configurational approach in organizational network research. In Fiss, P., Marx, A., & Cambré, B. (Eds). *Configurational theory and methods in organizational research*. Emerald Group Publishing Limited.
Raab, J., Mannak, R. S., & Cambré, B. (2015). Combining structure, governance, and context: A configurational approach to network effectiveness. *Journal of public administration research and theory*, *25*(2), 479-511. https://doi.org/10.1093/jopart/mut039
Raeymaeckers, P., & Dierckx, D. (2012). How can we study the integration of networks among human service organizations? Some lessons from organizational sociology. *European Journal of Social Work*, *15*(4), 484-502 https://doi.org/10.1080/13691457.2012.704871
Redactie (2013). Gehandicapte Daniëlla uit Groningen stierf 'gruweldood'. *Algemeen Dagblad.* Retrieved from https://www.ad.nl/binnenland/gehandicapte-daniella-uit-groningen-stierf-gruweldood~aa1ff586/
Redactie (2013). Inspectie onderzoekt gruwelmoord op Daniëlla. *Algemeen Dagblad.* Retrieved from https://www.ad.nl/binnenland/inspectie-onderzoekt-gruwelmoord-op-daniella~a3e95cb2/
Redactie (2014). Moeder wijst moordenaar van gehandicapte dochter aan. *Algemeen Dagblad.* Retrieved from https://www.ad.nl/binnenland/moeder-wijst-moordenaar-van-gehandicapte-dochter-aan~a4f7e205/
Redactie (2015). 18 jaar cel en tbs voor moord gehandicapte Daniëlla. *Algemeen Dagblad*. Retrieved from https://www.ad.nl/binnenland/18-jaar-cel-en-tbs-voor-moord-gehandicapte-daniella~a3daa166/
Rittel, H. W., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy sciences*, *4*(2), 155-169. https://doi.org/10.1007/BF01405730
Rometsch, M., & Sydow, J. (2007). On identities of networks and organizations. In M. Kronberger & S. Gudergan (Eds.), Only connect: Neat words, networks and identities (19-47). Copenhagen: Liber.
Sandström, A., & Lundmark, C. (2016). Network structure and perceived legitimacy in collaborative wildlife management. *Review of Policy Research*, *33*(4), 442-462. https://doi.org/10.1111/ropr.12180
Samenwerkend Toezicht Jeugd (2015). *Gezinnen met Geringe Sociale Redzaamheid. Casuïstiek Groningen.* Ministerie van Volksgezondheid, Welzijn en Sport. Retrieved from https://www.inspectie-jenv.nl/Publicaties/rapporten/2015/04/07/gezinnen-met-geringe-sociale-redzaamheid---casuistiek-groningen
Saz-Carranza, A., & Ospina, S. M. (2011). The behavioral dimension of governing interorganizational goal-directed networks—Managing the unity-diversity tension. *Journal of Public Administration Research and Theory*, *21*(2), 327-365. https://doi.org/10.1093/jopart/muq050
Saz-Carranza, A., Salvador Iborra, S., & Albareda, A. (2016). The power dynamics of mandated network administrative organizations. *Public Administration Review*, *76*(3), 449-462. https://doi.org/10.1111/puar.12445
Scott, W. R. (2013). *Institutions and organizations: Ideas, interests, and identities*. Sage publications.
Shipilov, A., Gulati, R., Kilduff, M., Li, S., & Tsai, W. (2014). Relational pluralism within and between organizations. *Academy of Management Journal*, *57*(2), 449-459. https://doi.org/10.5465/amj.2013.1145
Simmel, G. (1950). *The Sociology of Georg Simmel.* Translated and Edited by K. Wolff. Free Press, New York

Smith, J. G. (2020). Theoretical advances in our understanding of network effectiveness. *Perspectives on Public Management and Governance*, *3*(2), 167-182. https://doi.org/10.1093/ppmgov/gvz032
Stoker, G. (1998). Governance as theory: five propositions. *International social science journal*, *50*(155), 17-28. http://dx.doi.org/10.1111/1468-2451.00106
Suchman, M. C. (1995). Managing legitimacy: Strategic and institutional approaches. *Academy of management review*, *20*(3), 571-610. https://doi.org/10.5465/amr.1995.9508080331
Sutcliffe, K. M., & Zaheer, A. (1998). Uncertainty in the transaction environment: an empirical test. *Strategic management journal*, *19*(1), 1-23. https://doi.org/10.1002/(SICI)1097-0266(199801)19:1%3C1::AID-SMJ938%3E3.0.CO;2-5
Sydow, J., Schüßler, E., & Müller-Seitz, G. (2016). *Managing inter-organizational relations: Debates and cases*. Bloomsbury Publishing.
Tasselli, S., Kilduff, M., & Menges, J. I. (2015). The microfoundations of organizational social networks: A review and an agenda for future research. *Journal of Management*, *41*(5), 1361-1387. https://doi.org/10.1177%2F0149206315573996
Toubiana, M., Oliver, C., & Bradshaw, P. (2017). Beyond differentiation and integration: the challenges of managing internal complexity in federations. *Organization Studies*, *38*(8), 1013-1037. https://doi.org/10.1177%2F0170840616670431
Trist, E. (1977). A concept of organizational ecology. *Australian journal of management*, *2*(2), 161-175. https://doi.org/10.1177%2F031289627700200205
Turrini, A., Cristofoli, D., Frosini, F., & Nasi, G. (2010). Networking literature about determinants of network effectiveness. *Public administration*, *88*(2), 528-550. https://doi.org/10.1111/j.1467-9299.2009.01791.x
Van de Ven, A. H., Ganco, M., & Hinings, C. R. (2013). Returning to the frontier of contingency theory of organizational and institutional designs. *Academy of Management Annals*, *7*(1), 393-440. https://doi.org/10.5465/19416520.2013.774981
Vangen, S. & Huxham, C. (2009). Introducing the theory of collaborative governance. In Osborne, S.P. (Ed.). *The New Public Governance? Emerging Perspectives on the Theory and Practice of Public Governance* (pp. 179-200). Routledge. https://doi.org/10.4324/9780203861684
Vangen, S., Hayes, J. P., & Cornforth, C. (2015). Governing cross-sector, inter-organizational collaborations. *Public Management Review*, *17*(9), 1237-1260. https://doi.org/10.1080/14719037.2014.903658
Voets, J., Van Dooren, W., & De Rynck, F. (2008). A framework for assessing the performance of policy networks. *Public management review*, *10*(6), 773-790. https://doi.org/10.1080/14719030802423129
Vollenberg, M., Kenis, P., & Raab, J. (2007, October). Provan and Milward 1995 revisited: A case-study on network structure and network effectiveness of a Dutch mental health care network. In *9th Public Management Research Conference, Tucson, Arizona October*. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.553.2314&rep=rep1&type=pdf
Wang, W. (2016). Exploring the determinants of network effectiveness: The case of neighborhood governance networks in Beijing. *Journal of Public Administration Research and Theory*, *26*(2), 375-388. https://doi.org/10.1093/jopart/muv017
Weick, K.E. (1979). *The Social Psychology of Organizing*. Addison-Wesley, Reading, Mass.
Willem A., & Gemmel, P. (2013). Do governance choices matter in health care networks?: an exploratory configuration study of health care networks. *BMC Health Services Research*, *13*(1), 1-10. https://doi.org/10.1186/1472-6963-13-229
Wooten, M., & Hoffman, A.J. (2016). Organizational Fields Past, Present and Future. In R. Greenwood, C. Oliver, K. Sahlin and R. Suddaby (Eds.). *The SAGE Handbook of Organizational Institutionalism* (pp. 130-148). London: Sage Publications. Ross School of Business Paper No. 1311, Available at SSRN: https://ssrn.com/abstract=2767550 or http://dx.doi.org/10.2139/ssrn.2767550

CHAPTER 2. MODES OF NETWORK GOVERNANCE REVISITED. ASSESSING THEIR PREVALENCE, PROMISES, AND LIMITATIONS IN THE LITERATURE

In collaboration with Patrick Kenis, Jörg Raab, & Bart Cambré

Modes of network governance revisited. Assessing their prevalence, promises, and limitations in the literature

The systematic literature review takes stock of the empirical literature, citing Provan and Kenis (2008). It provides insights into how their contingency theory of network governance has been developed in an established and recognized research agenda in the last ten years. We offer means to summarize and synthesize key findings on the modes of network governance, contingency factors, and network-level tensions. We conclude that the governance of organizational networks as a vocabulary has been adopted in the management and organization sciences literature to explain organizational networks' development, functioning, and effectiveness. But further theoretical development and testing are warranted to inform the practice of network governance, particularly when, how, and why to use institutions and structures of authority and collaboration to allocate resources and coordinate and control joint action within and between organizational networks.

Keywords: network governance, organizational networks, modes of network governance, contingency factors, network-level tensions, network effectiveness

Introduction

The present literature review focuses on the governance of organizational networks. Building on Provan and Kenis (2008), Gulati, Puranam, and Tushman (2012), and Puranam (2018), an organizational network is defined as a (1) multiagent system of three or more legally autonomous organizations that are (2) not bound by authority based on employment relationships but characterized by (3) a distinct identity derived from a particular boundary and membership arrangement and (4) network-level goals toward (5) which the constituent organizations' efforts are expected to contribute (Jarillo, 1988; Provan & Milward, 1995; Provan et al., 2007; Provan & Kenis, 2008; Provan & Lemaire, 2012; Raab et al., 2015; Kenis & Raab, 2020). Organizational networks have become increasingly prevalent in public and nonprofit sectors (Berry et al., 2004; Isett et al., 2011; Lecy et al., 2014) and various industries (Poldolny & Page, 1998; Baker & Faulkner, 2002; Provan et al., 2007; Kilduff & Brass, 2010) because they present an alternative strategy to organizations to deal with institutional complexity, solve problems, and provide services that cannot be achieved or easily achieved by a single organization (Provan & Lemaire, 2012; Popp et al., 2014; Nowell & Kenis, 2019).

Each organizational network exhibits a division of labor, which means that its network-level goal is separated into a set of tasks and allocated among several organizations. Rather than multiple

organizations working together independently, serendipitously, or competing, organizations joining a network perform joint efforts to achieve a set of tasks (Provan & Milward, 2001; Provan et al., 2007; Raab & Kenis, 2009; Provan & Lemaire, 2012). Any organizational network must then organize a governance mode without relying on formal authority to ensure that organizations engage in collaboration and that their activities are coordinated for a given division of labor (Provan & Kenis, 2008). Only by going through sorting organizations into a goal-directed system of coordinative action, can authority be arranged, and collaboration structured to maximize the value of the network (Provan et al., 2007; Provan & Kenis, 2008; Gulati et al., 2012; Puranam, 2018; Lemaire & Provan, 2018; Kenis & Raab, 2020; Lemaire, 2020).

Different levels of analysis and perspectives have been taken to study organizational networks (Provan et al., 2007; Isett et al., 2011; Moliterno & Mahoney, 2011; Emerson et al., 2012; Gulati et al., 2012; Raab et al., 2015; Vangen et al., 2015; Lemaire et al., 2019; Carboni et al., 2019; Berthod & Segato, 2019; Nowell et al., 2019). Provan and Kenis (2008) suggested combining the network analytical and governance perspectives to consider the network as the unit of analysis and accordingly treat them as differentiated organizational forms. By combining these perspectives, Provan and Kenis (2008) developed a contingency theory of network governance to explain how networks govern themselves under different situations, contingent on their configuration, and the conditions for the effectiveness of each network governance mode. Network governance concerns the 'use of institutions and structures of authority and collaboration to allocate resources and to coordinate and control joint action across the network (Provan & Kenis, 2008: 231).' It 'entails the structure and processes that enable organizations to direct, coordinate and allocate resources for the network and to account for its activities (Vangen et al., 2015: 1244).'

According to Provan and Kenis (2008), a network governance mode can be determined by two dimensions: brokered/non-brokered governance and internal/external governance (Provan & Kenis, 2008). Combined, these two dimensions lead to three ideal types of network governance modes: (1) a shared-participant mode, where network members jointly govern the network (non-brokered/internal), (2) a lead organization mode, in which the network is governed by one network member (brokered/internal), and (3) a network administrative organization mode, where a separate organization is established to govern the network (brokered/external).

Although Provan and Kenis' network governance modes have increasingly been cited in the management and organization sciences literature, we lack evidence on which mode is effective under what specific conditions and for what uses they are employed to achieve integration of effort by a group of organizations working together to accomplish a collective set of tasks. We propose it is time to take stock of the empirical evidence about how organizational networks govern themselves and further develop Provan and Kenis' network theorem. This article aims to revisit Provan and Kenis' contingency theory of network governance by assessing the accumulated knowledge of the

governance of organizational networks as reported in empirical research from the last ten years since its publication in 2008. More explicitly, we set out to systematically review what network governance modes have been examined in the empirical literature citing Provan and Kenis (2008), because we are interested in what institutions and structures of authority and collaboration organizational networks use to arrange three or more organizations given contingent conditions, manage network-level tensions, and adapt network governance modes over time. The following questions guided our review of the empirical literature:

1. Which network governance modes have been identified?
2. What explains the differences in these network governance modes?
3. What are the consequences of network governance modes?

The article is structured into three sections. In the first section, we describe the scope and method of the systematic literature review. In the next section, we take stock of the contingency theory of network governance. This section is structured in three main parts, each centering on a core construct of the theorem. In the third section, we present what lessons we learned from reviewing the empirical literature on the network governance modes and their evolution, contingency factors, systems fit, network-level tensions, and network effectiveness. We close this last section by outlining a research agenda presenting what future direction research on the governance of organizational networks might take.

Table 1. PRISMA Statement

Phases	Steps
Identification*	803 records identified through database searching.
	No additional records identified through sources.
	No duplicates were found.
Screening	803 records were screened on title and abstract.
	605 records were excluded.
Eligibility	198 records were assessed on eligibility.
	198 records were cross-referenced with 120 records in the 2018 version of this paper.
	77 records were additionally excluded.
Included	121 records were included in qualitative synthesis

Note: Web of Science Electronic Database was latest accessed on 26.02.2020 in which conducted a default search on the article of Provan, K. G., & Kenis, P. (2008). Modes of network governance: Structure, management, and effectiveness. Journal of public administration research and theory, 18(2), 229-252. At time of search the article was 1,123 times cited (from Web of Science Core collection). Database was refined to the Social Sciences Citation Index (SSCI) of the Web of Science database, article as document type and English as language. Based on this setting, we collected all citations from 2008-2019—excluded 19 articles from 2020, resulting in 803 citing articles. In an earlier version of this article presented at PMRC 2015 we

also included the Google Scholar Database. We decided, however, to opt solely for Web of Science Electronic Database considered this database to be more accurate and reproducible and is used by others as one of the standards.

Scope and method of review

We conducted a systematic literature review on the empirical literature citing the journal article: Provan, K. G., & Kenis, P. (2008). Modes of network governance: Structure, management, and effectiveness. *Journal of public administration research and theory, 18*(2), 229-252. We opted for this scope because we are primarily interested in whether and how network governance introduced by Provan and Kenis (2008) has been used and developed over the past ten years.

Review approach and data management

In Table 1, we have displayed our review approach (cf. Liberati et al., 2009). The review approach consisted of three sequential steps. The first step was data extraction of articles in the Web of Science database. We extracted, mapped, and assessed 803 journal articles written in English that cited the seed article reported in the ISI Web of Knowledge database (Clarivate 2019), covering 12 years (2008-2019). We refined the extraction to the Social Sciences Citation Index (SSCI) of the Web of Science database.

The second step was screening all titles and abstracts of identified articles and assessing which articles were eligible for further processing. We applied three inclusion/exclusion criteria to determine eligibility based on the core constructs of Provan and Kenis's contingency theory displayed in Table 2. Given our scope and interest, we excluded articles that did not consider the network as the unit of analysis (Provan et al., 2007; Raab et al., 2013), were primarily conceptual or descriptive in nature, or mainly contributed by methodological considerations and measurements. Simultaneously, we checked whether articles focused on "network governance" as a topic in the title and abstract using Provan and Kenis's definition of network governance. We downloaded and fully screened journal articles if the title and abstract were found to be insufficient to assess the article's eligibility. The screening and assessment of eligibility resulted in the exclusion of 605 articles. Because of this, we omitted the works of Koliba et al. (2011), Emerson and Nabatchi (2015), Kelman and Hong (2015), Page et al. (2015), Vangen (2017), and Leroux et al. (2019) despite being aware of their relevance in the field of public management. In addition, we did not include articles that studied leadership in networks, i.e., McGuire and Silvia (2009), Silvia and McGuire (2010), and Cepiku and Mastrodascio (2021), and excluded articles focusing on "collaborative governance" as an alternative to government, state, market, or hierarchy (see Vangen et al. 2015 for an apt distinction between collaborative governance and governing collaborations).

Table 2. Formal definition of Provan and Kenis' network-level contingency theory of network governance

Core constructs		Definition
1.	Organizational network	Groups of three or more legally autonomous organizations that work together to achieve not only their own goals but also a collective goal (Provan & Kenis, 2008: 231).
2.	Network effectiveness	The attainment of positive network-level outcomes that could not normally be achieved by individual organizational participants acting independently (Provan & Kenis, 2008: 230).
3.	Network governance	The use of institutions and structures of authority and collaboration to allocate resources and to coordinate and control joint action across the network as a whole (Provan & Kenis, 2008: 231).
4.	Two key factors and three ideal types of network governance modes	The network governance mode is determined by two key factors: brokered/non-brokered governance and participant (or internal)/external governance. Combining these factors leads to three ideal-types of modes. *1) Shared participant mode* is a non-brokered form of network governance characterized by a network without an administrative entity in which all or majority of network members participate in the governance of the network. *2) Lead-organization mode* is a brokered form of network governance characterized by a network member in the role of a lead-organization which acts as an administrative entity in the governance of the network and/or participates as a service provider in the network. *3) Network administrative organization mode* is a brokered form of network governance characterized by a distinct administrative entity that is specifically set up to govern the network.
5.	Four contingency factors	1) *Trust*: the level of trust density that occurs across the network as a whole; that is the distribution of trust and whether it is reciprocated among network members (Provan & Kenis, 2008: 238). 2) *Network size*: the number of network participants: 3) *Goal consensus*: the degree of consensus on broad network-level goals, both regarding goal content and process (Provan & Kenis, 2008: 239). 4) *Need for network-level competencies*: the needs that arise of the nature of the task being performed by network members and the external demands and needs faced by the network (Provan & Kenis, 2008: 240).
6.	Systems fit	Consistency between four contingency factors and a particular mode of governance (both in terms of the number of consistent factors and the extent to which these factors are consistent with characteristics of the governance form) (Provan & Kenis, 2008: 241; see also Drazin & Van de Ven, 1985).
7.	Three network tensions	1) Efficiency versus inclusiveness 2) Internal versus external legitimacy 3) Flexibility versus stability

The remaining 198 eligible articles were downloaded, read, indexed, and classified in the third step. An Excel database was built that adhered to the same standard as Provan et al. (2007). We indexed and summarized each article by ID (author, title, abstract, year of publication, and source), topic (research question, research design, unit of analysis, type of data, country, sector, and key findings), and network governance themes (network description, network governance mode, network contingency factors, network-level tensions, and network evolution). A research assistant of the first author reviewed the Excel database after completion.

In this last step, we performed four checks to determine if articles were eligible for the review. Each article was classified on (1) the presence or absence of the three ideal types of network governance modes and other governance modes. When a network governance mode was not described, only implicitly specified, or not mentioned, an article needed to address (2) one or more of the original contingency factors, (3) network tensions, or (4) network governance evolution to be

included in the review. When in doubt regarding the inclusion of an article, the first author consulted the second and third authors.

Following this review approach, we excluded another 77 articles, classifying 121 articles on seven core constructs of the network-level structural contingency theory of network governance by Provan and Kenis. In the online supplement, we have supplemented the database in which we provide an overview of which articles we have in/excluded in the review. Also, the summary table can be found in the online supplement or by emailing the first author.

Analysis

We prepared, integrated, and coded text accounts from included articles for the analysis and descriptive findings. This allowed us to identify and assess the state of knowledge and remaining gaps in key constructs of Provan and Kenis' theorem. To be able to conduct the analysis, we coded articles on topics (eight variables: year, country, sector, research question, type of study, type of data, type of analysis, and key findings) and network governance themes (seven variables: network description, network governance mode, network contingency factors, fit, network-level tensions, network evolution, and network effectiveness). For the network governance themes, we focused on coding the main emphasis of Provan and Kenis's theorem in each article (Table 2).

Each variable was further analyzed to unpack the substantive content and dimensions. We synthesized (1) network governance modes' properties, (2) what explains their differences, and (3) what—if any—are the consequences of network governance modes. More specifically, we examined how—if at all—network governance modes are related to certain contingency factors, how fit is established, how network tensions are managed, how network governance modes evolve, and whether we can ground the relationship between network governance and network effectiveness based on the included articles.

We studied patterns that repeatedly occurred within and between variables to answer these questions. We aimed to explore why found linkages existed and applied theoretical explanations of Provan and Kenis (2008) to account for the review's findings if applicable. This involved going back and forth between the patterns of association within and between variables and theoretical explanations. In case the theoretical reasoning of Provan and Kenis (2008) did not suffice, we juxtaposed rival explanations derived from the review to establish the closeness of fit.

Results

In this section, we take stock of the contingency theory of network governance. This section is structured in three main parts. In the first part, we identify which network governance modes have been examined in the literature. We show them in Tables 3 and 4. In the second part, we explain the

differences in these network governance modes by focusing on Provan and Kenis's original contingency factors. The results are summarized in Tables 5 and 6. The third part centers on the consequences of network governance modes. Table 7 provides an overview and summarizes these main findings. Based on these parts, we close by presenting what lessons we learned from reviewing the empirical literature on the network governance modes and their evolution, contingency factors, network-level tensions, systems fit, and network effectiveness. Before we elaborate on the key findings of the review, however, we start by briefly presenting the descriptive findings of the study. We compare these findings with the systematic literature of review by Provan et al. (2007).

Descriptive results

Based on the summary table of 121 articles provided in the online supplement, the central characteristics of network governance of organization networks can be summarized as follows.

The number of articles examining the governance of organizational networks has increased over time compared to the latest systematic literature review of network research by Provan et al. (2007). Based on our selection of empirical research from the Web of Science database, 11 articles, on average, were published annually (2009-2019), with a spike of 21 articles in 2017. This is not surprising given the increasing number of citations by Provan and Kenis (2008) since its publication and the recent attention the topic has received with the symposium on purpose-oriented networks published in the journal of PPMG (cf. Nowell & Kenis, 2019).

More than half of the articles included in the review are published in public administration journals (71 articles, 59%), with the top 5 consisting of PMR (n=15), JPART (n=14), IPMJ (n=5), PA (n=5), and PAR (n=4). Despite that the article of Provan and Kenis (2008) was published in JPART, we observe that substantial attention has been devoted to the governance of networks in journals of management and organization sciences (27 articles, 22%), health-related journals (11 articles, 9%) and other journals as well (12 articles, 10%).

Therefore, we believe it is fair to state that the governance of organizational networks has been developed in an established and recognized research agenda over the last ten years. This research agenda is geographically biased (cf. Nohrstedt et al., 2018). Specifically, we found network studies primarily conducted in a single country biased towards the US, Canada, and Europe (98 articles, 81%). In our selection, Europe (54 articles) dominates North America (29 articles). Studies from the continents of Africa, the Caribbean, Central America, and South America are underrepresented in our selection. A promising finding is that 23 studies examined networks in two or more countries, with nine studies having an intra-regional focus and 14 studies even portraying a global scope.

Regarding sector[2], we find, similar to Provan et al. (2007), the sector of human, health, and social activities to be most prominent in the selection of studies (41 articles, 38%), followed by the sector of public administration, defense, and social security (28 articles, 26%), the sector of agriculture, forestry and fishing, eight articles (7%), the sector of professional, scientific and technical activities, and six articles (6%) in the sector of activities of extraterritorial organizations and bodies. Twelve articles (10%) examined networks in multiple sectors.

Comparable to Provan et al. (2007), case study research is the most common type of network study conducted. With 53 studies adhering to a single case study research design (44%) and 52 to a multiple case study research design (43%). Also, we found 16 studies with a survey research design (13%) with the studies of Span et al. (2012), Klijn et al. (2015), Klijn et al. (2016), Markovic (2017), Chapman and Varda (2017), and Mosley and Jarpe (2019) in specific having samples of 150+ observations. The two studies of Klijn and colleagues in 2015 and 2016 are promising since they allow us to compare observations among countries across various continents.

Unlike Provan et al. (2007), the selection of empirical research was unevenly distributed with cross-sectional data in favor of longitudinal studies (90 articles, 74% versus 31 articles, 26%). Most empirical studies conducted some form of qualitative data analysis to examine networks. Fifty-six studies used a qualitative analysis approach such as thematic (i.e., Vermeiren et al., 2021), content (i.e., Moynihan, 2009), narrative inquiry (i.e., Ospina & Saz-Carranza, 2010), framework analysis (i.e., Sheaff et al., 2010), pattern analysis (i.e., Klaster et al., 2017) or -matching (i.e., Cornforth et al. 2015). Moreover, nine studies favored comparative analysis (i.e., Segato & Raab, 2019), four studies employed (network) ethnography (i.e., Waring & Crompton, 2020), and two studies used process tracing (i.e., Quissell & Walt, 2016). We also observe that nine studies employed Qualitative Comparative Analysis (QCA), of which five studies conducted a crisp-set QCA (i.e., Lemaire, 2020) and four studies used a fuzzy-set QCA (i.e., Wang, 2016). In addition, four studies either adhered to a form of research-oriented action research (RO-AR) (i.e., Mitterlechner, 2018) or another form of action research (i.e., Risien, 2019).

Compared to these qualitative data analysis approaches, only 18 studies consorted to quantitative data analysis, including various types of regression analyses (i.e., Kelman et al. 2013), co-variance analyses (i.e., ANOVA, see Chapman & Varda, 2017), structural equation models (i.e., Maccio & Cristofoli, 2017), and Bayesian statistics for regression modeling (i.e., Iborra et al., 2018). Often these analyses are complemented with descriptive, confirmatory factor analysis, and bi-variate or correlation analyses.

[2] Coding based on classifications derived from Eurostat Ramon - Reference and Management of Nomenclatures. International Standard Industrial Classification of All Economic Activities, Revision 4 (2008).

Although network research has been tied to Social Network Analysis (SNA), the selection of empirical research only included 14 studies that either used SNA (i.e., Lemaire & Provan, 2018 or Lubell et al., 2017) or Exponential Random Graph Modeling (ERGM) (i.e., Raeymaeckers, 2013). This result is a bit surprising, given that network structure has received increasing attention in public administration (Hu et al., 2016) and in strategic management and organization studies (Tasselli et al., 2015; Shipilov & Gawer, 2020).

Part 1. Taking stock of network governance modes

In this part, we take stock of the network governance modes examined in the empirical literature citing Provan and Kenis (2008). Table 3 maps all the studies that exhibit one of the three ideal-type modes of network governance. This table shows ten network studies that mentioned a shared-participant mode of governance, 24 studies displaying a lead organization mode of governance, and 39 studies showing the network administrative organization as a mode of network governance. In addition, the review also revealed 22 studies showcasing multiple modes of network governance and 26 studies mentioning other modes of network governance. In Table 4, we display these studies.

The shared participant mode of governance is described in the empirical literature as a dedicated group of network members coined as an executive committee, multi-organizational- or cross-functional working team, or other types of groups. This network governance mode is characterized by autonomy, responsibility, shared decision-making, predefined budgets, closed boundaries based on location, and resource interdependence (Binkhorst & Kingma, 2012; Segato & Raab, 2019; Wang, 2016).

The lead organization mode of governance can be conceived as a leader (i.e., Diaz-Gibson, Zaragoza, Daly, Mayayo, & Romani, 2017), a team (i.e., Agostino, Arnaboldi, & Dal Molin, 2017), a program (i.e., Alvarez, Pilbeam, & Wilding, 2010), an organization (i.e., Stadtler & Probst, 2012), or even as a governmental agency (i.e., Poocharoen & Ting, 2015) that governs the network. Most studies confirm, however, that the lead organization is a network member with specific experience and capacity to lead the network (Stadtler & Probst, 2012). Still, variants are found, such as a co-leadership arrangement (Nolte & Boenigk, 2011) with more than often having membership in multiple domains (i.e., Moretti & Zirpoli, 2016), creating a span of different governance roles (Span et al., 2012).

Typical descriptions of network administrative organizations (NAOs) are a unit with its staff separate from those of the constituent agencies (Kelman, Hong, & Turbitt, 2013), the third party from a public funding agency supported by an elected board of representatives from the network members (Nilsen & Gausdal, 2017), or a single agency designated as an administrative organization (Romzek, LeRoux, Johnston, Kempf, & Piatak, 2014). Moynihan (2009) even categorizes the Incident Command System (ICS) as an NAO. Other examples of NAOs are a 501(c)(3) organization (Jacobson, 2016), a

trust (Ehren & Godfrey, 2017), a project (Lubell, Jasny, & Hastings, 2017), an office (Saz-Carranza, Salvador Iborra, & Albareda, 2016), a global secretariat (Arensman, Wessel, & Hilhorst, 2017), a governmental agency (Wang, Chen, & Berman, 2016), an authority (Milward, Provan, Fish, Isett, & Huang, 2010), or even a bold experiment (Hoflund, 2012).

Table 3. Mapping the governance modes of organizational networks from the empirical literature citing Provan and Kenis

	Internal	External
Non-brokered	**Shared participant mode (N=10):** Binkhorst and Kingma (2012), De Corte et al. (2017), Lindencrona et al. (2009), Nowell (2010), Raeymaeckers (2013), Raeymaeckers (2016), Raeymaeckers and Kenis, (2016), Segato and Raab, (2019), Wang (2016), and Wister et al. (2015)	-
Brokered	**Lead organization mode (N=24):** Agostino et al. (2017), Alvarez et al. (2010), Chen et al. (2010), Davis et al. (2011), Diaz-Gibson et al. (2017), Dooley and Gubbins (2019), Heard-Lauréote (2018), Hermansson (2015), Herranz (2009), Kilelu et al. (2017), Lucidarme et al. (2018), Marques et al. (2011), Moretti and Zirpoli (2016), Nolte and Boenigk (2011), Nowell et al. (2018), Poocharoen and Ting (2015), Provan and Huang (2012), Provan et al. (2009), Span et al. (2012), Stadler and Probst (2012), Van Meerkerk and Edelenbos (2014), Vasavada (2013), Vermeiren et al. (2019), and Ysa et al. (2014)	**Network administrative mode (N=39):** Arensman et al. (2016), Casey et al. (2011), Chandra and van Hillegersberg (2018), Cornforth et al. (2015), Dooley (2013), Ehren and Godfrey (2017), Fedorowicz et al. (2018), Fitzgerald and Harvey (2015), Gibb et al. (2017), Hermans et al. (2019), Hoflund, (2012), Huang (2014), Iborra et al. (2018), Jacobson (2016), Kelman et al. (2013), Lemaire (2020), Lemaire and Provan (2018), Lemaire et al. (2017), Lubell et al. (2017), Lucidarme et al. (2016), McPherson et al. (2017), Milward et al. (2010), Mischen (2015), Moynihan (2009), Müller-Seitz (2012), Nilsen and Gausdal (2017), Ospina and Saz-Carranza (2010), Piatak et al. (2018), Planko et al. (2017), Provan et al. (2011), Risien (2019), Romzek et al. (2014), Saz-Carranza and Ospina (2011), Saz-Carranza et al. (2016), Vangen et al. (2015), Verschoore et al. (2017), Wang (2016), Waring and, Crompton (2020), and Wincent et al. (2013)

Note: Only articles exhibiting one mode of network governance are displayed.

Table 4. Mapping the governance modes of organizational networks from the empirical literature citing Provan and Kenis

	Articles
Multiple original network governance modes (N=22)	Agostini and Wegner (2018), Bayne et al. (2017), Beaument and Dredge (2010), Berthod et al. (2017), Boeke (2018), Christofoli and Markovic (2016), Conrad (2015), Cristofoli et al. (2019), Cunningham et al. (2012), Harting et al. (2019), Hubeau et al. (2019), Hutter (2014), Klaster et al. (2017), Lam (2018), Lee (2018), Maccio and Cristofoli (2017), Mitterlechner (2018), Mosley and Jarpe (2019), Raab et al. (2015), Rudnick et al. (2019), Van der Zee et al. (2017), and Willem and Gemmel (2013)
Other network governance modes (N=26)	Ansell (2015), Ansell et al. (2012), Chapman and Varda (2017), De Pourcq et al. (2018), Kilelu et al. (2013), Kilfoyle and Richardson (2015) Klerkx and Aarts (2013), Klijn et al. (2015), Klijn et al. (2016), Klijn et al. (2019), Ledema et al. (2017), Lee and Dodge (2019), Markovic (2017), Moynihan (2009), Ofek (2015), Paquin (2013), Quissel et al. (2016), Reypens et al. (2019), Schuessler et al. (2013), Sheaff et al. (2010), Sheaff et al. (2014), Trang et al. (2015, Vangen and Huxham (2012), Vangen and Winchester (2014), Wiktoworicz et al. (2010), and Willem and Lucidarme (2014)

Concerning studies examining multiple modes of network governance, we find that almost all studies focus on comparing two or more different modes of governance, displaying various combinations of brokered modes, non-brokered, and hybrid modes of network governance. Exceptions were the studies of Berthod et al. (2017), Mitterlechner (2018), and Raab et al. (2015). While network studies exhibiting other modes of network governance did not use other dimensions to distinguish network governance modes, they did use different labels (i.e., De Pourcq et al., 2018; Schußler, Decker, & Lerch, 2013). For example, Wiktorowicz et al. (2010) 's study comparing modes of governance in ten local mental health networks used a corporate structure, mutual adjustment, or an alliance governance model. Although they resembled the designs of the ideal types of Provan and Kenis (2008), other modes of governance differed in the managerial activities and strategies used to coordinate the efforts of network participants elaborating on how networks work (Klerkx & Aarts, 2013; Paquin & Howard-Grenville, 2013; Klijn et al. 2015; Klijn et al., 2020; Markovic, 2017). Nevertheless, the vocabulary adopted resembled Provan and Kenis ideal types, and we found one study that further developed brokered external network governance to distinguish between two distinct loci of governance. Kilfoyle and Richardson (2015) – analyzing the Universal Postal Union (UPU) governance structures and the use of management accounting and control systems by network-level administrators – identified two governance layers with four organizational bodies in the UPU. Building on the earlier work of Provan (1983), they defined 'the bodies through which members set policy (the UPU Congress and its standing committees) as the "network constitutional organization" (Kilfoyle & Richardson, 2015: 552)', while the NAO is tasked with implementing these policies within the network.

Part 2. Variations in network governance modes

In this part, we assess the contingency factors of network trust, size in terms of the number of network participants, goal consensus, and network-level competencies. We classified 85 of the 121 network studies mentioning one or more contingency factors. Table 5 summarizes the findings of 51 network studies with a single network governance mode, and Table 6 shows the results of 34 network studies displaying multiple modes or other modes of network governance[3].

The literature review yielded several findings across studies exhibiting a single mode of network governance and multiple modes of governance. First, Table 5 shows that in studies demonstrating a single mode of network governance, the explanatory factors of trust, goal consensus, and the need for network-level competencies are less addressed in shared participant modes than in brokered modes of network governance. This is striking to us since this mode of governance is argued to be most effective for achieving network-level outcomes when trust is widely shared, goal consensus is high, and the need for network-level competencies is low among relatively few network participants (Provan & Kenis, 2008).

Second, in the same table, we also find that trust is examined more for the lead organization network governance mode. One explanation for trust being more addressed may be because of the characteristic hub-spoke network topology in which the network member leading the network must be trustworthy (highly centralized trust) as perceived by other organizations participating in the network (low-density). Provan et al. (2009) determined that trust network density (based on perceived trustworthiness) matters in a lead organization governed network. They found that social indicators of trustworthiness, reputation, and influence were positively predicted by how a network is structurally embedded. Findings were most robust for embeddedness based on information centrality and their combined any-links measure for multiplexity (Provan et al. 2009: 889). In addition, the study by Vasavada (2013), examining the Gujarat disaster management network, found trust to be narrowly shared among a central group and a peripheral group of actors, with an overall low density of trust in the network (Vasavada, 2013: 379). Vasavada (2013) ascribed these discrepancies to the resource dependence dynamics in the developing country setting with a pivotal role of the state government in managing the interdependence on international funding agencies. Important for explaining variations in lead organizations is how this network governance reduces extreme power imbalance to allow trust, commitment, and legitimacy to grow (Lucidarme et al., 2018: 366).

[3] Note that the articles of Hutter (2014) and Rudnick et al. (2019) showcase multiple original and other network governance modes but are listed under multiple modes.

Table 5. *Network studies with a single governance mode*

	N	Trust	Size	Goal consensus	Network-level competencies
Single mode					
Shared-participant mode[4]	7	1	5	3	3
Lead organization mode[5]	20	11	4	7	4
Network Administrative mode[6]	24	8	5	7	9
Total single modes	51	20	14	17	16

[4] Lindencrona et al. (2009), Nowell (2010), Raeymaeckers (2016), Raeymaeckers and Kenis (2016), Segato and Raab (2019), Wang (2016), Wister et al. (2014)

[5] Agostino et al. (2017), Alvarez et al. (2010), Chen and Graddy (2010), Davis et al. (2011), Diaz-Gibson et al. (2017), Heard-Laureote (2018), Hermansson (2016), Herranz (2009), Lucidarme (2018), Moretti and Zirpoli (2016), Nolte and Boenigk (2011), Poocharoen and Ting (2015), Provan and Huang (2012), Provan et al. (2009), Span et al. (2012), Stadtler (2012), Van Meerkerk and Edelenbos (2014), Vasavada (2013), Vermeiren et al. (2019), Ysa et al. (2014)

[6] Cornforth et al. (2015), Ehren and Godfrey (2017), Fedorowicz et al. (2018), Fitzgerald and Harvey (2015), Gibb et al. (2017), Hermans et al. (2019), Hoflund (2012), Iborra et al. (2018), Kelman et al. (2013), Lemaire (2020), Lemaire and Provan (2018), Lubell et al. (2017), Lucidarme et al. (2016), McPherson et al. (2017), Milward et al. (2010), Mischen (2015), Moynihan (2009), Müller-Seitz (2012), Piatak et al. (2018), Planko et al. (2017), Provan et al. (2011), Romzek et al. (2014), Verschoore et al. (2017), Wang et al. (2016)

Table 6. *Network studies with multiple modes or other modes of network governance*

	N	Trust	Size	Goal consensus	Network-level competencies
Multiple or other modes*					
Multiple modes[7]	17	5	8	5	-
Other modes[8]	12	6	8	3	4
Not mentioned[9]	5	1	2	2	-
Total multiple or other modes	34	12	18	10	4

Note: * The articles of Hutter (2014) and Rudnick et al. (2019) showcase multiple original and other modes. They are listed under multiple modes

[7]Agostini and Wegner (2018), Bayne et al. (2017), Beaumont and Dredge (2010), Boeke (2018), Cristofoli and Markovic (2016), Cristofoli et al. (2019), Cunningham et al. (2012), Harting et al. (2019), Hutter (2014), Klaster et al. (2017), Lam and Li (2018), Maccio and Cristofoli (2017), Mosley and Jarpe (2019), Raab et al. (2015), Rudnick et al. (2019), van der Zee et al. (2017), Willem and Gemmel (2013)

[8] Kilelu et al. (2013), Kilfoyle and Richardson (2015), Klerkx and Aarts (2013), Klijn et al. (2019), Markovic (2017), Ofek (2015), Schüßler et al. (2013), Sheaff et al. (2010), Trang et al. (2015), Vangen and Winchester (2014), Wiktorowicz et al. (2010), Willem and Lucidarme (2014)

[9] Chapman and Varda (2017), Klijn et al. (2016), Klijn et al. (2015), Lee and Dodge (2019), Vangen and Huxham (2012)

Third, we find that the need for network-level competencies is examined more in the network administrative organization than in other network governance modes (see Table 5). This may be explained because this governance mode is proposed to be best suited for task interdependence and uncertainty and external, complex demands imposed upon the network (Provand & Kenis, 2008).

The need for network-level competencies encompasses various capabilities in the empirical literature. Several examples are that NAO-governed networks should invest in the softer skills of collaboration and the foundation of trust and the more technical skills necessary for knowledge management (Mischen, 2015). In addition, it is also required to build an NAO's social base during its formative years (Hoflund, 2012; cf. Milward et al., 2009) and mitigate learning episodes to understand network learning processes (Gibb et al., 2017). Moreover, Wang et al. (2016: 282) suggest that implementation capacity is critical in network settings. The strategies adopted by an NAO are crucial to improving this capacity (cf. Kilfoyle & Richardson, 2015).

In some cases, the need for network-level competencies is also tied with the purpose orientation of the network (cf. Nowell & Kenis, 2019). For instance, Piatak et al. (2018: 20) suggested that the formal, vertical authority of NAOs is limited in mitigating goal conflict without the informal, horizontal interactions with network members that are critical to building goal consensus. While they emphasized the importance of building a network culture in which the purpose permeates organizational levels and member organizations, Lemaire (2020: 189) instead suggested that the architecture of relationships, such as bridging and linking ties, is vital to ensure goal congruence in a network (cf. Nowell, 2010). Not acknowledging the need for network-level competencies or being unaware of the micro-dynamics of mobilization and coalition-building undertaken by individuals in the network can explain why networks fail (Moretti & Zirpoli, 2016: 627).

Fourth, concerning studies with multiple modes of network governance, we find in Table 6 no study addressing the need for network-level competencies. An explanation for this might be the methodological issues of examining multiple networks over a period of years (Provan et al., 2007), especially if the interest is in the social practices of network-level competencies (Berthod et al., 2017). In contrast, the structural feature of the size of the network is more frequently used as an explanatory factor than network trust and goal consensus, which involve processes and mechanisms that explain network functioning. Nevertheless, the literature seems at a "practice-turn" (cf. Berthod et al., 2017) in which structural features of size and trust are combined with practices of goal consensus and network competencies to elaborate on how to deal with governance choices in networks (Willem & Gemmel, 2013), how to balance relationships (Klaster et al. 2017), or how to support the endurance of networks by focusing on the pivotal role of the network manager (Maccio & Cristofoli, 2017).

Finally, we also find several studies that displayed other modes of governance but used Provan and Kenis's original contingency factors as explanatory factors. Note that for these modes, we did find studies addressing network-level competencies.

Part 3. Consequences of network governance modes

In the final part, we explain the consequences of network governance modes and present findings on the theoretical mechanism of fit, network-level tensions, and network governance mode evolution. In Table 7, we have categorized the findings of the review according to these themes, and Figure 1 classifies a total of 27 articles that address network effectiveness by various categories of network governance modes (single, multi, and other) and three levels of outcomes (organization, network, and community).

Table 7 demonstrates that network effectiveness is primarily addressed in brokered governed networks such as the lead organization and the network administrative organization in studies exhibiting a single mode of network governance. Only three times is network effectiveness reported regarding a shared-participant mode of governance. We find a total of 12 studies mentioning network effectiveness in studies reporting multiple or other modes of network governance.

In Table 8, we classified network governance modes and levels of network effectiveness. We discern three levels of effectiveness: organizational effectiveness, network effectiveness, and community effectiveness (Provan & Milward, 2001). We have categorized studies that report single, multiple, and other network governance modes for each of these levels. In addition, we have included two studies that do not mention network governance modes (Klijn et al., 2015; Klijn et al., 2016).

Based on this classification, we find that most network studies focus on network effectiveness, and several included other levels of effectiveness (i.e., Lindencrona et al., 2009; Nowell, 2010; Provan et al., 2009; Chen & Graddy, 2010; Cunningham et al., 2012; Raab et al., 2015; Wang, 2016). In studies focusing on network effectiveness, brokered network governance modes are more prevalent than non-brokered network governance modes. A promising finding is the network studies of Willem and Gemmel (2013), Cristofoli and Markovic (2016), Klaster et al. (2017), and Cristofoli et al. (2019), examining network effectiveness and showcasing all three ideal types of network governance modes. Furthermore, we found network studies examining network effectiveness with other modes of network governance. Finally, various gaps in levels of effectiveness and modes of network governance were found.

The review revealed several studies that associate (aspects of) network governance with network effectiveness (i.e., Arensman et al., 2017; Cunningham et al., 2012; Erik Hans Klijn et al., 2016; Erik-Hans Klijn et al., 2015; Lindencrona et al., 2009; Lubell et al., 2017; Markovic, 2017; Sheaff et al., 2014; Vasavada, 2013; Willem & Lucidarme, 2014; Ysa, Sierra, & Esteve, 2014). In addition, we also observe some studies in which network governance is a condition that, in combination with other conditions, explains whether a network is (perceived as) effective or not (i.e., Willem & Gemmel, 2013; Raab et al., 2015; Lucidarme et al. 2016; Cristofoli & Markovic, 2016).

These findings suggest preliminary evidence that network governance is an important explanatory factor of network effectiveness either in isolation or in combination with other conditions. With some exceptions in the literature, the review made clear that network governance modes are not commonly used as explanatory factors of network effectiveness, nor are they regularly being examined as a phenomenon of interest or as a dependent variable.

Table 7. Classification of the network governance contingency theory: modes, fit, tensions, evolution, and effectiveness

	Fit[10]	Network tensions[11]				Evolution[12]	Effectiveness[13]
		EI	IEL	FS	Multiple/ Other		
Single mode							
Shared-participant mode (SP)	2	-	1	-	-	-	3
Lead organization mode (LO)	1	1	1	1	-	8	7
Network Administrative mode (NAO)	1	2	-	-	3	6	5
Multiple or other modes							
Multiple modes	-	-	-	1	3	4	8
Other modes	1	-	-	1	1	2	2
Not mentioned	-	-	-	-	1	-	2
Total single modes	4	3	2	1	3	14	15
Total multiple or other modes	1	0	0	2	5	6	12

[10] **Single modes:** SP: Wister et al. (2014) and Lindencrona et al. (2009); LO: Agostino et al. (2017); NAO: Lubell et al. (2017).

[10] **Multiple or other modes***:* Ofek (2015).

[11] **Single modes:** SP-IEL: Raeymaeckers (2016); LO-EI: Vermeiren et al. (2019), LO-IEL: Hermansson (2016), LO-FS: Herranz (2009); NAO-EI: Fitzgerald and Harvey (2015), and Moynihan (2009). *Multiple or other tensions:* NAO: McPherson et al. (2017), NAO: Romzek et al. (2014), NAO-IE: Ehren and Godfrey (2017).

[11] **Multiple, other, or no mention of modes:** Multi-FS: Cristofoli et al. (2019); Other-FS: Willem and Lucidarme (2014); *Multiple or other tensions:* Multi: Raab et al. (2015); Bayne et al. (2017); Klaster et al. (2017); Other: Vangen and Winchester (2014); Not mentioned: Vangen and Huxham (2012).

[12] **Single modes:** LO: Agostino et al. (2017), Alvarez et al. (2010), Heard-Laureote (2018), Herranz (2009), Moretti and Zirpoli (2016), Provan and Huang (2012), Provan et al. (2009), and Span et al. (2012); NAO: Cornforth et al. (2015), Ehren and Godfrey (2014), McPherson et al. (2017), Milward et al. (2010), Moynihan (2009), and Provan et al. (2011).

[12] **Multiple or other modes:** Multi: van der Zee et al. (2017), Bayne et al. (2017), Klaster et al. (2017), and Agostini and Wegner (2018). Other: Klerkx and Aarts (2013) and Sheaff et al. (2010).

[13] **Single modes:** SP: Lindencrona et al. (2009), Nowell (2010), and Wang (2016); LO: Chen and Graddy (2010), Moretti and Zirpoli (2016), Nolte and Boenigk (2011), Provan et al. (2009), van Meerkerk and Edelenbos (2014), Vasavada (2013), and Ysa et al. (2014); NAO: Fitzgerald and Harvey (2017), Lubell et al. (2017), Lucidarme et al. (2016), Milward et al. (2010), and Mischen (2015).

[13] **Multiple, other, or no mention of modes:** Multi: Cunningham et al. (2012), Raab et al. (2015), Bayne et al. (2017), Harting et al. (2019), Cristofoli and Markovic (2016), Cristofoli et al. (2019), Klaster et al. (2017), and Willem and Gemmel (2013). Other: Markovic (2017) and Willem and Lucidarme (2014). Not mentioned: Klijn et al. (2015) and Klijn et al. (2016).

Table 8. Classification of network governance modes and network effectiveness

		Single			Multi				Other	
		Shared-participant mode[14]	Lead organization mode[15]	Network administrative organization mode[16]	Shared and lead organization[17]	Shared and NAO[18]	Lead organization and NAO[19]	Shared, lead organization and NAO[20]	Other governance modes[21]	No governance modes mentioned[22]
Levels of Effectiveness	Organizational effectiveness	-	Provan et al. (2009)[a] and Chen and Graddy (2010)[b] [N=2]	-	-	-	-	-	-	-
	Network effectiveness	Lindencrona et al. (2009)[a] and Nowell (2010)[b] [N=2]	Nolte and Boenigk (2011)[c], Vasavada (2013)[d], van Meerkerk and Edelenbos (2014)[e], Ysa et al. (2014)[f], and Moretti and Zirpoli (2016)[g] [N=5]	Milward et al. (2010)[a], Fitzgerald and Harvey (2015)[b], Mischen (2015)[c], Lucidarme et al. (2016)[d], and Lubell et al. (2017)[e] [N=5]	Bayne et al. (2017)[a] and Harting et al. (2019)[b] [N=2]	-	Cunningham et al. (2012)[a] and Raab et al. (2015)[b] [N=2]	Willem and Gemmel (2013)[a], Cristofoli and Markovic (2016)[b], Klaster et al. (2017)[c], and Cristofoli et al. (2019)[d] [N=4]	Willem and Gemmel (2014)[a] and Markovic (2017)[b] [N=2]	Klijn et al. (2015)[a] and Klijn et al. (2016)[b] [N=2]
	Community effectiveness	Lindencrona et al. (2009)[a] and Nowell (2010)[b], and Wang (2016)[c] [N=3]	Chen and Graddy (2010)[b] [N=1]	-	-	-	Cunningham et al. (2012)[a] and Raab et al. (2015)[b] [N=2]	-	-	-

[14] A: Network performance and client outcomes in refugee resettlement support, B: Collaborative's effectiveness to improve their communities' responses to domestic violence, and C: Neighborhood governance

[15] A: Organizational trustworthiness, reputation, and influence, B: Client outcomes and inter-organizational relationships, C: Performance of disaster response operations, D: Disaster management effectiveness, E: Network performance and trust in context of spatial planning, F: Urban revitalization, and G: network failure

[16] A: Performance of mental health care system, B: Translational activity to impact modes of operation, C: Network performance in the context of school readiness, D: Network effectiveness of health care promotion, and E: Network effectiveness of invasive species management

[17] A: Network effectiveness and network efficiency, and B: Implementation of intervention strategies of integrated public health policy

[18] n/a

[19] A: Network effectiveness (in terms of developing models of care) and community effectiveness in changing and improving practice, and B: network and community effectiveness of crime prevention

[20] A: Network effectiveness of health care service delivery, B: Idem, C: Public policy implementation, and D: Network effectiveness of health care service delivery

[21] A: Network effectiveness of public (welfare) service delivery, and B: Network effectiveness of health care service delivery

[22] A: Network performance and trust in context of spatial planning, and B: Idem

Table 9. Overview of the main findings

Key constructs of the contingency theory of network governance		Main findings
Features of 121 empirical articles on network governance in the Web of Science database	Years	The span of years: 2009-2019.
	Source	The main source of articles is in public administration journals (N=71), followed by journals in management and organization sciences (N=27), health-related journals (N=11), other journals (N=12).
	Country	The research agenda is geographically biased towards the US, Canada, and Europe. Network studies from the continents of Africa, the Caribbean, Central America, and South America are warranted. Promising is that 46 network studies portray a multi-country scope with either an intra-regional or global focus.
	Sector	The sector of human, health, and social activities is most prominent in the selection of studies (N=41), followed by the sector of public administration, defense, and social security (N=28), the sector of agriculture, forestry, and fishing, eight articles, the sector of professional, scientific and technical activities, and six articles in the sector of activities of extraterritorial organizations and bodies. Twelve articles (10%) examined networks in multiple sectors.
	Type of study	Generally, network studies either adhere to single- or multiple-case research designs.
	Type of data	Network studies are mostly cross-sectional in nature (N=90). 31 articles report longitudinal data.
	Type of analysis	Qualitative data analysis was preferred over quantitative data analysis in network studies.
Features of network governance themes	Network governance modes	The three original network governance modes are adopted as a vocabulary in the empirical literature, citing Provan and Kenis (2008). On some occasions, other governance modes are mentioned. The literature lacks a discussion on network governance dimensions and practices, nor are network governance modes often chosen as a phenomenon of interest or dependent variable.
	Contingency factors	The four original contingency factors are addressed for both the three ideal type modes and other modes of network governance. In network studies exhibiting a single network governance mode, contingency factors are less addressed in non-brokered governed networks. Trust, goal consensus, and network-level competencies are more often mentioned in brokered governed networks. Network-level competencies are not mentioned in studies with multiple modes of network governance.
	Fit	Few network studies examine fit/misfit between network governance modes and contingency factors
	Network tensions	The network tensions of efficiency-inclusiveness, internal-external legitimacy, and flexibility-stability are present in the empirical literature. However, gaps exist in the efficiency-inclusiveness tension in the shared-participant mode and internal-external legitimacy and flexibility-stability in the network administrative organization. In network studies that exhibit multiple modes of network governance, the tensions of efficiency-inclusiveness and internal-external legitimacy are not found.
	Network governance mode development	The empirical literature citing Provan and Kenis (2008) addresses network evolution. However, most of these articles do not focus on network governance mode development, with a few exceptions.
	Network effectiveness	The empirical literature citing Provan and Kenis (2008) provides preliminary evidence that network governance is an important explanatory factor of network effectiveness either in isolation or in combination with other conditions. But further theoretical development and testing are warranted to inform the practice of network governance, particularly when, how, and why to use institutions and structures of authority and collaboration to allocate resources and coordinate and control joint action within and between organizational networks.

Fitness

In their study, Provan and Kenis (2008) adhere to systems-fit (Drazin & Van de Ven, 1985) to determine the internal consistency of multiple contingencies (i.e., trust density, number of network participants, goal consensus, and the need for network-level competencies) with the structural characteristics of network governance modes (non-brokered/brokered governance and participant/external governance). However, in the empirical research, we only find five studies in Table 7 that address, to various degrees, the concept of fit.

Although we found five other studies that included all the four original contingency factors of Provan and Kenis (Wiktoworicz et al., 2010; Schüßler et al., 2013; Vasavada, 2013; Wister et al., 2014; Planko et al., 2017), only the study of Lubell et al. (2017) addressed the theoretical mechanism of fit. Lubell et al. (2017) proposed the idea of "institutional fit," connecting Provan and Kenis's (2008) contingency framework with specific social-ecological conditions. In addition, they operationalized fit by using a "fitness" measure that represents the correlation between the empirical network and the best possible fitting "ideal" core-periphery model (Borgatti & Everett 2000). In their study, network effectiveness is supported by four critical contingencies in the Spartina case, providing substantive proof that under the right conditions, a local collaborative partnership coexists with a centralized governance network (Lubell et al. 2017: 705).

Regarding evaluating fitness, Ofek (2015) proposes differentiating between the governing system and the system to be governed, as well as separating the analysis of structural and dynamic aspects of complexity. By doing so, the link between what to evaluate and how to evaluate can be clarified since the former refers to the involvement of network management. At the same time, the latter impacts the approach of network evaluation.

The point that Ofek (2015) raises carries implications for determining the quality or state of being fit as it implies it is both a function of consistency between critical contingency factors and a particular mode of governance and coverage in terms of what is being evaluated, how and by whom. For instance, Lindencrona et al. (2009) validate that network governance is critical for network performance and frames it as a strategic decision based on what effects are sought given various situational conditions. They suggest a critical role for network steering groups that facilitate active management participation in administering and steering the network activities. This indicates that network performance requires continuous mutual adjustment among organizations participating in the network. This raises the issue of who is evaluating the network to be appropriately put in an appropriate state and adapted to the environment to be capable of surviving. What is acceptable from one viewpoint may be opposite from another. Wister et al. (2014) emphasize the robustness and sustainability in leadership as fundamental for a shared-participant network governance mode because it provides the network the capability to perform without failure under a wide range of

conditions, even when leadership changes. Although the study of Agostino et al. (2017) concerns a lead organization network governance mode, they also point to the importance of strategic decision-making and subscribe to the studies of Lindencrona et al. (2009) and Wister et al. (2014) that a lack of human and financial resources dedicated to network activity, and instability of network managers undermine how a network can conform and adjust correctly.

Network-level tensions

Provan and Kenis's (2008) basic proposition was that 'network managers that operate within a network governance mode must recognize and respond to three basic network-level tensions, or contradictory logics (paradoxes), that are inherent in network governance (Provan & Kenis, 2008: 247).'

As shown in Table 7, the network tensions of efficiency-inclusiveness, internal-external legitimacy, and flexibility-stability are recognized only by several network studies exhibiting a single mode of network governance. Furthermore, in network studies showing an NAO, we also found multiple original and other network tensions. Note the gaps found for the shared-participant mode, the efficiency-inclusiveness tension, the network administrative mode, and the internal-external legitimacy and flexibility-stability tension. The flexibility-stability tension was mentioned in studies with multiple modes and other modes of network governance. Still, the selected empirical literature does not mention the other two original tensions. In this category, multiple original and other network tensions were also reported.

Based on these network studies, the original tensions proposed by Provan and Kenis are found to be relevant. Fitzgerald and Harvey (2015) recognized the tension between the inclusivity of multiple stakeholders and effective decision-making processes, while Cornforth et al. (2015) confirmed that an extensive and relatively inclusive network raised concerns about its efficiency and effectiveness in making decisions. Moynihan (2009) raises concerns about the short-term coordination costs of adding new network members and finds that the bias against inclusiveness may increase under (a) conditions of mission urgency and (b) when the emergent component is relatively large. Ansell et al. (2012) point out the negative consequences of having a solid lead organization. Although a lead organization can reduce the demands on network members, it can also lead to less commitment and reinforce informal coordination. Vermeiren et al. (2021: 16) argue that a balance between inclusiveness and efficiency in the decision-making process can be established by a leading agency and coordinator acting as a steward and mediator in the network, a core steering committee with decision-making authority, and working groups.

The study of Raeymaeckers (2016) and van der Zee et al. (2017) confirm the relevance of recognizing and responding to the tension between internal and external legitimacy. It highlights that network performance can be improved only by focusing on both. Hermansson (2016) study found that

the lead organization appeared to be able to provide the internal legitimacy needed to encourage integration and collaboration. Hermansson (2016) suggests that this finding depends on the political-administrative culture in which legitimacy is examined, as notions of why actors perceive interaction as meaningful can be culturally biased to some extent (Hermansson, 2016: 346). Moreover, Moynihan (2012) points to the innate characteristics of networks as an explanation of why 'network members will generally care about their extra-network reputation since they depend upon resources from political actors, and so may be willing to engage in blame avoidance strategies that undermine their intra-network reputation (Moynihan, 2012: 585).'

Finally, Ansell et al. (2012) confirm the network tension between the flexibility to changing conditions and stability to provide a framework for long-term interaction and commitment. Cristofoli et al. (2019) guarantee stability conducive to network effectiveness (cf. Provan and Milward 1995; Milward et al. 2010). Network managers' capacities to stabilize and consolidate the relationships among network partners seem to be ongoing activities for the network manager. Stabilizing appears to be critical both in the early stage and in adult networks, in the presence and the absence of trust, in connected and dispersed networks (Cristofoli et al., 2019: 1794).' Contrarily, Willem and Lucidarme (2014) suggest that flexibility is beneficial for network performance, despite that flexibility might also reduce stability, create uncertainty, and increase differences between partners, which can minimize trust among partners (cf. Powell, Koput, & Smith-Doerr, 1996). Taken together, these studies provide insights into the trade-offs between flexibility and stability of the network and suggest that a particular choice in adopting a governance mode can have an impact (Herranz, 2009).

Other network tensions

In addition, to the original three network tensions of Provan and Kenis (2008), we also found other types of tensions in the reviewed network studies. The tension of unity-diversity is introduced by Ospina and Saz-Carranza (2010) and Saz-Carranza and Ospina (2011) and later also addressed by Arensman et al. (2017). This tension 'holds that network participants can both be in a state of being in accord while at the same time having diversity in their properties and processes (Saz-Carranza & Ospina, 2011: 328).' The diversity here resembles the interrelated tensions that pertain to the management of cultural diversity examined in the study of Vangen and Winchester (2014).

Other tensions are found in the study of Berthod et al. (2017) and Bayne et al. (2017). Berthod et al. (2017) describe the network tension of accountability-autonomy. The fundamental issue here is to establish appropriate monitoring and control without imposing strong constraints on network members that might limit collaboration or minimize their independence, obstructing involvement. Bayne et al. (2017) mention the effectiveness-efficiency tension in their study of how strategic network processes influence their performance at the network level. In essence, this tension encapsulates the

competing demands of producing desired outcomes in a way that wastes the least time, effort, and resources.

Several studies also make mention of the various trade-offs between competing demands or logic, often explained in (implicit) terms of paradox. For example, the study by Vangen and Huxham (2012) elaborates that central to the principle, and the enactment of collaborative advantage is to deal with a so-called *goal-paradox*. Vangen and Huxham (2012) examine the underlying nature of goal congruence and diversity in collaborations and how the characteristics of goals in collaborations influence organizations' ability to agree on the joint goals for the collaboration.

Many network studies addressing network tensions in one way or another point to balancing these tensions through various properties and processes (i.e., Klaster et al., 2017) or even cultivating them by managing network behavior (i.e., Saz-Carranza & Ospina, 2011).

Evolution of network governance modes

Finally, we take stock of the empirical literature citing Provan and Kenis (2008) on how network governance modes evolve. Provan and Kenis (2008: 247) assumed that if networks survive over time, it is likely that network governance modes will develop according to predictable patterns. More specifically, they proposed that a likely development path is a non-brokered governed network evolving into a brokered governed network. The opposite – an NAO or lead-organization mode developing into a shared participant – was proposed to be more unlikely (Provan & Kenis, 2008).

In table 7, we show 14 network studies with a single mode of governance that address network governance mode evolution and six studies with multiple or other modes of governance. Note that no network studies are found for the shared-participant mode that mentions network governance mode evolution.

Most of these studies provide additional insights into network governance evolution. Taken together, it is important to recognize patterns of complexity (both in terms of size and diversity), formalization and centralization in the trajectory of a network governance mode developmental path (Provan et al. 2009; Alvarez et al. 2010; Provan & Huang, 2012). This is espoused by Moretti and Zirpoli (2016) and Agostino et al. (2017). They suggest that network failure is based on the interplay of the network's static dimensions (opportunism and ignorance) and dynamic dimensions (framing and mobilizing) and the role of institutions.

According to Paquin and Howard-Grenville (2013), orchestrators play an important role in the network since they build the capacity to assemble a network over time through accumulating resources and specialized expertise. As the network develops, an orchestrator faces an evolving set of dilemmas arising from the need to demonstrate value for various members and audiences. To resolve such dilemmas, orchestrators may shift their actions, moving from initially encouraging serendipitous encounters between network members ("blind dates") to increasingly selecting members and more

closely influencing their interactions ("arranging marriages") (Paquin & Howard-Grenville, 2013). Missing so-called "collaborative windows" in which network members change priorities and alter their commitment can lead to network decline or demise (Cornforth et al., 2015). This also holds for the affordances and constraints of technology, as illustrated by Jacobson (2016). This study shows that the nature of technology does matter for governance and the interaction of the two matters for both organizational and inter-organizational success.

After reviewing these studies, we find that the developmental path from a non-brokered to a brokered mode of governance was confirmed in two studies. The case study of Mitterlechner (2018) shows how the mode of governance evolved from (1) non-governance (period 1) to a (2) hybrid arrangement characterized by non-brokered governance (period 2), to finally a hybrid arrangement characterized by both a non-brokered and brokered mode of lead organization governance (period 3). This study shows how the network addressed recurrent problems of network governance and joint network action in creative and experimental ways, pointing out the temporal nature of network governance (Mitterlechner, 2018).

In another case study, Provan et al. (2011) found that the network could form and become an entity by first developing a shared identity around a common problem because there was a recognized solution in the community. This allowed the network to coalesce and form an NAO that was able to build cooperation and information sharing across many organizations (Provan et al., 2011).

Where do we stand and where to go from here?

In this study, we took stock of the empirical literature on the governance of organizational networks, citing Provan and Kenis (2008). In table 9, we have summarized the main findings of the systematic literature review. The aim of this section is to stimulate a research agenda by addressing several gaps in the empirical literature that merits further attention to develop a contingency theory of network governance. These gaps comprise, first, a focus on network governance modes dimensions and practices, secondly, advancing a better grasp of systems fit and misfit based on the consistency and coverage of original and other contingency factors, thirdly, network level tension management, fourthly, network governance mode evolution, and finally, network governance as an explanatory factor of network effectiveness.

We broadly conclude that the network governance modes have been adopted in the empirical literature, and their underlying premises are substantiated by various network studies, at least implicitly. The empirical literature, however, lacks explanations for differences in governance modes and provides even fewer explanations for network governance modes outcomes.

The premise of non-brokered internal network governance seems to hold in general in the empirical literature. However, we found other means to support and coordinate network activities in shared-participant modes of governance. For instance, arrangements such as co-leadership roles

(Wister et al., 2014), the appointment of a manager or installment of a management system (Willem & Gemmel, 2013), or multi-tiered arrangements of a multi-organizational team and a network steering group that allow for multiplex coordination. Such means allow networks to functionally differentiate their members among governance bodies or roles.

Consistent with Provan and Kenis (2008), the lead organization mode is adopted in the empirical literature. But we also found traits that differ from Provan and Kenis's (2008) original conception. For instance, the lead organization can be temporary (Van Meerkerk & Edelenbos, 2014) with provisional authority (Hermansson, 2016). Moreover, lead organization modes can be mandated through a contract (Chen & Graddy, 2010; Provan et al., 2009) or by governmental assignment (Vermeiren et al., 2021). In addition, we found that the lead organization mode of network governance can change over time (Alvarez et al., 2010; Moretti & Zirpoli, 2016; Provan & Huang, 2012) and, as such, can carry history (Vasavada, 2013; Moretti & Zirpoli, 2016).

Regarding the NAO, we observed that many NAOs are multi-tiered, having multiple levels or bodies arranged in various ways. A neat example of this can be found in studies by Vangen et al. (2015) and Cornforth, Hayes, and Vangen (2015). NAOs. Iborra et al. (2018) even opted to differentiate NAOs based on a board structure, suggesting that these different governance bodies have distinguishing characteristics (cf. Planko et al., 2017). These studies confirm the criticality of being neutral. For instance, Fedorowicz et al. (2018) study depicted an NAO as an independent governing body allowing public safety networks to attain public safety goals and improve data sharing and communication. In addition, Gibb et al. (2017) described the NAO as a neutral body created to govern the interest of its members and provide strategic and innovative guidance as well as a skill set to its network members. Being neutral does not mean NAOs lack control, authority, or influence over others. Rather, NAOs can be known for their power dependencies impacting their design and governance (Saz-Carranza et al., 2016).

In conclusion, network governance modes are not alike, which can affect network effectiveness (cf. Provan & Milward, 1995). Moreover, findings on network governance modes suggest that they differ not only in kind based on brokered/non-brokered and internal/external governance dimensions but also in degree within each kind. This necessitates we classify under what conditions and for what specific uses a network governance mode is employed to achieve integration of a group of organizations working together to accomplish a collective set of tasks. Specifically, we propose that network governance dimensions need a systematic inquiry on network governance dimensions to elucidate the ways in which organizational networks can be governed. Related to this, we argue that a focus on network practices of how networks govern themselves seems to be another promising avenue.

Another conclusion we draw is that despite the many citations Provan and Kenis received in the last ten years, we still lack existing evidence on what explains the differences and outcomes of

network governance modes. For instance, the review indicated that the shared-participant mode in general and the original contingency factors in specific are less examined than in brokered modes of network governance. But the substance of the evidence after synthesizing these studies left us with many open answers. With respect to the shared participant mode, organizational networks consisting of a relatively small number of organizations working together as a network but with no distinct governance entity may be less preferred as a form of organizing, despite being depicted as the simplest form of a network (cf. Kenis & Provan, 2009). In practice having governance resides entirely with the network members themselves is thereof more difficult than organizing it around a focal network member or a distinct, formal administrative entity (cf. Lindencrona et al., 2009; Raeymaeckers, 2016; Raeymaeckers & Kenis, 2016).

What surprised us was that only a few network studies focused explicitly on the how what, and when of network governance modes under conditions of interdependence and uncertainty, making corroboration on what explains the differences and outcomes of network governance modes challenging. For instance, many studies addressed network trust in studies exhibiting the lead organization mode. However, we still cannot confirm if this mode is most effective for achieving network-level outcomes when trust is narrowly shared among network participants, goal consensus is moderately low, and the need for network-level competencies is moderate among a relatively moderate number of network participants (Provan & Kenis, 2008). We call for more network studies that compare multiple network governance modes and, i.e., their different needs for network-level competencies since a distinction in which contingency factor explains what is being coordinated and with which mode under certain circumstances is critical for our understanding of whether networks work.

Another issue worth investigating further is examining fit and network effectiveness. Consistent with earlier critiques of contingency theory in management and organization sciences (cf. Schoonhoven, 1981; Donaldson, 2001), we propose that Provan and Kenis (2008) may suffer from a lack of clarity in assumptions regarding the systems approach towards establishing fit. With system-fit as its primary theoretical mechanism (Drazin & van de Ven, 1985), a contingency theory posits, on the one hand, that there is no one best way to organize, and on the other hand, that any form of organizing is not equally effective under all conditions (Galbraith, 1974; Donaldson, 2001). Systems-fit emphasizes the need to adopt a type of analysis that allows examining patterns of consistency (both in terms of the number of consistent contingency factors and the extent to which these factors are consistent with network governance modes properties) as well as determining coverage (in terms of size between the network governance mode and the set of contingency factors, and network effectiveness as the outcome) among network configurations, practices, and outcomes under particular circumstances (Miller, 1981; Drazin & Van de Ven, 1985; Raab et al., 2013; Willem & Gemmel, 2013; Raab et al., 2015).

Despite Provan and Kenis (2008) being explicit in their assumptions and boundary conditions under which conditions modes of network governance are adopted and proposed to be effective, they draw primarily on broad network conceptualizations, which the literature hesitates to adopt. Examples are the concept of network trust density or the aspects of the content and process of network goal consensus (Provan & Kenis, 2008). In a similar vein, network-level competencies and even the network size suffer from ambiguity on how to operationalize these contingency factors. Consequently, the overall explanation of why network governance modes are adopted is accepted in the literature. However, the underlying substance regarding how networks govern themselves under which circumstances remains open for discussion. This perhaps explains why none of the eight propositions of Provan and Kenis are yet verified. Instead, network studies focus more on network governance practices and mechanisms to explain what happens inside an organizational network.

Other often-heard critiques of contingency theory are the simplification of the underlying core elements, viewing fit between these elements as static rather than a dynamic equilibrium, or suggesting singular association and linear relationships (van de Ven et al., 2013). These critiques may also hold to Provan and Kenis' theorem in some regard. We found ample evidence on managing network tensions across governance modes and even fewer network studies examining network governance mode development paths. Hence, there is a clear need to study organizational networks not only during a more extended period at different levels of analysis but also incorporate the idea that states of fit and misfit are temporary in nature and alternate when the context, structure, or performance of the network changes (cf. Berthod et al., 2017).

The few studies that investigated network governance mode development show that we might need to revisit network developmental paths. This is timely since recently, Nowell et al. (2019) proposed that networks are in some manner interdependent on each other as part of a broader (network) ecology in organizational fields. This carries consequences for network governance explanations as environmental conditions, and population dynamics are placed center of how networks are shaped and constrained (Nowell et al., 2019). The literature on the governance of organizational networks has not surprisingly been focusing mostly on "intra-" network mechanisms and dynamics, rather than mechanisms and dynamics between networks or at the level of communities and organizational fields. Such explanations, however, require other theoretical traditions than contingency theory (cf. Raab et al., 2015).

Finally, we need more systematic research to substantiate network governance as an explanatory factor of network effectiveness. A relative lack of work on network governance mode outcomes may be ascribed to studying organizational networks as the unit of analysis. Not disentangling the governance mode as an essential variable in the network governance mode-network interface prevents advancing our knowledge of network governance modes' performance as a subpart of overall network effectiveness. Studying organizational networks requires multi-level focus on

effectiveness, examining the mode of governance both as a network property and outcome, like studying interactions among various organizations participating in the network (cf. Tasselli et al. 2015). Future research requires more systematic research to substantiate network governance as an explanatory factor of network effectiveness to include a multi-level focus on effectiveness.

Concluding remarks

Based on the systematic literature review findings, we provide insights into how the contingency theory of network governance by Provan and Kenis has been developed in an established and recognized research agenda in the last ten years. We offer means to summarize and synthesize key findings on the modes of network governance, contingency factors, and network-level tensions.

We conclude that the governance of organizational networks as a vocabulary has been adopted in the management and organization sciences literature to explain organizational networks' development, functioning, and effectiveness. But further theoretical development and testing are warranted to inform the practice of network governance, particularly when, how, and why to use institutions and structures of authority and collaboration to allocate resources and coordinate and control joint action within and between organizational networks.

Based on our assessment, we suggest that the findings on the contingency factors as explanatory factors are suggestive and circumstantial. Most studies neglect to examine them, and only a few studies implicitly used them as explanatory factors providing us with anecdotal evidence at best. Therefore, we lack explanations about network governance modes and their outcomes, nor did we find any study testing any of Provan and Kenis's propositions. Nevertheless, the original premise of Provan and Kenis (2008) is substantiated by a diverse body of work examining network governance in various ways and contexts.

The evidence presented in this study is limited in multiple ways. First, network studies on the governance of organizational networks included are not comprehensive in the span of years (2009-2019). Furthermore, the selection of network studies is biased towards the US, Canada, and Europe. Although we designed the systematic literature review with clear and focused objectives and predefined explicit criteria to prevent selection bias, some articles might not have been included even though they might be relevant. Finally, we scoped this study to use Provan and Kenis (2008) as the seed article for citations in the Web of Science database, but this may hamper the external validity of this study since other theoretical models and definitions are used in the literature to explain the governance of organizational networks (i.e., Kickert et al., 1997; Jones et al., 1997; Ansell & Gash, 2008; Emerson et al., 2012; Gulati et al., 2012; Kapucu & Hu, 2020). By supplementing the database in which we provide an overview of which articles we have in/excluded in the review, we aim to increase transparency and provide scholars the means to assess the quality of the study. To generalize the findings, future research should replicate this systematic literature review periodically to make our

understanding of the governance of organizational networks completer and more in-depth. In conclusion, we nevertheless believe that we have reviewed most studies devoted to Provan and Kenis's theoretical model. Based on the review, we determine that their model is preliminary at best and still provides fertile ground for future research.

References

* References included in the systematic literature

*Agostini, L., & Wegner, D. (2018). How government policies shape the development process of strategic networks. *Measuring Business Excellence*. https://doi.org/10.1108/MBE-10-2017-0075

*Agostino, D., Arnaboldi, M., & Dal Molin, M. (2017). Critical crossroads to explain network change: evidence from a goal-directed network. *International journal of public sector management*. https://doi.org/10.1108/IJPSM-04-2016-0078

*Alvarez, G., Pilbeam, C., & Wilding, R. (2010). Nestlé Nespresso AAA sustainable quality program: an investigation into the governance dynamics in a multi-stakeholder supply chain network. *Supply Chain Management: An International Journal*. https://doi.org/10.1108/13598541011028769

*Ansell, C. (2018). When collaborative governance scales up: lessons from global public health about compound collaboration. In *How Does Collaborative Governance Scale?* (pp. 95-116). Policy Press. https://doi.org/10.51952/9781447340560.ch005

Ansell, C., & Gash, A. (2008). Collaborative governance in theory and practice. *Journal of public administration research and theory*, *18*(4), 543-571. https://doi.org/10.1093/jopart/mum032

*Ansell, C., Sondorp, E., & Stevens, R. H. (2012). The promise and challenge of global network governance: the global outbreak alert and response network. *Global Governance*, 317-337. https://www.jstor.org/stable/23269960

*Arensman, B., van Wessel, M., & Hilhorst, D. (2017). Does local ownership bring about effectiveness? The case of a transnational advocacy network. *Third World Quarterly*, *38*(6), 1310-1326. https://doi.org/10.1080/01436597.2016.1257908

Baker, W. E., & Faulkner, R. R. (2017). Interorganizational networks. *The Blackwell companion to organizations*, 520-540. https://doi.org/10.1002/9781405164061.ch22

*Bayne, L., Schepis, D., & Purchase, S. (2017). A framework for understanding strategic network performance: Exploring efficiency and effectiveness at the network level. *Industrial Marketing Management*, *67*, 134-147. https://doi.org/10.1016/j.indmarman.2017.07.015

*Beaumont, N., & Dredge, D. (2010). Local tourism governance: A comparison of three network approaches. *Journal of sustainable tourism*, *18*(1), 7-28. https://doi.org/10.1080/09669580903215139

Berry, F. S., Brower, R. S., Choi, S. O., Goa, W. X., Jang, H., Kwon, M., & Word, J. (2004). Three traditions of network research: What the public management research agenda can learn from other research communities. *Public administration review*, *64*(5), 539-552. https://doi.org/10.1111/j.1540-6210.2004.00402.x

*Berthod, O., Grothe-Hammer, M., Müller-Seitz, G., Raab, J., & Sydow, J. (2017). From high-reliability organizations to high-reliability networks: the dynamics of network governance in the face of emergency. *Journal of Public Administration Research and Theory*, *27*(2), 352-371. https://doi.org/10.1093/jopart/muw050

Berthod, O., & Segato, F. (2019). Developing purpose-oriented networks: A process view. *Perspectives on Public Management and Governance*, *2*(3), 203-212. https://doi.org/10.1093/ppmgov/gvz008

*Binkhorst, J., & Kingma, S. F. (2012). Safety vs. reputation: Risk controversies in emerging policy networks regarding school safety in the Netherlands. *Journal of Risk Research*, *15*(8), 913-935. https://doi.org/10.1080/13669877.2012.686049

*Boeke, S. (2018). National cyber crisis management: Different European approaches. *Governance*, *31*(3), 449-464. https://doi.org/10.1111/gove.12309
Carboni, J. L., Saz-Carranza, A., Raab, J., & Isett, K. R. (2019). Taking dimensions of purpose-oriented networks seriously. *Perspectives on Public Management and Governance*, *2*(3), 187-201. https://doi.org/10.1093/ppmgov/gvz011
*Casey, D. K., & Lawless, J. S. (2011). The parable of the poisoned pork: Network governance and the 2008 Irish pork dioxin contamination. *Regulation & Governance*, *5*(3), 333-349. https://doi.org/10.1111/j.1748-5991.2011.01113.x
Cepiku, D., & Mastrodascio, M. (2021). Leadership behaviours in local government networks: an empirical replication study. *Public Management Review*, *23*(3), 354-375. https://doi.org/10.1080/14719037.2019.1679233
*Chandra, D. R., & Hillegersberg, J. V. (2018). Governance of inter-organizational systems: a longitudinal case study of Rotterdam's Port Community System. *International journal of information systems and project management*, *6*(2), 47-68. https://aisel.aisnet.org/ijispm/vol6/iss2/4
*Chapman, C. L., & Varda, D. M. (2017). Nonprofit resource contribution and mission alignment in interorganizational, cross-sector public health networks. *Nonprofit and Voluntary Sector Quarterly*, *46*(5), 1052-1072. https://doi.org/10.1177%2F0899764017713875
*Chen, B., & Graddy, E. A. (2010). The effectiveness of nonprofit lead-organization networks for social service delivery. *Nonprofit Management and Leadership*, *20*(4), 405-422. https://doi.org/10.1002/nml.20002
*Conrad, E. (2018). Bridging the hierarchical and collaborative divide: the role of network managers in scaling up a network approach to water governance in California. In *How Does Collaborative Governance Scale?* (pp. 43-64). Policy Press. https://doi.org/10.51952/9781447340560.ch003
*Cornforth, C., Hayes, J. P., & Vangen, S. (2015). Nonprofit–public collaborations: Understanding governance dynamics. *Nonprofit and Voluntary Sector Quarterly*, *44*(4), 775-795. https://doi.org/10.1177%2F0899764014532836
*Cristofoli, D., & Markovic, J. (2016). How to make public networks really work: A qualitative comparative analysis. *Public Administration*, *94*(1), 89-110. https://doi.org/10.1111/padm.12192
*Cristofoli, D., Trivellato, B., & Verzillo, S. (2019). Network management as a contingent activity. A configurational analysis of managerial behaviors in different network settings. *Public Management Review*, *21*(12), 1775-1800. https://doi.org/10.1080/14719037.2019.1577905
*Cunningham, F. C., Ranmuthugala, G., Westbrook, J. I., & Braithwaite, J. (2012). Net benefits: assessing the effectiveness of clinical networks in Australia through qualitative methods. *Implementation Science*, *7*(1), 1-13. https://doi.org/10.1186/1748-5908-7-108
*Davis, P., West, K., & Yardley, L. (2011). Networks In Open Systems Of Governance: The case of an English local older persons' care system. *Public Management Review*, *13*(5), 683-705. https://doi.org/10.1080/14719037.2010.532960
*De Corte, J., Verschuere, B., & De Bie, M. (2017). Networks for welfare provision: Getting a grip on processes of social exclusion by evaluating network effectiveness. *Social Policy & Administration*, *51*(7), 1174-1190. https://doi.org/10.1111/spol.12241
*De Pourcq, K., De Regge, M., Van den Heede, K., Van de Voorde, C., Gemmel, P., & Eeckloo, K. (2018). Hospital networks: how to make them work in Belgium? Facilitators and barriers of different governance models. *Acta Clinica Belgica*, *73*(5), 333-340. https://doi.org/10.1080/17843286.2018.1457196
*Díaz-Gibson, J., Zaragoza, M. C., Daly, A. J., Mayayo, J. L., & Romaní, J. R. (2017). Networked leadership in educational collaborative networks. *Educational Management Administration & Leadership*, *45*(6), 1040-1059. https://doi.org/10.1177%2F1741143216628532
Donaldson, L. (2001). *The contingency theory of organizations*. Sage.
*Dooley, L., & Gubbins, C. (2019). Inter-organisational knowledge networks: synthesising dialectic tensions of university-industry knowledge discovery. *Journal of knowledge management*. https://doi.org/10.1108/JKM-06-2018-0343

*Dooley, L., Kirk, D., & Philpott, K. (2013). Nurturing life-science knowledge discovery: managing multi-organisation networks. *Production Planning & Control*, *24*(2-3), 195-207. https://doi.org/10.1080/09537287.2011.647873
Drazin, R., & Van de Ven, A. H. (1985). Alternative forms of fit in contingency theory. *Administrative science quarterly*, 514-539. https://doi.org/10.2307/2392695
*Ehren, M., & Godfrey, D. (2017). External accountability of collaborative arrangements; a case study of a Multi Academy Trust in England. *Educational Assessment, Evaluation and Accountability*, *29*(4), 339-362. https://doi.org/10.1007/s11092-017-9267-z
Emerson, K., & Nabatchi, T. (2015). *Collaborative governance regimes*. Georgetown University Press.
Emerson, K., Nabatchi, T., & Balogh, S. (2012). An integrative framework for collaborative governance. *Journal of public administration research and theory*, *22*(1), 1-29. https://doi.org/10.1093/jopart/mur011
*Fedorowicz, J., Sawyer, S., & Tomasino, A. (2018). Governance configurations for inter-organizational coordination: A study of public safety networks. *Journal of information technology*, *33*(4), 326-344. https://doi.org/10.1057/s41265-018-0056-z
*Fitzgerald, L., & Harvey, G. (2015). Translational networks in healthcare? Evidence on the design and initiation of organizational networks for knowledge mobilization. *Social Science & Medicine*, *138*, 192-200. https://doi.org/10.1016/j.socscimed.2015.06.015
Galbraith, J. R. (1974). Organization design: An information processing view. *Interfaces*, *4*(3), 28-36. https://doi.org/10.1287/inte.4.3.28
*Gibb, J., Sune, A., & Albers, S. (2017). Network learning: Episodes of interorganizational learning towards a collective performance goal. *European Management Journal*, *35*(1), 15-25. https://doi.org/10.1016/j.emj.2016.09.001
Gulati, R., Puranam, P., & Tushman, M. (2012). Meta-organization design: Rethinking design in interorganizational and community contexts. *Strategic management journal*, *33*(6), 571-586. https://doi.org/10.1002/smj.1975
*Harting, J., Peters, D., Grêaux, K., van Assema, P., Verweij, S., Stronks, K., & Klijn, E. H. (2019). Implementing multiple intervention strategies in Dutch public health-related policy networks. *Health Promotion International*, *34*(2), 193-203. https://doi.org/10.1093/heapro/dax067
*Heard-Lauréote, K. (2018). The origins of the European Coalition for Vision: exploring the formation of a network. *International Journal of Public Administration*, *41*(2), 137-149. https://doi.org/10.1080/01900692.2016.1255961
*Hermans, S., Sevenants, A., Declercq, A., Van Broeck, N., Deliens, L., Cohen, J., & Van Audenhove, C. (2019). Integrated palliative care for nursing home residents: exploring the challenges in the collaboration between nursing homes, home care and hospitals. *International journal of integrated care*, *19*(2). https://doi.org/10.5334%2Fijic.4186
*Hermansson, H. M. (2016). Disaster management collaboration in Turkey: Assessing progress and challenges of hybrid network governance. *Public administration*, *94*(2), 333-349. https://doi.org/10.1111/padm.12203
*Herranz Jr, J. (2009). Endogenous development dynamics of multisectoral network management. *International Public Management Journal*, *12*(3), 370-397. https://doi.org/10.1080/10967490903094145
*Hoflund, A. B. (2012). Building a Network Administrative Organization's Social Base: Lessons From the National Quality Forum. *Administration & Society*, *44*(8), 908-935. https://doi.org/10.1177%2F0095399711433695
*Huang, K. (2014). Knowledge sharing in a Third-Party-Governed health and human services network. *Public Administration Review*, *74*(5), 587-598. https://doi.org/10.1111/puar.12222
*Hubeau, M., Vanderplanken, K., Vandermoere, F., Rogge, E., Van Huylenbroeck, G., & Marchand, F. (2019). Sharing is caring: The role of culture in the transformative capacity and continuation of agri-food networks. *Environmental Innovation and Societal Transitions*, *33*, 127-139. https://doi.org/10.1016/j.eist.2019.04.002

*Hutter, G. (2014). Goal-oriented networks and capacity building for natural hazards–examples in the Dresden region. *Natural Hazards and Earth System Sciences*, *14*(1), 81-94. https://doi.org/10.5194/nhess-14-81-2014
*Iborra, S. S., Saz-Carranza, A., Fernández-i-Marín, X., & Albareda, A. (2018). The governance of goal-directed networks and network tasks: An empirical analysis of European regulatory networks. *Journal of Public Administration Research and Theory*, *28*(2), 270-292. https://doi.org/10.1093/jopart/mux037
*Iedema, R., Verma, R., Wutzke, S., Lyons, N., & McCaughan, B. (2017). A network of networks: the governance of deliberative approaches to healthcare improvement and reform. *Journal of health organization and management*, *31*(2), 223-236. https://doi.org/10.1108/JHOM-07-2016-0146
Isett, K. R., Mergel, I. A., LeRoux, K., Mischen, P. A., & Rethemeyer, R. K. (2011). Networks in public administration scholarship: Understanding where we are and where we need to go. *Journal of public administration research and theory*, *21*(suppl_1), i157-i173. https://doi.org/10.1093/jopart/muq061
*Jacobson, D. D. (2016). How and why network governance evolves: evidence from a public safety network. *Electronic Markets*, *26*(1), 43-54. https://doi.org/10.1007/s12525-015-0203-0
Jarillo, J. C. (1988). On strategic networks. *Strategic management journal*, *9*(1), 31-41. https://doi.org/10.1002/smj.4250090104
Jones, C., Hesterly, W. S., & Borgatti, S. P. (1997). A general theory of network governance: Exchange conditions and social mechanisms. *Academy of management review*, *22*(4), 911-945. https://doi.org/10.5465/amr.1997.9711022109
Kapucu, N., & Hu, Q. (2020). *Network governance: Concepts, theories, and applications*. Routledge.
Kelman, S., & Hong, S. (2015). This could be the start of something big: Linking early managerial choices with subsequent organizational performance. *Journal of Public Administration Research and Theory*, *25*(1), 135-164. https://doi.org/10.1093/jopart/muu010
*Kelman, S., Hong, S., & Turbitt, I. (2013). Are there managerial practices associated with the outcomes of an interagency service delivery collaboration? Evidence from British crime and disorder reduction partnerships. *Journal of Public Administration Research and Theory*, *23*(3), 609-630. https://doi.org/10.1093/jopart/mus038
Kenis, P., & Provan, K. G. (2009). Towards an exogenous theory of public network performance. *Public administration*, *87*(3), 440-456. https://doi.org/10.1111/j.1467-9299.2009.01775.x
Kenis, P., & Raab, J. (2020). Back to the future: Using organization design theory for effective organizational networks. *Perspectives on Public Management and Governance*, *3*(2), 109-123. https://doi.org/10.1093/ppmgov/gvaa005
Kickert, W. J., Klijn, E. H., & Koppenjan, J. F. (Eds.). (1997). *Managing complex networks: Strategies for the public sector*. Sage.
Kilduff, M., & Brass, D. J. (2010). Organizational social network research: Core ideas and key debates. *Academy of management annals*, *4*(1), 317-357. https://doi.org/10.5465/19416520.2010.494827
*Kilelu, C. W., Klerkx, L., & Leeuwis, C. (2013). Unravelling the role of innovation platforms in supporting co-evolution of innovation: Contributions and tensions in a smallholder dairy development programme. *Agricultural systems*, *118*, 65-77. https://doi.org/10.1016/j.agsy.2013.03.003
*Kilelu, C. W., Klerkx, L., & Leeuwis, C. (2017). Supporting smallholder commercialisation by enhancing integrated coordination in agrifood value chains: Experiences with dairy hubs in Kenya. *Experimental Agriculture*, *53*(2), 269-287. https://doi.org/10.1017/S0014479716000375
*Kilfoyle, E., & Richardson, A. J. (2015). Governance and control in networks: a case study of the Universal Postal Union. *Accounting, Auditing & Accountability Journal*, *28*(4), 551-580. https://doi.org/10.1108/AAAJ-04-2014-1687
*Klaster, E., Wilderom, C. P. M., & Muntslag, D. R. (2017). Balancing relations and results in regional networks of public-policy implementation. *Journal of Public Administration Research and Theory*, *27*(4), 676-691. https://doi.org/10.1093/jopart/mux015

*Klerkx, L., & Aarts, N. (2013). The interaction of multiple champions in orchestrating innovation networks: Conflicts and complementarities. *Technovation*, *33*(6-7), 193-210. https://doi.org/10.1016/j.technovation.2013.03.002
*Klijn, E. H., Sierra, V., Ysa, T., Berman, E., Edelenbos, J., & Chen, D. Y. (2016). The influence of trust on network performance in Taiwan, Spain, and the Netherlands: A cross-country comparison. *International public management journal*, *19*(1), 111-139. https://doi.org/10.1080/10967494.2015.1115790
*Klijn, E. H., van Meerkerk, I., & Edelenbos, J. (2020). How do network characteristics influence network managers' choice of strategies?. *Public money & management*, *40*(2), 149-159. https://doi.org/10.1080/09540962.2019.1665828
*Klijn, E. H., Ysa, T., Sierra, V., Berman, E., Edelenbos, J., & Chen, D. Y. (2015). The influence of network management and complexity on network performance in Taiwan, Spain and the Netherlands. *Public Management Review*, *17*(5), 736-764. https://doi.org/10.1080/14719037.2014.957340
Koliba, C. J., Mills, R. M., & Zia, A. (2011). Accountability in governance networks: An assessment of public, private, and nonprofit emergency management practices following Hurricane Katrina. *Public Administration Review*, *71*(2), 210-220. https://doi.org/10.1111/j.1540-6210.2011.02332.x
*Lam, W. F., & Lei, W. (2020). Network structure and collaborative innovation processes: a comparative analysis of two elderly service networks in Shanghai. In *Handbook of Public Policy and Public Administration in China* (pp. 305-324). Edward Elgar Publishing. https://doi.org/10.4337/9781789909951.00027
Lecy, J. D., Mergel, I. A., & Schmitz, H. P. (2014). Networks in public administration: current scholarship in review. *Public Management Review*, *16*(5), 643-665. https://doi.org/10.1080/14719037.2012.743577
*Lee, C. (2018). The leadership of balancing control and autonomy in public sector networks: the case of Singapore. *Journal of Asian Public Policy*, *11*(2), 151-172. https://doi.org/10.1080/17516234.2017.1370774
*Lee, J., & Dodge, J. (2019). Keeping Your Enemies Close: The Role of Distrust in Structuring a Local Hydraulic Fracturing Policy Network in New York. *Journal of Public Administration Research And Theory*, *29*(2), 175-192. https://doi.org/10.1093/jopart/muy074
*Lemaire, R. H. (2020). What is our purpose here? Network relationships and goal congruence in a goal-directed network. *The American Review of Public Administration*, *50*(2), 176-192. https://doi.org/10.1177%2F0275074019879506
Lemaire, R. H., Mannak, R. S., Ospina, S. M., & Groenleer, M. (2019). Striving for state of the art with paradigm interplay and meta-synthesis: Purpose-oriented network research challenges and good research practices as a way forward. *Perspectives on Public Management and Governance*, *2*(3), 175-186. https://doi.org/10.1177%2F2750740177007 22
*Lemaire, R. H., & Provan, K. G. (2018). Managing collaborative effort: How Simmelian ties advance public sector networks. *The American Review of Public Administration*, *48*(5), 379-394. https://doi.org/10.1177%2F0275074017700722
*Lemaire, R. H., Provan, K. G., Mercken, L., & Leischow, S. J. (2017). Shaping the evolution of the information flow: The centralizing mechanisms in the evolution of the North American tobacco quitline consortium. *International Public Management Journal*, *20*(3), 467-488. https://doi.org/10.1080/10967494.2016.1276034
LeRoux, K., Piatak, J., Romzek, B., & Johnston, J. (2019). Informal accountability in children's service networks: The role of frontline workers. *Human Service Organizations: Management, Leadership & Governance*, *43*(3), 188-204. https://doi.org/10.1080/23303131.2019.1637804
*Lindencrona, F., Ekblad, S., & Axelsson, R. (2009). Modes of interaction and performance of human service networks: A study of refugee resettlement support in Sweden. *Public Management Review*, *11*(2), 191-215. https://doi.org/10.1080/14719030802685404
Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P., ... & Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of

studies that evaluate health care interventions: explanation and elaboration. *Journal of clinical epidemiology*, *62*(10), e1-e34. https://doi.org/10.1016/j.jclinepi.2009.06.006
*Lubell, M., Jasny, L., & Hastings, A. (2017). Network governance for invasive species management. *Conservation Letters*, *10*(6), 699-707. https://doi.org/10.1111/conl.12311
*Lucidarme, S., Babiak, K., & Willem, A. (2018). Governmental power in elite sport networks: a resource-dependency perspective. *European sport management quarterly*, *18*(3), 348-372. https://doi.org/10.1080/16184742.2017.1405998
*Lucidarme, S., Cardon, G., & Willem, A. (2016). A comparative study of health promotion networks: configurations of determinants for network effectiveness. *Public management review*, *18*(8), 1163-1217. https://doi.org/10.1080/14719037.2015.1088567
*Macciò, L., & Cristofoli, D. (2017). How to support the endurance of long-term networks: The pivotal role of the network manager. *Public Administration*, *95*(4), 1060-1076. https://doi.org/10.1111/padm.12349
*Markovic, J. (2017). Contingencies and organizing principles in public networks. *Public Management Review*, *19*(3), 361-380. https://doi.org/10.1080/14719037.2016.1209237
*Marques, L., Ribeiro, J. A., & Scapens, R. W. (2011). The use of management control mechanisms by public organizations with a network coordination role: A case study in the port industry. *Management Accounting Research*, *22*(4), 269-291. https://doi.org/10.1016/j.mar.2011.09.001
McGuire, M., & Silvia, C. (2009). Does leadership in networks matter? Examining the effect of leadership behaviors on managers' perceptions of network effectiveness. *Public Performance & Management Review*, *33*(1), 34-62. DOI: 10.2753/PMR1530-9576330102
*McPherson, C., Ploeg, J., Edwards, N., Ciliska, D., & Sword, W. (2017). A catalyst for system change: a case study of child health network formation, evolution and sustainability in Canada. *BMC Health Services Research*, *17*(1), 1-16. https://doi.org/10.1186/s12913-017-2018-5
Miller, D. (1992). Environmental fit versus internal fit. *Organization science*, *3*(2), 159-178. https://doi.org/10.1287/orsc.3.2.159
Miller, D. (1981). Toward a new contingency approach: The search for organizational gestalts. *Journal of management studies*, *18*(1), 1-26. https://doi.org/10.1111/j.1467-6486.1981.tb00088.x
*Milward, H. B., Provan, K. G., Fish, A., Isett, K. R., & Huang, K. (2010). Governance and collaboration: An evolutionary study of two mental health networks. *Journal of Public Administration Research and Theory*, *20*(suppl_1), i125-i141. https://doi.org/10.1093/jopart/mup038
*Mischen, P. A. (2015). Collaborative network capacity. *Public Management Review*, *17*(3), 380-403. https://doi.org/10.1080/14719037.2013.822527
*Mitterlechner, M. (2018). Governing integrated care networks through collaborative inquiry. *Journal of Health Organization and Management*. https://doi.org/10.1108/JHOM-01-2018-0012
Moliterno, T. P., & Mahony, D. M. (2011). Network theory of organization: A multilevel approach. *Journal of management*, *37*(2), 443-467. https://doi.org/10.1177%2F0149206310371692
*Moretti, A., & Zirpoli, F. (2016). A dynamic theory of network failure: The case of the Venice Film Festival and the local hospitality system. *Organization Studies*, *37*(5), 607-633. https://doi.org/10.1177%2F0170840615613369
*Mosley, J. E., & Jarpe, M. (2019). How structural variations in collaborative governance networks influence advocacy involvement and outcomes. *Public Administration Review*, *79*(5), 629-640. https://doi.org/10.1111/puar.13037
*Moynihan, D. P. (2012). Extra-network organizational reputation and blame avoidance in networks: The Hurricane Katrina example. *Governance*, *25*(4), 567-588. https://doi.org/10.1111/j.1468-0491.2012.01593.x
*Moynihan, D. P. (2009). The network governance of crisis response: Case studies of incident command systems. *Journal of Public Administration Research and Theory*, *19*(4), 895-915. https://doi.org/10.1093/jopart/mun033
*Müller-Seitz, G. (2012). Absorptive and desorptive capacity-related practices at the network level–the case of SEMATECH. *R&d Management*, *42*(1), 90-99. https://doi.org/10.1111/j.1467-9310.2011.00668.x

*Nilsen, E. R., & Gausdal, A. H. (2017). The multifaceted role of the network orchestrator—A longitudinal case study. *International Journal of Innovation Management*, *21*(06), 1750046. https://doi.org/10.1142/S1363919617500463
Nohrstedt, D., Bynander, F., Parker, C., & 't Hart, P. (2018). Managing crises collaboratively: Prospects and problems—A systematic literature review. *Perspectives on Public Management and Governance*, *1*(4), 257-271. https://doi.org/10.1093/ppmgov/gvx018
*Nolte, I. M., & Boenigk, S. (2011). Public–nonprofit partnership performance in a disaster context: The case of Haiti. *Public administration*, *89*(4), 1385-1402. https://doi.org/10.1111/j.1467-9299.2011.01950.x
*Nowell, B. (2010). Out of sync and unaware? Exploring the effects of problem frame alignment and discordance in community collaboratives. *Journal of Public Administration Research and Theory*, *20*(1), 91-116. https://doi.org/10.1093/jopart/mup006
Nowell, B., Hano, M. C., & Yang, Z. (2019). Networks of networks? Toward an external perspective on whole networks. *Perspectives on Public Management and Governance*, *2*(3), 213-233. https://doi.org/10.1093/ppmgov/gvz005
Nowell, B. L., & Kenis, P. (2019). Purpose-oriented networks: The architecture of complexity. *Perspectives on Public Management and Governance*, *2*(3), 169-173. https://doi.org/10.1093/ppmgov/gvz012
*Nowell, B., Steelman, T., Velez, A. L. K., & Yang, Z. (2018). The structure of effective governance of disaster response networks: Insights from the field. *The American Review of Public Administration*, *48*(7), 699-715. https://doi.org/10.1177%2F0275074017724225
*Ofek, Y. (2015). The missing linkage in evaluating networks: A model for matching evaluation approaches to system dynamics and complexity. *Public Performance & Management Review*, *38*(4), 607-631. https://doi.org/10.1080/15309576.2015.1031005
*Ospina, S. M., & Saz-Carranza, A. (2010). Paradox and collaboration in network management. *Administration & society*, *42*(4), 404-440. https://doi.org/10.1177%2F0095399710362723
Page, S. B., Stone, M. M., Bryson, J. M., & Crosby, B. C. (2015). Public value creation by cross-sector collaborations: A framework and challenges of assessment. *Public Administration*, *93*(3), 715-732. https://doi.org/10.1111/padm.12161
*Paquin, R. L., & Howard-Grenville, J. (2013). Blind dates and arranged marriages: Longitudinal processes of network orchestration. *Organization Studies*, *34*(11), 1623-1653. https://doi.org/10.1177%2F0170840612470230
*Piatak, J., Romzek, B., LeRoux, K., & Johnston, J. (2018). Managing goal conflict in public service delivery networks: Does accountability move up and down, or side to side?. *Public Performance & Management Review*, *41*(1), 152-176. https://doi.org/10.1080/15309576.2017.1400993
*Planko, J., Chappin, M. M., Cramer, J. M., & Hekkert, M. P. (2017). Managing strategic system-building networks in emerging business fields: A case study of the Dutch smart grid sector. *Industrial Marketing Management*, *67*, 37-51. https://doi.org/10.1016/j.indmarman.2017.06.010
Podolny, J. M., & Page, K. L. (1998). Network forms of organization. *Annual review of sociology*, 57-76. https://www.jstor.org/stable/223474
*Poocharoen, O. O., & Ting, B. (2015). Collaboration, co-production, networks: Convergence of theories. *Public Management Review*, *17*(4), 587-614. https://doi.org/10.1080/14719037.2013.866479
Popp, J., MacKean, G. L., Casebeer, A., Milward, H. B., & Lindstrom, R. R. (2014). *Inter-organizational networks: A review of the literature to inform practice*. Washington, DC: IBM Center for the Business of Government. Retrievable at: https://www.businessofgovernment.org/report/inter-organizational-networks-review-literature-inform-practice
*Provan, K. G., Beagles, J. E., & Leischow, S. J. (2011). Network formation, governance, and evolution in public health: The North American Quitline Consortium case. *Health care management review*, *36*(4), 315. https://doi.org/10.1097%2FHMR.0b013e31820e1124

Provan, K. G., Fish, A., & Sydow, J. (2007). Interorganizational networks at the network level: A review of the empirical literature on whole networks. *Journal of management*, *33*(3), 479-516. https://doi.org/10.1177%2F0149206307302554

*Provan, K. G., & Huang, K. (2012). Resource tangibility and the evolution of a publicly funded health and human services network. *Public Administration Review*, *72*(3), 366-375. https://doi.org/10.1111/j.1540-6210.2011.02504.x

*Provan, K. G., Huang, K., & Milward, H. B. (2009). The evolution of structural embeddedness and organizational social outcomes in a centrally governed health and human services network. *Journal of Public Administration Research and Theory*, *19*(4), 873-893. https://doi.org/10.1093/jopart/mun036

Provan, K. G., & Kenis, P. (2008). Modes of network governance: Structure, management, and effectiveness. *Journal of public administration research and theory*, *18*(2), 229-252. https://doi.org/10.1093/jopart/mum015

Provan, K. G., & Lemaire, R. H. (2012). Core concepts and key ideas for understanding public sector organizational networks: Using research to inform scholarship and practice. *Public Administration Review*, *72*(5), 638-648. https://doi.org/10.1111/j.1540-6210.2012.02595.x

Provan, K. G., & Milward, H. B. (1995). A preliminary theory of interorganizational network effectiveness: A comparative study of four community mental health systems. *Administrative science quarterly*, 1-33. https://doi.org/10.2307/2393698

Provan, K. G., & Milward, H. B. (2001). Do networks really work? A framework for evaluating public-sector organizational networks. *Public administration review*, *61*(4), 414-423. https://doi.org/10.1111/0033-3352.00045

Puranam, P. (2018). *The microstructure of organizations*. Oxford University Press.

*Quissell, K., & Walt, G. (2016). The challenge of sustaining effectiveness over time: the case of the global network to stop tuberculosis. *Health Policy and Planning*, *31*(suppl_1), i17-i32. https://doi.org/10.1093/heapol/czv035

Raab, J., & Kenis, P. (2009). Heading toward a society of networks: Empirical developments and theoretical challenges. *Journal of management inquiry*, *18*(3), 198-210.

Raab, J., Lemaire, R. H., & Provan, K. G. (2013). The configurational approach in organizational network research. In Fiss, P., Marx, A., & Cambré, B. (Eds). *Configurational theory and methods in organizational research*. Emerald Group Publishing Limited.

*Raab, J., Mannak, R. S., & Cambré, B. (2015). Combining structure, governance, and context: A configurational approach to network effectiveness. *Journal of public administration research and theory*, *25*(2), 479-511. https://doi.org/10.1093/jopart/mut039

*Raeymaeckers, P. (2016). Should I stay or should I go? A qualitative analysis of legitimacy in a shared participant-governed network. *Human Service Organizations: Management, Leadership & Governance*, *40*(3), 267-280. https://doi.org/10.1080/23303131.2015.1117553

*Raeymaeckers, P. (2013). From a bird's eye view? A comparative analysis of governance and network integration among human service organizations. *Journal of Social Service Research*, *39*(3), 416-431. https://doi.org/10.1080/01488376.2013.775091

*Raeymaeckers, P., & Kenis, P. (2016). The influence of shared participant governance on the integration of service networks: A comparative social network analysis. *International Public Management Journal*, *19*(3), 397-426. https://doi.org/10.1080/10967494.2015.1062443

*Reypens, C., Lievens, A., & Blazevic, V. (2021). Hybrid Orchestration in Multi-stakeholder Innovation Networks: Practices of mobilizing multiple, diverse stakeholders across organizational boundaries. *Organization Studies*, *42*(1), 61-83. https://doi.org/10.1177%2F0170840619868268

*Risien, J. (2019). Curators and sojourners in learning networks: Practices for transformation. *Evaluation and program planning*, *73*, 71-79. https://doi.org/10.1016/j.evalprogplan.2018.12.001

*Romzek, B., LeRoux, K., Johnston, J., Kempf, R. J., & Piatak, J. S. (2014). Informal accountability in multisector service delivery collaborations. *Journal of Public Administration Research and Theory*, *24*(4), 813-842. https://doi.org/10.1093/jopart/mut027

*Rudnick, J., Niles, M., Lubell, M., & Cramer, L. (2019). A comparative analysis of governance and leadership in agricultural development policy networks. *World development*, *117*, 112-126. https://doi.org/10.1016/j.worlddev.2018.12.015
*Saz-Carranza, A., Salvador Iborra, S., & Albareda, A. (2016). The power dynamics of mandated network administrative organizations. *Public Administration Review*, *76*(3), 449-462. https://doi.org/10.1111/puar.12445
*Saz-Carranza, A., & Ospina, S. M. (2011). The behavioral dimension of governing interorganizational goal-directed networks—Managing the unity-diversity tension. *Journal of Public Administration Research and Theory*, *21*(2), 327-365. https://doi.org/10.1093/jopart/muq050
Schoonhoven, C. B. (1981). Problems with contingency theory: testing assumptions hidden within the language of contingency" theory". *Administrative science quarterly*, 349-377. https://doi.org/10.2307/2392512
*Schüßler, E., Decker, C., & Lerch, F. (2013). Networks of clusters: A governance perspective. *Industry and innovation*, *20*(4), 357-377. https://doi.org/10.1080/13662716.2013.805929
*Segato, F., & Raab, J. (2018). Mandated network formation. *International Journal of Public Sector Management*. https://doi.org/10.1108/IJPSM-01-2018-0018
*Sheaff, R., Benson, L., Farbus, L., Schofield, J., Mannion, R., & Reeves, D. (2010). Network resilience in the face of health system reform. *Social science & medicine*, *70*(5), 779-786. https://doi.org/10.1016/j.socscimed.2009.11.011
*Sheaff, R., Windle, K., Wistow, G., Ashby, S., Beech, R., Dickinson, A., ... & Knapp, M. (2014). Reducing emergency bed-days for older people? Network governance lessons from the 'Improving the Future for Older People'programme. *Social Science & Medicine*, *106*, 59-66. https://doi.org/10.1016/j.socscimed.2014.01.033
Silvia, C., & McGuire, M. (2010). Leading public sector networks: An empirical examination of integrative leadership behaviors. *The Leadership Quarterly*, *21*(2), 264-277. https://doi.org/10.1016/j.leaqua.2010.01.006
*Span, K. C., Luijkx, K. G., Schalk, R., & Schols, J. M. (2012). What governance roles do municipalities use in Dutch local social support networks?. *Public Management Review*, *14*(8), 1175-1194. https://doi.org/10.1080/14719037.2012.664013
*Stadtler, L., & Probst, G. (2012). How broker organizations can facilitate public–private partnerships for development. *European Management Journal*, *30*(1), 32-46. https://doi.org/10.1016/j.emj.2011.10.002
Tasselli, S., Kilduff, M., & Menges, J. I. (2015). The microfoundations of organizational social networks: A review and an agenda for future research. *Journal of Management*, *41*(5), 1361-1387. https://doi.org/10.1177%2F0149206315573996
*Trang, S., Zander, S., & Kolbe, L. M. (2015). The contingent role of centrality in IT network governance: An empirical examination. *Pacific Asia Journal of the Association for Information Systems*, *7*(1), 3. https://aisel.aisnet.org/pajais/vol7/iss1/3
Van de Ven, A. H., Ganco, M., & Hinings, C. R. (2013). Returning to the frontier of contingency theory of organizational and institutional designs. *Academy of Management Annals*, *7*(1), 393-440. https://doi.org/10.5465/19416520.2013.774981
*Van der Zee, E., Gerrets, A. M., & Vanneste, D. (2017). Complexity in the governance of tourism networks: Balancing between external pressure and internal expectations. *Journal of Destination Marketing & Management*, *6*(4), 296-308. https://doi.org/10.1016/j.jdmm.2017.07.003
*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. https://doi.org/10.1007/s11077-013-9181-2
Vangen, S. (2017). Developing practice-oriented theory on collaboration: A paradox lens. *Public Administration Review*, *77*(2), 263-272. https://doi.org/10.1111/puar.12683
*Vangen, S., Hayes, J. P., & Cornforth, C. (2015). Governing cross-sector, inter-organizational collaborations. *Public Management Review*, *17*(9), 1237-1260. https://doi.org/10.1080/14719037.2014.903658

*Vangen, S., & Huxham, C. (2012). The tangled web: Unraveling the principle of common goals in collaborations. *Journal of Public Administration Research and Theory*, *22*(4), 731-760. https://doi.org/10.1093/jopart/mur065
*Vangen, S., & Winchester, N. (2014). Managing cultural diversity in collaborations: A focus on management tensions. *Public Management Review*, *16*(5), 686-707. https://doi.org/10.1080/14719037.2012.743579
Vangen, S., Hayes, J. P., & Cornforth, C. (2015). Governing cross-sector, inter-organizational collaborations. *Public Management Review*, *17*(9), 1237-1260. https://doi.org/10.1080/14719037.2014.903658
*Vasavada, T. (2013). Managing disaster networks in India. *Public Management Review*, *15*(3), 363-382. https://doi.org/10.1080/14719037.2013.769854
*Raeymaeckers, P., & Beagles, J. (2021). In search for inclusiveness: Vertical complexity in public-nonprofit networks. *Public Management Review*, *23*(2), 189-209. https://doi.org/10.1080/14719037.2019.1668471
*Verschoore, J., Balestrin, A., & Teixeira, R. (2017). Network management and associated firms' outcomes: multilevel analysis in the Southern Brazilian context. *Journal of Management & Governance*, *21*(1), 211-232. https://doi.org/10.1007/s10997-016-9345-5
*Wang, W. (2016). Exploring the determinants of network effectiveness: The case of neighborhood governance networks in Beijing. *Journal of Public Administration Research and Theory*, *26*(2), 375-388. https://doi.org/10.1093/jopart/muv017
*Wang, X., Chen, K., & Berman, E. M. (2016). Building network implementation capacity: evidence from China. *International Public Management Journal*, *19*(2), 264-291. https://doi.org/10.1080/10967494.2015.1115791
*Waring, J., & Crompton, A. (2020). The struggles for (and of) network management: an ethnographic study of non-dominant policy actors in the English healthcare system. *Public Management Review*, *22*(2), 297-315. https://doi.org/10.1080/14719037.2019.1588360
*Wiktorowicz, M. E., Fleury, M. J., Adair, C. E., Lesage, A., Goldner, E., & Peters, S. (2010). Mental health network governance: comparative analysis across Canadian regions. *International Journal of Integrated Care*, *10*. https://doi.org/10.5334%2Fijic.525
*Willem, A., & Gemmel, P. (2013). Do governance choices matter in health care networks?: an exploratory configuration study of health care networks. *BMC Health Services Research*, *13*(1), 1-10. https://doi.org/10.1186/1472-6963-13-229
*Willem, A., & Lucidarme, S. (2014). Pitfalls and challenges for trust and effectiveness in collaborative networks. *Public Management Review*, *16*(5), 733-760. https://doi.org/10.1080/14719037.2012.744426
*Wincent, J., Thorgren, S., & Anokhin, S. (2013). Managing maturing government-supported networks: The shift from monitoring to embeddedness controls. *British Journal of Management*, *24*(4), 480-497. https://doi.org/10.1111/j.1467-8551.2012.00819.x
*Wister, A. V., Beattie, B. L., Gallagher, E. M., Gutman, G. M., Hemingway, D., Reid, R. C., ... & Symes, B. (2014). Effectiveness of a shared leadership model: the British Columbia network for aging research. *Administration & Society*, *46*(8), 863-884. https://doi.org/10.1177%2F0095399712465594
*Ysa, T., Sierra, V., & Esteve, M. (2014). Determinants of network outcomes: The impact of management strategies. *Public administration*, *92*(3), 636-655. https://doi.org/10.1111/padm.12076

Appendix:

The summary table and the database of the systematic literature review are available on request by email. Please send an email to s.vandenoord@gmail.com

CHAPTER 3. NETWORK OF NETWORKS: PRELIMINARY LESSONS FROM THE ANTWERP PORT AUTHORITY ON CRISIS MANAGEMENT AND NETWORK GOVERNANCE TO DEAL WITH THE COVID-19 PANDEMIC

Steven van den Oord

In collaboration with Niels Vanlaer, Hugo Marynissen, Bert Brugghemans, Jan Van Roey, Sascha Albers, Bart Cambré, & Patrick Kenis

Network of Networks: Preliminary Lessons from the Antwerp Port Authority on Crisis Management and Network Governance to Deal with the COVID-19 Pandemic

In this article, the authors describe and illustrate what they call a "network of networks" perspective and map the development of a lead network for the Antwerp Port Authority that governed organizations and networks in the port community before and during the COVID-19 pandemic. They find that setting a collective focus and selective integration is crucial in the creation and reproduction of an effective system to deal with a wicked problem like the COVID-19 pandemic adequately. The findings on crisis management and network governance are used to engage practitioners and public policy planners to revisit the current design and governance of organizational networks within organizational fields that have been hit by the COVID-19 pandemic.

Introduction

A network is a system of three or more organizations (undertaken either voluntarily or by mandate) that work together to achieve a purpose that none of the participating organizations could achieve independently by themselves (Provan, Fish, and Sydow 2007; Provan and Kenis 2008). They are distinct entities with unique identities that require examination as a whole (Provan, Fish, and Sydow 2007; Provan and Kenis 2008; Raab and Kenis 2009). Despite the prominence of networks in practice, their popularity as a research subject, and their relevance for society (Raab and Kenis 2009), we still tend to study individual organizations to understand the collective behavior of networks.

Studies of networks from multiple disciplines predominantly focus on organizations and their relations (ego networks), potentially neglecting or even misinterpreting the relationship between the details of the network and the larger view of the whole (Bar-Yam 2004; Provan, Fish, and Sydow 2007). In addition, we sometimes forget that studying networks from a whole network perspective is necessary but not sufficient to understand "such issues as how networks evolve, how they are governed, and, ultimately, how collective outcomes might be generated" (Provan, Fish, and Sydow 2007, 480). Recently, for instance, it has been argued by Nowell, Hano, and Yang (2019, 214) that an external (outside-in) perspective should accompany our dominant internal focus on networks to explain "the forces that may shape and constrain action in network settings." Inspired by this so-called network of networks perspective, this article shows how such a perspective allows for better grasping of (and hence, dealing with) wicked problems (Cartwright 1987), a type of problem that an organizational field such as a port or a city frequently encounters.

Networks Embedded in Organizational Fields: The Case of COVID-19

The COVID-19 pandemic can be understood as a wicked problem because there are no quick fixes and simple solutions to the problem, every attempt to solve the issue is a "one-shot operation," and the nature of the problem is not understood until after the formulation of a solution (Conklin 2005). Wicked problems are "defined by a focus, rather than a boundary" (Cartwright 1987, 93). [1] Successfully managing such problems therefore requires a reassessment of how a group of organizations and networks make temporally sense and structure a wicked problem. The COVID-19 pandemic has directed our attention to a pivotal point in network governance: the connection between complexity and scale (Bar-Yam 2004). It has led us to acknowledge that an appreciation for the scope and detailed nature of a wicked problem is essential, while simultaneously pairing it with a network solution that matches in scale and complexity (Bar-Yam 2004).

To understand how to deal with the COVID-19 pandemic, then, one needs to comprehend the relation between a larger, complex system and the scope and nature of the problem. We call this larger, complex system an organizational field (Kenis and Knoke 2002). In the classics of public administration literature, the relationship between an organization and its environment has been studied from a variety of perspectives, focusing on selection or adaption to institutional pressures and resource dependence (Aldrich and Pfeffer 1976; Oliver 1991). An emphasis on environments is therefore not new. Interestingly, however, network scholars in public administration have only recently intensified their efforts to use concepts of the environment as an explanatory factor in the creation, reproduction, or dissolution of networks (Lee, Rethemeyer, and Park 2018; Nowell, Hano, and Yang 2019; Raab, Mannak, and Cambré 2015).

Building on DiMaggio and Powell's (1983) understanding of an organizational field, Kenis and Knoke (2002, 275) link interorganizational relationships and mechanisms such as tie formation and dissolution to define an "organizational field-net" as "the configuration of interorganizational relationships among all the organizations that are members of an organizational field." The key issue here is on which scale and what details we should consider examining intersections of organizations and networks embedded in a certain environment, since environmental dynamics are crucial in our understanding of the creation and reproduction of both system within as well as the larger system as a whole (cf. Mayntz 1993).

However, to define and examine such larger, complex systems like organizational fields, we need to understand why organizations and networks come together, cooperate, and consequently create and reproduce such a larger, complex system (Kenis and Knoke 2002; Nowell, Hano, and Yang 2019; Provan, Fish, and Sydow 2007). We therefore propose that instead of focusing on an organizational network as the unit of analysis (Provan, Fish, and Sydow 2007; Provan and Kenis 2008), a shift to a collective of networks that is embedded in an organizational field is instructive (cf. Nowell,

Hano, and Yang 2019). This means that our unit of observation shifts from one network as a separate entity with a unique identity (cf. Provan and Kenis 2008; Raab and Kenis 2009) to a network of networks (Nowell, Hano, and Yang 2019).

Network of Networks

Building on Maier's (1998) system of systems approach and using Nowell, Hano, and Yang's (2019) notion of network of networks, we accordingly define a network of networks as an assemblage of networks, which individually may be regarded as subsystems that are operationally and managerial autonomous but are part of a larger, complex organizational field by many types of connections and flows (Maier 1998; Nowell, Hano, and Yang 2019; Provan, Fish, and Sydow 2007).

In this article, we adopt a configurational approach to network of networks, in line with the long-standing recommendation by Alexander (2015). See Figure 1. In such an approach, a network of networks is "best understood as clusters of interconnected structures and practices" of various networks being distinct entities and having unique identities (Fiss 2007, 1180; Provan and Kenis 2008; Raab, Lemaire, and Provan 2013). This means a clean break from the predominant linear paradigm and instead adopting a systemic view in which we assume that "patterns of attributes will exhibit different features and lead to different outcomes depending on how they are arranged" (Fiss 2007, 1181; Provan, Fish, and Sydow 2007; Provan and Kenis 2008).

Moreover, we note that often assumptions about the structure and governance of networks are used that are suspect at best for dealing with the complexity that networks bring (Raab, Lemaire, and Provan 2013; Rethemeyer and Hatmaker 2008). Further, most network studies only employ an endogenous perspective on networks, which in some cases is bound to the performance of an individual organization, a network cluster, or a certain organizational domain (e.g., health or social care), even though networks by nature are multilevel, multidisciplinary, and interdependent (Provan, Fish, and Sydow 2007; Provan and Milward 2001; Raab, Mannak, and Cambré 2015).

In particular, scholars often tend to ignore the specific nature of the problems that networks face in their environments (McChrystal et al. 2015; Raab and Milward 2003). This is an issue because not fully understanding the interdependence of a collection of smaller systems or understanding what the larger, complex system is up against makes dealing with a wicked problem like the COVID-19 pandemic very difficult.

Scope, Methods, and Network Analysis

As part of a larger applied research project on a collaboration between the fire and emergency services (Antwerp Fire Service, Antwerp Port Authority, police, and municipality, among others) in the Port of Antwerp and Antwerp Management School (Van den Oord et al. 2019), we focus in this article on

how the Port Authority of the Port of Antwerp (Belgium) dealt with the COVID-19 pandemic. In particular, we examine the network structure and the embeddedness of individual actors of both the crisis management team and the leadership team of the Antwerp Port Authority (APA) to describe how this network managed the crisis and governed the port community, which is composed of various organizations and networks, before and during the COVID-19 pandemic. By providing descriptive evidence concerning the development of the overall network structure and the embeddedness of individual actors before and during the COVID-19 pandemic, we aim to ground the notion of network of networks and hope to engage practitioners and public administration scholars to rethink current design and governance of organizational networks within their respective organizational fields that have been hit by the COVID-19 pandemic.

For this article, we narrowed the scope of analysis to two levels to describe the interdependence between crisis management and network governance on the operational and policy level of the APA. [2] As Alter and Hage (1993) suggested, we need to make a minimum distinction between the policy level and the administrative level because coordination of joint efforts tends to transcend organizational hierarchical levels as well as involve multiple different functional units such as divisions or departments. The data allowed us to differentiate between these two levels: the crisis management team (operations, or, to use Alter and Hage's term, administration) and the leadership team (policy).

To understand how the APA attempted to manage the crisis throughout the COVID-19 pandemic, we conduct a network analysis based on three sources of data. For our primary data source, we draw on the records and minutes of three types of meetings: the crisis management team (CMT) meetings, the nautical partners (NP) meetings, and the leadership team (LT) meetings. The data cover a period of 12 weeks (January 20–April 12, 2020), including 53 meetings mentioning 73 unique actors involved in the port community. Data records are based on 26 CMT meetings with a total estimated duration of 20 hours (66 logbook pages), 16 LT meetings with a total estimated duration of 10 hours (19 logbook pages), and 11 NP meetings with a total estimated duration of 12 hours.

In addition, we consult data from Sciensano, which is the Belgian institute for health responsible for the epidemiological follow-up of the COVID-19 epidemic in collaboration with its partners and other health care actors. These data provide insight into the dynamics of the pandemic. The third source of data were coauthors 2, 4, and 5, who managed the pandemic in the Port of Antwerp. The second author attended all CMT meetings and participated in various LT meetings, while the fourth author was present in some of the task force meetings (not examined in this article). By collaborating with these practitioners, we are able to go back and forth to the data during these periods, allowing for interpretation of relationships between the APA and actors in the port community as well as building rich narratives of issues discussed in these meetings.

In table 1, we report descriptive measures of the data on the meetings. For data analysis, meetings were grouped into four phases of the COVID-19 crisis, with a network structure created for each: (1) pre-crisis network (January 20–March 1, six weeks), (2) pre-lockdown network (March 2–March 15, two weeks), (3) lockdown network (March 16–March 29, two weeks), and (4) crisis network (March 30–April 12, two weeks).

The reason we opted for six rather than two weeks in the first period is to illustrate what we observed as a "slow start of the COVID-19 pandemic that increased exponentially" (Sciensano 2020). This aligns with the meta-data of the statistical reports of Sciensano, which started issuing data beginning on March 1, 2020, and provided a daily report from March 14 onward. [3]

Four network plots (and one overview plot) are presented to provide descriptive evidence concerning overall network structures and the embeddedness of individual actors in the four phases. For each phase, we present a one-mode matrix based on the actors' list in which we weigh ties between two actors based on the frequency of mentioning in the records of the logbook and/or minutes of the meetings.

Three rounds of coding were executed in an iterative manner in which we went back and forth to the data and codes of various issues and actors involved in each CMT and LT meeting that was reported in the data. In Appendix C in the Supporting Information online, we provide an excerpt of data cleaning and the coding process. We aimed to minimize bias by having the first and second author agree on codes and accordingly discuss the application of codes with the third author to agree on the content of issues and the involvement of actors reported in the various meetings.

Simultaneous with the coding process, an actor list of APA departments was developed, indexed, and pseudonymized (differentiating between operations and policy, n = 18), as well as actors of the port community (n = 55). The coding process was performed in Microsoft Excel. To calculate centralization and density scores reported in table 1, we used Ucinet 6 (Borgatti, Everett, and Freeman 2002). To develop the network plots, we use the node and centrality layout based on degree centrality analysis in the network visualization tool Visone 2.7.3 (http://visone.info/; Brandes and Wagner 2004).

The remainder of the article is organized in three sections. In the first results section, we present the findings on the structure and governance of the network of networks. We display in five figures an overall overview (figure 2), as well as more detailed views for each period (figures 3-6) to describe the development of the network structure and the embeddedness of individual actors of both the CMT and the LT of the APA during the COVID-19 pandemic. In the second results section, we elaborate on the findings of how this network of networks managed the crisis before and during the COVID-19 pandemic. We close with a discussion and conclusion section, in which we present recommendations for future research and practice.

Because of space limitations, readers can find more detail on the broader research project online. In Appendix A, we provide background on the Port of Antwerp, a description of the APA, and

a more detailed account of the two levels of analysis and the involved actors. In Appendix B, we elaborate on each type of brokerage that the lead APA network enacted, illustrating the veracity of this dynamic process governing a network of networks.

Table 1. Types of data and descriptive measures of four networks

	Pre crisis network	Pre lock down network	Lock down network	Crisis network
Period (2020)	20/01-01/03	02/03-15/03	16/03-29/03	30/03-12/04
Weeks	6	2	2	2
Days	42	14	14	14
Meetings (all*)	3	5	24	21
Type of issues~ addressed in meetings	17 total	44 total	195 total	97 total
Decision-making	4	9	16	6
Information	11	29	138	74
Organizing	-	4	8	2
Planning	-	-	9	2
Sense-making	1	1	14	11
Solution	1	1	10	2
Actors involved	28	32	57	53
Ties	89	146	482	416
Centralization^	0.25	0.35	0.34	0.54
Density^	0.02	0.03	0.09	0.08
Multiplexity				
Frequency 1-3	89	127	316	346
Frequency 4-6	-	19	68	51
Frequency 7-9	-	-	51	27
Frequency 10-12	-	-	40	-
Frequency 13+	-	-	12	-
Central actors of APA only				
Rank 1	POA_OP/HSS	POA_OP/HSS	POA_OP/HSS	POA_OP/HSS
Rank 2	POA_HR	POA_HR	POA_HR	POA_OP/VT
Rank 3	POA_AD/SH	POA_CM	POA_OP/VT	POA_CM
Rank 4	POA_CM	POA_AD/SH	POA_AD/SH	POA_AD/SH
Rank 5	POA_KR	POA_KR	POA_CM	POA_HR
Central actors APA excluded				
Rank 1	FOD_VG/SP	SERVPROV3	STKHLDR_IND	FOD_VG/SP
Rank 2	STKHLDR_IND	STKHLDR_SHIP**	SERVPROV1	NAUTAUTH
Rank 3	STKHLDR_SOC1**	FOD_ECON**	FOD_VG/SP	STKHLDR_IND
Rank 4	MEDIC1**	FOD_VG/GD**	STKHLDR_SHIP	STKHLDR_SHIP
Rank 5	STKHLDR_SHIP	STKHLDR_IND**	SERVPROV2	STKHLDR_INLAND

Note:

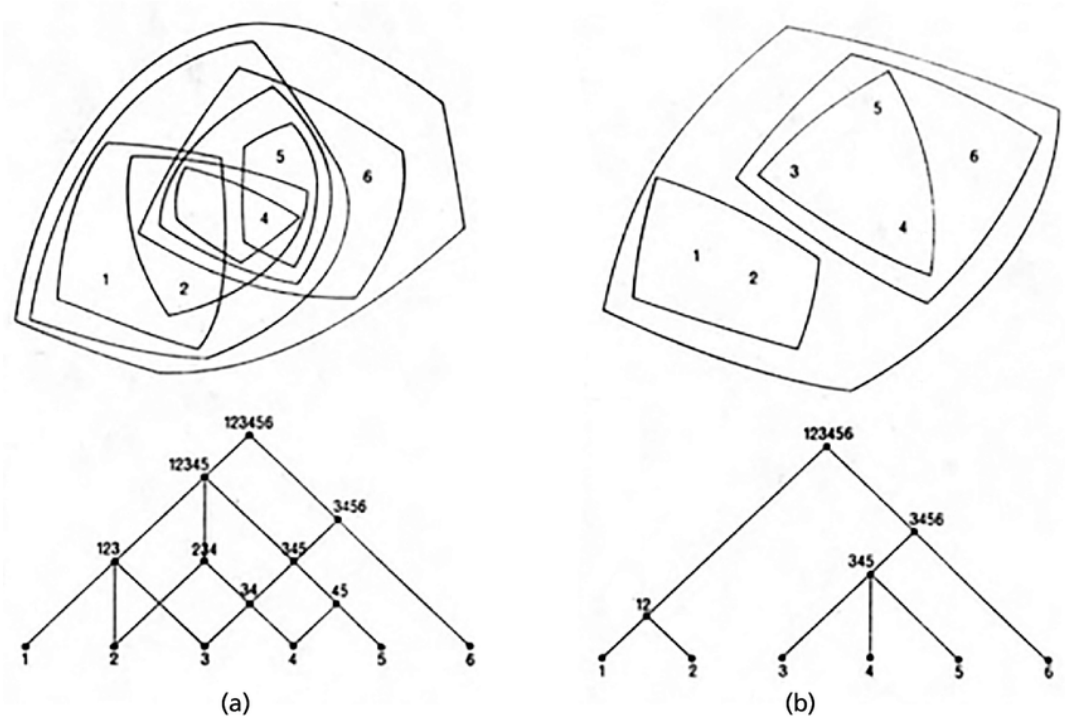
*We had access to data from three types of meetings: crisis management team meetings (CMT, N=25 including 3 extra), leadership team meetings (LT, N=15), and nautical partners meeting (NM, N=10).

~Type of issues is based on the crisis management and leadership team meetings (egocentric network perspective)

^ For the purpose of analysis values of ties between actors (N=73) were dichotomized

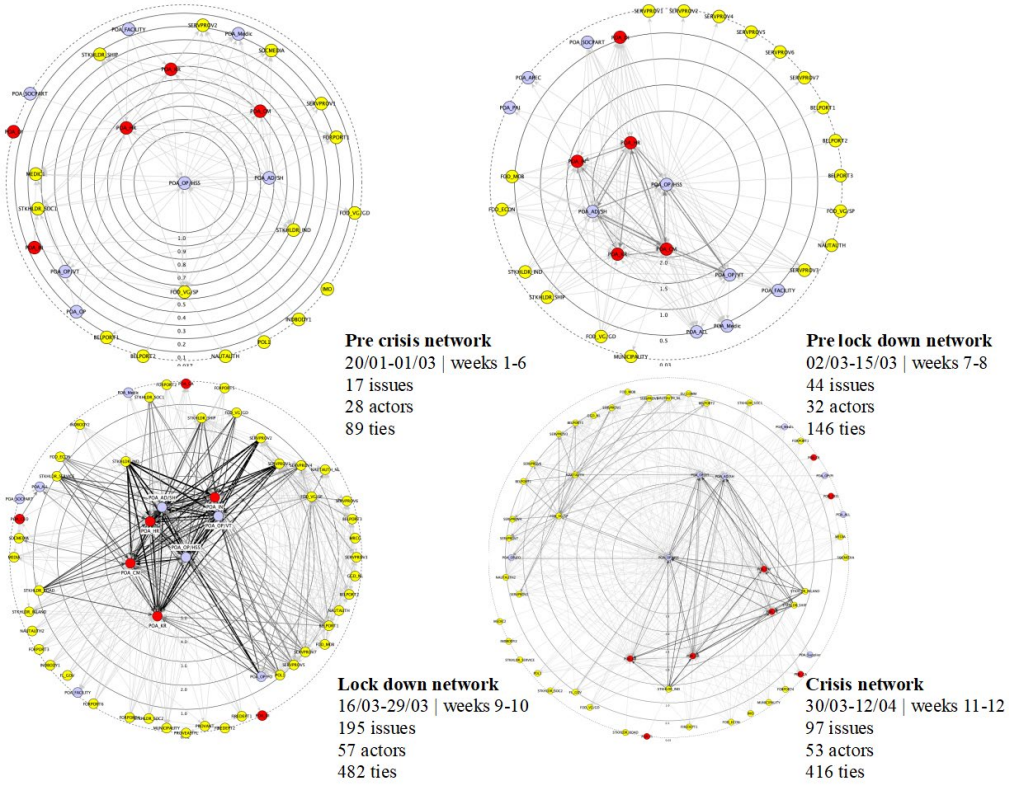
** Actors centrality value is similar

Figure 1. Semilattice (a) versus tree structure (b) to illustrate the embeddedness of networks (subsets) in an organizational field (superset). Original source: Alexander (2015). A city is not a tree. 50th anniversary edition. Original text originates from 1965. Figure is adapted from Gabriel and Quillien (2019).



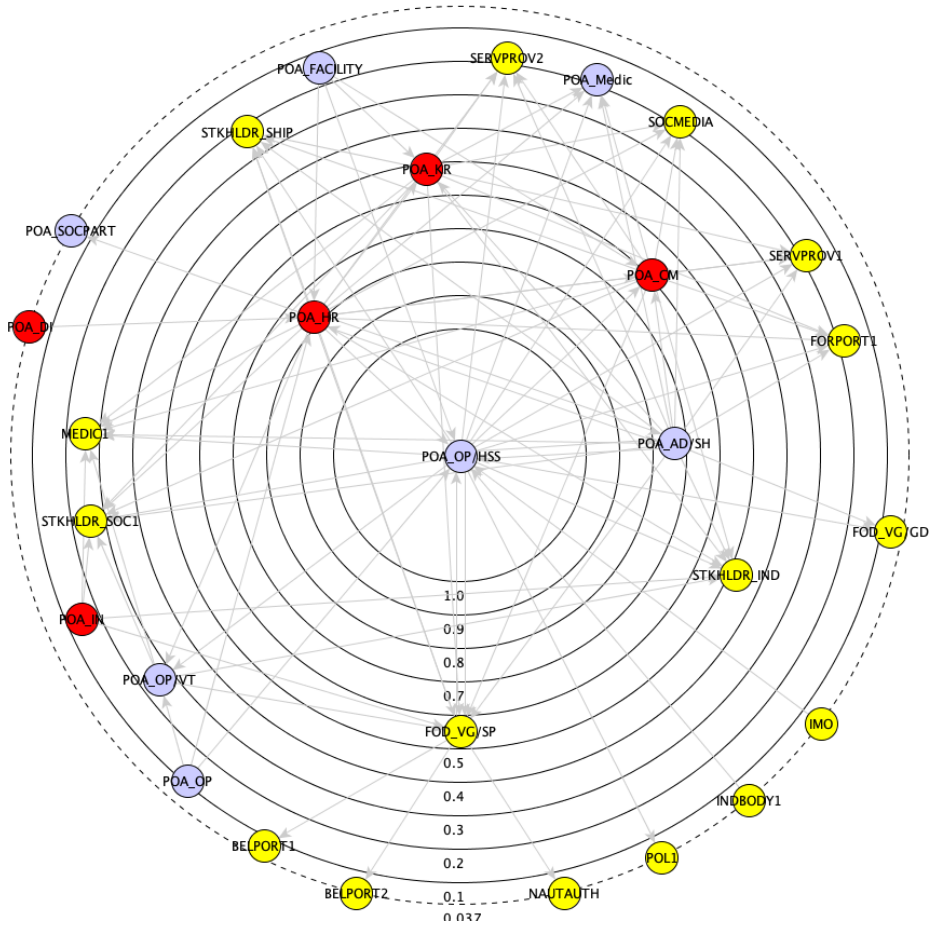
By comparing the semilattice structure (a) to a tree structure (b), it becomes clear that *'a collection of sets forms a semilattice if and only if, when two overlapping sets belong to the collection, the set of elements common to both also belongs to the collection. Contrary a collection of sets forms a tree if and only if, for any two sets that belong to the collection either one is wholly contained in the other or else they are wholly disjoint (Alexander 2015 :6-7).'*

Figure 2. Evolution of four network structures of APA and port community during the COVID-19 pandemic in the Port of Antwerp.



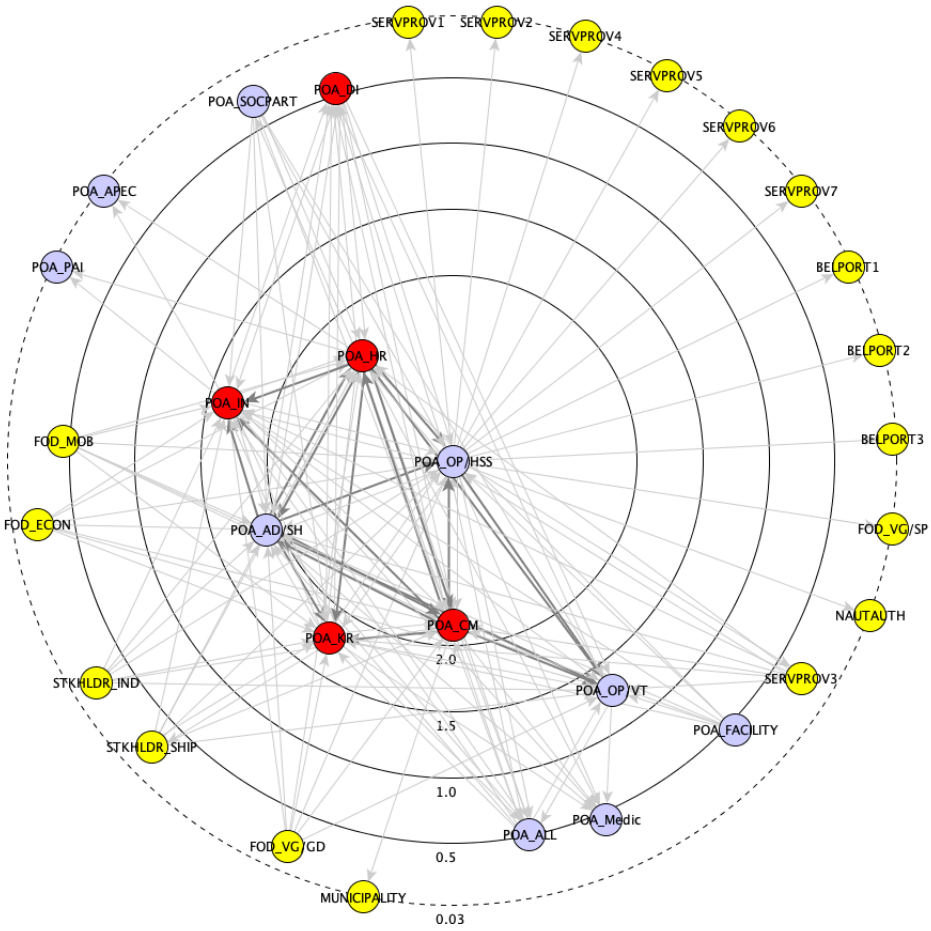
Legend:
Centrality layout based on node value (degree std., link strength frequency value).
Ties with a frequency 1-3 are displayed in light grey.
Ties with a frequency 4-6 are displayed in dark grey.
Ties with a frequency 7-9 are displayed in black
Ties with a frequency 10-12 are displayed in black with a larger size.
Ties with a frequency 13+ are displayed in black with a larger size.
Red nodes refer to leadership of APA.
Purple nodes refer to operations of APA.
Yellow nodes refer to partners of POA.

Figure 3. Pre-crisis network.



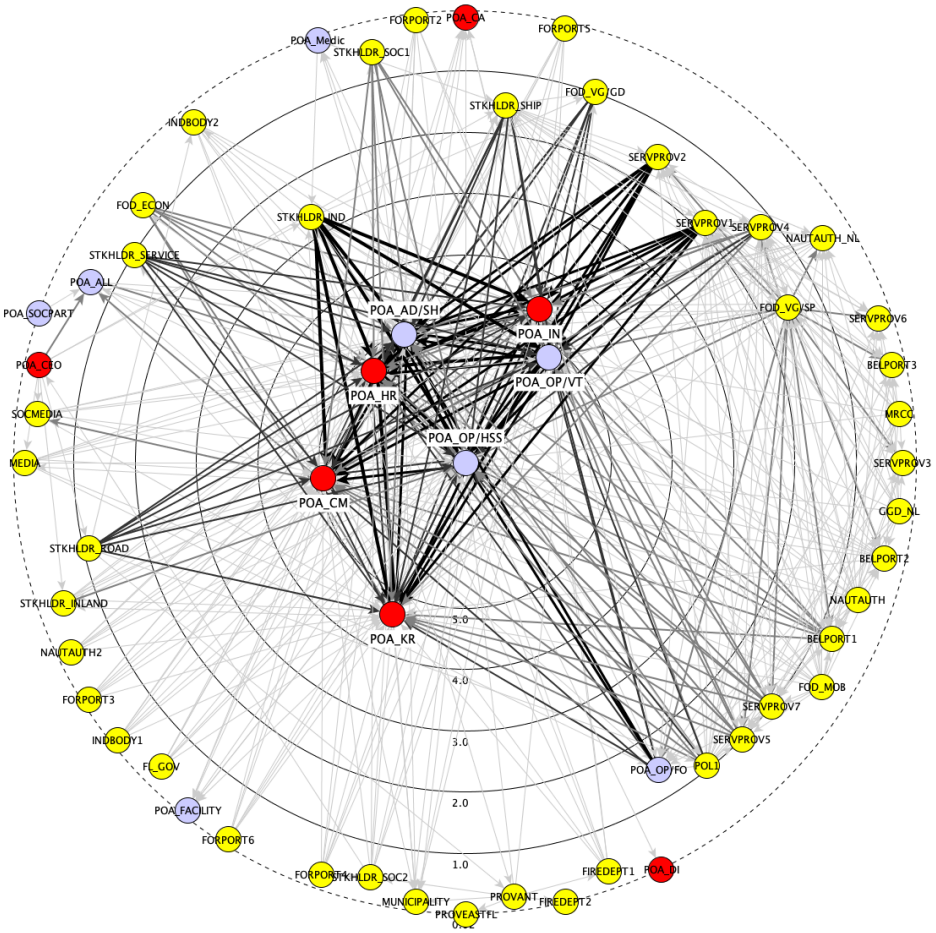
***Legend*:**
Centrality layout based on node value (degree std., link strength uniform).
28 actors with 89 ties in total are displayed.
Ties with a frequency 1-3 are displayed.
Red nodes refer to leadership of APA.
Purple nodes refer to operations of APA.
Yellow nodes refer to partners of POA.

Figure 4. Pre-lock down network.



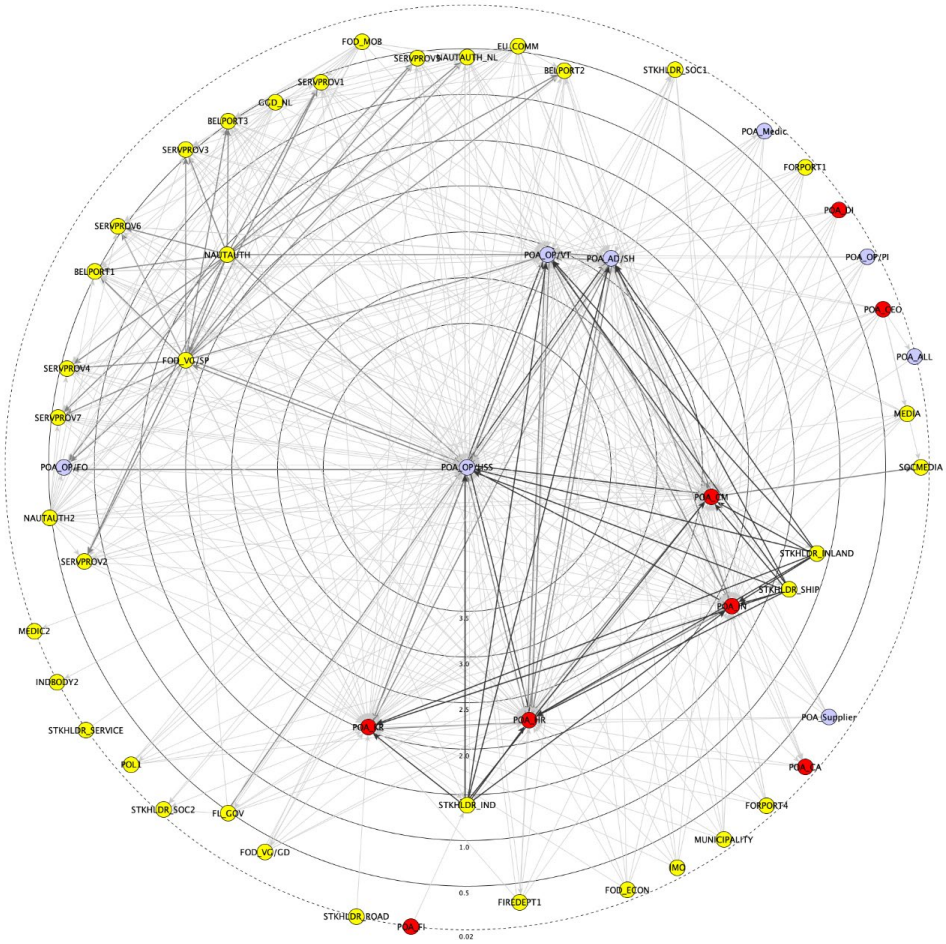
Legend:
Centrality layout based on node value (degree std., link strength uniform).
32 actors with 146 ties in total are displayed.
Ties with a frequency 1-3 are displayed in light grey.
Ties with a frequency 4-6 are displayed in dark grey.
Red nodes refer to leadership of PALN.
Purple nodes refer to operations of PALN.
Yellow nodes refer to partners of POA.

Figure 5. Lock down network



***Legend*:**
Centrality layout based on node value (degree std., link strength uniform). 57 actors with 482 ties in total are displayed.
Ties with a frequency 1-3 are displayed in light grey. Ties with a frequency 4-6 are displayed in dark grey. Ties with a frequency 7-9 are displayed in black Ties with a frequency 10-12 are displayed in black with a larger size. Ties with a frequency 13+ are displayed in black with a larger size.
Red nodes refer to leadership of APA, purple nodes refer to operations of APA and, yellow nodes refer to partners of POA.

Figure 6. Crisis network



***Legend*:**
Centrality layout based on node value (degree std., link strength uniform).53 actors with 416 ties in total are displayed.
Ties with a frequency 1-3 are displayed in light grey. Ties with a frequency 4-6 are displayed in dark grey. Ties with a frequency 7-9 are displayed in black
Red nodes refer to leadership of APA, purple nodes refer to operations of APA, and yellow nodes refer to partners of POA.

Findings on the Structure and Governance of Network of Networks: An Endogenous Perspective on Selective Integration

In figure 2, we map the network structures along the evolution of the COVID-19 pandemic. In the first six weeks, the network structure was composed of 28 actors dealing with 17 issues in total (see tables 1 and 2). However, in the course of merely four weeks (March 1–29), the number of actors doubled, the number of initial ties multiplied more than five times, and together with its partners, the APA had to deal with 195 issues in just two weeks at its peak. In the last phase, the situation stabilized (March 30–April 4).

In those periods, each network structure shows various links between APA actors (purple and red nodes) and external actors (yellow nodes) from which APA derives its legitimacy (Human and Provan 2000). The goal of the APA was to avoid a legitimacy crisis in which it could lose its formal authority over the Port of Antwerp (Human and Provan 2000). Therefore, it aimed to prevent at all costs the closure of the port as a result of the COVID-19 pandemic. The APA followed what Human and Provan (2000) term a "dual legitimacy-building strategy," in which personnel were provided with resources and support to arrange institutions and structures of authority and collaboration such as a CMT on the level of operations and a task force and NP meeting on the policy level. The LT compared with the CMT was more externally focused on building outside-in legitimacy by solidifying relationships with important stakeholders from the port community.

The APA can be considered successful in managing the pandemic in the sense that the port remained fully operational throughout the four phases on all terminals. In comparison, one U.S. port was reported to have closed down for several hours on March 18 as a result of contamination of personnel (incident report, Port of Houston, March 19, 2020 [4]).

When comparing the four network structures with each other, we find that after the first six weeks, a core group of actors from the APA assembled. Together these seven actors—(purple and red nodes) displayed in the center of the figures—formed what we term a lead network (cf. Provan and Kenis 2008). Analogous to Provan and Kenis's lead organization—a mode of governance involving a single organization acting as a highly centralized network broker to govern all major network-level activities and key decisions—a lead network from a network of networks point of view represents a single network composed of multiple functional units from various organizations and networks that differ in (lateral) position, categories of relevant resources, knowledge, or experience, and in proportion to socially valued tangible and intangible assets or resources within the organizational field of the Port of Antwerp (cf. Harrison and Klein 2007).

The comparison of structures with the issues being dealt with before and during the COVID-19 pandemic (table 1) shows that in the pre-crisis network (figure 2), the departments and divisions of the APA acted under business as usual. Before the pandemic started, the mode of governance of the

APA was best described as brokered governance, which both governs the sustainment of the port community and its activities as well as participates as a broker in major port activities and key decisions (see Appendix A). This corresponds with elements from a lead organization (level of operations) as well as a network administrative organization (policy level) as governance modes (cf. Provan and Kenis 2008).

When we examine the development of the APA evolving from a pre-lockdown network to a lockdown network to a crisis network, we observe that the governance of the network developed into a lead network that, at its core, was composed of APA actors (cf. Nowell et al. 2018). Over the course of the pandemic, its structure evolved from a state of loosely coupled links that were targeted and appropriate (figures 3, 4) toward a state of tightly coupled links that were stronger and more intense based on the frequency of interactions (figures 5, 6). Note that although the crisis network structure in figure 6 is similar in the number of actors and amount of ties compared with the lockdown network in figure 5, the number of issues to be resolved by the APA in collaboration with others dropped significantly from 195 to 97 in two weeks' time.

Once the Port of Antwerp entered the phase of lockdown and subsequently crisis, the functional units of the APA took the lead, enacted by multiple brokerage roles allowing them to pool information and resources and work together with port community actors to guarantee the operability of the port as well as ensure that the main sea gateway remained open for shipping. We found incidence for five types of brokerage (Gould and Fernandez 1989; see Appendix B), with the lead APA network selectively integrating various overlapping subgroups both within as well as (in a later stage) between functional units of various organizations and networks.

The strategic orientation in brokering followed by the lead network was to collaborate to achieve the field-level goal: keeping the port open (cf. Soda, Tortoriello, and Iorio 2018). During the pandemic, this was exemplified by three distinct brokering behaviors: separating, mediating, and joining (stratification of) organizations and networks (Grosser et al. 2019; Gulati, Puranam, and Tushman 2012).

The network analysis also showed that another network was created by the lead APA network to safeguard, monitor, and control the sea gate to the port during the lockdown period (figure 5). In figure 5, this network is difficult to isolate because of the density of the network structure (table 1); however, in figure 6, the network is more evident in the top-left corner. The inception of the network can be derived from the NP meeting initiated by the APA on March 12. The inception of this network as an institution and structure of authority and collaboration is interesting for several reasons.

Table 2. A description of solutions-to-problems differentiated for scales highlighting against the interlink between crisis management team and leadership team given type of issue.

Classifications of issues (selective coding)	Types of issues (axial coding)	APA operations	APA directors
Information	Communication	• Communication of formal procedure on handling incoming vessels suspected of contamination (31 Jan.) • Communication with governments, stakeholders, and service providers how to conduct a case of Covid-19 contamination (Extra crisis management meetings on 6th and 7th Apr.) • Guideline for inland navigation sent out for review (18th Apr.) • APA operations organized webinars to ensure national and international partners of the operational readiness and continuation of the Port	• First suspect case of personnel possibly infected communicated by intranet of APA (12 Mar.) • First communication by CEO around the sixth Crisis Management Team meeting (16th of Mar.) • Press conference on wearables (24th of Mar.) • Contact with government to ensure full operability of Port of Antwerp (25th Mar.) • Letter concerning the use of dust masks send out (26th Mar.)
	Confirmation	• Confirmation of successful distribution of sanitation products (28 Feb.) • Inland navigation plan approved by government (8th Apr.) • Confirmation to ship-owners that it is safe for their vessels to call at the port of Antwerp	• Unions agreed on measures for working home (5th Mar.)
	Sending or receiving feedback	• Feedback received from governments (5th,25th Mar.), stakeholders (23rd, 25th Mar.), service providers (25th Mar., 1st Apr.) • Feedback on situation with the parking of trucks (30th Mar.) • Feedback from Task Force (2nd Apr.)	• Daily updates from the Crisis Management team to the Leadership team • Feedback president to board (17th Mar.) • Feedback to Province (27th Mar.) • Feedback from Audit (2nd Apr.) • Feedback on perception of task forces from parties not involved
	Information provision	• Information on suspected vessels (18th 20th, 23rd, 25th Mar., 6th and 10th Apr.) • Information on port transportation, parking, office and equipment, organization (23rd, 24th, 25th, 26th, 27th, 30th Mar.,) • Information from other ports (23rd Mar., 1st Apr.) • Internal web-page online	• Document on temporary employment (17th Mar.) • Statement following the Press Conference of the government on the situation in the Port of Antwerp (continuation of activities) • Information from government (13th Mar.) • Roundtable with port authorities (27th Mar.) • Information from other ports 30th Mar.)
	Inquiry	• by FOD VG/GD on March 16th for assistance in the delivery of PPE for the medical sector (turning point in crisis)	• From Emergency and Fire service on border closure (20th Mar.) • On financial measures and possibilities (20th – 31st Mar.)
	Q&A	• Startup of the corona@portofantwerp.com information address for stakeholders	• Multiple questions by mail and telephone received from Port Facility Security Officers (10 Feb.) • AP Interview with head of communication

Classifications of issues (selective coding)	Types of issues (axial coding)	APA operations	APA directors
	Receiving signals	• From Huwei, China (22nd Jan.) • From suspicion of vessel containment (2nd Mar.) • From situation on parked truck drivers (16th Mar.) • From personnel concerns (13th, 16th, 19th, 25th Mar.) • From running out of stocks (12th Mar.), delayed payments (24th Mar.), cargo (25th Mar.) • From service providers (20th Mar.) • From an incident with incoming vessel (14th Apr.)	• From concerns of nautical partners (13th Mar.) • From concerns of a port and the Task Force (19th Mar.) • From concerns of customers (13th Mar.) • From concerns of service providers (17th, 19th, 24th, Mar.) • From concerns of stakeholders (17th, 18th Mar.) • Identification that one of the key partners might not be fully prepared.
	Sending or receiving updates	Various updates from and to governments, stakeholders, and service providers. Some mention worthy updates were: • Update from cruise ships (5th Mar.) • Update from Italian situation (12th Mar.) • Update given to social partners (12th Mar.) • Update from foreign ports (in heavily affected regions) (17th Mar.) • Update from government on safety masks (19th Mar.) • Update on cross-border employees (24th Mar.) • Update on Biohazardous waste (26th Mar.) • Update from Board of Directors (3rd Apr.) • Update from Media and communicative actions (6th Apr.) • Update on cured personnel (10th Apr.)	• Update on conference call and telecommunication (17 Mar.) • Update from other ports (18th Mar., 1st Apr.) • Update on media (20th Mar.) • Update on Biohazardous waste (20th Mar.) • Update on personnel and organization (23rd Mar.) • Update on Task Force (30th Mar.)
	Verification	• With other port (26th Feb.) • With international colleagues (12th Mar.) • With stakeholders and service providers (16th Mar.) • With customers on inland navigation (20th Mar.)	• On necessary measures for continuity and exchange personnel of (17th Mar.)
Decisions	Decision-making	Various decisions were made. Some mention worthy were: • On travel arrangements, visits, and events (2nd Mar.) • On in-house activities and other events (12th Mar.) • On startup of nautical partners meetings (12th Mar.) • On lock down of operations • On safety equipment and personal protection measures (17th Mar.) • On source On safety, medical, and personal protection equipment to others (20th Mar.) • On reopening of truckers parking (30th Mar.) • On lower frequency of crisis management team meeting (2nd Apr.) • APA took the lead in developing a procedure was released on how to work with Inland Vessels. This was released on April 8th and based on earlier decisions and communication, which started as from March 26th.	Various decisions were made. Some mention worthy were: • On enhance of business Intel (17th Mar.) • On implementing extra measure of physical distance in operations (17th Mar.) • On involving stakeholders in distribution of disinfectants (20th Mar.) • On setup of resilience platform • On starting up a team to look into the non-operational critical processes (March 20th) • On reduction of frequency of leadership team meetings (Incl. Task Force) • As from 13/03, APA took the decision to take the lead in starting up frequent calls with all partners in the Nautical Chain both on operational as on policy level

Classifications of issues (selective coding)	Types of issues (axial coding)	APA operations	APA directors
Organizing	Division of labor	• Of opening contact register for personnel (5th Mar.) • Of sanitation of desks and working areas (5th Mar.) • Of implementation of HR policy on temporary unemployment and annual leave (From 12th Mar. onwards) • Of implementation of lock down (16th Mar.)	• Of work organization and communication (13th Mar. onwards) • Policy on home office and work organization (maximum working from home) Of registration of COVID-19 related projects (17th Mar.) • Of interview arrangements (Media) (23rd Mar.) • Of customers relations for financial help (24th Mar.) • Of arrangements with audit committee (26th Mar.)
Planning	Strategic planning	• Of defining essential functions in port to allow for travel (16th Mar.) • Of post-COVID-19 preparation (23rd Mar.) • Of coordination among governments and emergency and fire services (23rd Mar. onwards) • Of restart plan (6th Apr. onwards)	• To realign organization's long term strategy (20th Mar.) • To become Post-COVID-19 ready as a port (27th Mar.)
	Preparation	• Of minimum staff in case of lock down (16th Mar.) • Of internal call center • Of back-up team members for the CMT (30th Mar.)	• Preparation of a delegation to the backup Directors to act on behalf of the primary responsible in decision authority (March 18th)
Sense making	Situational awareness	• Business Intel (26th Feb. onwards)	
	Discussion	• On external call center (17th Mar.) • On additional risks (I.e., Cybercrime) (19th Mar.) • On external communication to stakeholders (24th Mar.) • On symbolic thank you to all personnel (25th Mar.) • On future regulatory advice to Scheldt users (27th Mar.) • On authority of inland navigation vessels (1st Apr.) • On wearables for physical distancing (6th Apr.)	• On safety masks and equipment (18th Mar.) • On parking of trucks / truck drivers (23rd Mar.) • On the executive order of the government to ensure continuation of the logistic chain (25th Mar.)
	Interpretation	• On the perceived need to take measures (10th Feb) • On persons visiting the Port House or the Visitor Centre (March 12th)	• On the measures taken by the Federal government (on March 13th) • On additional measures taken by the Federal Government, (on March 20th)
Solutions	Partial improvements	• Public poster in function of first communication (27th Feb.) • Campaign of #supporttheport (19th Mar.) • Launch of COVID-19 website (19th Mar.) • Launch of external website (20th Mar.) • Launch of help line for personnel (25th Mar.)	• Poster on physical distancing on request of stakeholders (19th Mar.) • Sticker for cross border transport (23rd Mar.) • Support of campaign #supporttheport (2nd Apr.)

The network was highly selective in its member base, representing a limited number of actors responsible for the nautical operations in relation to the Flemish and Dutch ports of the Scheldt estuary, including the port authorities, tugboat companies, and pilots. In line with the shared-participant network governance mode (Provan and Kenis 2008), this network of a small group of actors aligned around a common purpose: keeping the sea gate to the ports in the Scheldt River open at all costs, despite the fact that these actors have historically been in competition with each other. The priority of keeping each port in the Scheldt estuary open during the pandemic likely explains why they were willing to redistribute operational resources among one another as long as this safeguarded the attainment of not closing down their port.

Although the network was originally incepted as a temporary information diffusion network, its function altered over the course from sharing information, to problem-solving, to building (inter)national capacity to address future community needs which might arise.

The presidency of the meeting was handed over to the transnational nautical authority over the Scheldt estuary beginning April 1 to be consistent with its formal authority toward external parties (e.g., shipping) and to further enhance consensus and power symmetry between the actors. By stepping down as chair, the lead APA network ensured that competitors remained working together.

Findings on Crisis Management by the Network of Networks: An Exogenous Perspective on Collective Focus

In table 2, we provide an overview of what the APA did in terms of crisis management, differentiating between the levels of operations and policy. When we look at the issues that were addressed in the APA meetings, we see a shift in attention from COVID-19 as a public health issue toward the effects of the pandemic on the economy and society. Further, the types of issues addressed in the various meetings over the four periods suggest that COVID-19 as a wicked problem was mostly perceived as a problem of "information provision," "decision-making," and, to a lesser degree, "sense-making" of the current situation that the APA was in (see table 1 for a summary and table 2 for details).

When we retrospectively examined how the APA managed the crisis in the Port of Antwerp throughout the COVID-19 pandemic, we found several interesting matters that highlighted the idiosyncrasies of this information problem. Both on the level of operations as well as policy, the APA acquired, distributed, interpreted, and integrated information (Flores et al. 2012). This suggests that COVID-19 was mostly perceived as an information problem because both a lack and an abundance of information led to not fully understanding the nature of the problem, which made COVID-19 wicked.

Information was transferred through various means of communication. At some point, the APA even organized webinars to ensure that national and international partners were informed of the operational readiness and continuation of the port. However, in most cases, feedback and updates were exchanged within the APA and with actors from the port community. The APA made sure that

information was presented to those who needed to execute particular tasks or coordinated crisis management and communication (Puranam, Alexy, and Reitzig 2014).

Another emerging topic was the operational method, resulting in a clear collective focus on the tasks at hand. This helped the APA get some kind of grip on the crisis situation. Related to this was how the APA developed a collective focus within the port community. Internally, the CMT (operations) reported daily updates to the LT (policy) on various issues. It made sure that it collected the perceptions of parties that were not involved in the task force. The task force was assembled by the APA to have policy-level meetings with the representative bodies of the main industry and shipping stakeholders, including public actors such as the Federal Police, the Fire Department, the Federal Public Service of Health, and representatives of the municipal, provincial, and regional governments to ensure alignment across logistic chain and the environment in which it acted.

Externally, the APA detected early (warning) signals from the evolving situation in China because of its national and international network of ports. After verifying the signals received, the APA could take informed measures to contain and manage the crisis.

Based on being informed quickly and accurately, the APA was able to take the lead and act proactively. As a response to numerous inquiries about dealing with inland navigation barges within the COVID-19 context, a procedure was drafted by the APA and shared for consent with the other ports in the Scheldt estuary and with the authorities responsible for inland navigation on March 21 and released on April 8 after final verification with the inland navigation representative bodies. The extensive but delaying consent seeking led to a unified approach toward a highly scattered subgroup, the inland navigation industry, which fully embraced it.

Another example was how the APA prepared and dealt with the lockdown. Belgium went into lockdown beginning on March 18, but on March 16, the APA was already defining the essential functions of the port that needed to remain operational for travel and transportation. The APA's high performance can be (at least) partially attributed to it being principal driven rather than rule driven (cf. Lauder and Marynissen 2018). The APA's guiding principle during the pandemic was that the port should remain open. The data provide various indications that the APA acted in this proactive fashion. For example, on March 13, the APA made the decision to take the lead in starting frequent calls with all partners in the nautical chain, both on the operational and on the policy level. Also, it followed up on the executive order of the government to ensure continuation of the logistic chain (March 25) and realigned its long-term strategy (March 20), as well as planned how to become a post-coronavirus port (March 17) with a restart plan (April 6) and a backup team for leadership already in place even before policy was determined (March 18).

This likely explains why we found that from March 23, the crisis was contained, and consequently from April 2, the APA decided to reduce the frequency of meetings. Interestingly, however, when we took into account the actual solutions the APA had devised to solve the pandemic,

we found it made a public poster, initiated a digital campaign, launched two websites, and arranged a call center to provide a hotline to help personnel.

Discussion and Recommendations for Future Research

Our findings inform further research on network of networks in public administration in three ways. First, the notion of network of networks adheres to a multilevel "systems" analysis, which requires both an endogenous and an exogenous view on networks embedded within a larger system (Contractor, Wasserman, and Faust 2006; Maier 1998; Moliterno and Mahony 2011; Nowell, Hano, and Yang 2019; Provan, Fish, and Sydow 2007; Provan and Kenis 2008). The notion of network of networks implies different questions from those asked in the traditional streams of organizational research and network research. It can be crucial in helping public managers and policy planners make their organizational fields more resilient, because it underpins how networks with different configurations of structure and modes of governance have different effects depending on the nature of the problem being faced and the embeddedness of these networks and organizations within an organizational field (Berthod et al. 2017; Raab, Mannak, and Cambré 2015).

Although this article only examined the notion of network of networks from an egocentric point of view (the APA within the Port of Antwerp community), we gained a first glimpse of the scale and complexity that was involved with the COVID-19 pandemic. Future research could in particular build on and extend this exogenous network of networks perspective, focusing on a collection of multiple networks that in some ways are interdependent within an organizational field to explain why and how they might come together to create a larger, more complex system such as a port or city. Based on the preliminary evidence presented here and building on the work of others, we propose two governance mechanisms that can be crucial in these explanations: first, how a network of networks provides and motivates a collective focus by an organizational field on the problem being faced (cf. Kenis and Knoke 2002; Provan and Kenis 2008), and second, how a network of networks installs and uses institutions and structures of authority and collaboration to selectively integrate those networks that need to work together, while others that do not need to work together do not (Nowell, Hano, and Yang 2019; Provan and Kenis 2008; Provan and Lemaire 2012).

The notion of network of networks combined with the network governance perspective of Provan and Kenis (2008) can be helpful in advancing empirical research on the design and governance of network of networks. It centers our attention on the ways in which networks at one level are embedded within and articulated by networks at other levels (Kilduff and Tsai 2003; Tasselli, Kilduff, and Menges 2015). This requires defining the various loci of network governance, for example, differentiating between the use of institutions and the structure of authority and collaboration at various intersections of policy, administration, and task integration (Alter and Hage 1993; Nowell, Hano, and Yang 2019; Rethemeyer and Hatmaker 2008). This not only prompts us to rethink the

original dimensions of network governance outlined by Provan and Kenis (2008) from an exogenous perspective, but also suggests adopting a dynamic and configurational approach toward brokerage (cf. Kwon et al. 2020; Vermeiren, Raeymaeckers, and Beagles 2019; Raab et al., 2015).

In addition, previous research on organizational and network design may guide us in how to design institutions and structures on authority and collaboration that can act as structural inter- and intra-faces that a network of networks selectively can employ to achieve a field-level purpose (Albers, Wohlgezogen, and Zajac 2016; Gulati, Puranam, and Tushman 2012; Moynihan 2009; Kenis and Raab 2020). Specific attention should be given to the influence of various forms of embeddedness and proximity on interorganizational tie formation and dissolution to explain subset and superset relations between various networks understood as smaller systems embedded in the larger, complex system of the organizational field (Mannak et al. 2019; van Zelst, Mannak, and Oerlemans 2017).

Third, the findings provide some preliminary evidence for addressing anticipatory and mitigative actions among a network of high-reliability organizations, that is, fire and emergency services, police, and municipalities (Weick and Sutcliffe 2011), and networks, that is, the lead APA network and the network of nautical partners (Berthod et al. 2017). The concept of high-reliability organizations gives direction for anticipating and containing incidents within a single organization and focuses on maintaining a high degree of operational safety that can be achieved by "a free flow of information at all times" (Rochlin 1999, 1554) embedded in "a pattern of heedful interrelations of actions in a social system" (Weick and Roberts 1993, 357). We lack, however, examples of how these types of interrelations must be designed, supported, or implemented in an organization (Marynissen et al. 2014) or a network (Berthod et al. 2017).

This research helps us understand the response to crisis in a very specific case and context. Nevertheless, several preliminary findings may be generalizable to other organizational fields such as (air)ports, cities, safety regions, health and social care systems, or innovation regions such as the Brainport region. For instance, one important aspect we found was the consistency of communication and the selective integration of organizations and networks with adequate monitoring and control, avoiding imposing strong constraints that limit cooperation or minimize the independence of various subsystems. However, in some contexts such as safety regions, this may be at odds with common practices in crisis management among public organizations that are dominated by a strong command and control approach (Groenendaal and Helsloot 2016; Moynihan 2009).

Moreover, as we are increasingly not only dealing with one specific organization, but with multiple organizational networks that are involved in "taming" a wicked problem, the findings suggests that network managers (brokers) and public policy planners (designers) need to think together about how a network of a collection of organizational networks can create, selectively integrate, and reproduce an effective complex, larger system that offers more adequate functionality and performance to match the scope and detailed nature of a problem that faces an organizational

field. Future research needs to determine which configuration of structure and governance of network of networks consistently achieves what field-level outcomes given the context of an organizational field. When limited diversity is present among various organizational fields, we can start by revisiting the preliminary theorems introduced by Keith Provan and colleagues.

This calls for further investigation of various wicked problems as coevolutionary patterns of interaction between networks and organizations as separate from, yet part of, an environment external to these networks and organizations themselves (Alter 1990; Nowell, Hano, and Yang 2019). The empirical work on fire and emergency services by Berthod et al. (2017), on health care by Nowell, Hano, and Yang (2019), and on public health and infectious disease outbreaks by Raab et al. (2020), De Vries et al. (2019), and Kenis et al. (2019) illustrates both the theoretical relevance and practical value of an exogenous perspective on network of networks.

To stimulate fresh thinking in practice and spur empirical research on network of networks, our viewpoint is as follows: The key to the solution of how to deal with a wicked problem is to structure a system in such a way that provides appropriate incentives for collective focus and selective integration with adequate monitoring and control, but to avoid imposing strong constraints that might limit cooperation or minimize the operational and managerial independence of various subsystems that make up this larger, complex system.

Conclusion and Limitations

In this article, we reported on how the Antwerp Port Authority dealt with the COVID-19 pandemic by examining the network structure and the embeddedness of individual actors of both the crisis management team and the leadership team. We drew on the records and minutes of three types of meetings: crisis management team meetings, nautical partners meetings, and leadership team meetings. The data covered a period of 12 weeks (January 20–April 12), including 53 meetings mentioning 73 unique actors involved.

The network analysis revealed how the structure of the lead APA network developed during various phases of the crisis. We found various indications of interdependence and emergence between the APA as a lead network in a network of networks within the port community. In addition, the results show how the lead APA network governed organizations and networks in the port community. Practitioners and scholars should be tentative in generalizing these preliminary findings presented here, because the data only allowed us to employ an egocentric network perspective based on the APA lead network. By having provided descriptive evidence concerning the development of the structure, governance, and crisis management by the APA lead network before and during the COVID-19 pandemic, we hope to engage practitioners and network scholars to rethink current design and governance of organizational networks within organizational fields that have been hit by the COVID-19 pandemic. It would be very promising for policy and practice to be able in the nearby future to

identify what factors of a wicked problem that faces an organizational field determines what combination of structure and governance arrangement we need to employ when, and why.

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Notes

[1] By "defining a focus," we mean a temporally unfolding and contextualized process of input regulation and interaction articulation in which a "wicked problem" is scanned, given meaning to, and structured by decomposing it into a set of tasks that can be divided and allocated (Daft and Weick 1984; Faraj and Xiao 2006; Puranam, Alexy, and Reitzig 2014). Note that this process of defining or making sense is temporal and subjective in nature and a key challenge is organizing solutions toward problems of which are not fully in scope nor understand its detailed nature require that we make sense of how we understand problems (Weick 1995).

[2] In future research, we aim to broaden this scope by expanding the periods as well as the triangulate the egocentric perspective from the Port Authority with other perspectives from actors of the port community.

[3] Sciensano is the Belgian institute for health responsible for the epidemiological follow-up of the COVID-19 epidemic in collaboration with its partners and other health care actors. Data can be accessed at https://www.sciensano.be/en.

[4] Port of Houston, incident report, March 19, 2020, https://porthouston.com/wp-content/uploads/COVID19_2020_03_18_BCT_BPT_Incident_Report.pdf.

References

Agranoff, R., & McGuire, M. (2003). Collaborative public management: New strategies for local governments. Georgetown University Press.

Albers, S., Wohlgezogen, F., & Zajac, E. J. (2016). Strategic alliance structures: An organization design perspective. Journal of Management, 42(3), 582-614. https://doi.org/10.1177/0149206313488209

Aldrich, H. E., & Pfeffer, J. (1976). Environments of organizations. Annual review of sociology, 2(1), 79-105. https://www.jstor.org/stable/2946087
Alexander, C. (2015). A city is not a tree. 50th Anniversary Edition. (Eds. Mehaffy, M.W.) Sustasis Press.
Alter, C., & Hage, J. (1993). Organizations working together(Vol. 191). Sage Publications, Inc.
Alter, C. (1990). An exploratory study of conflict and coordination in interorganizational service delivery system. Academy of management journal, 33(3), 478-502. https://doi.org/10.5465/256577
Bar-Yam, Y. (2004). Making things work: solving complex problems in a complex world. Knowledge Industry.
Berthod, O., Grothe-Hammer, M., Müller-Seitz, G., Raab, J., & Sydow, J. (2017). From high-reliability organizations to high-reliability networks: the dynamics of network governance in the face of emergency. Journal of Public Administration Research and Theory, 27(2), 352-371. https://doi.org/10.1093/jopart/muw050
Borgatti, S.P., Everett, M.G. and Freeman, L.C. 2002. Ucinet 6 for Windows: Software for Social Network Analysis. Harvard, MA: Analytic Technologies.
Brandes, U., & Wagner, D. (2004). Analysis and visualization of social networks. In Graph drawing software (pp. 321-340). Springer, Berlin, Heidelberg.
Cartwright, T. J. (1987). The lost art of planning. Long Range Planning, 20(2), 92-99. https://doi.org/10.1016/0024-6301(87)90011-2
Contractor, N. S., Wasserman, S., & Faust, K. (2006). Testing multitheoretical, multilevel hypotheses about organizational networks: An analytic framework and empirical example. Academy of Management Review, 31(3), 681-703.
Conklin, J. (2005). Wicked Problems & Social Complexity. CogNexus Institute. (Accessed on 04/12/2020 at https://cognexus.org/wpf/wickedproblems.pdf
Daft, R. L., & Weick, K. E. (1984). Toward a model of organizations as interpretation systems. Academy of management review, 9(2), 284-295. https://doi.org/10.5465/amr.1984.4277657
De Vries, M., Kenis, P., Kraaij-Dirkzwager, M., Ruitenberg, E. J., Raab, J., & Timen, A. (2019). Collaborative emergency preparedness and response to cross-institutional outbreaks of multidrug-resistant organisms: a scenario-based approach in two regions of the Netherlands. BMC public health, 19(1), 52. https://doi.org/10.1186/s12889-018-6376-7
DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. American sociological review, 147-160. https://doi.org/10.2307/2095101
Faraj, S., & Xiao, Y. (2006). Coordination in fast-response organizations. Management science, 52(8), 1155-1169. https://doi.org/10.1287/mnsc.1060.0526
Financial Times (2020). Coronavirus crisis brings fragmented Brussels together. Published on March 25, 2020, https://www.ft.com/content/3d24b654-187e-4270-b051-acfc350498d2
Fiss, P. C. (2007). A set-theoretic approach to organizational configurations. Academy of management review, 32(4), 1180-1198. https://doi.org/10.5465/amr.2007.26586092
Flores, L. G., Zheng, W., Rau, D., & Thomas, C. H. (2012). Organizational learning: Subprocess identification, construct validation, and an empirical test of cultural antecedents. Journal of Management, 38(2), 640-667. https://doi.org/10.1177/0149206310384631
Gabriel, R. P., & Quillien, J. (2019). A Search for Beauty/A Struggle with Complexity: Christopher Alexander. Urban Science, 3(2), 64. https://doi.org/10.3390/urbansci3020064
Gould, R. V., & Fernandez, R. M. (1989). Structures of mediation: A formal approach to brokerage in transaction networks. Sociological methodology, 89-126. https://doi.org/10.2307/270949
Groenendaal, J., Helsloot, I. (2016). A preliminary examination of command and control by incident commanders of Dutch fire services during real incidents. Journal of Contingencies & Crisis Management, 24, 2–13. https://doi.org/10.1111/1468-5973.12096
Grosser, T. J., Obstfeld, D., Labianca, G., & Borgatti, S. P. (2019). Measuring mediation and separation brokerage orientations: A further step toward studying the social network brokerage process. Academy of Management Discoveries, 5(2), 114-136. https://doi.org/10.5465/amd.2017.0110

Gulati, R., Puranam, P., & Tushman, M. (2012). Meta-organization design: Rethinking design in interorganizational and community contexts. Strategic management journal, 33(6), 571-586. https://doi.org/10.1002/smj.1975
Harrison, D. A., & Klein, K. J. (2007). What's the difference? Diversity constructs as separation, variety, or disparity in organizations. Academy of management review, 32(4), 1199-1228. https://doi.org/10.5465/amr.2007.26586096
Head, B. W. (2008). Wicked problems in public policy. Public policy, 3(2), 101.
Human, S. E., & Provan, K. G. (2000). Legitimacy building in the evolution of small-firm multilateral networks: A comparative study of success and demise. Administrative science quarterly, 45(2), 327-365. https://doi.org/10.2307/2667074
Kenis, P., & Knoke, D. (2002). How organizational field networks shape interorganizational tie-formation rates. Academy of Management Review, 27(2), 275-293. https://doi.org/10.5465/amr.2002.6588029
Kenis, P., & Raab, J. (2020). Back to the future: Using organization design theory for effective organizational networks. Perspectives on Public Management and Governance. https://doi.org/10.1093/ppmgov/gvaa005
Kenis, P., Schol, L. G., Kraaij-Dirkzwager, M. M., & Timen, A. (2019). Appropriate governance responses to infectious disease threats: developing working hypotheses. Risk, Hazards & Crisis in Public Policy, 10(3), 275-293. https://doi.org/10.1002/rhc3.12176
Kilduff, M., & Tsai, W. (2003). Social networks and organizations. Sage.
Kwon, S. W., Rondi, E., Levin, D. Z., De Massis, A., & Brass, D. J. (2020). Network brokerage: An integrative review and future research agenda. Journal of Management. https://doi.org/10.1177/0149206320914694
Lee, J., Rethemeyer, R. K., & Park, H. H. (2018). How does policy funding context matter to networks? Resource dependence, advocacy mobilization, and network structures. Journal of Public Administration Research and Theory, 28(3), 388-405. https://doi.org/10.1093/jopart/muy016
Marynissen, H., Ladkin, D., Denyer, D., Pilbeam, C. (2014). The constitutive role of safety communication in an organization managing high-risk processes. Conference paper for the Fourth International Conference on Engaged Management Scholarship, Tulsa, OK. https://dx.doi.org/10.2139/ssrn.2554051
Mannak, R. S., Meeus, M. T., Raab, J., & Smit, A. C. (2019). A temporal perspective on repeated ties across university-industry R&D consortia. Research Policy, 48(9), 103829. https://doi.org/10.1016/j.respol.2019.103829
Marynissen, H., Lauder, M. (2020). Stakeholder-focused communication strategy during crisis. A case study based on the Brussels terror attacks. International Journal of Business Communication, 57(2) 176–193. https://doi.org/10.1177/2329488419882736
Mayntz, R. (1993). Modernization and the logic of interorganizational networks. Knowledge and Policy, 6(1), 3-16. https://doi.org/10.1007/BF02692798
McChrystal, G. S., Collins, T., Silverman, D., & Fussell, C. (2015). Team of teams: New rules of engagement for a complex world. Penguin.
Milward, H. B., & Provan, K. G. (2006). A manager's guide to choosing and using collaborative networks (Vol. 8). Washington, DC: IBM Center for the Business of Government. Retrievable at: https://www.businessofgovernment.org/report/managers-guide-choosing-and-using-collaborative-networks
Moliterno, T. P., & Mahony, D. M. (2011). Network theory of organization: A multilevel approach. Journal of management, 37(2), 443-467. https://doi.org/10.1177/0149206310371692
Nowell, B., Hano, M. C., & Yang, Z. (2019). Networks of Networks? Toward an External Perspective on Whole Networks. Perspectives on Public Management and Governance, 2(3), 213-233. https://doi.org/10.1093/ppmgov/gvz005
Oliver, C. (1991). Strategic responses to institutional processes. Academy of management review, 16(1), 145-179. https://doi.org/10.5465/amr.1991.4279002
O'Toole Jr, L. J. (2015). Networks and networking: The public administrative agendas. Public administration review, 75(3), 361-371. https://doi.org/10.1111/puar.12281

Pfeffer, J., & Salancik, G. R. (2003). The external control of organizations: A resource dependence perspective. Stanford University Press.
Powell, W.W. (1990). Neither Market nor Hierarchy. Network forms of Organization. In Godwyn, M. & Gittell, J.H. (Eds.). *Sociology of Organizations: Structures and Relationships* (pp. 30-40). Sage.
Provan, K. G., Fish, A., & Sydow, J. (2007). Interorganizational networks at the network level: A review of the empirical literature on whole networks. Journal of management, 33(3), 479-516. https://doi.org/10.1177/0149206307302554
Provan, K. G., & Kenis, P. (2008). Modes of network governance: Structure, management, and effectiveness. Journal of public administration research and theory, 18(2), 229-252. https://doi.org/10.1093/jopart/mum015
Provan, K. G., & Lemaire, R. H. (2012). Core concepts and key ideas for understanding public sector organizational networks: Using research to inform scholarship and practice. *Public Administration Review*, *72*(5), 638-648. https://doi.org/10.1111/j.1540-6210.2012.02595.x
Provan, K. G., & Milward, H. B. (2001). Do networks really work? A framework for evaluating public-sector organizational networks. *Public administration review*, *61*(4), 414-423. https://doi.org/10.1111/0033-3352.00045
Provan, K. G., & Milward, H. B. (1994). Integration of community-based services for the severely mentally III and the structure of public funding: A comparison of four systems. *Journal of Health Politics, Policy and Law*, *19*(4), 865-894. https://doi.org/10.1215/03616878-19-4-865
Provan, K. G., & Milward, H. B. (1995). A preliminary theory of interorganizational network effectiveness: A comparative study of four community mental health systems. *Administrative science quarterly*, 1-33. https://doi.org/10.2307/2393698
Puranam, P., Alexy, O., & Reitzig, M. (2014). What's "new" about new forms of organizing?. *Academy of management Review*, *39*(2), 162-180. https://doi.org/10.5465/amr.2011.0436
Raab, J., & Kenis, P. (2009). Heading toward a society of networks: Empirical developments and theoretical challenges. *Journal of management inquiry*, *18*(3), 198-210. https://doi.org/10.1177%2F1056492609337493
Raab, J., Kenis, P., Kraaij–Dirkzwager, M., & Timen, A. (2020). Ex ante knowledge for infectious disease outbreaks: Introducing the organizational network governance approach. Springer series Knowledge & Space. Retrievable at: http://www.springer.com/series/7568
Raab, J., Lemaire, R. H., & Provan, K. G. (2013). The configurational approach in organizational network research, 225-253. In: Fiss, P.C., Cambré, B., & Marx, A. (Eds). Configurational theory and methods in organizational research, no. 38. Bingley, UK: Emerald Group Publishing, 2013,.
Raab, J., Mannak, R. S., & Cambré, B. (2015). Combining structure, governance, and context: A configurational approach to network effectiveness. *Journal of public administration research and theory*, *25*(2), 479-511. https://doi.org/10.1093/jopart/mut039
Raab, J., & Milward, H. B. (2003). Dark networks as problems. Journal of public administration research and theory, 13(4), 413-439. https://doi.org/10.1093/jpart/mug029
Rethemeyer, R. K., & Hatmaker, D. M. (2008). Network management reconsidered: An inquiry into management of network structures in public sector service provision. Journal of public administration research and theory, 18(4), 617-646. https://doi.org/10.1093/jopart/mum027
Rochlin, G. I. (1999). Safe operation as a social construct. Ergonomics, 42(11), 1549-1560. https://doi.org/10.1080/001401399184884
Salancik, G. R. (1995). Wanted: A good network theory of organization. https://doi.org/10.2307/2393642
Schneider, C. Q., & Wagemann, C. (2012). Set-theoretic methods for the social sciences: A guide to qualitative comparative analysis. Cambridge University Press.
Soda, G., Tortoriello, M., & Iorio, A. (2018). Harvesting value from brokerage: Individual strategic orientation, structural holes, and performance. Academy of Management Journal, 61(3), 896-918. https://doi.org/10.5465/amj.2016.0123

Tasselli, S., Kilduff, M., & Menges, J. I. (2015). The microfoundations of organizational social networks: A review and an agenda for future research. Journal of Management, 41(5), 1361-1387. https://doi.org/10.1177/0149206315573996

Van den Oord, S., Brugghemans, B., Marynissen, H., & Albers, S. (2019). From network to network of networks: a case study on network management to deal with uncertainty and equivocality. Full paper presentation at PMRC '19 – Public Management Research Conference 2019, The University of North Carolina at Chapel Hill, United States, June 11-14.

van Zelst, M., Mannak, R., & Oerlemans, L. (2017). With whom do firms form ties? A meta-analysis on the influence of embeddedness and proximity on inter-organizational tie formation. https://doi.org/10.31219/osf.io/3akbn

Vermeiren, C., Raeymaeckers, P., & Beagles, J. (2019). In search for inclusiveness: vertical complexity in public-nonprofit networks. Public Management Review, 1-21. https://doi.org/10.1080/14719037.2019.1668471

Weick, K. E. (1995). Sensemaking in organizations (Vol. 3). Sage.

Weick, K. E., Robberts, K. H. (1993). Collective mind in organizations: Heedful interrelating on Flight decks. Administrative Science Quarterly, 38(3), 357- 381. https://doi.org/10.2307/2393372

Weick, K. E, Sutcliffe, K. (2007). Managing the Unexpected – Resilient Performance in an Age of Uncertainty. San Francisco, CA: J Wiley & Sons.

APPENDICES

Background of the applied research project

Since 2018, the Antwerp Fire Service (Brandweer Zone Antwerpen or BZA) and Antwerp Management School (AMS) have been joining forces in an applied research project to develop a future vision on the organization of emergency services in Antwerp (hence the involvement of the fourth and fifth author, being the Fire Chief and company commander). In this project, we examine how to organize larger, complex systems for collective, field-level behavior; How organizations and networks in an organizational field can be selectively integrated—so that those networks that need to work together do so, while others that not need to work together, do not; And what institutions and structures of authority and collaboration we need that provide network managers (system designers) the means to create, collectively define, integrate, and dissolve a network solution to organizational field challenges such as public safety and health.

The second author is the Business Continuity Manager of the Port Authority, Port of Antwerp and plans to start with a PhD research at the University of Antwerp in 2020. He conducted multiple interviews for a conference paper, "The structure of effective network governance of the Antwerp Public Safety Network: Insights from Domain and Field Experts", that was accepted for presentation at IRSPM 2020 and PMRC 2020 conferences. Due to the COVID-19 pandemic, however, his topic changed course to examining the structure and network governance of the Port Authority in the midst of crisis management of the COVID-19 pandemic in the Port of Antwerp.

APPENDIX A: Description of Port of Antwerp

With 235mio tons of maritime freight volume (in 2019), the Port of Antwerp is the second largest port in Europe. Stretching over a surface of 120 km² and centrally positioned some 80km inland it has 60% of Europe's production and purchasing power within a 500km radius. Under the authority of the Federal and Flemish government, the port area stretches over two provinces with the Scheldt River in between. Apart from the Port of Antwerp, the Scheldt Estuary houses another three seaports, of different size and government structure, and their ancillary services. Nearly 62,000 persons work in the port community, which also contains the second largest petrochemical cluster in the World. This positions the Port of Antwerp as one of the main gateways to Europe. Not only is the port critical to the logistics required to support governments in their attempts to reduce the effects of the COVID-19 pandemic, it is also a vital infrastructure that allows for continued economic activity in Europe in general and Belgium in particular.

Description of the Antwerp Port Authority (APA)

The Antwerp Port Authority (APA) is a public limited company under public law, fully owned by the Municipality of Antwerp. APA plays a key role in the port's day-to-day operations. Employing about 1,650 workers the Port Authority manages and maintains the docks, the bridges, the locks, the quay walls and the land. Eight departments that each are divided in various subdivisions and teams structure APA. The leadership team is composed of a CEO, International Relations Director, Operations Director, Client Relations Director, and Finance Director, supplemented with the Chief Communication & Marketing Officer, the Chief Corporate Affairs Officer, the Chief Human Resources Officer and the Chief Digital, Information and Innovation Officer.

Description of two levels of analysis and involved actors from APA

On the level of operations, we found three actors that played a central role in the network of networks. These actors were the department Harbor, Safety and Security (OP/HSS), the Vessel Traffic department (OP/VT), and the Safety and Health department (AD/SH). These three departments acted as the executives of the port by controlling and monitoring the port community. Based on participant observations by the second author, we also had access to data on the Operations Director (OP) who has been heavily involved in managing these departments

On the policy level—four actors were found to be involved with the port governance and crisis management: the Marketing and Communication Director (CM), the Customer Relations Director (KR), the Human Resources Director (HR), and the Regional Development Manager (IN). As a leadership team these actors were responsible for all communication and marketing from APA, the

management of current and future customers and stakeholder in the port community, and the wellbeing of all employees. The department Harbor, Safety and Security (OP/HSS), part of the Operations department of APA contains the Harbor Master office which deals with all safety, security, traffic and emergency aspects of the operations within the port area. The Harbor Master has judicial authority in the port area. The Vessel Traffic department (OP/VT) equally resides under the Operations department and manages the efficient flow of shipping traffic within the port area. This excludes traffic on the river Scheldt that is managed by service providers under the Flemish Government. Finally, the Safety and Health department (AD/SH) is responsible for the implementation of the occupational safety and health policy of APA.

The Director of Operations (OP) oversees the nautical operations department, which is responsible for the fleet and the above mentioned shipping traffic management and Harbor Safety and Security. Asset management and port projects respectively deal with the development and management of the dry and maritime structure and with technical projects that have an impact on port infrastructure.

The director of the Marketing and Communication department is responsible for all forms of communication and marketing for APA. It organizes national and international events, manages the Port Authority's online presence and takes care of the internal communication. The director Customer Relations heads the department that collaborates with existing and future customers of the Antwerp Port Authority, within the strategic guidelines and in consultation with the International Networks manager. This department is closest to the industrial, shipping, inland navigation, road- and rail transportation stakeholders. The Regional Development Manager is responsible for expanding and maintaining contacts with international head offices of existing and potential customers and setting up global partnerships. Finally, the Human Resources director leads the HR department, which develops and implements the personnel policy in line with the corporate vision, strategy and culture. This director also acts as the sparring partner for top management as well as a reliable discussion partner for trade unions and external stakeholders of APA.

Description of important actors from the port community

On a governmental level, the Federal Public Service for Health, Food Safety and Environment, and the Federal Agency Saniport (responsible for sanitary control of international traffic) have been involved. Being the main actor of the Belgian Federal government in the context of the COVID-19 pandemic, the first one is responsible for public health whereas the latter acts more on an operational level. A third Federal governmental agency involved was the Federal Public Service for Economy. This agency supports the conditions for a competitive, sustainable and balanced market for goods and services. This agency was more centrally involved with APA as it is in charge of the quality control and distribution of medical equipment and personal protective equipment (PPE).

The second category involves the port stakeholders. In general, we identified five types of stakeholders in the port: industry, shipping, services, road-, and rail transportation. Based on table 1 and figure 1, we found that the Industry stakeholders and the Shipping stakeholders were more mentioned in the COVID-19 crisis meetings. Note that next to those two stakeholders, there are also the Inland Navigation owners, operators and representatives, who are more scattered and are often smaller businesses.

In Belgium, this represents merely 1150 vessels with a total capacity of 1,8mio ton and around 1800 persons, a majority self-employed. APA alone already handles about 99,3 mio ton goods for over 52000 inland navigation vessels annually, which emphasizes the international context of this stakeholder segment (2019). The Industry Stakeholders comprise all companies that are based in the port (900 companies in approximation). These include terminal operators (containers, liquid, dry bulk, etc.) and chemical production companies, often subsidiaries of multinational companies within the port area. They have a commercial relationship with APA, being concessionaires and APA being the landlord. The Shipping Stakeholders on the other hand, are those that own, manage, operate or represent the shipping lines. This includes shipping companies but also agencies and representative bodies. Their commercial relationship with APA takes the form of port dues.

The final category represents the nautical service providers that act as the pilots for the different sections of the river Scheldt, the dock pilots, helmsmen, boatmen and other supportive services that ensure safe navigation from sea to port and vice versa. These service providers closely collaborate with the operations department of APA.

APPENDIX B: Brokerage types

We provide for each brokerage type (structural position) of Gould and Roberto (1989) a short qualitative account to illustrate the veracity of this dynamic process of brokerage conducted by the APA Lead network. The strategic orientation in brokering followed by the Lead network was to collaborate in order to achieve the field-level goal: keeping the port open (cf. Soda et al., 2018). During the pandemic this was exemplified by three distinct brokering behaviors: separating, mediating, and joining organizations and networks (cf. Grosser et al., 2019).

(1) Coordinator within subgroups of the APA lead network: joining. Perhaps the best example of this was the role that the director of operations brokered in function of involving the members of the operations department (purple nodes in figures) with member of the leadership team (red nodes in figures). In the beginning and during the pandemic APA in its modes of governance demonstrated on multiple accounts (see table 2) to be an efficient facilitator for consistent communication and preventive measures. This success may be contributed to the internal information sharing of functions units of the crisis management team and the leadership team.

(2) *Itinerant broker between subgroups within the port community: mediation.* In this role functional units of the Lead APA network acted as a mediator between two subgroups of the community. In one example they mediated a concern regarding a parking lot dedicated to trucks. Whereas the parking was closed in agreement with the port police force on March 20th, it was reopened with additional enforcement measures on March 26th after extensive dialogue between representative bodies of the road transportation industry and the police force. This could not have been the case without mediation of the Lead APA network between conflicting subgroups of the port community.

(3) *Gatekeeper of the port community: mediating.* In this brokerage role the Lead APA network in close collaboration with the Federal Agency Saniport (responsible for sanitary control of international traffic) which ships were allowed to enter. They acted as a go-between controlling access from the sea to the land. APA preventively assigned a lay-by berth as quarantine area for suspected ships and the APA Harbour Master office played a key role in authorizing suspected vessels to berth and under what conditions, informing the right parties and providing conditions to leave port after being cleared following an infection. In its gatekeeper role on several occasions the Lead APA network needed to switch to mediation when disputes between the different actors (ships, service providers, shore industry, etc.) over preventive measures need to be promoted for reconciliation—always with the aim of safeguarding port operations whilst protecting the health of those involved.

(4) *Representative of the port community: mediating.* Although during the COVID-19 pandemic formally no additional authority was assigned to APA, its primary legitimacy base derived from its central position as a core provider of services to the industry and safeguarding the shipping interests reaching far beyond the local and regional economy of Antwerp. This also means that APA as a broker represents the port community for instance illustrated by a press release on the Task Force on April 2nd: "At the moment Port of Antwerp is not experiencing any fall in the volume of freight. In fact there is a noticeable increase in the volume of pharmaceuticals and e-commerce. The supply of foodstuffs is also going smoothly. On the other hand there has been a fall in imports and exports of cars and other industrial components due to various industries closing down."

(5) *Liaison within and between organizational fields: separating and joining* APA holds a key position within the European logistic chain. During the outbreak of the pandemic combined with the onset of a lock down as imposed by the Belgian government(s) this resulted in widespread hoarding causing APA to affirm both the political importance (being a vital infrastructure for Belgium) and operational capacity of the port of Antwerp. Due to its concrete role within the port community APA initiated the nautical partners meeting during the pre-lock down phase creating another network. The Lead APA network saw advantage in the inception of a new institution and structure of authority and collaboration (joining), however, they restricted (separating) the number of

participants involved (cf. Provan & Kenis 2008). By limiting the number of network participants the Lead APA network was able to create a narrow orientation for the network purpose: safeguard access to the seaport for shipping. In addition, to increase effectiveness the Lead APA network mediated by handing over the presidency of the meeting to the transnational nautical authority over the Scheldt Estuary as from April 1st in order to be consistent with its formal authority towards external parties (i.e. shipping) and to further enhance consensus and power symmetry between the actors.

APPENDIX C: cleaning and coding example

Table with excerpts from the logbook and meeting minutes of crisis management team meetings and leadership team meetings to illustrate the data cleaning and coding process.

Date	Data source	Level of analysis	Raw and un-structured data	Cleaned, structured, and translated data	Open coding	Axial coding	Final codes used for type of issues
2/jan	Crisis management team meeting	Operations / administration	x	x	Raising concern on situation Huwei	Receiving signals	Information
6/feb	Crisis management team meeting	Operations / administration	x	x	Situation Report	Situational awareness	Sense-making
/mrt	Crisis management team meeting	Operations / administration	x	x	Travel Arrangements	Decision-making	Decision-making
3/mrt	Leadership team meeting	Policy / strategy	x	x	Information on measures from government	Information provision	Information
8/mrt	Crisis management team meeting	Operations / administration	x	x	Discussion on measures taken for port labour	Discussion	Sense-making
9/mrt	Leadership team meeting	Policy / strategy	x	x	Concerns of XXX on role of Task Force	Receiving signals	Information
/apr	Leadership team meeting	Operations / administration	x	x	Reduction on Task Force meetings	Decision-making	Decision-making

Note. Due to sensitivity of data, we do not show raw data and cleaned data.

CHAPTER 4. HOW DOES LEADERSHIP MANAGE NETWORK-LEVEL TENSIONS? A CASE STUDY ON THE ANTWERP FIRE SERVICE NETWORK LEADERSHIP DURING THE COVID-19 PANDEMIC

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How does leadership manage network-level tensions? A case study on the Antwerp Fire Service network leadership during the COVID-19 pandemic

Abstract. A crucial topic is how network leadership recognizes and responds to network-level tensions. When we focus on how leadership manages these tensions, it seems we favor a one-sided view by focusing predominantly on how leadership manages tensions within the network. In this article, we propose that why a specific network-level behavior is enacted can (partially) be explained by how network leadership is embedded within an organizational field and how environmental and population dynamics shape network tensions. We present the results of a single case study of the Antwerp Fire Service and combine Social Network Analysis and After-Action Review to examine (1) with whom the leadership team of the Antwerp Fire Service and the fire chief affiliated during the COVID-19 pandemic and (2) what network-level tensions arose in the larger, complex organizational field of the province of Antwerp. The results outline how network leadership dealt with network-level tensions, and we discuss implications for future research.

MAD statement. This article aims to *Make a Difference* (MAD) by positioning the notion of network tensions and network leadership at the very core of leadership theory and practice. This is done by introducing network tensions before suggesting that network leadership needs to respond to and manage network tensions shaped and constrained by environmental and population dynamics of an organizational field. The contributions show how network leadership dealt with tensions shaped across messy network boundaries. As a result, the article may help inform leadership practice and scholarship on how to deal with multiple network memberships, overlapping network involvement, and broader network-environment relationships that characterize collective goods.

Keywords: Network Leadership, Network-level tensions, Network Management, Network Governance, Fire Service, COVID-19 pandemic.

Introduction

Organizational networks are increasingly employed to address global challenges seemingly intractable for any organization to handle. Inherent to this organizational form is the premise that outcomes like

ending poverty, protecting the planet, and improving the lives and prospects of people in our communities are interdependent on the effort of organizations participating in the network (Human & Provan, 2000; Provan & Milward, 2001; Provan et al., 2007; Provan & Kenis, 2008).

Despite a great deal of progress that has been made in recent years in understanding why networks form, what they are capable of accomplishing, how they are managed and governed, and how they can function effectively, there are many issues and topics that are still not well understood (Provan et al., 2007; Provan & Lemaire, 2012; Popp et al., 2014). One topic is the impact of multiple network memberships, overlapping network involvement, and broader network-environment relationships on how network tensions are created (Provan & Lemaire, 2012; Nowell et al., 2019). To inform scholarship and practice on this topic, public management scholars have recently examined organizational networks from an external network perspective (Nowell et al., 2019; van den Oord et al., 2020; Yang & Nowell, 2021). In this view, organizational networks are part of network population ecologies operating within organizational fields (Nowell et al., 2019; van den Oord et al., 2020; Yang & Nowell, 2021). In such fields, organizational networks are composed of three or more organizations often from various organizational domains, which determine task environments creating interdependencies and interconnections among network members (Nowell et al., 2019). Employing such an external network perspective on organizational networks can be fruitful for explaining network dynamics, mainly when multiple networks and organizations compete over scarce resources (Nowell et al., 2019) or deal with collective action problems in turbulent environments (van den Oord et al., 2020). Moreover, it can help explain network development about environmental change (Provan et al., 2011) or the co-evolution of networks and their environment (Koza & Lewin, 1998; 1999; cf. Tasselli et al., 2015). However, adopting such a perspective also carries implications for examining network leadership (Müller-Seitz, 2012) since multiple network memberships and overlapping network involvement evokes contradictions between networks and their members. Competing demands due to this pose challenges that require network leadership to bargain power (Saz-Carranza et al., 2016), oscillate between modes of governance (Berthod et al., 2016), bridge differences, frame basic agreements and procedures, and contribute to enhancing the capacity of networks and its members (Saz-Carranza & Ospina, 2011).

This study aims to draw attention to how network leadership manages network-level tensions shaped and constrained outside a network's boundaries. Suppose we accept that organizational networks are inherently full of conflict and tensions (Lemaire, 2020; Berthod & Segato, 2019) and are multilevel and multifaceted in nature (Rethemeyer & Hatmaker, 2008; Moliterno & Mahony, 2011; Nowell & Kenis, 2019; Lemaire et al., 2019; Carboni et al., 2019). In that case, a contradictory logic can originate from within and outside the network (cf. Das & Teng, 2000). In both situations, network leadership must recognize and respond to network tensions to manage the network (Provan & Kenis, 2008; Saz-Carranza & Ospina, 2011). Nevertheless, to date, we favor a one-sided view of network

tensions by focusing predominantly on how network tensions internally come to be (Das & Teng, 2000; Provan & Kenis, 2008) – "contradictory, yet interrelated elements that exist simultaneously and persist over time" (Smith & Lewis, 2011, p. 382) – even though network population dynamics and interdependencies can drive network tensions, behaviors, and outcomes as well (Provan & Milward, 1995; Provan et al., 2007; Provan & Kenis, 2008; Nowell et al., 2019).

Consequently, we propose reconsidering "where network tensions come from" and studying how network leadership identifies and leverages internal and external opportunities and threats across messy network boundaries over time (Lewis et al., 2014; Lemaire & Provan, 2018). Only by examining networks in conjunction with their environment can we fully understand how network-level tensions arise, what role network leadership may play, how networks can recognize and respond to them, and whether their origin matters.

We conducted a single case study of the Antwerp Fire Service (AFS), which like many others, was confronted by the COVID-19 pandemic. We combined Social Network Analysis (SNA) and After-Action Review (AAR) to examine (1) with whom the leadership team of the Fire Service and the Fire chief affiliated during the first wave of the pandemic and (2) what network-level tensions arose in the larger, complex organizational field of the province of Antwerp. We describe how the network of the AFS leadership team developed and next present which network tensions they addressed retrospectively in dealing with the institutional crisis of the COVID-19 pandemic.

We have structured the article as follows. First, we conceptualize network-level tensions and position ourselves in the leadership literature. Next, we present our research design, methods used, and the AFS case study findings. We close by outlining how network leadership dealt with network-level tensions and present implications for future research.

Network-level tensions

In network studies, tensions are often conceptualized as competing logics insofar as a collaboration between individuals, organizations, or networks is concerned (Vangen et al., 2015). On the network level, this translates to paradoxical challenges for those that are concerned with the functioning of the network (Vangen et al., 2015), while at the organizational level, this involves interactions between organizations (individuals that represent organizations) and their orientation towards the network and their host organization (Vangen & Winchester, 2014). For instance, in a longitudinal case study of a biotechnical alliance, de Rond and Bouchikhi (2004) illustrate network tensions as a coevolutionary interchange of design and emergence, cooperation and competition, trust and vigilance, expansion and contraction, and control and autonomy. Hence, network studies address tensions in one way or another, often pointing to balancing multi-level and multi-faceted contradictions through various properties and processes (Klaster et al., 2017) necessitating a response by network (management) behavior (Provan & Kenis, 2008; Saz-Carranza & Ospina, 2011).

Network tensions

For the conceptualization of network tensions, we draw on the previous work of Provan and Kenis (2008), in which they define three network tensions: efficiency-inclusiveness, internal-external legitimacy, and flexibility-stability (see Berthod & Segato, 2019 for a recent overview of other network tensions). We first describe these network-level tensions and then conceptualize them from an external network perspective to illustrate some critical commonalities and differences in network tensions and their implications for network leadership.

Efficiency-inclusiveness

The network tension of efficiency-inclusiveness involves the contradictory logic of "the need for administrative efficiency on the one hand and the need for member involvement, through inclusive decision-making on the other" (Provan & Kenis, 2008, p. 242). The previous literature underscores trade-offs in involving network members in the decision-making processes of the network. For instance, Moynihan's (2009) study of incident command systems raises concerns about the short-term coordination costs of adding new network members and finds that the bias against inclusiveness may increase under (a) conditions of mission urgency and (b) when the emergent component is relatively large. In other words, cultivating the tension between efficiency-inclusiveness resolves around the arrangement of network members. The more extensive the network, the more time-consuming and resource-intensive governance processes tend to be (Provan & Kenis, 2008). Moreover, Ansell et al. (2012) pointed out the negative consequences of having a solid lead organization in the network. Although a lead organization can reduce the demands on network members (read: increase efficiency), it can also lead to less commitment and reinforce informal coordination among network members.

Internal-external legitimacy

The tension of internal-external legitimacy refers to the generalized perception from in- and outsiders that a network's actions, activities, and structure are desirable and appropriate (Suchman, 1995; Human & Provan, 2000). Network legitimacy encapsulates the status and credibility of the network and its activities as perceived by network members and outside constituents (Human & Provan, 2000). Cultivating legitimacy involves finding and maintaining a balance between different in- and outsiders. The challenge is twofold; To build network legitimacy internally and externally and address the potential tension between them (Human & Provan, 2000; Provan & Kenis, 2008; Raeymaeckers, 2016).

Accepting a network by both in- and outsiders can lead to cognitive support and commitment to resources from stakeholders. This will determine whether the network can endure as a viable

organizational form to accomplish a common purpose (Human & Provan, 2000; Provan & Kenis, 2008). But this may also depend on the innate characteristics of networks and in which political-administrative culture network legitimacy is established, as notions of why actors perceive network interactions as meaningful can be culturally biased to some extent (Hermansson, 2016) and explain why "network members will generally care about their extra-network reputation since they depend upon resources from political actors, and so may be willing to engage in blame avoidance strategies that undermine their intra-network reputation" (Moynihan, 2012, p. 585).

Flexibility-stability

The tension of flexibility-stability entails the competing logic that, on the one hand, "a network needs to ensure rapid network responses in ways that meet changing stakeholders' needs and environmental demands, while, on the other hand, developing consistent responses to stakeholders and being dependable in requisite demands over time" (Provan & Kenis, 2008, p. 245). According to Ansell et al. (2012), dealing with this tension requires long-term interaction and commitment. Networks are often heralded for being flexible, although flexibility might also reduce their stability, create uncertainty, and increase differences between network members, which can minimize trust among actors (Willem & Lucidarme, 2014). Cristofoli et al. (2019) find that stability is conducive to network effectiveness. According to them, more attention should be paid to behavioral features, such as deliberate and persistent network management activities that support and reinforce long-term relationships. Network managers' capacities to stabilize and consolidate the relationships among network partners seem to be ongoing activities for the network manager. "Stabilizing relationships is critical both in early-stage and mature networks, in the presence of as well as the absence of trust, and connected and dispersed networks" (Cristofoli et al., 2019, p. 1794).

Conceptualizing network tensions

Except for the internal-external legitimacy and flexibility-stability tension, the beforementioned studies examine network tensions predominantly from an internal perspective (Provan & Kenis, 2008). It, therefore, seems we have favored a one-sided view by focusing on how the network manages tensions within the network. We argue, however, that we need to adopt Nowell, Hano, and Yang's (2019) external network perspective and broaden our focus on how network leadership faced with contradictory demands makes sense and enacts a collective solution across messy boundaries in an organizational field (Nowell et al., 2019; van den Oord et al., 2020; Yang & Nowell 2020). Adopting such a view implies that environmental and population dynamics in an organizational field can drive network tensions requiring us to conceptualize the environment-network relationship.

Organizational fields consist of an "assemblage of networks, which individually may be regarded as operationally and managerial autonomous subsystems but are part of a larger, complex organizational field by many types of connections and flows" (van den Oord et al., 2020, p. 881). From an external network perspective, we define network tensions as competing logics that can arise both within and between purpose-oriented networks (van den Oord et al., 2020; Nowell & Milward, 2022) and propose why network-level behavior is enacted can (partially) be explained by how networks and their members are embedded within an organizational field (Nowell et al., 2019; van den Oord et al., 2020; Yang & Nowell 2020). If we adopt an external network view on network-level tensions, that is, they are multilevel and multifaceted and can result from an interplay of environmental and population dynamics shaping and constraining network tensions, we consequently need to study how network leadership recognizes and responds to them and whether the origin of network dynamics matter.

Network leadership

In Müller-Seitz's (2012) systematic literature review, network leadership is differentiated into two forms: hierarchical and heterarchical network leadership (cf. Gulati et al., 2012). In hierarchical network leadership, decision rights are concentrated in one or a few network members, whereas heterarchical network leadership is shared among network members (Provan & Kenis, 2008; Gulati et al., 2012).

The difference between these two forms can be explained by the degree of stratification and tiering in the network giving rise to and enabling the exercise of status- or role-based authority structures among network agents (Provan & Kenis, 2008; Gulati et al., 2012; Tasselli & Kilduff, 2021). For instance, in a brokered network, an organization or individual spans boundaries and exploit structural holes by purposively connecting or disconnecting others in the network (Burt et al., 2013). A broker can be considered an intermediary differentiated from the other network members by occupying a role in which they purposively act as an agent to facilitate activities among network members and outsiders (Laumann & Marsden, 1982; Obstfeld et al., 2014). Such roles can vary in position and scope (Gould & Roberto, 1989). In contrast, leadership in a non-brokered network is based on how most network members participate in the governance of the network (Milward & Provan, 2006; Provan & Kenis, 2008). From an external network perspective, accordingly, network leadership must consider that networks present in an organizational field may differ in their leadership form, which gives rise to competing logic insofar as a collaboration between networks is concerned.

As suggested by Müller-Seitz (2012), we move beyond this dichotomous conception of hierarchical and heterarchical network leadership and, in this article, position network leadership as an emergent property of purpose-oriented networks of three or more organizations working together to attain a purpose that none of the organizations independently can achieve (Provan & Lemaire, 2012;

Lemaire & Provan, 2018; Sedgwick et al., 2022). Purpose-oriented networks are inherently full of conflict and tensions since their members differ in means and ends (Lemaire, 2020). We define in this article network leadership as "the collective pursuit of delivering on purpose" (By, 2020, p. 35). Purpose involves "the pursuit of a worthy idea and activity, the outcome of which goes beyond the individual or an individual organization" (By 2020, p. 34). But, this poses various network leadership challenges (Bartelings et al., 2017; Cristofoli et al., 2019; Cepiku & Mastrodascio, 2021; Brugghemans et al., 2021).

One challenge is dealing with the membership of organizations in multiple networks (cf. Nowell et al., 2019) since this can give rise to what has been coined "the two hats problem" (Milward et al., 2016). Especially in the case of overlapping network involvement by organizations, individuals can have diverged interests in the networks and the organizations they partake in. Another challenge for network leadership is dealing with agency dilemmas when "one" network can make decisions or take actions on behalf of other networks in the organizational field. Principal-agent problems can easily arise among networks because principal-agent relationships are ill-defined due to network-environment relationships following network boundary and membership arrangements (Gulati et al., 2012) and the causal texture of the environment (Emery & Trist, 1965). Especially in circumstances where either networks or their members are motivated to act in their own best interests, principal-agent relationships are different compared to vertically integrated organizations simply because network representatives – individuals acting in the network representing various organizations – do not personify the network as a whole nor do they always act collectively interested (Fama, 1980; Eisenhardt, 1989; Provan & Milward, 2001).

To examine how network leadership deals with such challenges, we need to draw on "collectivity" as an alternative theoretical lens through which leadership resides in complexity and systemic dynamics (Uhl-Bien & Arena, 2018; Ospina et al., 2020). Such an understanding is critical because 'leadership in organizational networks is not grounded in bureaucratic notions of hierarchy, authority, and control derived from employment relationships (Gulati et al., 2012). Its understanding is based on the relational capability derived from network members' present or absent relationships that grant access to resources and capabilities to influence without apparent exertion of force or direct exercise of command (Provan & Kenis, 2008; Paquin & Howard-Grenville, 2013).

Network leadership relies on "informal authority based on expertise, reputation, status, gatekeeping privileges, or control over key resources or technology" (Gulati et al., 2012, p. 573). This leverages network leadership, developing a "process of social influence through which emergent coordination and change are constructed and produced" (Uhl-Bien, 2006, p. 668). Network leadership accordingly "should not only be seen as a position of authority but also as an emergent, interactive dynamic—a complex interplay from which collective impetus for action and change emerges when heterogeneous agents interact in networks in ways that produce new patterns of behavior and new modes of operating" (Uhl-Bien et al., 2007, p. 299).

Case study design and methods

This study's unit of analysis is the AFS crisis response network, for which we use the AFS leadership team as the unit of observation. This network pursues the joint goal of planning and actions to address natural and artificial disasters, crises, critical incidents, and tragic events (Moynihan, 2009). In Table 1, we provide a pseudonymous actor list of the AFS crisis response network.

Boundary specification and actor selection of the crisis response network followed the procedures outlined by Laumann et al. (1992). We applied the nominalist sampling approach for scoping and bounding the AFS crisis response network. We consulted AFS's policy plan 2020-2025, which lists all organizations with which the AFS formally collaborates. We complemented this list of actors with agents mentioned in the minutes of the crisis meetings of the AFS leadership team. In addition, we consulted the Fire chief's agenda during that period.

We identified 102 unique actors that can be classified into different types of agents active at various levels; agents ranged from individuals to groups (of individuals), organizational units, organizations, or governmental agencies involved in Antwerp municipality (local level), the province of Antwerp (regional level), the Flemish region (Flanders), Belgium (federal level), and internationally.

We divided the first pandemic wave into four subperiods following the Belgian chronology of the lockdown and reopening in 2020. For each subperiod, we compiled a list of actors relying on the positional approach to assess who participated and affiliated with whom (Laumann et al., 1992). This allowed us to investigate how the crisis response network developed during the first wave of the pandemic. Following a reputational approach, we discussed each list per subperiod with the Fire chief and the Chief Technology Officer (co-authors) (Laumann et al., 1992). This previous step is consistent with the realist approach and serves as a validity check.

Data collection

We purposefully sampled data from 133 crisis management meeting notes over 20 weeks (27/02/2020—08/06/2020). This included data from AFS crisis management meetings notes, the FAN boards used[23], the minutes of the provincial crisis center, information gathered by the fire chiefs of the province of Antwerp, the Antwerp fire chief's journal, and the minutes of meeting with the federal crisis center. Each entry (n=349) was coded on the source, date, key issues, and actors. Network ties were measured in terms of actors' participation in crisis meetings providing conditions under which pairwise relations among actors become more likely and included based on key issues concerning

[23] A FAN board is a whiteboard (or a digital equivalent) in which "Facts," "Actions," and "Needs" are collected and updated during a crisis. This is a structured Incident Command System (ICS) to provide decision-makers with an overview of a crisis.

information-sharing, resource allocation, and coordination and control of joint efforts of organizations across the network (Provan & Huang, 2012; Provan & Kenis, 2008). We triangulated these sources to develop a node list of actors' pairwise interactions sorted by date (n=73). Although the AFS is involved with more than 102 actors, only those actors with a recorded interaction (i.e., in- and outgoing ties derived from the sampled data) with one or more members of AFS were accounted for as part of the crisis response network. Accordingly, this study focuses on the "enacted" crisis response network (cf. Isett & Provan, 2005).

Table 1. Pseudonymous actor list of the AFS crisis response network

	UID	Category	Type of actor
1	AFS1_X	(1) Antwerp Fire Service	Individual
2	AFS2_G	(1) Antwerp Fire Service	Group of individuals
3	AFS3_G	(1) Antwerp Fire Service	Group of individuals
4	AFS4_G	(1) Antwerp Fire Service	Group of individuals
5	AFS5_X	(1) Antwerp Fire Service	Individual
6	AFS6_X	(1) Antwerp Fire Service	Individual
7	AFS7_G	(1) Antwerp Fire Service	Group of individuals
8	AFS8_U	(1) Antwerp Fire Service	Unit
9	AFS9_U	(1) Antwerp Fire Service	Unit
10	AFS10_U	(1) Antwerp Fire Service	Unit
11	AFS11_U	(1) Antwerp Fire Service	Unit
12	AFS12_U	(1) Antwerp Fire Service	Unit
13	AFS13_X	(1) Antwerp Fire Service	Individual
14	AFS14_X	(1) Antwerp Fire Service	Individual
15	AFS15_X	(1) Antwerp Fire Service	Individual
16	AFS16_X	(1) Antwerp Fire Service	Individual
17	AFS17_X	(1) Antwerp Fire Service	Individual
18	AFS18_X	(1) Antwerp Fire Service	Individual
19	AFS19_X	(1) Antwerp Fire Service	Individual
20	AFS20_X	(1) Antwerp Fire Service	Individual
21	AFS21_X	(1) Antwerp Fire Service	Individual
22	AFS22_U	(1) Antwerp Fire Service	Unit
23	AFS23_G	(1) Antwerp Fire Service	Group of individuals
24	AFS24_G	(1) Antwerp Fire Service	Group of individuals
25	AFS25_G	(1) Antwerp Fire Service	Group of individuals
26	AFS26_G	(1) Antwerp Fire Service	Group of individuals
27	AFS27_U	(1) Antwerp Fire Service	Unit
28	AFS28_U	(1) Antwerp Fire Service	Unit
29	AFS29_U	(1) Antwerp Fire Service	Unit
30	AFS30_U	(1) Antwerp Fire Service	Unit
31	AFS31_U	(1) Antwerp Fire Service	Unit
32	AFS32_U	(1) Antwerp Fire Service	Unit
33	AFS33_U	(1) Antwerp Fire Service	Unit
34	AFS34_U	(1) Antwerp Fire Service	Unit

35	AFS35_G	(1) Antwerp Fire Service	Group of individuals
36	AFS36_X	(1) Antwerp Fire Service	Individual
37	AFS37_U	(1) Antwerp Fire Service	Unit
38	AFS38_U	(1) Antwerp Fire Service	Unit
39	AFS39_U	(1) Antwerp Fire Service	Unit
40	AFS41_U	(1) Antwerp Fire Service	Unit
41	AFS42_X	(1) Antwerp Fire Service	Individual
42	AFS43_X	(1) Antwerp Fire Service	Individual

Table 1 – continued. Pseudonymous actor list of the AFS crisis response network

	UID	Category	Type of actor
43	ANT3_X	(2) Municipality of Antwerp	Individual
44	ANT4_X	(2) Municipality of Antwerp	Individual
45	ANT5_X	(2) Municipality of Antwerp	Individual
46	ANT36_O	(2) Municipality of Antwerp	Organization
47	ANT42_U	(2) Municipality of Antwerp	Unit
48	ANT43_X	(2) Municipality of Antwerp	Individual
49	ANT44_X	(2) Municipality of Antwerp	Individual
50	ANT51_O	(2) Municipality of Antwerp	Organization
51	PRA6_O	(3) Province of Antwerp	Organization
52	PRA14_X	(3) Province of Antwerp	Individual
53	PRA15_O	(3) Province of Antwerp	Organization
54	PRA16_O	(3) Province of Antwerp	Organization
55	PRA25_U	(3) Province of Antwerp	Unit
56	PRA27_O	(3) Province of Antwerp	Organization
57	PRA28_O	(3) Province of Antwerp	Organization
58	PRA29_O	(3) Province of Antwerp	Organization
59	PRA30_O	(3) Province of Antwerp	Organization
60	PRA31_O	(3) Province of Antwerp	Organization
61	PRA34_X	(3) Province of Antwerp	Individual
62	PRA35_G	(3) Province of Antwerp	Group of individuals
63	PRA40_O	(3) Province of Antwerp	Organization
64	PRA46_U	(3) Province of Antwerp	Unit
65	PRA48_O	(3) Province of Antwerp	Organization
66	PRA49_G	(3) Province of Antwerp	Group of individuals
67	PRA56_O	(3) Province of Antwerp	Organization
68	FLA1_O	(4) Flemish community	Organization
69	FLA2_O	(4) Flemish community	Organization
70	FLA41_O	(4) Flemish community	Organization
71	FLA52_O	(4) Flemish community	Organization
72	FLA54_O	(4) Flemish community	Organization
73	FLA57_X	(4) Flemish community	Individual
74	FLA58_X	(4) Flemish community	Individual
75	FLA59_X	(4) Flemish community	Individual
76	FLA60_X	(4) Flemish community	Individual

77	FLA61_O	(4) Flemish community	Organization
78	FED7_O	(5) Federal level	Organization
79	FED8_U	(5) Federal level	Unit
80	FED9_O	(5) Federal level	Organization
81	FED10_X	(5) Federal level	Individual
82	FED11_U	(5) Federal level	Unit
83	FED12_U	(5) Federal level	Unit
84	FED13_X	(5) Federal level	Individual
85	FED17_X	(5) Federal level	Individual
86	FED18_U	(5) Federal level	Unit
87	FED19_U	(5) Federal level	Unit
88	FED20_X	(5) Federal level	Individual
89	FED22_O	(5) Federal level	Organization
90	FED26_O	(5) Federal level	Organization
91	FED32_O	(5) Federal level	Organization
92	FED33_O	(5) Federal level	Organization
93	FED37_O	(5) Federal level	Organization
94	FED38_U	(5) Federal level	Unit
95	FED39_O	(5) Federal level	Organization
96	FED47_O	(5) Federal level	Organization
97	FED50_O	(5) Federal level	Organization
98	INT21_O	(6) International level	Organization
99	INT23_O	(6) International level	Organization
100	INT24_O	(6) International level	Organization
101	INT45_O	(6) International level	Organization
102	INT55_O	(6) International level	Organization

To capture and understand the interplay between environmental and population dynamics in the province of Antwerp's larger, complex organizational field and network-level tensions[24] in the AFS crisis response network, we applied an After-Action Review (AAR) of actions taken by AFS leadership in response to the pandemic. Through three focus groups, we aimed to retrospectively capture best practices, gaps, and lessons learned by reflecting with AFS leadership on their beliefs and experiences of the crisis response. We formulated two learning objectives: (1) assess to what extent the AFS crisis

[24] In this study, we operationalize network tensions as a latent construct that can only be indirectly inferred from the network's structural and relational patterns of the crisis response network activity. While a crisis is often perceived as an exceptional or an unexpected event, Roux-Dufort (2007) analyses crises as a process of incubation that starts long before the triggering event. Emphasizing the processual nature of crisis (Turner, 1976), the role of crisis management lies in a "surge of meaning that fosters organizational change and transformations" (Roux-Dufort, 2007, p. 110). This surge of meaning is based on the exchange of information within the network leading to collective enactment (Weick, 1993). In contrast, the leadership's role is to bring events and structures within the network and set them in motion (Weick, 1988).

response was efficient and (2) determine whether the AFS crisis response was adequate. The AAR was limited to the first wave of the COVID-19 pandemic (Feb.-Jun. 2020). Participants were instructed to conduct an open and honest professional discussion to identify ways to sustain what was done well and develop recommendations for overcoming obstacles (WHO, 2019).

The three focus groups were held in April and May of 2021, each lasting two hours. In the focus groups, we reviewed (1) what was the strategy or plan of AFS and what risks were considered, (2) identified what happened, (3) examined why things happened, and (4) formalized the learning by asking: what AFS leadership take-away as a team was and what lessons learned must be shared with others (WHO, 2019).

Given the aftermath of the third wave of COVID-19, focus groups were held digitally. In the first focus group, we focused on the pre-lockdown phase (before March 16, 2020). In the second focus group, the focus was on the lockdown phase (between March 16 and May 2020), and the third focus group revolved around the two reopening phases (May to June 2020). Participants of the focus groups were briefed on key events in each period of the first wave of the COVID-19 pandemic. We presented network plots of the AFS crisis response network for each period showing with whom the Antwerp leadership team of the Fire Service and the fire chief affiliated during the pandemic. We obtained and documented informed consent for each participant attending the focus groups.

Finally, we interviewed the AFS Fire chief for three hours in July 2021. On the one hand, this interview promoted another data collection method, allowing us to explain different aspects of collaborative efforts in the AFS crisis response network. On the other hand, it provided us with the means to validate the results found in the Social Network Analysis and the After-Action Review. In doing so, we attempted to develop a complete picture and cross-check evidence.

In Table 2, we present a summary of the types of collected data.

Data analysis

Data were analyzed following three steps. First, we conducted a Social Network Analysis with whom the leadership team of the Antwerp Fire Service and the fire chief affiliated during the first wave of the pandemic. We constructed five 102 * 102 one-mode adjacency matrices for each pandemic's subperiod/phase of the first wave. Note that these matrices are largely unconfirmed because a present tie between a pair of actors was recorded based on secondary sources from the Antwerp Fire Service. This is a weaker standard for measuring the presence of relationships than treating a relationship as present only if both actors report a relationship (Huang & Provan, 2007a).

Table 2. Type of collected data

Meeting notes studied	N=133
AFS crisis meetings AFS (FAN)	57
AFS crisis management logs (Pandemic)	13
AFS Operational cell meeting	1
AFS council meeting with Mayors	7
Provincial crisis meeting	1
Flemish fire service network	46
Multi-logs Federal Government Belgium	5
Other meetings	3
Other documents studied	N=5
Policy decisions Governing Council AFS	2
Operational cell guidelines	2
Communication event	1
Semi-structured interviews	N=1
Focus groups	N=3
Time period	27 February 2020—08 June 2020
	73 events

We opted for degree centrality as an egocentric measure of actor involvement in the crisis response network for each phase because we are interested in direct connections between and among actors (Huang & Provan, 2007b). For non-directional graphs, degree centrality is the number of links connected to that actor. Given that we are dealing with directional graphs, we opted for degree centrality by normalizing indices through division by the sum of all scores, viewing indices as percentage values (Baur, 2008: 36). We also computed a Herfindahl index / Blau's index to measure the composition of differences in levels among network actors (see table 1) to discern variety in hierarchical differentiation of actors in the AFS crisis response network (Harrison & Klein, 2007; Huang & Provan, 2007a; Gulati et al., 2012). Furthermore, we used network density as a network measure of network structure. Network density measures the overall connectedness among actors in a network (Wasserman & Faust, 1994; Provan et al., 2007); the higher the density score, the more connected the network.

We used Visone v.2.23 (Brandes et al., 2004; Brandes et al., 2006) to produce the network measures and visualize five network plots. Except for the network plot of the first wave (all periods), we used a centrality node layout using the degree of centrality as a value for nodes and the frequency of relationships as a value for ties. In the network plots of the four phases, node size is based on the degree centrality (%) measure. Network ties were manually classified into three categories indicating relationship strength based on frequency: category (1): 1-5 interactions, category (2): 6-10 interactions, and category (3): 10+ interactions. AFS actors are displayed in red, and other network actors are shown in cyan.

In the second step of the data analysis, we conducted a data-driven Thematic Analysis (Dixon-Woods et al., 2005) to analyze the After-Action Review of the focus groups. Focus groups were non-verbatim transcribed and coded (Corbin & Strauss, 1990). We first conducted open coding, breaking textual data into discrete parts, and labeling them accordingly. This yielded 20 codes for 172 coded buckets of text. Then, we applied axial coding in which we integrated, translated, and connected various codes representing textual data. Finally, we integrated the different codes into four main themes reported in the findings: challenges, crisis mode, network tensions, and network management.

As a final step, we conducted a member check with the fire chief to determine the accuracy of the findings. We triangulated the findings of the social network analysis and the thematic analysis using pattern matching to link found patterns with theoretical patterns (Trochim, 1989). To build credibility, we presented the case study findings and asked the fire chief to affirm that the results reflected his views and experiences or that they did not.

Case study findings

Tables 3 and 4 present the comparative statistics of the AFS crisis response network during each period following the Belgian crisis phases of the first wave of the COVID-19 pandemic.

Table 3 shows that the number of actors in the AFS crisis response network declined from 75 to 40 over 20 weeks—concerning the pre-lock down towards the second reopening phase. The number of ties in the network remained similar for the first three phases (the pre-lockdown phase, the lockdown phase, and the first reopening phase) but dropped significantly in the second reopening phase. Table 3 also portrays low-density scores of the AFS crisis response network across the first wave of the COVID-19 pandemic, except for the first reopening phase.

Table 4 presents the number of actors and proportions for six levels concerning the AFS crisis response network. The ratio of actors for each level is displayed in brackets. These levels are the Antwerp Fire Service level (AFS), the Antwerp municipality (ANT), the Province of Antwerp level (PRA), Flanders (FLA), and the federal level (FED), and the international level (INT). In addition, we also display Blau's heterogeneity index as a measure of diversity with ranges from 0-1, with higher scores indicating more heterogeneity. The scores indicate the probability that two randomly selected actors from the AFS crisis network (N=102) belong to different levels. Table 4 shows the network composition of actors throughout the first wave of the COVID-19 pandemic and illustrates how the AFS crisis response network's heterogeneity at different levels fell, indicating different network compositions of actors across the four periods in the first wave of the COVID-19 pandemic.

Table 3. Comparative statistics for the AFS crisis response networks during the first wave of the Covid-19 pandemic

Crisis phases	Subperiods	Number of actors	Number of ties	Weak vs. strong ties			Density
				Cat 1. 1-5 ties	Cat 2. 6-10 ties	Cat 3. 10+ ties	
Pre-lock down phase	27feb. – 18mar.	75	442	295	99	48	0.08
Lockdown phase	19mar. – 15apr.	70	429	339	62	28	0.09
Reopening phase 1	16apr. – 17may.	53	424	378	29	17	0.15
Reopening phase 2	18may. – 06aug.	40	109	109	0	0	0.07
The 1st wave of the COVID-19 pandemic	27feb. – 06aug.	102	727	480	76	171	0.07

Table 4. Comparative statistics for the AFS crisis response networks during the first wave of the Covid-19 pandemic

Levels	Actors in crisis response network Pre-lock down phase	Actors in crisis response network Lock down phase	Actors in crisis response network Reopening phase 1	Actors in crisis response network Reopening phase 2
AFS	35 (0,47)	30 (0,43)	27 (0,51)	20 (0,50)
ANT	6 (0,08)	7 (0,10)	6 (0,11)	2 (0,05)
PRA	9 (0,12)	11 (0,16)	7 (0,13)	5 (0,13)
FLA	8 (0,11)	7 (0,10)	4 (0,08)	5 (0,13)
FED	13 (0,17)	14 (0,20)	8 (0,15)	8 (0,20)
INT	4 (0,05)	1 (0,01)	1 (0,02)	- (-)
Total actors	75	70	53	40
Blau's index	0,72	0,73	0,68	0,68

Note: The proportion of network actors for each level is in brackets. The maximum of Blau's index is 0,9. Blau's index for the first wave (overall periods) is 0,75 for 102 actors. AFS = Antwerp Fire Service level, ANT = Antwerp municipality level, PRA = Province of Antwerp level, FLA = Level of Flanders, FED = Federal level, and INT = International level.

In figure 1, we plot the AFS crisis network for the first wave of the COVID-19 pandemic (20 weeks across all periods), and in figures 2-5, we present the network plots of each of the four phases of the first wave of the COVID-19 pandemic. In the network plot of Figure 1, we can distinguish the AFS leadership team in the core (red nodes), AFS actors in the marge of the network plot (red nodes), and non-AFS actors in the periphery (cyan nodes at the edge of the network plot).

Based on the focus groups, it became clear that the leadership team quickly went into a daily rhythm of crisis meetings from the 9th of March to the end of May. Comparing the network plots (figures 2-5), we find that the AFS leadership team intensively interacted with predominantly each other in the pre-lockdown phase and the lockdown phase (larger, red-sized nodes), but that this interaction became less intense in the two reopening phases since, during the summer months, the

rhythm of crisis meetings became less frequent. This corresponds with the three categories of tie frequency shown in Table 3. A possible explanation for this is that the first two phases in the first wave of the COVID-19 pandemic concentrated on taming the wicked problem requiring more interactions.

One recurrent theme in the focus groups with the AFS leadership team was the main challenges arising from the COVID-19 pandemic, including the supply of protective equipment, face masks, alcohol gel, and cleaning material. AFS did not have prior experience with a worldwide spread of a viral respiratory disease, so they were confronted with purchasing goods or services in new markets and dealing with suppliers. In addition, to setting up the procurement of goods and services, AFS was also confronted with implementing new rules and regulations to make work environments safe and people behave safely. This created uncertainty because laws and regulations changed constantly. Moreover, employees were confronted with news updates at work and home, creating ambiguity.

Additionally, the AFS leadership team addressed the organization's transition to working from home in the focus groups. Although AFS already started with part-time working from home before the pandemic, the lockdown increased the pace of this transition tremendously. Working from home, however, stratified the fire services into two groups: firefighters and staff. Each of these groups was confronted with different issues creating different routines, rhythms, and pressures within the organization. This resulted in various leadership challenges regarding coordinating tasks and cooperating between the two groups. Work activities like meetings and physical mail had to be digitized. Necessitating that leadership develops other ways to inform and motivate staff to execute tasks. Contrarily, firefighters were eligible to work at fire posts if fire brigades remained isolated, which created, on the one hand, a false sense of business as usual, and on the other hand, conflicting working demands between firefighters and staff.

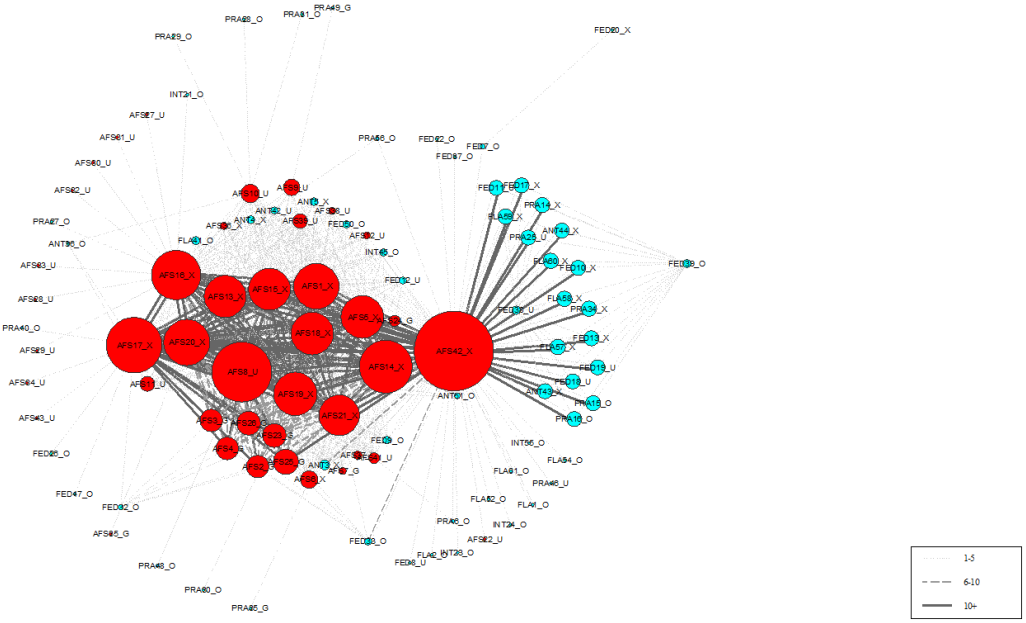

Figure 1: Network plot of the first wave, 27 Feb. – 06 Aug. 2020

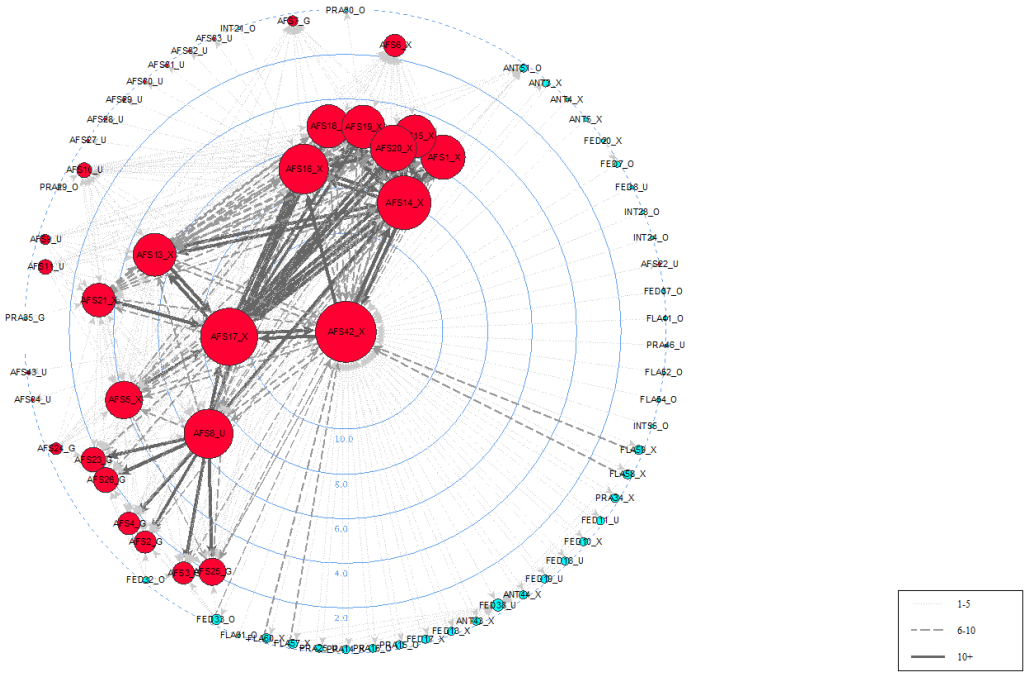

Figure 2: Network plot of pre-lock down phase, 27 Feb. – 18 Mar. 2020

Figure 2 plots the crisis response network in the pre-lock down phase. The network plot exhibits a cohesive, centralized group of AFS leadership actors. Except for actor AFS42_X, most of this core group interacts more frequently with each other than non-AFS actors. It is apparent in the plot that the leadership team is clustered in the center (AFS17_X) or the marge of the network (cluster of AFS actors in the top middle of the plot) with the AFS actor 17_X and AFS8_U occupying broker positions.

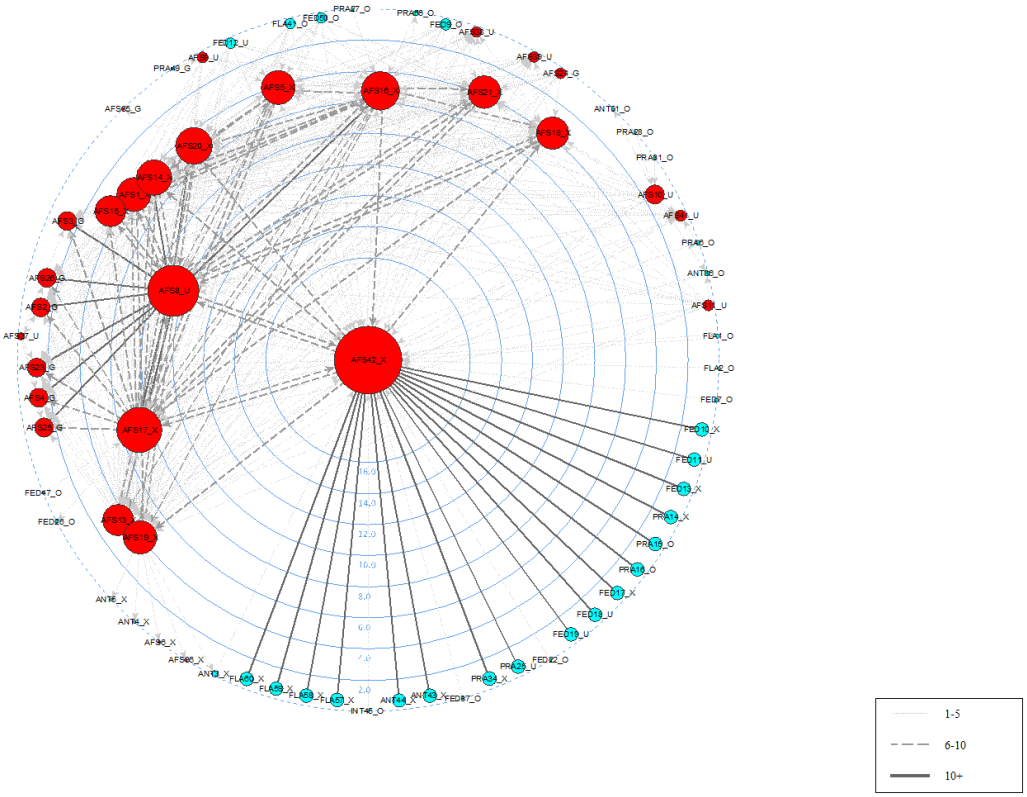

Figure 3: Network plot of lockdown phase, 19 Mar. – 15 Apr. 2020

The crisis response network in the lockdown phase is shown in figure 3. The crisis response network is decentralized, with most AFS leadership actors moving towards the marge-periphery of the network plot. Most apparent in this network plot is the central position and intensification of the interactions between AFS42_X and non-AFS actors (in cyan). In addition, the interactions between AFS17_X and others are less intense compared to the previous period.

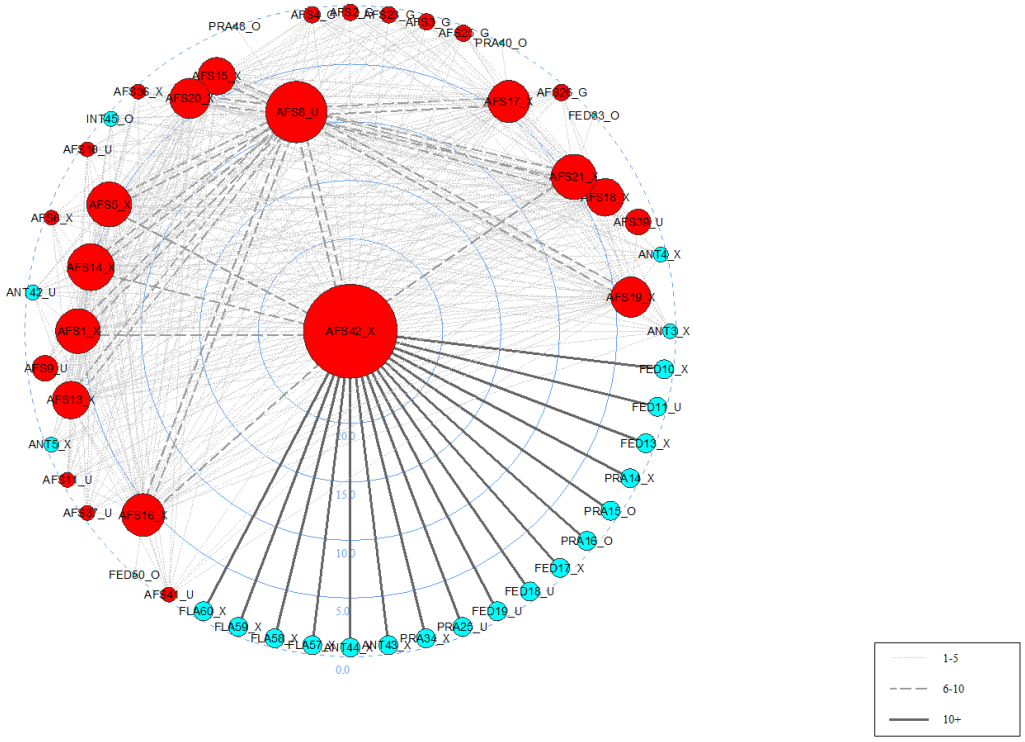

Figure 4: Network plot of reopening phase 1, 16 Apr. – 17 May. 2020

In figure 4, we display the network plot of the crisis response network in the first reopening phase. Most noteworthy in this network plot are fewer actors in the network. Nevertheless, we see a similar pattern during the lockdown phase in which AFS42_X occupies a central position interacting intensively with non-AFS actors and the AFS leadership actors being positioned in the marge/periphery of the network plot.

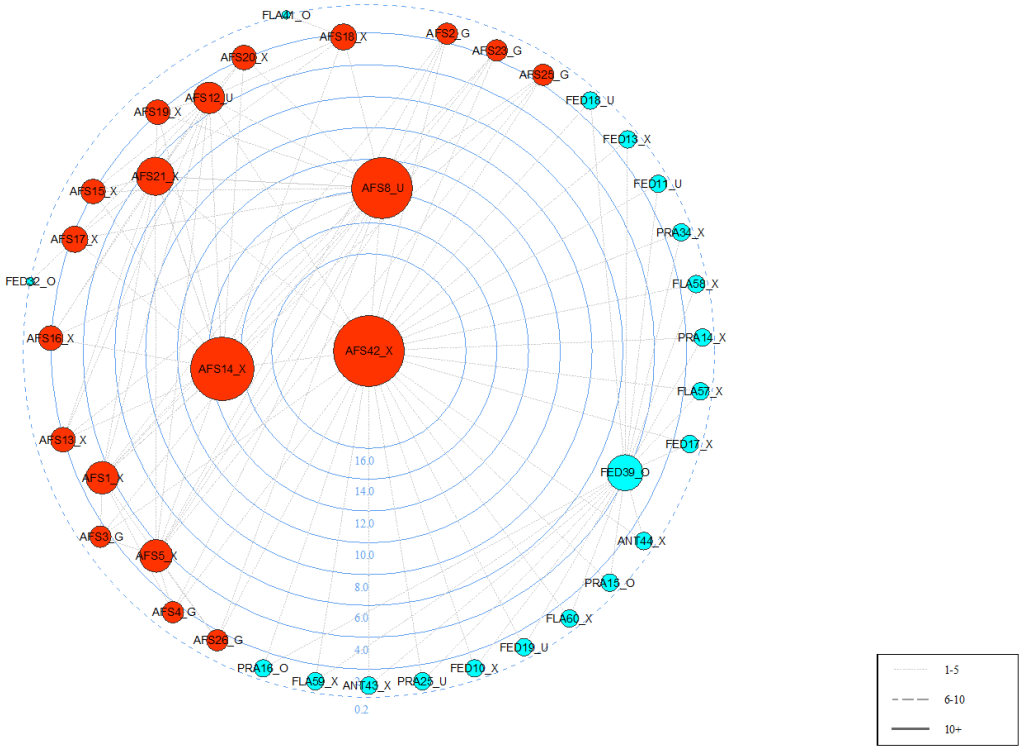

Figure 5: Network plot of reopening phase 2, 18 May. – 06 Aug. 2020

Figure 5 shows the crisis response network in the second reopening phase. The crisis response network is decentralized, with only three AFS actors occupying a central position: AFS42_X, AFS14_X, and AFS8_U. Compared to the previous phase, this crisis response network is composed of fewer network actors as well as a lower number of interactions among network actors. What is clear is that the intensity of interactions in the network plot has become less frequent. Also notice that in the marge of the network plot AFS21_X and a non-AFS actor FED39_O are positioned, indicating their relative importance. Furthermore, we find that in the periphery of the network plot, the non-AFS actors FED32_O and the FLA41_O. Both network actors interact with an AFS actor, signaling a possible nomination of external influence.

Network tensions

The focus groups reveal that the goal of the AFS was to guarantee the delivery of services and continue business processes. Its focus was twofold: 1) to support society and perform its task as an emergency service, and 2) to keep its employees safe and healthy and guarantee business continuity. The AFS leadership team identified that COVID-19 infections among firefighters could threaten operational readiness. Its leadership, therefore, developed an operating model with minimum employees needed to execute public services to mitigate this risk. Operational continuity was determined based on the occupation of fire posts, emergency, and non-operational vehicles, and safeguarding arrival times to deliver an adequate and fast response to a range of threats in the various areas of the Antwerp zone.

Moreover, to accomplish its goal, the AFS leadership team relied on its crisis response network for joint planning and effort with other organizations to address the consequences of the COVID-19 pandemic. In doing so, they were confronted with network tensions. We summarize the findings of the thematic analysis on network tensions and network leadership practices in Table 5.

Efficiency-inclusiveness

The AFS worked in a top-down structure during the first pandemic wave, with the strategic leadership team being the central apex of the organization. From the onset of the pandemic, the fire chief involved all directorates (risk management, operations, logistics, human resources, innovation and technology, finance, staff, and policy cell), increasing differentiation in contributions to the crisis team meetings.

To safeguard efficiency in decision-making, the AFS leadership team followed an incident command system based on facts, actions, and needs (FAN). Officers in the leadership team with crisis experience helped less experienced staff members to get acquainted with this system. In addition, efficient decision-making was increased by tiering the AFS leadership team. The fire chief, supported by his deputy and policy staff from the policy cell, mainly focused externally on collaborative governance. In contrast, other directors in the AFS leadership team were primarily focused on the strategy and operations of the AFS.

Consequently, this meant that it was predominantly the fire chief who participated in external meetings, as shown in the network plots (Figures 2-5). The fire chief (AFS42_X)[25] is the most central actor during the first wave of the pandemic. Although other leadership team members mainly focused on the AFS, the network plots in Figures 2-5 show that a few AFS directors (larger, red nodes) did maintain contact with external partners (cyan nodes). Note also that the "external" ties between the

[25] With permission, we may disclose that AFS42_X is the fire chief.

fire chief and non-AFS actors became more frequent in the lockdown and reopening phases (cf. Figures 2-5).

Table 5. Leadership practices to recognize and respond to network tensions

Network tension in the AFS crisis response network		Examples of leadership practices by AFS leadership team
Efficiency-inclusiveness	Decision-making	• Expand the leadership team by including all directors to increase differentiation • Employ an incident command system (FAN) to improve efficiency • Divide the leadership team into an internal and external tier to functionally differentiate the team and improve efficiency
Internal-external legitimacy	Perception	• Communicate to bridge differences and frame basic agreements and procedures • Broker information Bargain power together with local and regional actors
Flexibility-stability	Change	• Increase flexibility by loosening employees' working hours • Increase buffering capacity by setting up a pandemic budget • Building redundancy by cross-functionality of leadership team members Enhance the capacity of the network and its members by pooling resources and sharing best practices

During these two phases, the number of actors dropped in the AFS crisis response network from 70 to 53, while the number of ties remained almost similar. This suggests a tendency to include fewer actors from different policy levels in the AFS crisis response network and that the relationships between the fire chief and external actors grew more intense.

Internal-external legitimacy

Although the fire chief played an essential role as a broker of information within the AFS crisis response network throughout the first wave of the COVID-19 pandemic, another broker (FED39_O) appeared on the scene in the second reopening phase, interconnecting various non-AFS actors. The second reopening phase's network plot shows that these brokers are not connected (AFS42_X and FED39_O). This illustrates a situation of bargaining power within the crisis response network (see Figure 6).

On the federal level, the federal crisis centre must coordinate and facilitate the crisis response system by law. However, during the focus groups, it became apparent that the AFS perceived them as being too bureaucratic, focusing primarily on central coordination, and less willing to involve other partners like the fire services in the decision-making process.

Although the federal crisis centre was daily in the news as they took the lead in the communication about the evolution and the consequences of the pandemic, they were perceived by

the public media as being part of the federal department of health rather than the central coordinator of crisis management on a national level. According to some AFS participants in the focus groups, the federal crisis centre lacked a clear general purpose and strategic foresight. This challenged the alignment of decision-making between the various policy levels of the (local) governments and provinces, creating the perception of an extra layer of red tape obstructing a swift decision-making process.

The AFS leadership team experienced that the fire services were not always a priority at the Federal policy level. Understandably since initially, the pandemic was framed as a medical crisis on a global scale affecting an exceptionally high proportion of the population. This was different, however, at the municipal and provincial level, in which the AFS was an integral part of governmental bodies in developing and implementing a crisis response to deal with the pandemic. As a result, collaboration among network members in the province of Antwerp increased, while cooperation with the federal crisis centre was initiated at a later stage.

In terms of legitimacy, the words and actions taken by the governor of the province of Antwerp received greater importance in the organizational field of the province of Antwerp (media, relationship with majors, local authorities, and the like) than those of the federal crisis centre. From May 2020 on, when the sanitary regulations were promised to be eased in Belgium, the governor's credibility was espoused by the decision to enforce additional provincial measures for the province of Antwerp on top of the federal measures on the 29th of July 2020 against the COVID-19 pandemic. This strengthened the governor of Antwerp's role as a network leader even more. At the same time, this also gave birth to paradoxical challenges for those concerned with the functioning of other networks and organizations in the province of Antwerp and Flemish community. Especially since this order was unique in Flanders, capturing (international) media attention and challenging the credibility of the Federal crisis centre.

Flexibility-stability

In the focus groups, it became clear that mixed signals were obtained across organizational boundaries from various policy levels: municipal, provincial, and federal. For example, within the AFS, it is common for employees to be volunteers at other fire departments allowing them to cross-check information and decisions from multiple sources. Most AFS crisis response network members know each other through prior crisis management, education, training, and crisis simulation exercises. On the one hand, this increased trust and familiarity with each other's work processes. Still, on the other hand, this also required that the AFS continuously needed to bridge differences between its members and others in the AFS crisis response network.

Another example that provided mixed signals was verifying information through news media. The AFS, like its employees, waited for the federal government to see what updates and changes in

policy, rules, and regulations transpired. Consequently, all members of the AFS crisis response network continuously controlled noise from internal and external sources to make sense of the pandemic. This meant maintaining stability at the organizational, inter-organizational, and network levels due to uncertainty derived from limited foresight.

However, as the first wave of the pandemic evolved, AFS changed its approach to actively trying to make sense of its environment. Before reopening, they always abided by the federal government policy changes. During the reopening phases, they still scanned for signals but now implemented policy, rules, and regulations only when that made sense to them. To make such interpretations, AFS developed its colour signal system to translate new information and policy changes and bring out meaning to its employees on how to behave. In doing so, AFS found a way to overcome the lack of a federal framework and instead developed a modus operandi for understanding how to best deal with the current situation, allowing them to act proactively during the first wave. But this also required that the AFS leadership team continuously needed to frame basic agreements and procedures on sanitary actions in line with operational readiness since its colour signal system was not in accord with the federal government regulations that many members in the AFS crisis response network did adhere to.

The colour signal system provided stability during a disruptive change in the workplace, allowing the AFS leadership team to keep employees calm, act rationally, and adapt effectively as the situation evolved. The colour signal system illustrates how the AFS leadership team informed and motivated the fire service to deal with the crisis.

To improve its flexibility, the AFS leadership team aimed to create redundancies throughout the organization. Based on the focus groups, the AFS loosened staff working hours to reassure employees by affirming their roles and tasks rather than making eight hours daily. Moreover, the AFS set up a pandemic budget to secure resources, e.g., for spending on protective equipment for the workforce. Another example of building in redundancy was the AFS leadership team dividing itself into two groups (A and B) during the lockdown phase and assigning each director a replacement. This was either an officer or senior staff member given a secondary role in addition to its primary role within the AFS.

Externally, members of the AFS leadership team worked with partners across different policy levels to enhance the capacity of the crisis response network. For instance, all fire services in the Flemish region had to coordinate and compromise on what they were doing in terms of education, training, and exercise. Another example involved a close collaboration and alignment among the fire chiefs of the five zones within the Province of Antwerp – initiated and coordinated by the governor. On the municipal level, a continuous alignment tactically occurred between the AFS fire chief and the director of urban security of the city of Antwerp, and a regular alignment on strategic and tactical decisions between the fire chief and the CEO of the Port of Antwerp. In each meeting, the fire chief

needed to bridge differences and frame procedures of the AFS. A deviant procedure was allowing for exercise by firefighters before the reopening even though federal regulations did not yet permit this. This meant the fire chief was continuously finding a balance between following measures, making compromises, and not causing too much friction among various network partners in the crisis response network without jeopardizing the AFS's own goals.

Discussion

Establishing the phenomenon of network tensions

The development of the network aligns with the first four propositions of Nowell et al., (2018) on the structure of effective governance of disaster response networks dealing with complex disasters. Of importance is to understand that the AFS crisis response network only represents a part of the larger, complex federal crisis response system in Belgium, requiring them to coordinate existing operations and integrate new actors into collaborative efforts. We found that the AFS crisis response network was part of a collection of networks, which may be regarded as operationally and managerial autonomous subsystems acting in different organizational fields. Still, each is part of a larger, complex crisis response system with many types of connections and flows (van den Oord et al., 2020).

During the first wave of the COVID-19 pandemic, the relational and structural pattern of the AFS crisis response network developed from a core-periphery network to a smaller, denser network, with the Fire chief acting as the most central actor of the AFS leadership team in this crisis response network. We found that the network by design is highly dependent upon the capability of the fire chief, acting as an information broker (cf. Kwon et al., 2020) to facilitate and coordinate information flow between the AFS leadership team and other subgroups present at the local, regional, and lesser extent at the federal level. It can be pictured as if the fire chief stood on a balcony above the field, allowing him to view patterns and see a context for change or even create one. Using this analogy, network leadership can move back and forth between the balcony and the field, preventing them from being swept up in the field of action (Heifetz & Laurie, 2001).

To establish network tensions as a phenomenon, we need to operationalize tensions as a latent construct that can be observed from the field's action pattern resulting from various organizational networks and environmental dynamics. In line with this, the balcony represents a place and time where network leadership coalesces as an emergent property of one or more networks working together to attain a purpose. To understand if we are dealing with network tensions, we need to be clear on the boundary arrangements of networks and their membership since they shape the nature of network involvement within and between fields allowing us to identify tensions and explain how environmental and population dynamics influence them.

Network tensions and leadership practices

The findings of the relational and structural pattern of the AFS crisis response network suggest that network leaders and members must understand as much as possible about whom to work closely with since competing logics can stem from different fields, from different policy levels, and multiple networks memberships and overlapping network involvement. This calls for a better understanding of where network tensions come from (Berthod & Segato, 2019) and how network leadership practices can deal with network tensions (cf. Bartelings et al., 2017; Cristofoli et al., 2019; Cepiku & Mastrodascio, 2021).

The results showed that efficiency-inclusiveness tension revolves around decision-making processes both within and between networks, a need to balance administrative efficiency, and member involvement (Provan & Kenis, 2008). To deal with this tension, the AFS leadership team aimed to increase differentiation by expanding the team and increasing efficiency by employing an incident command system to cope internally. Moreover, the team functionally differentiated itself into two tiers, one focusing specifically on dealing with collaborative governance in various networks of which the AFS is a member and another tier focusing on the functioning of the AFS.

A suggested solution to mitigate the efficiency-inclusiveness tension is using multiple layers of vertical complexity within a network's governance structure (Vermeiren et al., 2021). Vermeiren et al. (2021, p. 16) argue that "a balance between inclusiveness and efficiency in the decision-making process can be established by a leading agent acting as a steward and mediator in the network, a core steering committee with decision-making authority and working groups". Applying such a solution means the network becomes stratified and hierarchically differentiated in roles reducing coordinative complexity and motivating members' participation (Gulati et al., 2012).

From an external network perspective, the difference lies in the conception of the hierarchy of means-and-ends decisions to attain a purpose. Organizations participating in a network make decisions about courses of action to be taken for achieving a network goal; these decisions accordingly define the input and outputs that other networks in the organizational field will seek to achieve by making their own decisions about actions to be taken, actions that in the aggregate will become the means to achieve higher-level (field) goals.

Consequently, at some point, there will be a need for a "balcony" to review and coordinate the decisions made by a population of networks in the field because of uncertainty surrounding field decision-making processes about which network goals are more important and what resources should be used to pursue a given objective. In previous work, such a balcony has also been termed a "network of networks" (cf. Nowell et al., 2019; van den Oord et al., 2020). A vital network leadership practice involves developing a judgmental strategy of whom to assemble on the balcony; that is, the determination of exclusivity to decision rights in the organizational field. The more exclusive the

access to the balcony is, the more efficient the decision-making processes will be by reducing the number of organizations, potentially limiting multiple membership, and overlapping network involvement. Contrarily, this will reduce the influence the network of networks will have in the organizational field.

Another implication of the case study results is that network leaders and members must respond to and manage network-environment dynamics. The pandemic's first wave has shown that the nature and variety of institutional processes can manifest in network tensions. The AFS and other organizations have faced multiple institutional demands ranging from regulative, normative, or cognitive in nature that prescribe what constitutes what is appropriate and what is not. Having numerous network memberships as an organization can impose a different plethora of pressures than when organizations are involved in only a few networks. Especially if demands of in- and outsiders of networks are misaligned, a situation of institutional complexity is created that instigates different strategic behaviours that organizations enact in direct response to the institutional and network processes that affect them.

Regarding internal-external network legitimacy, network leadership needs to determine situational awareness given the general perception of in- and outsiders within and across environmental niches. This requires developing a relational capacity responsive to internal and external legitimacy needs (Provan & Kenis, 2008). Network leadership must be able to switch between different strategies to respond to competing logics without damaging its reputation (Human & Provan, 2000). The latter is essential, mainly if networks depend on in- and outsiders to provide access to scarce resources.

In addition, to considering under which circumstances network leadership assembles "on the balcony," it is also essential for network leadership to anticipate the composition of differences in lateral position and differences in kind of resources held among network members since this can inform a particular choice in adopting a governance mode that can impact how networks function and develop over time (Provan & Kenis, 2008; Herranz, 2009; Provan et al., 2011) or what stabilizing activities, networks need to employ to mitigate the trade-off between flexibility and stability (Cristofoli et al., 2019). For instance, assembling network members from networks that differ in their inception (e.g., voluntary versus mandated), different developmental phases (e.g., emergence, transition, maturity, and sustainment or demise), and modes of governance (e.g., shared-participant, lead-organization, or network administrative organization) can reduce cohesiveness and network member input, trigger conflict and distrust, or even led to withdrawal (Harrison & Klein, 2007). As such, this confronts network leadership to deal with power bargaining among a set of networks in an organizational field (Saz-Carranza et al., 2016), coalescing and oscillating different modes of governance between them (Provan & Kenis, 2008; Berthod et al., 2016), and responding to institutional complexity by bridging differences, framing basic agreements and procedures, and enhancing

network competencies of this set of networks as well as with the broader network ecology in the organizational field (Saz-Carranza & Ospina, 2011; Nowell et al., 2019).

Conclusion

The case study aimed to reconsider where network tensions come from and examine how network leadership identifies and leverages internal and external opportunities and threats across messy network boundaries over time. By examining the AFS crisis network in conjunction with other networks and organizations in the organizational field of the province of Antwerp, and its environmental dynamics, we aimed to understand how network-level tensions arose, what role network leadership played, and how they recognized and responded to them, and whether their origin matters.

Based on Social Network Analysis, we showed how the leadership team of the Antwerp Fire Service and the fire chief affiliated in the AFS crisis response network during the first wave of the pandemic. The analysis presented that the AFS crisis response network developed from a core-periphery network to a smaller, denser network, with the fire chief acting as the most central actor in the network through the first wave of the COVID-19 pandemic. Based on the thematic analysis, we have provided insights into network leadership practices to recognize and respond to network tensions.

The case study design is not without limitations. First, our focus on a single network may limit the generalizability of our findings. A disadvantage is that we drew heavily on the recollections and views of the AFS leadership team involved in the After Action Review, making our findings suggestive. Although we used several secondary data sources to analyze the AFS crisis response network, this data may be incomplete and lack accuracy. Furthermore, the data uncovered an overall pattern in relationship evolution that had to be interpreted. Despite that, we corroborated the results of the sampling approach and inferences of the case study, future network research needs to collect full relational data, preferably over multiple waves of data collection (cf. Provan & Huang, 2012), and capture the views of different network agents. It requires an in-depth empirical analysis tracking the evolution of relational ties and network leadership practices (Berthod et al., 2017).

With these limitations in mind, this study presents a first step in establishing the phenomenon of network tensions. While further work is needed, we outline how network leadership dealt with network-level tensions across messy network boundaries. From a practical perspective, this case study implies that the art of network leadership, whether we are dealing with network management in or network management of, requires investigation of where network tensions originate from and that multiple network memberships, overlapping network involvement, and broader network-environment relationships can influence how network leadership responds and manages network

tensions. We hope our work will stimulate further research on network tensions and network leadership.

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The authors report that there are no competing interests to declare.

Data availability statement

The pseudonymized data that support the social network analysis of this study are available on request from the corresponding author, [SvdO]. The data are not publicly available due to containing information that could compromise the privacy of research participants.

References

Alter, C. (1990). An exploratory study of conflict and coordination in inter-organizational service delivery system. *Academy of management journal*, *33*(3), 478-502. https://doi.org/10.5465/256577

Ansell, C., Sondorp, E., & Stevens, R. H. (2012). The promise and challenge of global network governance: the global outbreak alert and response network. *Global Governance*, 317-337. https://www.jstor.org/stable/23269960

Bartelings, J. A., Goedee, J., Raab, J., & Bijl, R. (2017). The nature of orchestrational work. *Public management review*, *19*(3), 342-360. https://doi.org/10.1080/14719037.2016.1209233

Baur, M. (2008). *visone-Software for the Analysis and Visualization of Social Networks* (Doctoral dissertation, Karlsruhe, Univ., Diss., 2008). DOI: 10.5445/IR/1000010897

Berthod, O., Grothe-Hammer, M., Müller-Seitz, G., Raab, J., & Sydow, J. (2017). From high-reliability organizations to high-reliability networks: the dynamics of network governance in the face

of emergency. *Journal of Public Administration Research and Theory*, *27*(2), 352-371. https://doi.org/10.1093/jopart/muw050
Berthod, O., Grothe-Hammer, M., & Sydow, J. (2017). Network ethnography: A mixed-method approach for the study of practices in interorganizational settings. *Organizational Research Methods*, *20*(2), 299-323. https://doi.org/10.1177%2F1094428116633872
Berthod, O., & Segato, F. (2019). Developing purpose-oriented networks: A process view. *Perspectives on Public Management and Governance*, *2*(3), 203-212. https://doi.org/10.1093/ppmgov/gvz008
Brandes, U., & Wagner, D. (2004). Analysis and visualization of social networks. In *Graph drawing software* (pp. 321-340). Springer, Berlin, Heidelberg. DOI: 10.1007/978-3-642-18638-7_15
Brandes, U., Kenis, P., & Raab, J. (2006). Explanation through network visualization. *Methodology*, *2*(1), 16-23. https://psycnet.apa.org/doi/10.1027/1614-2241.2.1.16
Brugghemans, B., Pieters, S., & Marynissen, H. (2021). Alles is onder controle! & 9 andere mythes over organiseren in tijden van crisis. https://repository.uantwerpen.be/desktop/irua
Burt, R. S., Kilduff, M., & Tasselli, S. (2013). Social network analysis: Foundations and frontiers on advantage. *Annual review of psychology*, *64*, 527-547. https://doi.org/10.1146/annurev-psych-113011-143828
By, R. T. (2020). Organizational change and leadership: Out of the quagmire. *Journal of Change Management*, *20*(1), 1-6. https://doi.org/10.1080/14697017.2020.1716459
Carboni, J. L., Saz-Carranza, A., Raab, J., & Isett, K. R. (2019). Taking dimensions of purpose-oriented networks seriously. *Perspectives on Public Management and Governance*, *2*(3), 187-201. https://doi.org/10.1093/ppmgov/gvz011
Cepiku, D., & Mastrodascio, M. (2021). Leadership behaviours in local government networks: an empirical replication study. *Public Management Review*, *23*(3), 354-375. https://doi.org/10.1080/14719037.2019.1679233
Corbin, J. M., & Strauss, A. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. *Qualitative sociology*, *13*(1), 3-21. https://doi.org/10.1007/BF00988593
Cristofoli, D., Trivellato, B., & Verzillo, S. (2019). Network management as a contingent activity. A configurational analysis of managerial behaviors in different network settings. *Public Management Review*, *21*(12), 1775-1800 https://doi.org/10.1080/14719037.2019.1577905
Das, T. K., & Teng, B. S. (2000). Instabilities of strategic alliances: An internal tensions perspective. *Organization science*, *11*(1), 77-101. https://doi.org/10.1287/orsc.11.1.77.12570
De Rond, M., & Bouchikhi, H. (2004). On the dialectics of strategic alliances. *Organization science*, *15*(1), 56-69. https://doi.org/10.1287/orsc.1030.0037
Dixon-Woods, M., Agarwal, S., Jones, D., Young, B., & Sutton, A. (2005). Synthesising qualitative and quantitative evidence: a review of possible methods. *Journal of health services research & policy*, *10*(1), 45-53. https://doi.org/10.1177%2F135581960501000110
Eisenhardt, K. M. (1989). Agency theory: An assessment and review. *Academy of management review*, *14*(1), 57-74. https://doi.org/10.5465/amr.1989.4279003
Emery, F. E., & Trist, E. L. (1965). The causal texture of organizational environments. *Human relations*, *18*(1), 21-32. https://doi.org/10.1177%2F001872676501800103
Fama, E. F. (1980). Agency problems and the theory of the firm. *Journal of political economy*, *88*(2), 288-307. https://doi.org/10.1086/260866
Gould, R. V., & Fernandez, R. M. (1989). Structures of mediation: A formal approach to brokerage in transaction networks. *Sociological methodology*, 89-126. https://doi.org/10.2307/270949
Gulati, R., Puranam, P., & Tushman, M. (2012). Meta-organization design: Rethinking design in inter-organizational and community contexts. *Strategic management journal*, *33*(6), 571-586. https://doi.org/10.1002/smj.1975
Harrison, D. A., & Klein, K. J. (2007). What's the difference? Diversity constructs as separation, variety, or disparity in organizations. *Academy of management review*, *32*(4), 1199-1228. https://doi.org/10.5465/amr.2007.26586096
Heifetz, R. A., & Laurie, D. L. (2001). The work of leadership. *Harvard business review*, *79*(11). https://hbr.org/2001/12/the-work-of-leadership

Hermansson, H. M. (2016). Disaster management collaboration in Turkey: Assessing progress and challenges of hybrid network governance. *Public Administration*, *94*(2), 333-349. https://doi.org/10.1111/padm.12203
Herranz Jr, J. (2009). Endogenous development dynamics of multisectoral network management. *International Public Management Journal*, *12*(3), 370-397. https://doi.org/10.1080/10967490903094145
Huang, K., & Provan, K. G. (2007a). Structural embeddedness and organizational social outcomes in a centrally governed mental health services network. *Public Management Review*, *9*(2), 169-189. https://doi.org/10.1080/14719030701340218
Huang, K., & Provan, K. G. (2007b). Resource tangibility and patterns of interaction in a publicly funded health and human services network. *Journal of public administration research and theory*, *17*(3), 435-454. https://doi.org/10.1093/jopart/mul011
Human, S. E., & Provan, K. G. (2000). Legitimacy building in the evolution of small-firm multilateral networks: A comparative study of success and demise. *Administrative science quarterly*, *45*(2), 327-365. https://doi.org/10.2307%2F2667074
Isett, K. R., & Provan, K. G. (2005). The evolution of dyadic interorganizational relationships in a network of publicly funded nonprofit agencies. *Journal of Public Administration Research and Theory*, *15*(1), 149-165. https://doi.org/10.1093/jopart/mui008
Klaster, E., Wilderom, C. P. M., & Muntslag, D. R. (2017). Balancing relations and results in regional networks of public-policy implementation. *Journal of Public Administration Research and Theory*, *27*(4), 676-691. https://doi.org/10.1093/jopart/mux015
Kwon, S. W., Rondi, E., Levin, D. Z., De Massis, A., & Brass, D. J. (2020). Network brokerage: An integrative review and future research agenda. *Journal of Management*, *46*(6), 1092-1120. https://doi.org/10.1177%2F0149206320914694
Laumann, E. O., & Marsden, P. V. (1982). Microstructural analysis in interorganizational systems. *Social networks*, *4*(4), 329-348. https://doi.org/10.1016/0378-8733(82)90017-X
Laumann, E. O., Marsden, P. V., & Prensky, D. (1992). The boundary specification problem in network analysis. In Freeman, L.C., & White, D.R., & Romney, A.K., (Ed.). *Research methods in social network analysis*. Transaction Publishers.
Lemaire, R. H. (2012). *The functions of the network executive: A case study of network management, leadership and governance* (Doctoral dissertation, The University of Arizona).
Lemaire, R. H. (2020). What is our purpose here? Network relationships and goal congruence in a goal-directed network. *The American Review of Public Administration*, *50*(2), 176-192. https://doi.org/10.1177%2F0275074019879506
Lemaire, R. H., & Provan, K. G. (2018). Managing collaborative effort: How Simmelian ties advance public sector networks. *The American Review of Public Administration*, *48*(5), 379-394. https://doi.org/10.1177%2F0275074017700722
Lewis, M. W., Andriopoulos, C., & Smith, W. K. (2014). Paradoxical leadership to enable strategic agility. *California management review*, *56*(3), 58-77. https://doi.org/10.1525%2Fcmr.2014.56.3.58
Milward, B., Cooper, K. R., & Shumate, M. D. (2016). Who Says a Common Agenda Is Necessary for Collective Impact? *The Nonprofit Quarterly*. https://nonprofitquarterly.org/2016/06/21/who-says-a-common-agenda-is-necessary-for-collective-impact/
Milward, H. B., & Provan, K. G. (2006). *A manager's guide to choosing and using collaborative networks* (Vol. 8). Washington, DC: IBM Center for the Business of Government. Retrievable at: https://www.businessofgovernment.org/report/managers-guide-choosing-and-using-collaborative-networks
Moliterno, T. P., & Mahony, D. M. (2011). Network theory of organization: A multilevel approach. *Journal of management*, *37*(2), 443-467. https://doi.org/10.1177%2F0149206310371692
Moynihan, D. P. (2012). Extra-network organizational reputation and blame avoidance in networks: The Hurricane Katrina example. *Governance*, *25*(4), 567-588. https://doi.org/10.1111/j.1468-0491.2012.01593.x

Moynihan, D. P. (2009). The network governance of crisis response: Case studies of incident command systems. *Journal of Public Administration Research and Theory*, *19*(4), 895-915. https://doi.org/10.1093/jopart/mun033
Müller-Seitz, G. (2012). Leadership in interorganizational networks: a literature review and suggestions for future research. *International Journal of Management Reviews*, *14*(4), 428-443. https://doi.org/10.1111/j.1468-2370.2011.00324.x
Nowell, B., Hano, M. C., & Yang, Z. (2019). Networks of networks? Toward an external perspective on whole networks. *Perspectives on Public Management and Governance*, *2*(3), 213-233. https://doi.org/10.1093/ppmgov/gvz005
Nowell, B. L., & Kenis, P. (2019). Purpose-oriented networks: The architecture of complexity. *Perspectives on Public Management and Governance*, *2*(3), 169-173. https://doi.org/10.1093/ppmgov/gvz012
Nowell, B., & Milward, H. B. (2022). Apples to Apples: A Taxonomy of Networks in Public Management and Policy. *Elements in Public and Nonprofit Administration*. Cambridge University Press.
Nowell, B., Steelman, T., Velez, A. L. K., & Yang, Z. (2018). The structure of effective governance of disaster response networks: Insights from the field. *The American Review of Public Administration*, *48*(7), 699-715. https://doi.org/10.1177%2F0275074017724225
Obstfeld, D., Borgatti, S. P., & Davis, J. (2014). Brokerage as a process: Decoupling third party action from social network structure. In Daniel J. Brass, Giuseppe (Joe) Labianca, Ajay Mehra, Daniel S. Halgin, Stephen P. Borgatti (Eds.). *Contemporary perspectives on organizational social networks*. Volume 40, 135-159, Emerald Group Publishing Limited.
Ospina, S. M., Foldy, E. G., Fairhurst, G. T., & Jackson, B. (2020). Collective dimensions of leadership: connecting theory and method. *Human Relations*, *73*(4), 441-463. https://doi.org/10.1177%2F0018726719899714
Paquin, R. L., & Howard-Grenville, J. (2013). Blind dates and arranged marriages: Longitudinal processes of network orchestration. *Organization Studies*, *34*(11), 1623-1653. https://doi.org/10.1177%2F0170840612470230
Popp, J., MacKean, G., Casebeer, A., Milward, H. B., & Lindstrom, R. (2013). Inter-organizational networks. *A critical review of the literature to inform practice. Washington, DC: IBM Center for The Business Development*. Retrievable at: https://www.businessofgovernment.org/report/inter-organizational-networks-review-literature-inform-practice
Provan, K. G., Beagles, J. E., & Leischow, S. J. (2011). Network formation, governance, and evolution in public health: The North American Quitline Consortium case. *Health care management review*, *36*(4), 315. https://doi.org/10.1097%2FHMR.0b013e31820e1124
Provan, K. G., & Huang, K. (2012). Resource tangibility and the evolution of a publicly funded health and human services network. *Public Administration Review*, *72*(3), 366-375. https://doi.org/10.1111/j.1540-6210.2011.02504.x
Provan, K. G., & Kenis, P. (2008). Modes of network governance: Structure, management, and effectiveness. *Journal of public administration research and theory*, *18*(2), 229-252. https://doi.org/10.1093/jopart/mum015
Provan, K. G., & Lemaire, R. H. (2012). Core concepts and key ideas for understanding public sector organizational networks: Using research to inform scholarship and practice. Public Administration Review, 72(5), 638-648. https://doi.org/10.1111/j.1540-6210.2012.02595.x
Provan, K. G., & Milward, H. B. (1995). A preliminary theory of interorganizational network effectiveness: A comparative study of four community mental health systems. *Administrative science quarterly*, 1-33. https://doi.org/10.2307/2393698
Provan, K. G., & Milward, H. B. (2001). Do networks really work? A framework for evaluating public-sector organizational networks. *Public administration review*, *61*(4), 414-423. https://doi.org/10.1111/0033-3352.00045
Provan, K. G., Fish, A., & Sydow, J. (2007). Interorganizational networks at the network level: A review of the empirical literature on whole networks. *Journal of management*, *33*(3), 479-516. https://doi.org/10.1177%2F0149206307302554

Puranam, P., Alexy, O., & Reitzig, M. (2014). What's "new" about new forms of organizing?. *Academy of management Review*, *39*(2), 162-180. https://doi.org/10.5465/amr.2011.0436
Puranam, P. (2018). *The microstructure of organizations*. Oxford University Press.
Raeymaeckers, P. (2016). Should I stay or should I go? A qualitative analysis of legitimacy in a shared participant-governed network. *Human Service Organizations: Management, Leadership & Governance*, *40*(3), 267-280. https://doi.org/10.1080/23303131.2015.1117553
Rethemeyer, R. K., & Hatmaker, D. M. (2008). Network management reconsidered: An inquiry into management of network structures in public sector service provision. *Journal of public administration research and theory*, *18*(4), 617-646. https://doi.org/10.1093/jopart/mum027
Roux-Dufort, C. (2007). Is Crisis Management (only) A Management of Exceptions? *Journal of Contingencies and Crisis Management* *15*(2), 105–14. https://doi.org/10.1111/j.1468-5973.2007.00507.x
Saz-Carranza, A., & Ospina, S. M. (2011). The behavioral dimension of governing interorganizational goal-directed networks—Managing the unity-diversity tension. *Journal of Public Administration Research and Theory*, *21*(2), 327-365. https://doi.org/10.1093/jopart/muq050
Saz-Carranza, A., Salvador Iborra, S., & Albareda, A. (2016). The power dynamics of mandated network administrative organizations. *Public Administration Review*, *76*(3), 449-462. https://doi.org/10.1111/puar.12445
Sedgwick, D., Lemaire, R. H., Wirgau, J., & McKeague, L. K. (2022). Community foundations as network conveners: Structuring collective agency for child education and development system impact. *Journal of Public Administration Research and Theory*, *32*(2), 269-286. https://doi.org/10.1093/jopart/muab036
Smith, W. K., & Lewis, M. W. (2011). Toward a theory of paradox: A dynamic equilibrium model of organizing. *Academy of management Review*, *36*(2), 381-403. https://doi.org/10.5465/amr.2009.0223
Suchman, M. C. (1995). Managing legitimacy: Strategic and institutional approaches. *Academy of management review*, *20*(3), 571-610. https://doi.org/10.5465/amr.1995.9508080331
Sydow, J., Schüßler, E., & Müller-Seitz, G. (2015). *Managing inter-organizational relations: Debates and cases*. Macmillan International Higher Education.
Tasselli, S., & Kilduff, M. (2021). Network agency. *Academy of Management Annals*, *15*(1), 68-110. https://doi.org/10.5465/annals.2019.0037
Tasselli, S., Kilduff, M., & Menges, J. I. (2015). The microfoundations of organizational social networks: A review and an agenda for future research. *Journal of Management*, *41*(5), 1361-1387. https://doi.org/10.1177%2F0149206315573996
Trochim, W. M. (1989). Outcome pattern matching and program theory. *Evaluation and program planning*, *12*(4), 355-366. https://doi.org/10.1177%2F0149206315573996
Turner, B. A. (1976). The organizational and interorganizational development of disasters. *Administrative science quarterly*, 378-397. https://doi.org/10.1016/0149-7189(89)90052-9
Uhl-Bien, M. (2006). Relational leadership theory: Exploring the social processes of leadership and organizing. *The leadership quarterly*, *17*(6), 654-676. https://doi.org/10.1016/j.leaqua.2006.10.007
Uhl-Bien, M., & Arena, M. (2018). Leadership for organizational adaptability: A theoretical synthesis and integrative framework. *The leadership quarterly*, *29*(1), 89-104. https://doi.org/10.1016/j.leaqua.2017.12.009
Uhl-Bien, M., Marion, R., & McKelvey, B. (2007). Complexity leadership theory: Shifting leadership from the industrial age to the knowledge era. *The leadership quarterly*, *18*(4), 298-318. https://doi.org/10.1016/j.leaqua.2007.04.002
Van den Oord, S., Vanlaer, N., Marynissen, H., Brugghemans, B., Van Roey, J., Albers, S., ... & Kenis, P. (2020). Network of networks: preliminary lessons from the Antwerp Port Authority on crisis management and network governance to deal with the COVID-19 pandemic. *Public Administration Review*, *80*(5), 880-894. https://doi.org/10.1111/puar.13256
Vangen, S., & Winchester, N. (2014). Managing cultural diversity in collaborations: A focus on management tensions. *Public Management Review*, *16*(5), 686-707. https://doi.org/10.1080/14719037.2012.743579

Vangen, S., Hayes, J. P., & Cornforth, C. (2015). Governing cross-sector, inter-organizational collaborations. *Public Management Review*, *17*(9), 1237-1260. https://doi.org/10.1080/14719037.2014.903658
Vermeiren, C., Raeymaeckers, P., & Beagles, J. (2021). In search for inclusiveness: Vertical complexity in public-nonprofit networks. *Public Management Review*, *23*(2), 189-209 https://doi.org/10.1080/14719037.2019.1668471
Wasserman, S., & Faust, K. (1994). Social network analysis: Methods and applications. Cambridge.
Weick, K. E. (1988). Enacted sensemaking in crisis situations. *Journal of Management Studies,* 25(4), 305–317. https://doi.org/10.1111/j.1467-6486.1988.tb00039.x
Weick, K. E. (1993). The collapse of sensemaking in organizations: The Mann Gulch disaster. *Administrative Science Quarterly, 38*, 628–652. https://doi.org/10.2307/2393339
WHO (2019). The global practice of After Action Review: A Systematic Review of Literature. Geneva, Switzerland: World Health Organization; 2019 (WHO/WHE/CPI/2019.9). Licence: CC BY-NC-SA 3.0 IGO. Retrievable at: https://www.who.int/publications/i/item/WHO-WHE-CPI-2019.9
Willem, A., & Lucidarme, S. (2014). Pitfalls and challenges for trust and effectiveness in collaborative networks. *Public Management Review*, *16*(5), 733-760. https://doi.org/10.1080/14719037.2012.744426
Yang, Z., & Nowell, B. (2021). Network isomorphism? A network perspective on the symbolic performance of purpose-oriented networks. *International Public Management Journal*, *24*(3), 350-377. https://doi.org/10.1080/10967494.2020.1824949

CHAPTER 5. DEVELOPMENT OF A NETWORK GAME FOR COORDINATION OF SERVICE DELIVERY TO PEOPLE WITH A CHRONIC ILLNESS

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Development of a network game for coordination of service delivery to people with a chronic illness

Introduction. In this article, network governance is examined using a network game that enables participants to interact and communicate about the coordination of service delivery by playing a role in a simulated organizational network. **Methods.** The research design can be described as a data-driven inductive approach in which data were collected during two stages based on a participatory model-building as a form of action science. The data analysis was a reflexive and iterative process of going back and forth between the thematic analysis of the audiovisual recordings and the content analysis of the surveys. We report the interim findings and evaluate the network game based on two game sessions, each with 18 participants, held in 2017. **Results.** The interim findings of the two gaming sessions provide various instances in which participants acknowledged the validity of day-to-day practices of network governance. The findings suggest that appointing a network governance form is necessary to coordinate and integrate interactions among and between networks. **Conclusion.** This study presents a proof-of-concept of how a gaming and simulation approach replicates the governance of organizational networks. Moreover, the approach was experienced as being supportive for informing its participants on how organizational networks are effectively structured, governed, and managed in the context of coordinated service delivery for people with a chronic illness in Flanders (Belgium). It is recommended for future research to apply a quasi-experimental research design in which dimensions of network governance are manipulated to examine the behavioral underpinnings of goal-directed networks.

Keywords: Experimental game, chronic illness, health networks, care networks, community, integrated healthcare systems, administrative coordination

Introduction

An organizational network consists of three or more organizations working together to achieve a common network goal that none of the organizations can achieve independently.[1–3] Organizational networks have steadfastly become a preferred way of organizing service delivery to satisfy the needs of people with chronic illness and multi-problems, both internationally and in Flanders (Belgium).[4–12] Therefore, understanding how network actors coordinate and integrate organizational networks has become a leading research topic in network governance research.[1,2,5,6,13] Network governance is "the

use of institutions and structures of authority and collaboration to allocate resources and to coordinate and control joint action across the network as a whole" (p. 231).

One of the main difficulties in coordinating organizational networks is that they are characterized by an absence of unity in command and ownership.[2,6,14] Relationships among network members are primarily nonhierarchical, often even voluntary, and participants have substantial operating autonomy.[1,6] But, without the benefit of hierarchy, such as in a vertically integrated organization, network actors must use other mechanisms in their day-to-day practice to coordinate and integrate the network as a whole. This means that actors in organizational networks go beyond informal and intra-organizational cooperation among individuals to include inter-organizational relationships. In doing so, they must organize a purposive aggregation of individuals representing various organizations.[2,6,15–18] This raises the question of what governance mechanisms they use to exert concerted efforts toward a shared and explicitly recognized network goal. How do these network actors engage in building and maintaining organizational networks, and what are subsequently the behavioral underpinnings of goal-directed organizational networks?

The research objective is to understand further how network actors in goal-directed organizational networks coordinate and integrate the network as a whole and what governance mechanisms they use to replace hierarchy in a network context.[2,6,16] To advance the understanding of how organizational networks are coordinated and, ultimately, how collective outcomes might be generated, we must examine the network as a whole,[1,2,19] because to understand the behavioral underpinnings of a network, one must understand the context of that behavior. [1,20,21] Network-level studies, however, are generally very time-consuming, and only recently have network research methods been developed or matured to account for multiple networks. [1,5,22–24]

To overcome this challenge, we propose gaming and simulation in the tradition of Duke and Geurts[25] as an alternative approach to studying network governance and how network actors coordinate and integrate a whole network. We developed a network game called "Organizorg". "Organizorg" is an abbreviation for organization and care in Dutch. The network game enables participants to communicate about the issues, develop appropriate strategies and experience the probable impacts of decision-making and coordination of service delivery to people with chronic illness. In the appendix, we have briefly introduced the network game "Organizorg".

The aim of this article is twofold. First, we aim to demonstrate how a network game provides an opportunity to make participants experience, as accurately as possible, the coordination of service delivery to people with chronic illness in a simulated network context. Through debriefing after each game session, the experiences and insights are linked to participants' theory and daily practices, allowing participants to become aware and learn about goal-directed organizational networks. The second goal is that we aim to elaborate on how gaming and simulation provide an alternative approach to studying whole networks. The network game "Organizorg" has been played twice with 18

practitioners from Flanders' health and social care sector (Belgium). The article presents a proof-of-concept based on the findings, participants' experiences, and evaluation of the game based on two game sessions held in 2017.

Concepts used in designing the game simulation

Gaming and simulation are drawn on the notion of play and simulation. [25] Play is a central human characteristic. According to Stuart Brown[26], play needs to be "seen as a broad category of behavior, as basic in phenomenology to smart, complex animals as sleep and dreams, and as scientifically enigmatic" (p. 243). Caillois[27] defines play as "an activity, which is essentially free, separate, uncertain, unproductive, governed by rules and make belief" (p. 9). Game designers use the experiential and creative quality of play by simulating, at least partially, the behavior of a referent system. [25] Simulation, in this sense, is a conscious endeavor to reproduce the central characteristics of such a system to understand, experiment with, and predict the behavior of that system. [25]

Table 1. Network governance operationalized.

Network governance	**Theoretically conceptualized** [1,2,3,6,14,19,21,36,38,39,40,41,52]	**Operationalization in the game**
Dimensions	Network governance is understood as 'the use of institutions and structures of authority and collaboration to allocate resources and to coordinate and control joint action across the network as a whole'. [2: p. 231[	Three core game elements: strategy table, patient population table, and decision-making table.
Division of labor	The task division and allocation of service delivery by multiple organizations.	A combination of coordination by programming and feedback to solve the joint-production problem of participants producing one part of the solution for each patient in the game. The combination of the strategy table, patient population table, and decision-making table presents heuristics that resembles a pre-established blueprint of "action" that was interpreted, discussed, and adjusted by each group of participants by mutual adjustment based on the information received from the actual patients under treatment.
The integration of effort	Targeted and appropriate information provision among network members so that those organizations that need to work closely together do so, while others do not	
	The provision of rewards referring to mapping and allocating a set of rewards (both monetary and non-monetary) in order to motivate network members to get thing done.	

The main challenge in designing and applying gaming and simulation is whether elements of the reference systems (real-life cases) and their interrelationships are represented by game elements (constructs of these real-life cases) so that we can translate acquired knowledge and experiences from the game to reality. [25,28] In this way, a game simulation is "a communication mode or tool that contains a game-specific language and symbols, appropriate communication technologies, and multiple, simultaneous dialogue organized by events" (p. 337). [29] Game designers follow multiple steps to design a game-operating model based on the central characteristics of a referent system, which is accordingly constructed into a game for various purposes such as education, experiential learning, interventions, change management, policy exercises, or future scenario development. [25]

Following our research objective, we reproduced the central characteristics of three goal-directed organizational networks in the healthcare sector of Flanders (Belgium). The goal here was to produce these systems of service delivery and allow participants to experiment with the behavior of that system by playing a predefined role. [25] The game-operating model was designed around the concept of network governance. In Table 1, we have operationalized network governance. In the case of service delivery to people with chronic illness, organizations are dealing with high task uncertainty, complex causality, and nonlinear relationships that require focusing on the collective behavior of multiple organizations rather than focusing on the individual behavior of the members themselves and their interaction with others. [1] The central premise is that goal-directed organizational networks can deal with these issues because an organizational network consists of a set of organizations that exhibit diverse resources and competencies. But these resources and competencies may not be perfectly mobile across organizations explaining performance differences among networks. [30,36–42] If the network can organize a concerted effort among this set of members, it can leverage its members' resources and competencies, i.e., pool information, knowledge, and action, presumably achieving better outcomes than a single network member would achieve operating autonomously. But, to attain such network-level outcomes, the network must coordinate the network as a whole effectively. [2,3,5,19,31,32] This means the network must develop governance mechanisms that enhance the coordination, integration, or linking of different network parts to accomplish a collective set of tasks. [33] In essence, this is creating unity of effort under conditions of task uncertainty and interdependence, and according to Faraj and Xiao, [34] this can be best described as "a temporally unfolding and contextualized process of input regulation and interaction articulation to realize a collective performance" (p. 1157).

To design the game, we selected three real-life Flemish goal-directed organizational networks as referent systems to construct a game-operating network governance model. We choose a mental healthcare network (*Bovengemiddeld, Maar Efficiënt (BME)*), a primary care network (*Groot Maar Inclusief (GMI)*), and an emergent goal-directed network active on a local level (*Klein, Maar Fijn (KMF)*). The selection of these networks was based on access to and variation in network governance.

Each network satisfied the definition of a goal-directed organizational network[2] but varied in central characteristics.

In Table 2, the characteristics of the three networks are displayed. The table is based on meetings with representatives of the referent systems, personal observations, policy documents of the Belgian healthcare system in general and annual reports, case reports, and grey literature of the referent systems in specific. In addition, two systematic literature reviews on network governance and network management processes were used to inform and select core questions and network characteristics of interest. [13,43]

We developed three pre-established network strategies based on a system analysis of the referent systems. The system analysis involved an iterative process of brainstorming, reviewing the literature, interviewing, translating theory to practice and vice versa, and discussing how the dimensions of network governance in Table 1 expressed themselves in the referent systems. In conclusion of this process, the main game specifications were developed. Based on these specifications, the game elements and symbols required to play the game were constructed. The game prototype was then tested four times in which each test had a different aim ranging from experimenting with particular steps of play to testing the actual game dynamics and the validity of particular scenarios, symbols, and game elements. No restrictions were devised for beta testers; tests lasted between 120 and 240 minutes and were audio-recorded. After each test, the game designers fine-tuned the prototype of the game.

Methods

In this section, the design of the research, data collection, and data analysis of the two gaming sessions are explained.

Research design

The underpinning of the research design is action science. [44] Action science enquires to help practitioners discover the tacit choices they have made about their perception. [45] In this case, we used gaming and simulation to assist practitioners in exploration and experimentation with network governance by inquiring into the actors' behavior and reasoning behind it. [25] As such, action science attempts to bridge the gap between "research" and "practice" if people can achieve greater control over their fate by accessing their choices. [4]

Table 2. Strategy table displaying the central characteristics of the three referent networks that enabled to draw predefined strategies for the simulated networks in the game.

Core questions of interest?	Network characteristics	Network BME	Network GMI	Network KMF
To whom does the network offer value?	**Target group**	Severe Mentally Ill (SME)	Chronically illness (including disabilities)	Vulnerable groups
What is the network delivering or producing?	**Type of service delivery**	Service delivery supplied by the members of the network	Coordination of care	Service delivery supplied by the members of the network
	Network complexity	Supply in services is moderately divers	Supply in services is high divers	Supply in services is low divers
What kind or type of network is it?	**Network size**	Moderate number of participants in the network	Large number of participants in the network	Small number of participants in the network
	Network structure	Not centrally or decentrally integrated	Not centrally or decentrally integrated	Decentrally integrated
	Legal form	Mix of appointed functions and entities	Mix of appointed functions and entities	Voting: one vote a person
How does the network organize a joint effort?	**Network differentiation**	High number of functions, tasks, roles, and subgoals	Low number of functions, tasks, roles and subgoals	Average number of functions, tasks, roles and subgoals
	Task integration	Reciprocated (bilateral)	Collective (pooled)	Sequential
How does the network make decisions?	**Administrative coordination**	Group mode (mutual adjustment between 3 or more actors)	Personal (bilateral)	Group mode (mutual adjustment between 3 or more actors)
What kind of resources does the network uses?	**Mandate or voluntary**	Mandated by an external party	Mandated by an external party	Voluntary based on members' initiative
	Resource dependence	High external and high internal resource dependence	Low external and low internal resource dependence	Low external and high internal resource dependence
How does the network monitor and control?	**Control mechanism**	Formal bureaucratic control	Formal bureaucratic control	Personal and centralized control

Table legend:

BME, GMI and KMF are Dutch abbreviations that stand for "Bovengemiddeld, Maar Efficiënt", "Groot Maar Inclusief", and "Klein, Maar Fijn". We used these abbreviations to guarantee anonymity of the referent systems. In the game the abbreviations were used as a heuristic for the pre-defined network strategy of each simulated network. The table is based on meetings with representatives of the referent systems, personal observations, policy documents of the Belgian healthcare system in general and annual reports, case reports, and grey literature of the referent systems in specific. In addition, two systematic literature reviews on network governance and network management processes were used to inform and select core questions and network characteristics of interest. [13,44]

Data collection and sampling of participants

Data were collected during two stages. The first stage involved setting up a database containing various data sources to inform the system analysis of the three referent systems. We extracted and read scientific English journal articles acquired from two previous conference papers that each conducted a literature review on organizational network processes and network governance. [13,43] In addition, we collected and read various policy documents of the Belgian healthcare system in general and annual reports, case reports and grey literature of the referent systems. Based on this, we gained a broader understanding of the current situation of the healthcare system of Belgium as well as in-depth knowledge of network governance concerning the three referent systems of interest.

The second data collection stage involved how data were collected during and after the game. We used a purposive sampling of participants based on two criteria. Participants had to be either directly involved with the care for people with chronic care needs or were daily involved with network governance. In addition, participants had to speak Dutch and work in Belgium. Participants were invited to participate in a single game run via multiple invitations via email.

Each game session was fully audiovisual recorded except for the briefing. In each game run, the game accounting system collected the interaction patterns of each patient treated. Patients were randomly distributed among the networks, and we collected which combination of participants selected which treatment option for each patient and how reimbursements were accordingly divided among each other. Note that patients here are case reports of fictional people. In addition, we distributed two surveys in each game session. The first survey aimed to collect additional background information and determine previous experience with gaming and simulation. The second survey questioned with open questions participants on items of network governance. Finally, we collected all the game material used throughout each game run, including personal observations and notes of the authors.

Data analysis

The data analysis was a reflexive and iterative process of going back and forth between the thematic analysis of the audiovisual recordings and the content analysis of the surveys. The approach can be described as a data-driven inductive approach framed by the research objective of this article. We were interested in which governance mechanism came to be during the game sessions and in what ways the participants engaged in building and maintaining organizational networks. Based on emerging themes of the thematic analysis, we set out to elaborate on how the content of the surveys added to the understanding of how network actors in goal-directed organizational networks coordinate and integrate the network as a whole.

Thematic analysis of audiovisual recordings

For each simulated network in each game session, a descriptive summary was made that included the identification of the participant, age, gender, function, organization, and roles participants played. Next, we searched for key themes that each game session produced based on the personal observations and insights of the authors as being essential to network governance. This was a process of identification by carefully watching the audiovisual recordings multiple times in which emerging themes became the categories for analysis. [46] We focused on the practitioners' reflections during the two evaluations in the game and debriefing. These parts of the game session were primarily interesting because they centered on participants expressing and reflecting on their implicit choices while playing the game.

Content analysis of the surveys

Both surveys were digitalized into Microsoft Excel to prepare the data in three main categories following the structure of items of the second survey. This survey openly asked participants about their experiences with network governance in the game using four items that focused on the pros and cons. In addition, participants were asked to write down recommendations and advice to stakeholders in real life. Based on the three items, participants were asked to advise the minister, networks in Flanders, and patients on improving network governance. Finally, three items were used to question participants about what they perceived as preconditions of network cooperation and lessons learned based on the game experience. As such, we categorized the survey findings by network governance (in the game), advice and recommendations to stakeholders (in real life), and important preconditions of network governance (in real life). [47] By categorizing the findings in this way, we prepared the data for the coding process and the evaluation of the game. The coding process involved two steps of coding. Based on the data categorization, the first step was to use open coding to capture and interpret themes within and across each game session. We strived to find "patterns in the data that at minimum described and organized the possible observations and at maximum interpreted dimensions of network governance" (p. 161). [46] We constructed a data accounting sheet in Microsoft Excel that arrayed each participant's response by class of codes. [47,48] The second step in the coding process was axial coding. [47,48] This involved going back and forth to the content of the participants' responses by reviewing and revising the corresponding open codes with overarching themes that captured dimensions of network governance (see Table 1). We then interpreted these overarching themes in terms of network governance following the initial data categorization and analysis of the codes and key themes that emerged from the audiovisual recordings based on the two gaming sessions.

Evaluation of the game

The thematic and content analysis also informed us to evaluate the game using the 5c framework of Duke and Geurts. [25] The 5c's framework of Duke and Geurts [25] has previously been applied in Geurts et al.,[49] and is based on a comparative analysis of eight game simulations. Following the requirements of Mayer et al., [50] in which they report an evaluation of 12 games and the extensive list of criteria for the quality of a Simulation Game by Kriz and Hense [51], we regard the 5c's framework of Duke and Geurts[25] as most suitable to evaluate the network game "Organizorg". The main reason for this is that the framework exhibits five criteria for successful participatory policy analysis, which builds forward on management and organization studies literature. In addition, Mayer et al. 50 states that the gaming and simulation community generally lacks high-quality evaluation frameworks for what to measure comparatively. Especially in the case of whole networks in a policy and administration context, currently, no robust evaluation models exist in the gaming and simulation domain. [50,52]

Results

This section presents the interim findings and experiences from the two game sessions. We first describe two key themes that emerged from the thematic analysis of the audiovisual recordings. Next, we present the results of the content analysis of the surveys. The results section is closed with the game evaluation summarized in Table 3.

Emerging themes based on thematic analysis

The thematic analysis of the audiovisual recordings of both game sessions resulted in various themes. We will describe and elaborate on two specific themes that emerged as explanatory factors of network governance.

Appointing a network governance form

During both game sessions, all simulated networks except one called for a so-called network coordinator role. This role may be best described as a network spokesperson representing the network during the plenary discussions. In the game sessions, it was addressed that this spokesperson had to be neutral and primarily concerned with information provision and division of tasks. For instance, in the first game session, the assigned network coordinator played a part in leading the discussions in the networks. The network coordinator, however, resembled multiple roles ranging from negotiator to a go-between for the other networks.

In the network governance literature, one of the leading research topics is the form of the governance and management of networks. [2] The key assumption here is that selecting and utilizing

one form over another implies consequences for network outcomes. [2,21] The desire to have such roles in the simulated networks indicated a need for coordination and role clarity. More than once, the networks discussed mandate issues and attempted to formulate structures of authority. For example, a participant in one of the networks explained this as charismatic leadership. When other networks were confronted with why they assigned that form over another, they pointed to informal mechanisms as explanations.

Primarily, at the beginning of each game session, due to the game's design, it was apparent that networks discussed and made agreements and developed internal legitimacy regarding processes, rules, and structures. One simulated network explicitly proclaimed that they perceived themselves as a team rather than a network. As such, they found it more appropriate to organize their group in a more consensual and participative manner instead of entitling one of their members as a lead agent. The game was designed in such a way as to confront the networks with complex and, in some instances, urgent tasks. Calling for a network coordinator to coordinate and integrate the completion of the task at hand was only one way how the networks reacted. Another explanation relates to the underlying institutionalized norms and values of health- and social care professionals. When we tested the game prototype with students and other (non-healthcare) professionals, urgent cases of patients were not treated appropriately and were even neglected. This may suggest that the professional attitude of the participants in the two gaming sessions may impact the behavioral underpinnings of the simulated networks. The main point we can draw from this is that norms and values either support or undermine the commitment to concerted efforts and may affect how networks are governed. This became especially revealing when financial incentives created tensions among participants, confronting them with a dilemma of whether to compete with others or enhance the quality of treatment for each patient. When they opted for the latter, they took the risk of receiving low inducements and becoming dependent on others by coordinating in a group mode rather than a personal mode of coordination.

Interaction among and between networks

In both game runs, participants interacted among and between the simulated networks. These interactions were based on sharing information, interests, and preferences about solutions for patients. Participants regulated and articulated various solutions depending on which type of patient to serve. Participants engaged in programming, making plans, and discussing how particular scenarios could unfold. The game was designed in such a way that participants were provided opportunities to enact and make sense of the tasks at hand, and consequently, various processes of articulation among participants were initiated to create consensus on the network goal as well as how to coordinate and interact with each other. Integration occurs when individuals and organizations work together to coordinate services to patients. Working together implies formal or informal interactions that can

lead to a particular exchange of information, services, programs, and resources. [35]

Although participants were able to prepare themselves, most networks addressed that they did not achieve their predefined goals or successfully serve their target patients as intended. This was due to a lack of time, conducting no registration, and being self-interested rather than embracing a holistic network perspective. The intra-group dynamics in the networks resembled what may be best described as a process of task congruity and articulation between the participants' roles, the simulated network, and outsiders residing in the other networks. Participants had to interplay with inputs such as patients, role expectations, a developing network schema, and various feedback loops of information to achieve the task at hand. In addition to intra-dynamics in the networks, articulating the task and goal of the network led to inter-network dynamics. Participants attempted to commit others with unique resources outside of their network to secure potential common interests.

After each first round of gameplay, the emphasis moved towards communicating and developing rules of interactions across the networks rather than coordination of service delivery within the networks. The main driver for this was increasing competition because participants received feedback on their performance on an individual- and network level. Despite the nature of the networks becoming more competitive over time, in both game sessions, the three networks tried to devise creative ways to arrange the three networks into a larger service delivery system.

Content analysis of the surveys

The content analysis aims to compare whether the game is consistent with the behavioral underpinnings in the goal-directed organizational networks studied (referent systems) and the participants' day-to-day practice, given their recent game experience.

Network governance and essential preconditions.

Participants in both game sessions mentioned the smooth collaboration in the simulated networks and expressed that they found cooperation primarily enjoyable but dead earnest. In the first game session, respondents described network governance as working together to achieve a common goal, reaching a consensus, exchange of ideas, and the willingness to cooperate. The second game session showed similar results in which one respondent explained it as "an evolution from fairly chaotic towards a structured collaboration" (quote 27).

Based on the content analysis, we found goal consensus, coordination and integration, cooperation, network form and structure, and competition as overarching themes for network cooperation. The game participants connected goal congruity with coordination of effort that included the division of tasks, planning, and the need for skills such as negotiation and other interpersonal skills. The analysis showed that the overarching themes of network cooperation

described more the behavioral underpinnings of network governance rather than a particular structural form or mode. Although formalization and decentralization were mentioned, participants still needed to address how to design the network to enhance cooperation. Nevertheless, the benefits of network differentiation were stipulated, and participants said various prerequisites for network governance, such as willingness to cooperate, trust, decentralization, and norms and values.

In addition, participants also mentioned various constraints of network cooperation. One respondent said that competition between networks only sometimes leads to the best treatment for patients. Instead, more time was needed to settle agreements and make plans to let cooperation succeed. Based on the findings, this was often combined with what can be understood as building credibility. Without the legitimacy of strategies, structures, and processes, network cooperation will be inhibited, allowing self-interest and competition to prevail over working together.

The content analysis showed that essential preconditions of network cooperation revolved around three themes: a common network goal, interpersonal skills or interaction, and network-level competencies. A common network goal resembled a purpose or mission that surpassed individual goals. A network coordinator that communicates this goal was found to be imperative, serving the network members' interests and being willing to cooperate with others. One participant described this: "goals and resources need to be aligned properly for network cooperation to succeed" (quote 15). Important in this regard is that the multidisciplinary backgrounds in the network are reflected in the common goal and that there is a shared vision and engagement that leads to a shared identity. This will foster open communication, trust, and getting to know each other personally and increase knowledge of network members' strengths and weaknesses.

Participants ascribed importance to interpersonal skills or interaction to enhance working together to achieve a common network goal. Essential requirements to facilitate cooperation were listening and respecting each other, engagement, involvement, and taking responsibility. In addition, openness, transparency, and solidarity were essential factors to consider. By getting to know each other, over time, relationships might strengthen, enabling trust to be built. But this requires clear roles, communication, and agreements. One participant pointed out that this had to be established before the network became operational.

This implies that cooperation requires not only the willingness to cooperate but also abilities that enable working together. These abilities or competencies included having regular meetings or debriefings to discuss complicated issues or cases of patients. This will allow the dominance of an idea in which the network creates consensus on the goal and vision and how to achieve collaborative advantage. According to one participant, "a clear articulation of the set of tasks and members' strengths and weaknesses not only provides clear insight on the network abilities but also provides opportunities for better collaboration" (quote 16).

This participant stated that measuring patient indicators on the network level is important because network cooperation requires a clear return on collaboration.

Advice and recommendation to stakeholders.

The network game "Organizorg" aimed to provide participants with an experience of a simulated network context by playing a role of an organizational representative involved with the service delivery to patients with chronic illness. Given the articulation of this task and the division of labor, participants were required to integrate a concerted effort to treat patients selectively. This required providing information, access to unique resources and mapping, allocating and negotiating rewards to commit and motivate those organizations that need to work closely together.

Based on the simulated network experience, we asked participants to formulate advice and recommendations to stakeholders. The content analysis results presented the network's design and evaluation as two clear overarching themes that the participants advised to the government and current networks in Flanders (Belgium).

Goal-directed organizational networks must be purposively designed in purpose, size, and membership. The participants ascribed a facilitator role to the government in which they asked to be clear on defining the purpose of a network. Accordingly, networks must become perceived as legitimate and appropriate both by internal and external stakeholders. A clearly defined purpose of a network must then be accommodated in ways that guarantee an infrastructure, abilities, resources, and interests to attain positive outcomes. The participants designated and preferred financial incentives to juridical reinforcement or formalization as a policy vehicle to enhance the necessary prerequisites to make networks succeed.

Participants addressed the need to evaluate networks to make explicit agreements on processes, reimbursements, and roles between and among various networks. The aim of assessing networks is to avoid creating more networks for different target populations since there is already a high overlap among networks. Instead, networks must become more transparent because the size of networks and diversity in domains and backgrounds of network members impede how resources are currently being used. To do so, it was recommended to deregulate because professionals are losing satisfaction in their job due to the many rules, protocols, and bureaucracy in general. A participant advised reorganizing the healthcare system using small-scale organizational networks rather than financial inputs. Other participants called for a central entry point, the development of an electronic patient file, guidelines about quality of care and community welfare, investment in accessible psychologists and patient representative organizations, and transform financial incentives that safeguard patients' rights and quality of care.

Table 3. Evaluation of the network game 'Organizorg' based on two sessions played in 2017

5Cs framework of Duke and Geurts	Evaluative criteria	Descriptive summary	Evaluation of the game
Complexity	To what extent did the game conveyed the totality of a model and the dynamics of the referent systems?	• The game simulated an abstracted model based on three goal-directed organizational networks in Flanders (Belgium). The model exhibited several key features of these networks and in particular presented heuristics for strategy- and decision-making processes of the service delivery to patients with chronic illness and multiproblems. • The game reproduces various situations in which agreements and negotiations among and between participants and networks are made. In particular the game is designed to simulate the various tensions that arise from task division and allocation, information provision, and reward distribution in a multilevel context of a health- and social care community.	+ The game introduced aspects of network governance and portrayed discussions on network coordination during the steps of play and in the debriefing. + The game succeeded in conveying the tension between costs and quality of care. − The game lacked depth in the particular roles assigned to the participants. − By design of the game competition occurred between the simulated organizational networks.
Communication	To what extent did the game facilitated effective communication within and across diverse groups	• The game structured communication in three ways: the network level (group of participants), the level of the participant (the role of the participant), and the patients and the context of a health- and social care community. • The game consisted of a moderate number of different game elements and symbols that supported various instances of dialogue and multilogue assisting communication.	+ The game facilitated effective communication among and between the networks − The output of the discussion remained mostly implicit with regard to alterations to the network strategy, planning process and decision-making. − Participants experienced time pressure and one participant referred to the sometimes aggressive tone of communication. − Feedback from the accounting system can be more direct and more elaborative at the various levels.
Creativity	To what extent did the game facilitated and stimulated engagement making group work productive and enjoyable?	• In general the game was experienced as an enjoyable, but serious exercise. In the debriefing and follow-up with participants it became clear that the game engaged participants to think about network governance.	+ Participants enjoyed playing the game. + Participants appreciated gaming and simulation as a particular way to raise awareness and alternative learning exercise.

Consensus	To what extent did the game allow consensus building within and across diverse groups?	• The game asks participants to internalize the predefined network strategy and discuss it advantages and disadvantages. • Participants are required to define rules, norms and incentives to foster concerted action and support among each other in the network.	+ + +	In general the game succeeded in participants finding workable arrangements among and between the networks. However, several participants were disappointed by the fact that as soon as negotiations on client service delivery solutions began, it turned out that what participants agreed before, was not relevant or taken into account. Competition increased the tension among costs and quality of care dividing participants on norms and values.
Commitment	To what extent did the game serve as a vehicle to develop realistic, mature and well-grounded commitment and understanding of the problem statements?	• The goal in the game revolves around solving the joint-production problem of each patient. This requires participants to devise how to coordinate a simulated network. Participants were confronted with redefined network strategies and a complex decision-making exercise. • The game confronted participants in their ideas and views on network governance, rather than producing new solutions.	+ – –	The participants were able to reflect and produce feedback, advice and recommendations based on the experiences gained while playing the game A participant expressed the lack of exchange of "best-practices" in governing a network The game acted as a stand-alone scientific study that inductively examined the behavioral underpinnings of goal-directed organizational networks in Flanders. Future recommendation is to reproduce a single goal-directed organizational, which is purposively selected for a problem statement of interest. The game-operating model has to be co-produced with network members to increase the commitment and understanding of the issues at hand in that particular system.

Game evaluation

Table 3 summarizes how the game scores on the 5c framework. The following section presents the game experience based on the participants' perceptions and the extent to which the game succeeded in attaining the research objective. We close with a short personal reflection.

Game experience

Based on the distributed surveys and audiovisual recordings, particularly the debriefing, participants described the game sessions as a pleasant and interesting experience. Participants generally enjoyed dealing with complex topics, such as network governance, in the game simulation, especially when gaming and simulation are used as experiential learning tools. However, participants also addressed the time pressure in the game, the need for more exchange of expertise on best practices, and the

simplistic nature of game elements. We noticed that participants required time to become familiarized with the game elements and the language and format of gaming and simulation. In the debriefing and follow-up with participants, it was mentioned that they appreciated the revealing insights and everyday experience of playing a role in a simulated network context. They pointed to various similarities in their day-to-day practices. Above all, they complimented how the game succeeded in reproducing the tension between the quality of care and financial incentives.

Brief personal reflection

Reflecting on the experience of designing, building, and playing the network game "Organizorg" I learned that much of the network understanding is generated not only during gaming but before and after the gaming session. This led to lessons to deliberately design the coproduction process by involving others (co-authors and members of the referent systems) and testing the game during the modeling processes (Jac Geurts's rule of 10). Building on Richard Duke and Jac Geurts view gaming and simulation is best captured as a communication form to simulate "multilogues" – a language for complexity for the future – to structure communication in complex situations. [49] The implication for network research is that to overcome challenge of the unit of analysis (network as a whole) and the cost in time and effort to analyze multiple networks over time, we need to produce games that act as productive, safe, and fun environments in which we combine the rigor of systems analytical and simulation techniques with the creativity of collective scenario building and the communicative power of role-play. [25] The added value of such environments are they can convey a holistic perspective and provide an experience of network dynamics that allow participants and researchers to converse in a network management language. At the same time, however, we need future research on how to translate insights and experiences from the game (back) to reality into strategic action and help develop further our understanding of networks.

Discussion and conclusion

Discussion, limitations, and future recommendations

In this article, the research objective was to propose gaming and simulation in the tradition of Duke and Geurts[25] as an alternative approach to studying the behavioral underpinnings of goal-directed organizational networks. We examine network governance and how network actors coordinate and integrate the network. To do so, we opted to use gaming and simulation rather than a more conventional research design and method to deal with the difficulties of conducting network-level studies.

The main contribution of this article is that gaming and simulation is an alternative approach that provides various opportunities for studying whole networks. In this respect, the article must be understood as a proof-of-concept to study the behavioral underpinnings of goal-directed organizational networks in general and network governance in specific. Gaming and simulation offer several benefits compared to research designs and methods based on interviews, surveys, or archival data. [25,52] Such methods used for studying networks primarily capture network members' perception in hindsight or collect network data via key network representatives. [1,4,6,30,31,35,42] In contrast, gaming and simulation allow adding another round of data collection of both perception and behavior in a simulated context. [25,29,49–52] By simulating features and inner logic informed by a system analysis of a referent system, opportunities arise to examine and triangulate specific research topics of interest. [25] In addition, gaming and simulation extend traditional research design and methods by preceding with a participatory model-building approach to inform and reproduce, as accurately as possible, a simulated context in which participants and researchers can explore and experiment. [25,52] This provides more rich and real-time simulated network data, and gaming and simulation offer advantages for studying whole networks. The main challenge of gaming and simulation, however, is whether elements of the reference systems and their interrelationships are represented by game elements so that acquired knowledge and experiences can be translated into reality. [25,28] Moreover, gaming and simulation exhibit a combination of both play and simulation. As such, it requires a purposive design process in which peer review and testing are essential to increase internal validity without losing the fun of playing the game. [25,28,49,52]

In this regard, lessons drawn from this article on network governance must be considered with the following in mind. We replicated the central characteristics of three referent systems in a moderate-to-high abstract way to increase the freedom of role-playing. Consequently, elements in the game are not as detailed as in reality, and we selected elements from the game-operating network governance model (see Table 2). Therefore, the governance mechanisms that came to be during the game sessions, i.e., appointing a network governance form, translates to the reference system in a symbolic way. This means that one cannot be sufficiently aware of whether elements of the reference systems are accurately expressed in the game to explain why participants acted the way they acted and how game dynamics originated. Nevertheless, given these limitations, we systematically approached the design of the game (peer review), discussed the validity of the game during tests (member check), and debriefed experiences and results of the game with participants (in-game reflection and debriefing) and authors (data analysis), which makes us believe we attempted to improve the validity of the game explicitly to examine the essential elements of network governance as informed by previous literature. [25,28,29]

Future recommendations, however, would involve reproducing the central characteristics of a single goal-directed network rather than multiple networks to be better able to select, understand,

and experiment with a single system's behavior and situational factors. Specifically, we would recommend a quasi-experimental research design in which we manipulate the situational factors of resource munificence and system stability to examine how network actors act regarding network governance while controlling for states of network differentiation and integration mechanisms. To do so, the future game-operating model must become more complex contingent on the referent system understudy to enhance theory development that explains the structural determinants and behavioral underpinnings of the whole network and test whether the preliminary theories of network effectiveness as proposed by previous network studies hold. [2,31]

Conclusion

In this article, we further understand how network actors in goal-directed organizational networks coordinate and integrate the network as a whole and what mechanisms of collaboration they use to replace hierarchy in a simulated network context. To take up this task, we developed a proof-of-concept of a network game that enables participants to interact and communicate about the coordination of service delivery by playing a role in a simulated organizational network.

The network game "Organizorg" reproduced the central characteristics of three referent systems. We were interested in which mechanisms of collaboration came to be during the game sessions and in what ways the participants engaged in building and maintaining organizational networks. The main result of the two gaming sessions suggests that appointing a network governance form is necessary to coordinate and integrate interactions among and between networks. Whether these results reflect the behavioral underpinnings of the three referent systems requires future research. Still, the network game did provide various instances in which participants acknowledged the validity of day-to-day practices of network governance. Based on this, we conclude that gaming and simulation provide an alternative approach to studying whole networks that inform public leaders and managers active in organizational networks. The network game "Organizorg" allowed participants to experience and become aware of network characteristics and underlying logic. It allowed them to reflect and propose recommendations given their experiences and newly gained insights. Based on these recommendations, participants advised the Flemish government to be aware that future implementation of the healthcare system reform must allow for network goals guided by a clear policy framework, sufficient time, and resources. This prerequisite can foster personal interaction among health- and social care organizations and develop network-level competencies to create effective network cooperation.

References

1. Provan KG, Fish A and Sydow J. Interorganizational networks at the network level: a review of the empirical literature on whole networks. *J Manage* 2007; 33: 479–516.

2. Provan KG and Kenis P. Modes of network governance: structure, management, and effectiveness. *J Public Admin Res Theory* 2008; 18: 229–252.
3. Provan KG and Lemaire RH. Core concepts and key ideas for understanding public sector organizational net- works: using research to inform scholarship and practice. *Public Adm Rev* 2012; 72: 638–648.
4. Milward HB, Provan KG, Fish A, et al. Governance and collaboration: an evolutionary study of two mental health networks. *J Public Admin Res Theory* 2009; 20: i125–i141.
5. Raab J, Mannak RS and Cambre´B. Combining structure, governance, and context: a configurational approach to network effectiveness. *J Public Admin Res Theory* 2015; 25: 479–511.
6. Lemaire RH and Provan KG. Managing collaborative effort: how Simmelian ties advance public sector net- works. *Am Rev Public Admin* 2017. DOI: 10.1177/ 0275074017700722.
7. Lorant V, Grard A, Van Audenhove C, et al. Assessment of the priority target group of mental health service net- works within a nation-wide reform of adult psychiatry in Belgium. *BMC Health Serv Res* 2016; 16: 187
8. Lorant V, Nazroo J and Nicaise P; Title107 Study Group. Optimal network for patients with severe mental illness: a social network analysis. *Adm Policy Men Health* 2017; 1–11. DOI: 10.1007/s10488- 017-0800-7.
9. Willem A and Lucidarme S. Pitfalls and challenges for trust and effectiveness in collaborative networks. *Public Manage Rev* 2014; 16: 733–760.
10. Goderis G, Van Casteren V, Declercq E, et al. Care tra- jectories are associated with quality improvement in the treatment of patients with uncontrolled type 2 diabetes: a registry based cohort study. *Prim Care Diabetes* 2015; 9: 354–361.
11. Goderis G, D'hanis G, Merckx G, et al. Barriers andfacilitators towards an integrated chronic care model as experienced by primary care health providers. *Int J IntegrCare* 2016; 16: A78
12. Lucidarme S, Cardon G and Willem A. A comparative study of health promotion networks: configurations ofdeterminants for network effectiveness. *Public Manage Rev* 2016; 18: 1163–1217.
13. van den Oord S, Kenis P, Raab J, et al. Modes of network governance revisited. Assessing their prevalence, promises and limitations in the literature. In: *Full paper presentation at public management research conference*, Minneapolis, USA, 11–13 June 2015.
14. Vangen S, Hayes JP and Cornforth C. Governing cross- sector, inter-organizational collaborations. *Public Manage Rev* 2015; 17: 1237–1260.
15. McGuire M. Managing networks: propositions on what managers do and why they do it. *Public Adm Rev* 2002; 62: 599–609.
16. Agranoff R. Inside collaborative networks: ten lessonsfor public managers. *Public Adm Rev* 2006; 66: 56–65.
17. O'Leary R, Choi Y and Gerard CM. The skill set of thesuccessful collaborator. *Public Adm Rev* 2012; 72: S70–S83.
18. Imperial MT, Ospina S, Johnston E, et al. Understanding leadership in a world of shared problems: advancing net- work governance in large landscape conservation. *Front Ecol Environ* 2016; 14: 126–134.
19. Provan KG and Milward HB. Do networks really work?A framework for evaluating Public-Sector Organizationalnetworks. *Public Adm Rev* 2001; 61: 414–423.
20. Pfeffer J and Salancik GR. *The external control of organ-izations: a resource dependence perspective*. USA:Stanford University Press, 2003.
21. Milward HB and Provan KG. A manager's guide to choosing and using collaborative networks. Vol. 8. Washington, DC: IBM Center for the Business of Government, 2006.
22. Raab J, Lemaire RH and Provan KG. The configuration- al approach in organizational network research. In: Fiss PC, Cambre´B and Marx A (eds) *Configurational theory and methods in organizational research.* Research in the Sociology of Organizations no. 38. Bingley, UK: EmeraldGroup Publishing, 2013, pp.225–253.

23. Berthod O, Grothe-Hammer M, Mu¨ ller-Seitz G, et al. From high-reliability organizations to high-reliability net-works: the dynamics of network governance in the face of emergency. *J Public Admin Res Theory* 2017; 27: 352–371.
24. Berthod O, Grothe-Hammer M and Sydow J. Network ethnography: a mixed-method approach for the study of practices in interorganizational settings. *Organ ResMethods* 2017; 20: 299–323.
25. Duke RD and Geurts J. *Policy games for strategic management*. Amsterdam, Netherlands: Rozenberg Publishers,2004.
26. Brown S. Play as an organizing principle: clinical evi- dence and personal observations. In: Byers JA (ed.) *Animal play: evolutionary, comparative and ecological per- spectives*. Cambridge, UK: Cambridge University Press, 1998, pp.242–251.
27. Caillois R. *Man, Play and Games* (Barash M (trans),2001). Chicago: University of Illinois Press, 1958.
28. Peters V, Vissers G and Heijne G. The validity of games. *Simul Gaming* 1998; 29: 20–30.
29. Duke RD. A paradigm for game design. *Simul Games* 1980; 11: 364–377.
30. Provan KG and Huang K. Resource tangibility and the evolution of a publicly funded health and human services network. *Public Adm Rev* 2012; 72: 366–375.
31. Provan KG and Milward HB. A preliminary theory of interorganizational network effectiveness: a comparative study of four community mental health systems. *Admin Sci Q* 1995; 40: 1–33.
32. Human SE and Provan KG. Legitimacy building in the evolution of small-firm multilateral networks: a compar- ative study of success and demise. *Admin Sci Q* 2000; 45:327–365.
33. Van de Ven AH, Delbecq AL, Koenig R Jr. Determinants of coordination modes within organiza- tions. *Am Sociol Rev* 1976; 41: 322–338.
34. Faraj S and Xiao Y. Coordination in fast-response organizations. *Manage Sci* 2006; 52: 1155–1169.
35. Provan KG and Sebastian JG. Networks within net- works: service link overlap, organizational cliques, and network effectiveness. *Acad Manage J* 1998; 41: 453–463.
36. Wernerfelt B. A resource-based view of the firm. *Strat Manage J* 1984; 5: 171–180.
37. Barney J. Firm resources and sustained competitive advantage. *J Manage* 1991; 17: 99–120.
38. Granovetter M. Economic action and social structure: the problem of embeddedness. *Am J Sociol* 1985; 91: 481–510.
39. Uzzi B. The sources and consequences of embeddedness for the economic performance of organizations: the net- work effect. *Am Sociol Rev* 1996; 61: 674–698.
40. Uzzi B. Social structure and competition in interfirm net- works: the paradox of embeddedness. *Admin Sci Q* 1997; 42: 35–67.
41. Huang K. and Provan KG. Structural embeddedness and organizational social outcomes in a centrally governed mental health services network. *Public Manage Rev* 2007; 9: 169–189.
42. Huang K. Knowledge sharing in a third-party-governed health and human services network. *Public Adm Rev* 2014; 74: 587–598.
43. Van den Oord S, Lemaire RH, Kenis P, et al. Governance, structure, and processes: a configurational framework for the study of goal-directed networks. In: *Full paper presentation at public management research conference*, Aarhus, Denmark, 11–13 June 2016.
44. Argyris C, Putnam R and Smith DM. *Action science*. Vol. 13. Jossey-Bass Inc. Pub., 1985
45. Argyris C and Schön DA. Participatory action research and action science compared. A commentary. *Am Behav Sci* 1989; 32: 612–623.
46. Boyatzis RE. *Transforming qualitative information: the- matic analysis and code development*. USA: Sage Publications, 1998.
47. Miles MB and Huberman AM. *Qualitative data analysis: a sourcebook*. Beverly Hills, USA: Sage Publications,1994
48. Corbin JM and Strauss A. Grounded theory research:procedures, canons, and evaluative criteria. *Qual Sociol* 1990; 13: 3–21.

49. Geurts JL, Duke RD and Vermeulen PA. Policy gaming for strategy and change. *Long Range Plann* 2007; 40: 535–558.
50. Mayer I, Bekebrede G, Harteveld C, et al. The research and evaluation of serious games: toward a comprehensivemethodology. *Br J Educ Technol* 2014; 45: 502–527.
51. Kriz WC and Hense JU. Theory-oriented evaluation for the design of and research in gaming and simulation.*Simul Gaming* 2006; 37: 268–283.
52. Meijer S. *The organisation of transactions: studying supply networks using gaming simulation*. Vol. 6. Wageningen Academic Pub., 2009.

APPENDIX

Short game description of network game "Organizorg"

The game aims to enable participants to communicate, develop rules of interaction, make decisions, and become aware of how the distinctive characteristics and operating logic of a simulated network can work and how it can be adapted. In the game, a joint-production problem for four patient types is developed.19 Each patient, no matter the patient type, is unique in its needs. The game is designed in such a way that accordingly each participant is only able to produce a part of the solution for each of the patients' needs. Consequently, participants must work together to produce a concerted effort that satisfies all the needs of each patient. But, the game offers multiple solutions for each patient confronting participants with a complex decision-making process that involves defining a collective set of tasks, dividing and allocating these tasks and negotiating rewards contingent on every particular patient under treatment.

Crafting network strategies

We developed a strategy table that portrays multiple strategy options (based on Table 2). The strategy table serves multiple purposes. Foremost, the strategy table introduces the participants to the symbols, concepts, and language of organizational networks. Second, it provides a heuristic baseline in the game. This baseline creates a game reality in which participants can safely explore each other conceptions, experiences, and ideas. While at the same time helping participants to understand the gestalt of their organizational network in the game. In doing so, the strategy table acts as a decision-making tool that provides participants the opportunity to become aware of how the distinctive characteristics of each network in the game come to be.

Decision-making and service delivery

The game also exhibits a planning component introduced by providing a patient population table. This table allows participants to plan and learn step-by-step how to solve the joint-production problem based on the composition of the simulated network. Since multiple combinations of patient solutions are possible, we help participants to structure their decision-making by introducing another element: the decision-making table. This table introduces the main decision-making areas regarding service delivery. The table asks participants in each network to develop rules and incentives to manage their simulated organizational network.

After the preparation of decision-making, the game switches to a mode of action. This mainly involves interacting with and negotiating the prepared solutions for each patient. Networks, however,

receive patients randomly, creating a tension of coordination by programming and feedback for each patient. How participants accordingly deal with this tension is completely up to them within the rules of the game and if the goal in the game is achieved.

GENERAL DISCUSSION AND CONCLUSION

GENERAL DISCUSSION AND CONCLUSION

Given that today we still lack theoretical understanding and empirical evidence on the governance of goal-directed organizational networks, I thereof, set out to enhance the contingency theory of Provan and Kenis (2008). In doing so, this dissertation sought to remedy the mismatch between practice and theory on network governance by shedding light on how organizational networks govern themselves and what conditions explain the governance of organizational networks.

In this final chapter, I first summarize the main findings and present the broader theoretical implications of the findings for theory and practice. In addition, I will also discuss the generalizability, introduce the limitations of the findings, and then conclude with the future directions for network research on the governance of organizational networks.

Summary of the main findings

Chapter one. Network management language

In the first chapter, I introduced the reader to network management language. This was necessary because organizational networks are not business as usual and require a language that reflects how they function and emphasizes the relational aspects of this organizational form (Provan et al., 2007; Mandell et al., 2017). I positioned myself within the "Provan school," understanding organizational networks as unique, multiorganizational social systems based on present or absent relationships among three or more organizations working together to achieve a purpose that none of them individually can fulfill independently (Provan et al., 2007: 483). I introduced three seminal network theorems of Keith Provan and colleagues to explain network outcomes, behaviors, and properties. This gave me the foundation to develop a conceptual framework for goal-directed organizational networks. Based on this framework, I concluded that there are gaps in our understanding of (1) how network concepts and relations are related and, more specifically, (2) how combinations of conditions explain goal-directed organizational network outcomes.

Chapter two. Modes of network governance revisited

Building on this foundation, I reviewed Keith Provan's most cited article, "Modes of Network Governance: Structure, Management, and Effectiveness," in chapter two. I took stock of the empirical literature, citing Provan and Kenis (2008) over the last ten years, providing insights into how their network governance contingency theory – one of the seminal theories introduced in chapter two – has been developed in an established body of evidence. In the empirical literature, I explored which network governance modes have been identified, what explains the differences in these network

governance modes, and what are the consequences of network governance modes.

The systematic literature review found that the network governance modes have been adopted in the empirical literature. However, network governance modes are different, affecting network effectiveness. Moreover, the findings on network governance modes suggest that they differ not only in kind based on brokered/non-brokered and internal/external governance dimensions but also in degree within each kind.

Despite the many citations Provan and Kenis (2008) received in the last ten years, we still need more evidence on what explains the differences and outcomes of network governance modes. For instance, I found ample evidence of managing network tensions across governance modes and even fewer studies examining network governance mode development paths originally envisioned by Provan and Kenis. Although the overall explanation of why network governance modes are adopted is accepted in the literature, the underlying substance regarding how networks govern themselves under which circumstances remains open for discussion.

Thereof, I concluded that the governance of organizational networks as a vocabulary had been adopted in the management and organization sciences literature to explain organizational networks' development, functioning, and effectiveness. The systematic review indicates that the findings on the contingency factors as explanatory factors are suggestive and circumstantial. Most studies neglect to examine them, and only a few studies implicitly used them as explanatory factors, providing anecdotal evidence. As a result, we still lack evidence-based explanations about network governance modes and their outcomes, nor did I find studies testing any of Provan and Kenis's propositions. Nevertheless, the original premise of Provan and Kenis (2008) is substantiated by a diverse body of work examining network governance in various ways and contexts.

The story emerging from the systematic literature review is an infinite number of colors, but only a few names describe them. Hence, I conducted two case studies to advance our understanding of (1) the network governance concept and (2) how combinations of conditions explain goal-directed organizational network outcomes.

Chapter three. Network of networks

In chapter three of this dissertation, I aimed to understand why organizations and networks come together, cooperate, and create and reproduce a larger, complex system, more specifically, how the scope and nature of task environments and external demands require what mode of network governance needs to be adopted and what network competencies are necessary to achieve network-level goals.

Based on the single case study of the Antwerp Port Authority (APA) in the Port of Antwerp, I mapped the development of a lead network that governed organizations and networks in the organizational field of the Port of Antwerp before and during the COVID-19 pandemic. I conducted a

network analysis based on records and minutes of meetings of the APA before and during the COVID-19 pandemic. In addition, I consulted secondary data from Sciensano (the national public health institute of Belgium). To triangulate, I tapped into the experiences of my co-authors, who attended all the crisis management team meetings and various leadership team meetings. Based on triangulating the network analysis with three rounds of coding various issues and actors involved in the crisis management team and leadership team meetings, I found that a collective focus and selective integration are crucial network competencies in adequately creating and reproducing an influential network of networks to deal with a wicked problem like the COVID-19 pandemic.

The COVID-19 pandemic was mainly perceived as an information problem because a lack and an abundance of information led to not fully understanding the nature of the problem the Port of Antwerp faced. Consequently, the pandemic was perceived as "wicked," which necessitated APA to develop a collective focus within the port community. Internally within the network, the crisis management team (operations) reported daily updates on various issues to the leadership team (policy). At the same time, externally, the APA detected early (warning) signals from the evolving global situation of the pandemic because of its national and international network of ports. After verifying the signals received, the APA could take informed measures to contain and manage the crisis. The APA took the lead and acted proactively based on being informed quickly and accurately.

When comparing the structure and governance mode of the APA network during the first wave of the COVID-19 pandemic, I found that a core group of APA actors assembled a "lead network" that was composed of multiple functional units from various organizations and networks from the organizational field of the Port of Antwerp. Throughout the first wave of the COVID-19 pandemic, this network evolved from a state of loosely coupled links that were targeted and appropriate toward a state of tightly coupled links that were stronger and more intense based on the frequency of interactions. During this development, a network of functional units of the APA took the lead, enacted by multiple brokerage roles allowing them to pool information and resources and work together with port community actors to guarantee the port's operability, ensuring that the main sea gateway remained open for shipping. Finally, the network analysis revealed that another network was created by the lead APA network to safeguard, monitor, and control the sea gate to the port during the lockdown period.

Chapter four. Network leadership and network-level tensions

In chapter four, I proposed that why a specific network-level behavior is enacted can (partially) be explained by how network leadership is embedded within an organizational field and how environmental and population dynamics shape network tensions. Network leadership is another critical topic to understand why organizations and networks come together, cooperate, and create and reproduce a larger, complex system, what network governance needs to be adopted, and what

network competencies are necessary to achieve network-level goals.

Based on a single case study of the Antwerp Fire Service (AFS) in the province of Antwerp, I aimed to draw attention to how network leadership manages network-level tensions. I combined Social Network Analysis (SNA) and After-Action Review (AAR) to examine (1) with whom the leadership team of the Fire Service and the Fire chief affiliated during the first wave of the pandemic and (2) what network-level tensions arose in the larger, complex organizational field of the province of Antwerp. For the case study, I used data from crisis management meeting notes over 20 weeks (27/02/2020—08/06/2020), including FAN boards used, the minutes of the provincial crisis center, information gathered by the fire chiefs of the province of Antwerp, the Antwerp fire chief's journal, and the minutes of meeting with the federal crisis center. Moreover, three focus groups with the AFS leadership team were held in April and May of 2021. Finally, I interviewed the AFS Fire chief for three hours in July 2021.

The goal of the case study was to reconsider where network tensions come from by exploring how environmental and population dynamics shape them and how network leadership identifies and leverages internal and external opportunities across messy network boundaries over time. By examining the AFS crisis network in conjunction with other networks and organizations in the organizational field of the province of Antwerp, I aimed to understand how network-level tensions arose, what role network leadership played, how they recognized and responded to them, and whether environmental and population dynamics matter.

During the first wave of the COVID-19 pandemic, the relational and structural pattern of the AFS crisis response network developed from a core-periphery network to a smaller, denser network, with the Fire chief acting as the most central actor of the AFS leadership team in this network. Moreover, I found that the AFS crisis response network, by design, is highly dependent upon the capability of the fire chief to act as an information broker.

The findings of the relational and structural pattern of the AFS crisis response network suggest that network leadership must understand as much as possible about whom to work closely with since competing logics can stem from different fields through joint efforts of organizations from different policy levels having multiple network memberships and overlapping network involvement. Furthermore, the case study indicated that network leadership must respond to and manage network-environment dynamics, as it showed it was essential for network leadership to anticipate the composition of differences in lateral position and the kind of resources held among network members since this can inform a particular choice in adopting a governance mode that can impact how networks function and develop over time.

Chapter five. Taking a stance on gaming and simulation

In the final chapter of this dissertation, I took a stance on gaming and simulation in the tradition of

Duke and Geurts (2004) as an alternative research method for advancing our understanding of organizational networks and their practices over time.[26] Gaming and simulation 'combines the rigor of system analysis and simulation techniques with the creativity of scenario building and the communicative power of role-playing and structured group techniques' (Geurts et al., 2007: 535). According to Mayer (2009: 821), game simulations are 'experimental, rule-based, interactive environments, where players learn by taking actions and by experiencing their effects through feedback mechanisms that are deliberately built into and around the game.'

Another way to think of gaming and simulation as a research method is by equating them as (quasi-) experimental research designs (or A/B testing) to estimate cause-effect relationships between independent and dependent variables among treatment and control groups that (do not) include random assignments of participants. When applied as such, game simulations can collect rich, real-time (simulated) data even when random selection is difficult or impossible (Duke & Geurts, 2004; Stoppelenburg et al., 2012).

In the fifth chapter, network governance modes were examined using the network game "organizorg," which enables participants to interact and communicate about the coordination of service delivery by playing a role in a simulated organizational network. The quasi-experimental research design can be described as a data-driven inductive approach in which three organizational networks served as reference systems that were simulated (see table 2 in chapter 5). Network data were collected during two research stages based on a participatory model-building approach as a form of action science. The data analysis was a reflexive and iterative process of going back and forth first between the three reference systems and the game model and second between the thematic analysis of the audiovisual recordings of the two gaming sessions and the content analysis of the collected surveys of participants who played a role in the simulated networks.

Based on two game sessions, each with 18 participants, held in 2017, the findings showed a need for network governance indicated by the requested coordination of service delivery and the demand for role clarity. Participants adopted a network governance mode in the two gaming sessions to coordinate and integrate interactions among and between the networks. More than once, the networks discussed mandate issues and attempted to formulate institutions and structures of authority and collaboration like (leadership) roles or coordination mechanisms.

One takeaway from the game sessions was that norms and values in the network either support or undermine the commitment to concerted efforts and may affect how networks are governed. This became especially revealing when financial incentives in treating patients created

[26] Note that we restrict ourselves to tailor-made, non-digitalized game simulations for participatory policy- and strategy-making and analysis in the tradition of Richard Duke and Jac Geurts (Duke & Geurts, 2004; Stoppelenburg et al., 2012).

tensions among participants, confronting them with a dilemma of whether to compete with others or enhance the quality of treatment for each patient in the larger organizational field of "Pilota." Despite the nature of the networks becoming more competitive over time, the three networks tried to devise creative ways to arrange themselves into a more extensive service delivery system in the organizational field in both game sessions.

Based on the evaluations of the two gaming sessions, I assessed the game simulation to produce various instances in which participants acknowledged the validity of day-to-day network governance practices. As such, this study is a proof-of-concept that presents how a gaming and simulation approach can replicate the functioning of organizational networks. Moreover, the process was experienced as being supportive for informing its participants on how organizational networks can be effectively structured, governed, and managed in the context of coordinated service delivery for people with chronic illnesses in Flanders (Belgium).

Contribution to network theory

Following the summary of the main findings, I present the broader theoretical implications of the preceding dissertation chapters. Next, I state the findings' generalizability and limitations. Specifically, I aimed to contribute in three ways, and by doing so, I helped further remedy the mismatch between practice and theory on goal-directed organizational networks.

The first contribution of this dissertation is the conceptual development of scoping and bounding the network governance concept (Carboni et al., 2019). The insights from the studies in this dissertation challenge the two original dimensions of Provan and Kenis's contingency network governance theory that combined constitute the three original modes of network governance. Instead of emphasizing an either-or approach towards adopting a brokered/non-brokered and internal/external mode of governance, the findings in this dissertation, point to the possibility that network governance modes are layered in their structural features. Network governance modes can consist of overlapping cohesive network clusters (or cliques) composed of network members—creating "intercohesion" in terms of network structures that can be cohesive and overlapping (Provan & Sebastian, 1998; Vedres & Stark, 2010; Vangen et al., 2016; Nowell et al., 2019). As such, organizational networks can exhibit stratification through hierarchical differentiation of roles or tiers of network members (Gulati et al., 2012; Vermeiren et al., 2021). This suggests that a goal-directed organizational network can be both brokered and non-brokered or blend internal and external network governance.

The implication of the possibility of intercohesion and stratification suggests that we must relax the assumption that organizational networks are heterarchical (shared-participant governance) or hierarchical (governance by a lead organization or network administrative organization). Instead, we need to develop another understanding of network governance modes. An understanding in which the focal point of interest becomes how decision rights are arranged within and between

organizational networks in the larger organizational field (Nowell et al., 2019; van den Oord et al., 2020). Determining who makes decisions in the organizational network can help us outline why organizational networks as distinct entities vary regarding their use of institutions and structures of authority and collaboration and provide insights into how networks are governed (cf. van den Oord et al., 2017).

The second contribution of this dissertation is the further advancement of the external network perspective proposed by Nowell et al. (2019) by pointing to the need to abandon the implicit assumption that goal-directed organizational networks are closed systems isolated from their environment. Instead, they need to be treated as open systems that are weaved in a social context of organizations and networks and their environments. The case studies' findings echoed what Raab and Milward (2003) warned us before, that we should not ignore the nature of the problem in such environments and consider the content of network governance. Being confronted by the COVID-19 pandemic, the APA network (in chapter 3) and the AFS crisis response network (in chapter 4) needed to deal with various tasks and demands that were uncertain and interdependent on multiple organizations to alleviate the consequences of the pandemic. One of the main takeaways from the case studies was that network governance is about various issues ranging from determining who is responsible for which task, building and maintaining legitimacy, to managing conflict and commitment (cf. Milward & Provan, 2006).

Making a distinction in network governance content (i.e., information, skills, or resources) becomes increasingly important in organizational networks, especially where there is no reliance on formal authority (cf. Provan & Huang, 2012). It is then essential to consider the relationship quality between organizations as this explains structural holes and folds within and between networks (Coleman, 1988; Burt, 1992; Vedres & Stark, 2010). Depending on how intersections of network subgroups of organizations are arranged—exhibiting organizations with overlapping network involvement – informal authority can become established, and agreements between network members' actions each pursue in respect to others are negotiated.

Finally, the case studies also illustrated that the roots of authority are not merely inside the network's boundaries but can also arise from environmental and population dynamics, such as shifting interdependence between networks in the larger, complex organizational field. Effectively governed networks recognize and respond to such exceptions arising from coordination and cooperation failures within and between networks. These insights strengthen the need to flesh out the bones of institutions and structures of authority and collaboration employed in network governance modes and imply we must rethink network governance not only regarding its properties but also concerning its conditions like the content, circumstances, the stage of network development, and the environment in which the network is embedded.

The third contribution is further advancing how we develop our understanding under what conditions modes of network governance emerge and how organizational networks govern themselves. Provan and Lemaire (2012) informed practitioners and scholars that despite much progress in understanding organizational networks, many topics still need to be better understood. Methodological issues hamper the study of organizational networks; in general, three reasons are provided for this (Provan et al., 2007; Raab et al., 2013). The first reason is that network research can be very time-consuming and costly due to difficulties with the unit of analysis (Provan et al., 2007; Raab et al., 2013). Organizational networks can consist of multiple organizations; therefore, examining various networks over the years can result in a risky, complex endeavor that requires research methods appropriate for studying interactions and dynamics over time (Provan et al., 2007; Raab et al., 2013).

Another reason whole network research is experienced as challenging is specifying network boundaries (Provan et al., 2007; Raeymaeckers, 2013; Nowell et al., 2018). Determining network membership can have vast implications for meaningful analysis, especially when organizations are omitted or network involvement is wrongly assumed. Again, this relates to the unit of analysis problem as the basis of network bounding is rooted in what membership decisions are made given network membership criteria such as redundancy, duration, and exclusivity (Gulati et al., 2012). Issues arise, especially when organizational networks are composed of many organizations involved in multiple networks with overlapping sets of dyadic relations between them. What constitutes the network is typically defined as the network of relationships maintained by network members (Provan et al., 2007). A key point to recognize then is the commitment of organizations participating in the network to the network's purpose. However, this creates many issues when boundary arrangements must be clearly defined.

Finally, the study of organizational networks is also known to be predominantly cross-sectional in nature (Provan et al., 2007; see also descriptive results in chapter 2). As such, network scholars often study snapshots of networks rather than network dynamics. This may pose a risk because inferences gained from the past may not represent the network at present nor when the network develops over time. Consequently, the association between the network outcome and the explanatory factors cannot be determined because both are simultaneously assessed. In other words, without longitudinal (network) data, it is not possible to assess cause-and-effect relationships.

To overcome these issues and to develop further insights, network scholars have proposed a variety of research methods and analysis techniques, including Social Network Analysis including ERGMs (Raeymaeckers & Kenis, 2016; Lemaire et al., 2017; Lemaire & Provan, 2018), Qualitative Comparative Analysis (Raab et al., 2013; Raab et al., 2015), and, more recently, Network Ethnography (Berthod et al., 2017). Each of these methods and analysis techniques aims to improve the rigor and relevance for understanding the functioning of organizational networks as a unique organizational

form and why different modes of network governance might be appropriate for different types of networks at various stages of network development and environmental contexts (Provan et al., 2007).

In chapter five, I developed a stance on how gaming and simulation can also be used to study organizational networks. One reason why I did not include a medium-to-large N network study to test any of the propositions of Provan and Kenis's theory was the difficulty in collecting and analyzing goal-directed organizational networks comparatively, especially over time (cf. Raab et al., 2015; Berthod et al., 2017). Out of necessity, I developed an alternative approach to systematically examine network governance mode adoption and how networks govern themselves.

Gaming and simulation can benefit network scholars that need more time or resources to examine multiple networks over time as long as the phenomena of interest are reduced to their core mechanisms. I imply here that goal-directed organizational networks are abstractions of task-oriented groups of people that are not bound by employment relationships. In contrast, organizations traditionally consist of task-oriented groups of people bound by employment relationships. When such groups are simulated and placed in a lab environment ("read: a game"), network scholars have a relatively cheap and controllable testbed for developing and testing their network theories. For example, a sample of network participants can be randomly split into a treatment and control group. The networks in the treatment group receive artifacts of network governance mechanisms like planning and control systems, while the control group does not. Consequently, both groups are confronted with controlled inputs ("read: a scenario or vignette") to examine differences in outcomes between groups to extract what effect a particular artifact has on network outcomes. Although the results from such lab experiments (and their underlying game models) cannot directly aspire to explain real-world network phenomena, they provide value for educating, training, and examining theoretical mechanisms if we can prove they explain network outcomes in real life.

Generalizability and limitations

As we have explained above, this dissertation contributes to network-level theory in several ways. At the same time, however, we understand that the studies presented in the dissertation also have several limitations. I will now outline these limitations below.

The first general limitation derives from my positioning in the Provan school and the network management language that it comes with. For instance, one implicit bias is the utilitarian view of the Provan school, which often is coined by the phrase: "getting things done." I (re)visited many of the classics and attempted to draw from other traditions in the management and organization sciences (i.e., Phanish Puranam). Nevertheless, it might be possible that the way I think and examine networks is influenced directly by the language I learned from the Provan school. However, I believe that the work of Keith Provan is foundational and provided me with words for explaining organizational networks. Another implicit bias might derive from the network perspectives I choose. Using a whole

and external network perspective, my focus was to discern network patterns and the overall situation rather than focusing on details. Although this prevented me from not seeing the forest for the trees, I cannot exclude that I may have missed details of the design and governance of organizational networks.

Another limitation is that the evidence presented in the systematic literature review (chapter 2) needs to be more comprehensive in years (2009-2019). Furthermore, the selection of network studies is biased toward the US, Canada, and Europe. Although we designed the systematic literature review with clear and focused objectives and predefined explicit criteria to prevent selection bias, some articles might have yet to be included even though they might be relevant. The systematic literature review was scoped to use Provan and Kenis (2008) as the seed article for citations in the Web of Science database, but this may hamper the external validity of the findings since other theoretical models and definitions are used in the literature to explain the governance of organizational networks.

A third limitation is the single case study research designs employed in chapters three and four. My focus on two single networks may limit the generalizability of the case study findings due to its cross-sectional data. As such, the results are associations that can inform rather than explain, i.e., whether the governance of an organizational network explains network effectiveness. The variety in network outcomes reported in this dissertation is low since both networks can (indirectly) be indicated as effective. As such, this dissertation is limited in sufficient effective and ineffective network cases, severely challenging the generalizability of the findings. Although both cases are in the province of Antwerp and data is collected almost around the same period (both in the first wave of the COVID-19 pandemic), it is difficult to attribute the findings of both case studies to this context.

Another disadvantage is that we relied heavily on the perception and recollections of participants in the leadership and crisis management teams in both case studies. Although we accompanied those views with (other) secondary data sources, the data uncovered overall patterns in relationship evolution that had to be interpreted by the researcher. Although we corroborated the case study findings of the sampling approach and inferences of both case studies, practitioners and scholars should be tentative in generalizing the case study findings, especially since the data only allowed us to employ an egocentric network perspective based on the views of agents of the APA lead network and the AFS crisis response network.

A final limitation is that lessons drawn from the game simulation Organizorg on network governance must be considered with the following in mind. We replicated the central characteristics of three referent systems in a moderate-to-high abstract way to increase the freedom of role-playing. Consequently, elements in the game are not as detailed as in reality, and we selected elements from the game-operating network governance model. Therefore, the mechanisms of collaboration that came to be during the game sessions, i.e., appointing a network governance mode, symbolically

translate to the reference system. This means that one cannot be sufficiently aware of whether elements of the reference systems are accurately expressed in the game, which explains why participants acted the way they acted and how game dynamics originated.

Nevertheless, given these limitations, we systematically approached the design of the game (peer review), discussed the validity of the game during tests (member check), and debriefed experiences and results of the game with participants (in-game reflection and debriefing) and authors (data analysis), which makes us believe we attempted to improve the validity of the game explicitly to examine the essential elements of network governance as informed by the literature on the governance of organizational networks.

Direction for future network research

In the final part of the discussion and conclusion section, I conclude with four future directions for network research on the governance of organizational networks and outline the practical implications of this dissertation. I close by answering the research question.

Developing a taxonomy of network design and network governance modes

Although the original premise of Provan and Kenis (2008) is substantiated by a diverse body of literature examining network governance in various ways and contexts, further theoretical development and testing are warranted to inform the practice of network governance.

Future network research should focus on classifying different modes of network governance given different types of networks at various stages of network development and environmental contexts. By developing a taxonomy, we can, accordingly, develop typologies of effective network configurations, including network governance dimensions of Provan and Kenis (2008) as well as others, to explain under what conditions, stages, and contingency factors we should expect networks to function, and what makes them work better. Such propositions on network governance dimensions must be tested at multiple networks in different continents over the years, attempting to generalize inferences on the governance of organizational networks.

Network governance mechanisms

Simultaneously to this fieldwork, lab work is necessary for further theoretical development and theory validation to inform the "art" of network governance, particularly when, how, and why to use institutions and structures of authority and collaboration to allocate resources and coordinate and control joint action within and between organizational networks. For this, I propose that future research should develop game simulations following (quasi-) experimental designs, on the one hand,

to collect simulated data of "referent" systems examined in the fieldwork or "theoretical" systems based on logical remainders developed from other sources of evidence, and on the other hand to train network practitioners and policy planners on how to govern organizational networks in different scenarios. These game simulations must outline and capture what institutions and structures of authority and collaboration are used in modes of network governance to make the practice turn into network research (cf. Berthod et al. 2017).

The impact of informal authority to influence and network interdependence

Another avenue worth exploring further is how the conception and nature of authority in an organizational network influence network governance modes and the choices made in the division of labor and integration of effort (cf. Kenis & Raab, 2020). Future research needs to delve deeper into the sources of authority in organizational networks, their impact on making decisions and integrating joint efforts, and how the recognition of authority comes to be and provides individuals and groups the right to exercise power (cf. Saz-Carranza et al., 2016).

An external network perspective on how networks govern themselves

Finally, we also need network research that examines how environmental dynamics and network population ecologies in organizational fields impact how organizational networks are shaped and constrained in their behavior and outcomes. What impact the environment and the network population in the organizational field have on how networks govern themselves is worth exploring since this reinvokes the old discussion of structure versus agency in a time where we need alternative strategies to deal with grand societal challenges (George et al., 2016).

Practical implications

When I started my doctoral program at the University of Antwerp, my research interest was broadly on the differentiation and integration of organizational networks. As I have gone through the program, I studied the vast literature on organizational networks, I undertook various (field) research projects in multiple domains of the public and private sector, I was privileged to supervise executives, and I developed my skills in research design and analysis. These cumulative experiences and insights over the years have provided me with a better understanding of my research's practical implications for network managers and policy planners.

The first concern I aimed to address involved the conceptual development of scoping and bounding network governance (Carboni et al., 2019). I aimed to contribute by systematically reviewing

which network governance modes have been identified, what explains the differences in these network governance modes, and what are network governance modes' consequences. Based on the evidence of the empirical literature citing Provan and Kenis (2008), I substantiate the current theoretical view of network governance and extend its dimensions and boundary conditions. Practically, this contribution matters because it provides insights into network governance's primary forms and characteristics under different circumstances. It also enhances our understanding of under what specific conditions a particular network governance mode performs best.

The second concern I aimed to address was the implicit assumption network scholars often make of goal-directed organizational networks as closed systems isolated from their environment. I aimed to contribute by further advancing the external network perspective proposed by Nowell et al. (2019), in which organizational networks are treated as open systems that are weaved in a social context of organizations and networks and their environments and which adapt to interactions between the system and its environment. By doing so, I specified under what conditions network governance modes emerge, operate, and become institutionalized.

For practitioners, this is relevant because it elucidates how goal-directed organizational networks are governed and what conditions matter under which circumstances. By viewing organizational networks as open systems, the practical contribution is that network governance modes can either shape or constrain how goal-directed organizational networks establish a fit between the network and environmental conditions to act as effective organizational forms.

The practical implication is that there is no one-size-fits-all solution to govern a network. Returning to the case of Daniëlla in the introduction, the collaborative agency of inspections mentioned the absence of a “coordinator” that could establish services integration and build consensus on case management. The main takeaway for practice is that we must move beyond such notions or ideal type brokered or non-brokered governed networks because, in practice, organizational networks consist of many layers or tiers in which network governance is enacted by a temporally unfolding and contextualized process of many people working together. What this dissertation informs us is that public policy planners and network practitioners need to recognize that networks do not act in a vacuum. Instead, they interact with other people, places, and actions. Ignoring this prevents us from explaining how organizational networks are governed and how to make them function effectively since, in some cases, network governance is more about dealing with the environment than the network.

The third concern I aim to address is how we studied goal-directed organizational networks in general and their governance in specific. The final contribution I proposed was thereof methodological. To complement traditional research designs and methods, network scholars and practitioners should consider the promise of gaming and simulation for examining goal-directed organizational networks to help advance our understanding of behavior and outcomes. A game

simulation emulates a controlled context in which participants operate in a model of reality (they play a role in a game) and thus provides a repeatable (quasi-)experiment. This enables causal inference through randomization, offering a promising area of research to test and build network theory and overcoming some of the methodological challenges that whole network research presents. Developing a network game simulation stimulated discussion among network scholars and practitioners on how we examine the governance of goal-directed organizational networks. To improve network practices and fresh thinking of organizational networks, I developed a proof-of-concept of a network game simulation that can inspire others to study various theoretical mechanisms of goal-directed organizational networks.

Conclusion

The dissertation aimed to help remedy the mismatch between practice and theory on network governance by enhancing the structural contingency theory of network governance by Keith Provan and Patrick Kenis. The research question I formulated in this dissertation was how organizational networks govern themselves, and which network conditions explain the governance of organizational networks? Based on leveraging insights from a systematic literature review, two single case studies, and a network game simulation, this dissertation's findings show that organizational networks govern themselves differently, considering that they vary regarding environmental conditions and their structural pattern of relations. Furthermore, the results indicate that organizational networks use a range of institutions and structures of authority and collaboration to allocate resources and coordinate and control joint action across the network. How organizational networks govern themselves depends on how individuals and groups who make decisions are arranged in the organizational network. Goal-directed organizational networks vary concerning the structural and relational aspects of the network, such as the network goal, the distribution of trust throughout the network, the number of participating organizations, and its network competencies. On the other hand, the network development stage and environmental context. In conclusion, this dissertation contributes to our understanding of the design and governance of organizational networks. They can be effective only when a network's governance mode is targeted and appropriate. Our understanding of how organizational networks work and how to improve them is a collective endeavor that we will most likely need to develop to be ready for future societal challenges.

References

Ansell, C., & Gash, A. (2008). Collaborative governance in theory and practice. *Journal of public administration research and theory*, *18*(4), 543-571. https://doi.org/10.1093/jopart/mum032

Berthod, O., Grothe-Hammer, M., & Sydow, J. (2017). Network ethnography: A mixed-method approach for the study of practices in interorganizational settings. *Organizational Research Methods*, *20*(2), 299-323. https://doi.org/10.1177%2F1094428116633872

Berthod, O., & Segato, F. (2019). Developing purpose-oriented networks: A process view. *Perspectives on Public Management and Governance*, *2*(3), 203-212. https://doi.org/10.1093/ppmgov/gvz008
Bryson, J. M., Crosby, B. C., & Stone, M. M. (2015). Designing and implementing cross-sector collaborations: Needed and challenging. *Public administration review*, *75*(5), 647-663. https://doi.org/10.1111/puar.12432
Burt, R. S. (1992). *Structural holes*. The Social Structure of Competition. Cambridge: Harvard University Press.
Coleman, J. S. (1988). Social capital in the creation of human capital. *American journal of sociology*, *94*, S95-S120. https://doi.org/10.1086/228943
Duke, R. D., & Geurts, J. (2004). *Policy games for strategic management*. Rozenberg Publishers.
Eisenhardt, K. M. (1989). Agency theory: An assessment and review. *Academy of management review*, *14*(1), 57-74. https://doi.org/10.5465/amr.1989.4279003
Emerson, K., Nabatchi, T., & Balogh, S. (2012). An integrative framework for collaborative governance. *Journal of public administration research and theory*, *22*(1), 1-29.
Faraj, S., & Xiao, Y. (2006). Coordination in fast-response organizations. *Management science*, *52*(8), 1155-1169. https://doi.org/10.1287/mnsc.1060.0526
George, G., Howard-Grenville, J., Joshi, A., & Tihanyi, L. (2016). Understanding and tackling societal grand challenges through management research. *Academy of management journal*, *59*(6), 1880-1895. https://doi.org/10.5465/amj.2016.4007
Geurts, J. L., Duke, R. D., & Vermeulen, P. A. (2007). Policy gaming for strategy and change. *Long Range Planning*, *40*(6), 535-558. https://doi.org/10.1016/j.lrp.2007.07.004
Gulati, R., Puranam, P., & Tushman, M. (2012). Meta-organization design: Rethinking design in interorganizational and community contexts. *Strategic management journal*, *33*(6), 571-586. https://doi.org/10.1002/smj.1975
Head, B. W. (2019). Forty years of wicked problems literature: Forging closer links to policy studies. *Policy and Society*, *38*(2), 180-197. https://doi.org/10.1080/14494035.2018.1488797
Huang, K. (2014). Knowledge sharing in a Third-Party-Governed health and human services network. *Public Administration Review*, *74*(5), 587-598. https://doi.org/10.1111/puar.12222
Jones, C., Hesterly, W. S., & Borgatti, S. P. (1997). A general theory of network governance: Exchange conditions and social mechanisms. *Academy of management review*, *22*(4), 911-945. https://doi.org/10.5465/amr.1997.9711022109
Kenis, P., & Raab, J. (2020). Back to the future: Using organization design theory for effective organizational networks. *Perspectives on Public Management and Governance*, *3*(2), 109-123. https://doi.org/10.1093/ppmgov/gvaa005
Kilduff, M., & Tsai, W. (2003). *Social networks and organizations*. Sage.
Lemaire, R. H., & Provan, K. G. (2018). Managing collaborative effort: How Simmelian ties advance public sector networks. *The American Review of Public Administration*, *48*(5), 379-394. https://doi.org/10.1177%2F0275074017700722
Lemaire, R. H., Provan, K. G., Mercken, L., & Leischow, S. J. (2017). Shaping the evolution of the information flow: The centralizing mechanisms in the evolution of the North American tobacco quitline consortium. *International Public Management Journal*, *20*(3), 467-488. https://doi.org/10.1080/10967494.2016.1276034
Litwak, E., & Hylton, L. F. (1962). Interorganizational analysis: A hypothesis on co-ordinating agencies. *Administrative Science Quarterly*, 395-420. https://doi.org/10.2307/2390723
Mayer, I. S. (2009). The gaming of policy and the politics of gaming: A review. *Simulation & Gaming*, *40*(6), 825-862. https://doi.org/10.1177%2F1046878109346456
Milward, H. B., & Provan, K. G. (2006). *A manager's guide to choosing and using collaborative networks* (Vol. 8). Washington, DC: IBM Center for the Business of Government. Retrieved from https://www.businessofgovernment.org/report/managers-guide-choosing-and-using-collaborative-networks
Milward, H. B., Provan, K. G., Fish, A., Isett, K. R., & Huang, K. (2010). Governance and collaboration: An evolutionary study of two mental health networks. *Journal of Public*

Administration Research and Theory, *20*(suppl_1), i125-i141. https://doi.org/10.1093/jopart/mup038
Mintzberg, H. (1983). *Structure in fives: Designing effective organizations*. Prentice-Hall, Inc.
Nowell, B., Hano, M. C., & Yang, Z. (2019). Networks of networks? Toward an external perspective on whole networks. *Perspectives on Public Management and Governance*, *2*(3), 213-233. https://doi.org/10.1093/ppmgov/gvz005
Nowell, B. L., Velez, A. L. K., Hano, M. C., Sudweeks, J., Albrecht, K., & Steelman, T. (2018). Studying networks in complex problem domains: Advancing methods in boundary specification. *Perspectives on Public Management and Governance*, *1*(4), 273-282. https://doi.org/10.1093/ppmgov/gvx015
O'Toole Jr, L. J. (2015). Networks and networking: The public administrative agendas. *Public administration review*, *75*(3), 361-371. https://doi.org/10.1111/puar.12281
Provan, K. G., & Huang, K. (2012). Resource tangibility and the evolution of a publicly funded health and human services network. *Public Administration Review*, *72*(3), 366-375. https://doi.org/10.1111/j.1540-6210.2011.02504.x
Provan, K. G., & Kenis, P. (2008). Modes of network governance: Structure, management, and effectiveness. *Journal of public administration research and theory*, *18*(2), 229-252. https://doi.org/10.1093/jopart/mum015
Provan, K. G., & Lemaire, R. H. (2012). Core concepts and key ideas for understanding public sector organizational networks: Using research to inform scholarship and practice. *Public Administration Review*, *72*(5), 638-648. https://doi.org/10.1111/j.1540-6210.2012.02595.x
Provan, K. G., & Milward, H. B. (1994). Integration of community-based services for the severely mentally III and the structure of public funding: A comparison of four systems. *Journal of Health Politics, Policy and Law*, *19*(4), 865-894. https://doi.org/10.1215/03616878-19-4-865
Provan, K. G., & Milward, H. B. (1995). A preliminary theory of interorganizational network effectiveness: A comparative study of four community mental health systems. *Administrative science quarterly*, 1-33. https://doi.org/10.2307/2393698
Provan, K. G., & Milward, H. B. (2001). Do networks really work? A framework for evaluating public-sector organizational networks. *Public administration review*, *61*(4), 414-423. https://doi.org/10.1111/0033-3352.00045
Provan, K. G., & Sebastian, J. G. (1998). Networks within networks: Service link overlap, organizational cliques, and network effectiveness. *Academy of Management journal*, *41*(4), 453-463. https://doi.org/10.5465/257084
Provan, K. G., Fish, A., & Sydow, J. (2007). Interorganizational networks at the network level: A review of the empirical literature on whole networks. *Journal of management*, *33*(3), 479-516. https://doi.org/10.1177%2F0149206307302554
Provan, K. G., Huang, K., & Milward, H. B. (2009). The evolution of structural embeddedness and organizational social outcomes in a centrally governed health and human services network. *Journal of Public Administration Research and Theory*, *19*(4), 873-893. https://doi.org/10.1093/jopart/mun036
Puranam, P., Alexy, O., & Reitzig, M. (2014). What's "new" about new forms of organizing?. *Academy of management Review*, *39*(2), 162-180. https://doi.org/10.5465/amr.2011.0436
Puranam, P. (2018). *The microstructure of organizations*. Oxford University Press.
Raab, J., Lemaire, R. H., & Provan, K. G. (2013). The configurational approach in organizational network research. In Fiss, P., Marx, A., & Cambré, B. (Eds). *Configurational theory and methods in organizational research*. Emerald Group Publishing Limited.
Raab, J., Mannak, R. S., & Cambré, B. (2015). Combining structure, governance, and context: A configurational approach to network effectiveness. *Journal of public administration research and theory*, *25*(2), 479-511. https://doi.org/10.1093/jopart/mut039
Raab, J., & Milward, H. B. (2003). Dark networks as problems. *Journal of public administration research and theory*, *13*(4), 413-439. https://doi.org/10.1093/jpart/mug029
Raeymaeckers, P. (2013). From a bird's eye view? A comparative analysis of governance and network integration among human service organizations. *Journal of Social Service Research*, *39*(3), 416-431.

Raeymaeckers, P., & Kenis, P. (2016). The influence of shared participant governance on the integration of service networks: A comparative social network analysis. *International Public Management Journal*, *19*(3), 397-426. https://doi.org/10.1080/01488376.2013.775091
Saz-Carranza, A., & Ospina, S. M. (2011). The behavioral dimension of governing interorganizational goal-directed networks—Managing the unity-diversity tension. *Journal of Public Administration Research and Theory*, *21*(2), 327-365. https://doi.org/10.1093/jopart/muq050
Saz-Carranza, A., Salvador Iborra, S., & Albareda, A. (2016). The power dynamics of mandated network administrative organizations. *Public Administration Review*, *76*(3), 449-462. https://doi.org/10.1111/puar.12445
Stoker, G. (1998). Governance as theory: five propositions. *International social science journal*, *50*(155), 17-28. https://doi.org/10.1111/1468-2451.00106
Stoppelenburg, A., de Caluwé, L. I. A., & Geurts, J. L. A. (2012). Gaming: organisatieverandering met spelsimulaties. Kluwer.
Van Den Oord, S., Bertels, F., Geurts, J., Lenstra, R., Kenis, P., & Cambré, B. (2017). Development of a network game for coordination of service delivery to people with a chronic illness. *International Journal of Care Coordination*, *20*(3), 98-111. https://doi.org/10.1177%2F2053434517733842
van den Oord, S., Vanlaer, N., Marynissen, H., Brugghemans, B., Van Roey, J., Albers, S., ... & Kenis, P. (2020). Network of networks: preliminary lessons from the Antwerp Port Authority on crisis management and network governance to deal with the COVID-19 pandemic. *Public Administration Review*, *80*(5), 880-894. https://doi.org/10.1111/puar.13256
Vedres, B., & Stark, D. (2010). Structural folds: Generative disruption in overlapping groups. *American Journal of Sociology*, *115*(4), 1150-1190. https://doi.org/10.1086/649497

Abstract

In my dissertation, I study how organizational networks govern themselves and what conditions explain the governance of organizational networks. Organizational networks are groups of three or more organizations working together to achieve not only their own goals but also a collective goal. As an organizational form, they have become pivotal in various sectors because an organizational network provides policy planners and managers with an alternative strategy to deal with issues, solve problems, or produce products and services that are too broad in scope and too complex for any organization to handle. For organizational networks to be an effective organizational form, however, some mode of governance is imperative to ensure that they act as a goal-directed system of coordinated action. Despite their rising popularity, we still need more theoretical understanding and empirical evidence on under what conditions a mode of network governance varies and how networks use institutions and structures of authority and collaboration to govern themselves. This dissertation aims to help remedy the mismatch between practice and theory by enhancing the contingency theory of network governance by Keith Provan and Patrick Kenis. The findings show that organizational networks govern themselves differently, considering that they vary regarding environmental conditions and their structural pattern of relations. Furthermore, the results indicate that organizational networks use a range of institutions and structures of authority and collaboration to allocate resources and coordinate and control joint action across the network. Based on leveraging insights from a systematic literature review, two single case studies, and a network game simulation—network governance is explained, and the need to rethink its dimensions, perspectives, and research methods on the governance of organizational networks is addressed.

Samenvatting

In mijn proefschrift bestudeer ik hoe organisatienetwerken zichzelf besturen en welke condities de governance van organisatienetwerken verklaren. Organisatienetwerken zijn groepen van drie of meer organisaties die samenwerken om een gemeenschappelijk doel aan te pakken. Als organisatievorm zijn organisatienetwerken cruciaal geworden in verschillende sectoren. De reden hiervoor is dat een organisatienetwerk beleidsmakers en managers een alternatieve strategie biedt om problemen op te lossen of producten en diensten te produceren die een enkele organisatie afzonderlijk niet tot stand kan brengen. Om als een effectieve organisatievorm te fungeren, is een vorm van bestuur absoluut noodzakelijk om ervoor te zorgen dat informatie, middelen en activiteiten van verschillende organisaties in het netwerk worden verbonden en gedeeld. Ondanks hun populariteit hebben we nog meer theoretisch inzicht en empirisch bewijs nodig over onder welke omstandigheden een vorm van netwerkbestuur varieert en hoe organisatienetwerken verschillende soorten bestuur en structuur gebruiken om zichzelf te besturen. Dit proefschrift heeft tot doel de mismatch tussen praktijk en theorie te verhelpen door de contingentietheorie van netwerkbestuur van Keith Provan en Patrick Kenis te versterken. De bevindingen laten zien dat organisatienetwerken zichzelf op allerlei manieren besturen, gezien het feit dat ze verschillen wat betreft hun omgevingsfactoren en hun structurele relatiepatronen. Bovendien geven de resultaten aan dat organisatienetwerken een reeks van vormen van autoriteit en samenwerkingsstructuren gebruiken om informatie te delen, middelen toe te wijzen en gezamenlijke acties binnen het netwerk te coördineren en te controleren. Op basis van inzichten uit een systematisch literatuuronderzoek, twee gevalstudies en een netwerkspelsimulatie wordt netwerkbestuur uitgelegd en wordt ingegaan op de noodzaak om de dimensies, perspectieven en onderzoeksmethoden voor het bestuur van organisatienetwerken te heroverwegen.

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