A (meta)governance framework for multi-level governance of inter-organizational project networks

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Abstract

Little is known about the governance of inter-organizational networks for projects. This study empirically develops a theoretical framework for this, using twenty-eight project networks as case studies, applying 124 interviews in ten countries. The abductively developed three-layered governance framework has the individual network for a project at its lowest layer, explained through Multi-level Governance Theory. This is steered by a middle layer for the governance of networks, addressing the steering of the different networks these organizations are part of. At the top is metagovernance, where the ground rules are set by governments or investors. For each layer, the governance dimensions, as well as the enablers and disablers between layers, are defined The study's resulting theory provides an overall understanding of the governance of multiple networks for projects and provides practitioners with the parameters to optimize their networks for better project results.

Keywords: meta-governance, governance of networks, network governance, inter-organizational networks, projects

Introduction

The complexity of governing inter-organizational relationships has taken a central position in the current academic discourse on governance (Roehrich et al. 2020). This includes the governance of organizational designs of large complex projects and megaprojects (e.g., Denicol, Davies and Pryke, 2021; Derakhshan, Fernandes and Mancini, 2020) or new product development projects (Song, Cao and Zheng, 2016), which draw on many different partners motivated to collaborate by the joint creation of value. These values comprise value for partners, value through the creation of assets (for the owner), provision of paid-for services (by the subcontractors), and value in accomplishing the common goal (the project) (Zerjav 2021).

Such collaborations often last for several projects over time, which characterizes the organizations' mutual relationships as a timely unlimited network of reoccurring collaborations (Steen et al. 2018). Reoccurring collaborations are especially of interest for further research, as they help identify patterns of institutionalized tasks and interactions of network partners in existing relationships. Besides the obvious insight into the designs and functioning of the governance of these networks, a focus on reoccurring collaborations has the potential to identify patterns of 'proven' ways to govern these collaborations. This provides suggestions for practitioners on how to govern their interaction in networks. Some authors even argue that these types of networks already dominate the business of projects (e.g. DeFillippi and Sydow 2016). To define these settings, we extend Provan, Fish and Sydow's (2007) definition of networks to: a group of three or more organizations connected in ways that facilitate repetitive achievement of a common goal.

The magnitude of investment in these large projects is often in hundreds of millions, if not billions of USD (Flyvbjerg 2014). Through that, a network's governance in terms of choice of partners and their collaboration becomes a significant factor influencing the economic, social, and reputational results of the projects, their constituting organizations, and even their public and private investors (Braun and Sydow 2019). These inter-organizational networks continuously emerge, evolve, design, and redesign themselves to adjust to changing circumstances and maximize the joint performance of their projects and their constituting organizations (Sydow and Braun 2018). This development requires governance over time, which is typically referred to as network governance, herein defined as "the use of formal and informal institutions to allocate resources and coordinate joint action in a network of

organizations" (Kapucu and Hu, 2020, 5), such as network administrative units or ad-hoc collaborations for solving upcoming issues. This distinguishes network governance from network management, which is "planning, organizing, leading, and controlling, […] conditioned by continuous interaction and adaptation among autonomous actors" and situation-specific tasks (Järvensivu and Möller, 2009, 659).

The governance of these networks is not without problems. For example, Qiu et al. (2019), outline for the Hong Kong-Zhuhai-Macao Bridge project the friction between the governance provided by the funders (four governments), the laws and regulations in the different countries, the different working cultures, and the evolutionary complexity over the project lifecycle. To address these frictions, they emphasized governing through working principles for all parties, agreed upon within a hierarchy of governance institutions. Gil and Pinto (2018) point out governance challenges of four megaprojects in the UK, namely the London Olympic Park, Crossrail, High-speed 2, and, Heathrow Terminal 2, and trace them back to the difficulties arising from different levels of decision-making in governance. Tee, Davies, and Whyte (2019) showed how governance through guidelines, agreements, incentives, and institutionalized working practices helped to overcome governance issues in the Heathrow Terminal 5 megaproject.

The present study advances these findings by empirically developing the particularities of the governance structures for inter-organizational networks for projects and the interaction therein, into a governance model.

The classic studies portray network governance as a hybrid form of organizing, located between market and hierarchy (e.g., Powell, 1990), which provides relevant parties with the connections for mutual exchanges (Grandori and Soda 1995). These exchange transactions are conducted on the basis of mutual benefits, trust, and reciprocity, whose "players develop a culture of mutual cooperation because they are in for a long-term relationship" (Kim, 2006, 22). Subsequent studies looked at the network *per se* and its governing unit, such as network administration organizations internal and external to the network (e.g. Provan et al. 2007). Yet others looked at the ways networks govern their constituent entities through various mechanisms, such as through contractual and relational means (e.g., Pryke et al. 2018). These studies typically assume networks as a form of governance for their constituting organizational units, not as a governed entity. Hence, these studies investigated the governance structures and roles required for the network to govern itself, but not the higher levels of governance that steer these 'self-governing networks'. In line with that, Roehrich et

al. (2020) emphasize the need for further research on networks and their governance, and Wang et al. (2022) the need for further research in the design of inter-organizational networks for projects.

An important yet rarely addressed aspect is the governance of several simultaneous networks formed by the project-specific combination of organizations, such as different suppliers in different projects. For example, while company A is networked with companies B to G, they might collaborate with companies D, E, and F in one project and C, E, F, and G in a different project. To address this difference in the realm of governance, we follow Morris (1997) and Müller, et al. (2014) and differentiate between 'network governance' as the governance of a single network, and 'governance of networks' as the governance of several networks over time or simultaneously.

The literature's paucity on the differences and interfaces between these two governance layers provides for an incomplete picture of the linkages between governance levels and difficulties in developing an end-to-end theory on network governance in large complex projects and megaprojects. For example, the current level of knowledge does not allow practitioners to identify the particular governance dimension they need to influence to make the project sponsoring organization allow them to build a more democratic, flexible, and resilient network for a project. Other examples include how to reach out from the sponsoring and project management level to the many different individual suppliers and advisors through organizational means to bridge this gap and integrate the suppliers in the overall governance structure.

The present article addresses this omission by investigating the nature of governance of these networks aiming to understand the governance of these inter-organizational networks in terms of a) their layers and b) the constituting elements of these layers. Hence our research question is:

How are longer-term inter-organizational networks governed for joint large and megaprojects?

Metagovernance, as presented by Jessop (2015), is used as the theoretical framework for explaining the contextual governance parameters driving the formation of governance of networks. Multi-level governance theory (MLG) as presented by Hooghe and Marks (2001, 2003) is used as a theoretical lens to explain network governance. It applies especially to hybrid network structures by overcoming the one-dimensional limitations of most existing

governance theories of either being suitable for hierarchies or networks, but not both simultaneously (Šimkonis et al. 2021).

The unit of analysis are the governance dimensions for metagovernance, governance of networks, and network governance and their relationship. Critical realism as presented by Bhaskar (2016), with its integration of objectivity and subjectivity provides for a robust ontological perspective in this global multiple-case study design with 28 cases, using 124 interviews in ten countries worldwide. Each case is hereby a separate network. Data analysis and theory building followed the 'constructing mystery' approach by Alvesson and Kärreman (2007), a double-reflective approach that integrates the empirically collected data with existing theoretical frameworks and the prior experiences of the researchers to develop theoretically robust explanations of phenomena. More details in the methodology section.

The context of the majority of the above-mentioned studies is the construction industry and large infrastructure projects, even though inter-organizational networks for projects also exist in other industries. The present study follows this trend and collects mainly data on construction projects but also on energy, Oil & Gas, and IT projects in order to identify common and differential patterns across sectors. Megaprojects are typically one-off investments (of a magnitude described above) which are characterized by high levels of complexity (Turner and Xue 2018) and often associated with high failure rates, attributed to planning fallacies (Flyvbjerg 2021), including optimism bias, but also strategic misrepresentation, escalation of commitment (Denicol, Davies and Krystallis 2020), cognitive biases (Flyvbjerg 2021) or inappropriate management techniques (Turner 2022), to name a few. A detailed state-of-the-art review of the associated literature can be found in (Denicol, Davies and Krystallis 2020). The present study investigates the network of organizations executing these types of projects. Hence, large and megaprojects are the context, not the subject of investigation in the present study.

The study results provide academics with a draft for theorizing the governance of inter-organizational networks for projects, from formation to execution, contributing to the development of a network governance theory for large and megaprojects. Practitioners benefit from the study through guidelines for governance setup, influences on governance, and possible organizational interfaces for optimizing network governance efficiency. Moreover, practitioners benefit from guidance in safeguarding their network governance by anticipating the formation process and its impact on governance structures by positioning their resources, including their subcontractors, early on in the strategically best manner.

The next section of this article reviews the most relevant literature on network governance and the theoretical lens of MLG. This is followed by sections on methodology, results, and discussion. The article finishes with a conclusion section, where the research question is answered, and the contribution to knowledge is elaborated.

Literature review and theoretical lens

A large body of literature exists in the field of organizational networks and their governance. Its subset of inter-firm project networks typically describes them as a set of relatively autonomous actors within relatively stable but dynamic relationships of a more cooperative than competitive character, provided with opportunities for reoccurring collaborations in projects over time. The actors' motivation to collaborate stems, among others, from the possible access to specific resources in the network, the access to business opportunities, and the lower transaction costs through repetitive collaborations with the networked organizations. Hence these networks can be perceived as timely unlimited systems for delivering products or services through projects (Sydow 2003; Sydow and Windeler 2004; DeFillippi and Sydow 2016).

Disagreement about the concept of project network prevails. Some writers include bilateral relationships in inter-firm projects in network definitions (von Danwitz 2018, 525), while others propose that networks require a minimum of three independent organizations in collaboration (Hellgren and Stjernberg 1995). The present study adapts the latter perspective, as outlined in the introduction.

The classic work on project networks includes Jones et al.'s (1997) theory of network governance, which synthesizes Transaction Costs Economics and Social Network Theory and asserts that the presence of demand uncertainty, task complexity, human asset specificity and frequency are antecedents for stronger embeddedness among the networked organization, which gives rise to more social mechanisms for coordination and collaboration. Hence, when these conditions are in place, firms turn from market and hierarchy to network organization to coordinate and safeguard their exchanges. The crucial role of embeddedness is emphasized by Chakkol et al. (2018) by showing importance of collaborating both vertically and horizontally within the network using standards, formal contracts, and relational mechanisms for coordination within the network.

The dynamics in project networks are described by Hellgren and Stjernberg (1995) using case studies of three shopping mall projects in Sweden. From a network perspective, they describe the continuous change of the network structure, shaped by power shifts among the participating organizations and the shifting requirements between project stages. For example, a lack of central coordination during the design stage of projects, which turns into a pseudo-hierarchy at the implementation stage. Ahola (2018) did not support this finding and suggested that network designs are highly context contingent and can be strictly hierarchical when needed. He suggests three core types of networks, the strictly market driven hierarchy, the dyad-driven hierarchy of owner and systems integrator, and the integrated core network with a small network of organizations at the top, leading the wider network. While the three core models provide more flexible topologies, they still do not account for contemporary network designs with Special Purpose Entities (SPEs) specifically designed to take over particular governance roles (such as finance) from other organizations on the top of the hierarchy order to avoid clashes of responsibilities among the main actors in the network (Denicol et al. 2021; Sainati et al. 2017).

Other studies on the governance of these project networks have mainly addressed topics like a) structural characteristics of different governance modes as described above (e.g. Provan and Kenis 2008), b) the underlying governance mechanisms (e.g. Kujala, Aaltonen, Gotcheva, and Lahdenperä 2020), or c) the nature of the ties between the actors and their governance (e.g. Ebers and Maurer 2016).

Relatively little has been published on the governance of network governance, in other words, on the governance of several parallel networks, and their genesis through metagovernance. Hence, a gap exists in understanding what steers and controls the formation and life-cycle of inter-organizational networks for projects.

Metagovernance

Metagovernance is known as ‘the governance of governance’ (Torfing, 2016, 525) and addresses the setting of the boundaries for the self-governance of governed entities like networks to avoid governance failures (Gjaltema, Biesbroek, and Termeer 2020). This is done by balancing a) the extent of self-governance of the governed entity to let them define their own agenda, rules, norms, goals, and content, and b) setting the boundaries to maximize foreseen benefits. In other words, metagovernance facilitates, manages, and directs the

governing entity (such as networks) by carefully adjusting their level of self-regulation for overall benefit accomplishment (Torfing 2016).

Examples include the metagovernance of the variety of sustainability initiatives involving private actors. Here Derkx and Glasbergen (2014) looked at the metagovernance of initiatives for fair labour, sustainable tourism, and organic agriculture. They found that initiatives in each of these subject areas were characterized by bottom-up processes, attempts to converge goals and find consensus on benchmark criteria, and the vision of developing a new governance model for the entire subject area. The resulting metagovernance approach addressed the over-fragmentation by a) focusing on the coherence of standards and their related certifications, as well the convergence of goals; and b) harmonizing the implementation of standards through identification and dissemination of best practices to derive at an orchestrated convergence around the defined benchmarks for each topic area. For the public sector, Weyer, Adelt, and Hoffmann (2015, 12) referred to it as "the cautious moderation of self-organised processes by public agencies in order to ensure that decentralized coordination leads to acceptable results from a common welfare-oriented perspective".

Thus, metagovernance addresses the plurality of governance choices and aims for coherence in the governance of a subject area. This is done to avoid governance failure, which Jessop (2015) traces back to a) the oversimplification of conditions of actions and/or deficient knowledge about causal connections affecting the object of governance, b) coordination problems between interpersonal, inter-organizational, and inter-systemic levels, c) coordination problems due to the inconsistent definition of the objects of governance, time and space horizons of actions and their association with different interests and power levels. By taking a political science perspective, Jessop (2015) develops a framework of four reflexive modes of meta-governance, steered by a fifth one, where reflexive means the careful weighing of alternatives in the given context, before making a decision:

1. *Meta-exchange*: the reflexive design of markets or subdivisions thereof. Examples in the realm of (mega)projects include investor decisions to pursue particular trends and create related markets, like smart cities, new power generation modes etc. and the need for associated types of organizational networks (Braithwaite 2020)
2. *Meta–organization*: the reflexive design of organizations, intermediating organizations, and organizational ecologies. In project settings, this includes

legitimizing the use of Special Purpose Vehicles (SPVs) as organizational and governance entities (Sainati, Brookes, and Locatelli 2017)

3. *Meta-heterarchy:* the reflexive design of the conditions for self-organization. This includes the freedom for particular types of network formation, such as emergent or orchestrated (Lejano, Ingram, and Ingram 2014)
4. *Meta-solidarity*: the promotion of opportunities for collaboration of actors, such as creating social capital. In project settings, this includes knowledge-sharing networks, and the boundaries of distribution of decentralized knowledge (Ansell, 2000)
5. The *modification of the balance* between the four modes above. This addresses the need to change the emphasis on different modes described above in situational contingency.

Little is published about metagovernance in the realm of (mega)projects. Li, Lu, Ma, and Kwak (2018) touch upon the need for metagovernance in mega-events, such as the EXPO 2010 in China. Here they portray the projects as a network of stakeholders in need of metagovernance to steer the constant adjustment of network governance structures to the project's needs. Miller and Hobbs (2005) similarly described the dynamic nature of governance in large projects without explicitly mentioning the need for a higher level of governance to steer this dynamic. Inadequate attention to the design of the governance structure was identified by Denicol, Davies, and Krystallis (2020) as the leading cause for megaproject failures in the area of governance. Especially the balance between formal and informal governance structures, lack of adequate definition of roles, responsibilities, and accountabilities, was emphasized. Even though these are network governance tasks, it is the responsibility of metagovernance to ensure that these tasks are implemented appropriately, and governance failure is avoided. Among the authors' suggested remedies are better institutional embeddedness and the development of strategies to engage with different cross-national frameworks. These are metagovernance issues, or at least issues that are more adequately being dealt with at the metagovernance level, where government organizations or large-scale investors oversee the formation of networks for megaproject execution.

In summary, metagovernance are (semi)permanent policies and other guidelines, issued by an investor or public authority, which steer the formation of networks of networks (e.g. all networks needed to professionally build a smart city, such as training and education networks, information networks, tendering networks, project execution networks etc.) within which each individual network is governed through network governance.

Governance of networks

The governance of networks steers the appropriateness and timeliness of the governance for the different types of networks under the umbrella of an investor, for example, a government agency building the country's infrastructure (see Figure 1).

Network types include formal and informal information-sharing networks, training and education networks, knowledge exchange networks, and project execution networks. These networks can be active at different times, for example as part of a project or between projects. Each of these networks requires its particular governance, depending on the needs of the network to remain self-governing. For example, in execution networks for public projects, criteria like asset-specificity, task complexity, transaction continuity, uncertainty, degree of differentiation, and the intensity of inter-organizational interdependence are taken into account to develop the structure, decide on the players, their roles, and responsibilities (Kim 2006). The governance of networks should make sure that across all networks, information is accurately and timely provided, roles are clearly defined, work is done according to socially accepted standards, and in an ethically acceptable manner (Aras and Crowther 2010).

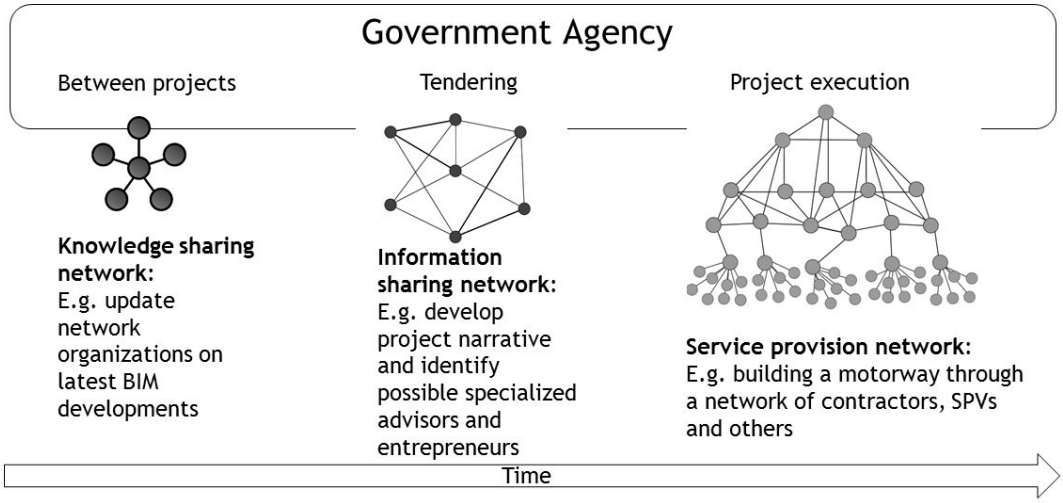

Figure 1: Different network activities at different times.

Project networks go through a life-cycle or evolution, which Popp et al. (2014) and Kapucu and Hu (2020) describe as formation; development and growth; maturity, sustainability and

resilience; and demise and transformation. The current study addresses the formation and development stages.

Network formation under governance of networks

Network formation is the creation of the network. This stage sets the mission and level of formality. Once the need for engaging in a network arises, the managers should decide on the formation and design of the network (Kapucu and Hu 2020). Through metagovernance (as described above), they include precursors, shadows of the past and the future, and context parameters in the governance and network structure and processes, setting the tone for collaboration and consensus finding, resilience, and sustainability. These managers may form networks through deliberate design or let them emerge without deliberate planning (Kapucu and Hu 2020). The former is often executed through a defined process and a finite set of defined candidate organizations. This results in 'orchestrated networks' (Lejano, Ingram, and Ingram 2014) whereby a 'triggering organization intentionally recruits network members and builds the legitimacy of the network'. Often with a few organizations with strong ties, integrated with a large periphery of organizations with weak ties. Emergent networks often result from environmental changes, which induce the actors' mutual interdependence and mutual interest. Emergent networks often lead to self-organizing structures, where criteria like strengths of existing ties, prominence of network members, structural and cognitive homophily play a key role in the decision to engage in a network (Dagnino, Levanti, and Mocciaro Li Destri 2016). These networks may be formed by getting people connected through various formal and informal activities, such as through workshops at conferences or similar events with access to potential candidates for networking (Hoberecht et al. 2011).

For the formation of networks, the governance of networks balances a diverse set of criteria. These include technical requirements, public acceptance, funding alternatives, and government encouragement (Popp et al. 2015). Other criteria include regional closure with short geographical distances for ease of access and board interlock across organizations. Institutional characteristics to be accounted for include the presence and size of the organizations required (e.g., small firms are more likely to network), the cultural-historical circumstances (e.g., is it typical to network in the region?), and social factors (are the right skills available at the right place) (Klaster, Wilderom, and Muntslag 2018). Once the decision

is made to build a network, the purpose of the network needs framing to decide on scope and outcome (Popp et al. 2015). This leads to a narrative of the network, which allows for sensemaking by possible network members for their decision to join (Bixler 2014) and provides for the legitimacy and accountability of the network (Popp et al. 2015).

The main reason for organizations to join, or to be asked to join, networks is the trust that developed from earlier interactions with network members (Shazi, Gillespie, and Steen 2015; Sydow and Windeler 2004), but also the social capital (Pinheiro et al. 2016), and the reciprocity, as well as the nature of the action required in the network (Swärd 2016). Less often refers the literature to performance, competition, and the network's frequency of action (Ebers and Maurer 2016).

Network governance and multi-level governance theory as its theoretical lens

Governance theories fall naturally into the categories of a) *generic* governance theories addressing the entire network or its dyadic relationship between entities, and b) *specific* theories addressing particular aspects of the network. Examples for generic theories include studies using a network perspective and addressing the structural characteristics of network governance, such as shared governance, governance by a network administrative organization, or by an external organization (Provan and Kenis 2008). Dyadic studies include those using hierarchical perspectives to address the dyadic relationships between network nodes, such as agency theory (Jensen and Meckling 1976) or contract theories (Kaulio 2018). Studies addressing specific perspectives include those for economic optimization as addressed in Transaction Costs Economics (Williamson 1985) or resource dependency addressed in Resource-based Theory (Barney 1991). Relevant to the present study are generic theories. However, a commonality among generic theories is their one-dimensional perspective, which hinders explaining heterogenic organizational settings, where hierarchical and non-hierarchical structures co-exist and develop over time.

Multi-level governance theory (MLG) (Hooghe and Marks 2001) addresses structural heterogeneity by providing a theoretical perspective that integrates hierarchical, non-hierarchical (a.k.a. market), and network governance theories in one theoretical framework, allowing integration of existing governance theories and applying them to organizational networks. MLG was originally developed in political science for the governance of highly

complex settings, such as the EU and its member states. MLG simultaneously applies two distinct governance perspectives:

- *Type I governance*, which addresses the hierarchical parts of the network, typically formed by the hierarchy of owner/sponsor, the temporary client organization, and the Tier One Suppliers (Denicol, Davies, and Pryke 2021). This governance is grounded in highly institutionalized rules and norms, which are explained through existing generic theories, such as agency theory.
- *Type II governance*, which addresses the non-hierarchical parts of the network, such as the individual suppliers, collaborating temporarily on tasks and projects. Type II governance typically emerges within Type I governance and can be ad-hoc, on a case-by-case basis, out of particular needs, and can also be established at the outset of the project (Skelcher 2005)

The two types of governance connect through organizational interface entities of varying formality (Skelcher 2005):

- *Clubs*, emerge from ad-hoc, informal collaboration of volunteers, typically to solve an issue. Their collaboration is based on trust and they typically appear in stewardship-like governance settings (Šimkonis et al. 2021).
- *Agencies* are formal units, setup and led by representatives of the prime-contractor (often from the project management team) and staffed with representatives of the subcontractors. Agencies are often setup for specific themes, such as quality or sustainability; hence, there can be several agencies in a project.
- *Boards* are the most formal interface entities, setup for internal and external governance issues. They are often setup by the local municipalities, which also appoint their members. Typically, they address subjects like users, finance, or technical issues. They are closer aligned with the project owner than clubs and agencies, and typically oversee correctness in execution, as for process compliance. Hence they are typically found in more principal-agent like settings (Šimkonis et al. 2021).

This distinction resonates with Pryke et al's (2018) finding of self-organizing groups for Doing, Designing, and Deciding in large scale projects. Recent work in the context of megaprojects validated the applicability of MLG for large and megaproject settings with a

mixture of organizational structures and identified the contextual contingencies for the emergence of the different types of interface-entities, such as the balance of trust and control in Type I governance and the timely perspective (ad-hoc to semi-permanent) in Type II governance (Šimkonis et al. 2021). The same perspective is applied in the present study. Table 1 summarizes the findings from the literature review, which are predominantly derived from studies in political science and require validation in the realm of projects.

Charac-teristic	*Meta-governance*	*Governance of networks*	*Network governance*
Aim	Govern governed entities to avoid governance failures	Governing the network of networks	Govern a specific network and its management
Modes	Meta-exchange, meta-organization, meta-heterarchy, meta-solidarity, the balance of modes	Structuring and forming the network of networks, its accountabilities, responsibilities, and modes of collaboration.	Type I and Type II governance, plus clubs, agencies, and boards as interface units
Example tasks	Develop policies for public procurement	Governance of the multitude of networks, depending on the needs of each individual network to remain self-governing	Decision on interface organizations for Type I and II governance

Table 1: Characteristics of meta-governance, governance of networks, and network governance

The literature review identified three distinct layers of governance for inter-organizational networks for projects. It also showed that no study has yet addressed the interaction of the layers for these types of networks in the realm of projects. This is done in the present article.

Methodology

Research design

The process of research design followed Saunders, Lewis, and Thornhill (2019). This requires, at the outset, defining the underlying philosophical stance. We choose critical realism (Bhaskar 2009, 2016), which assumes three layers of reality: a) the underlying objective *mechanisms* and structures (like existing procurement policies issued by a government or investor), which give rise to b) the *events* within which the investigated phenomenon happens (e.g., the selection of suppliers through a stringent selection process to determine the particular organizations for the inter-organizational network for the delivery of the project), through which c) a particular subjective *experience* occurs (e.g., the past and anticipated issues experienced by these organizations when working together).

This combination of objective and subjective realities provides for three ontological domains. The experiences constitute the ontological domain of the *empirical* (in this study, the interview data), the combination of experiences and events constitutes the ontological domain of the *actual* (here the cases investigated and their related interview data), and the combination of experience, events, and mechanisms constitute the domain of the *real* (the interview data, the cases, and the underlying explanatory mechanisms and structures) (Bhaskar 1998). This three-layered (a.k.a. tall) ontology, with its demand for precision at each of the three layers, enables higher levels of ontological precision than existing flat ontologies by showing how higher-level social systems furnish the practices of, for example, organizations (Seidl and Whittington 2014). Together with the 'constructing mystery' approach for theory building, it enables critical thinking by the researchers, which helps to explore tensions between the layers, to identify a most likely, but maybe not the only possible, explanation of the phenomenon (Bhaskar 2016).

In accordance with this, the study started with the ontological domain of the empirical and collected data through interviews. These data were interpreted in the context of the particular

cases, leading to the domain of the actual. Patterns of structures, documents, and processes underlying the actual domain, led to the domain of the real.

Abduction was used for theory development in a qualitative mono-method study, using multiple case studies as research strategy, which fits especially well to critical realism research (Easton 2010; Vincent and Wapshott 2014) in a cross-sectional time horizon. Data collection was done through interviews and analysis of the data followed the Alvesson and Kärreman' s (2007) constructing mystery approach, that is, a non-traditional, reflexive and abductive approach that aims for reconstructing the informant's life-worlds.

Data collection

Seven country teams, consisting of 16 researchers conducted 124 interviews in 28 case studies in ten countries worldwide. A case was hereby defined as a network of at least three companies that had worked together several times on different projects in the past five years. The networks were categorized by size as small (up to five organizations in the network), medium (six to 20 organizations), and large (more than 20 organizations). The case demographics are shown in Appendix 1.

Case sampling pursued variety maximization within the boundaries of large-scale construction projects, which provides for the identification of the most generic patterns across project types and geographies. The focus was on large and megaprojects in the construction industry. However, to better distinguish between industry specific and non-industry-specific patterns, we also collected data in the energy, engineering, and IT industries. This approach will not provide reliable patterns for other industries, but strengthen the findings in the construction industry.

We took a global perspective, assuming that local particularities can be addressed through follow-on studies. Following ethics approval from the Norwegian Centre for Research Data (NSD), semi-structured, face-to-face online interviews via Zoom/Teams were held. The interviews lasted between 60 and 90 minutes, were recorded, and subsequently transcribed. Interview participation was based on informed consent and started with general questions about the interviewee and organization, which was followed by a block of questions on network design, governance of networks, and finally network performance. The interview questions are listed in Appendix 2.

Interviewed roles included representatives from prime contractors, major suppliers, smaller suppliers and specialist roles. The details are shown Table 2.

Data collection took place between May and December 2020. An upfront-developed case-study protocol with the study's aims, research questions, interview questions, and introduction letters for organizations and interviewees synchronized the activities across teams and contributed to the reliability of the data. This was further supported during data analysis by pattern matching and replication logic according to Yin (2017). The search for multiple sources of evidence, key persons as informants, and the comparison of results across teams during the analysis workshop contributed to validity.

Role	*Geography*	*Number of interviews*
CEO, Owner	CA, CH, DE, FIN, IR, IS, LT, NO, UK	21
Manager	CA, CH, FIN, IR, IS, LT, NO, UK	34
Project manager	AU, CA, CH, DE, FIN, IR, IS, LT, NO, UK	41
Assistant project manager	CA	2
Lawyer	FIN	1
Consultant	AU, IR	6
Procurement	AU, CH, FIN,	4
Engineer	AU, CH, IR	5
Construction manager	CH	3
Program manager	AU	3
Superintendent	CA	2
Client	AU	2
Total		124

Table 2: Interviewed roles and their geographies

Data analysis

Alvesson and Kärreman' s (2007) constructing mystery approach respects the socially constructed nature of the data from interviewees. It allows filtering out institutionalized standard talk or politically correct statements by the respondents. The data are interpreted within the abductive triad of existing theoretical frameworks, own experiences, and interpretive results from the data (Alvesson and Skoldberg 2009). Recent years showed a steady increase in using this approach for project management research (e.g. Jacobsson, Lundin, and Söderholm 2015; Müller et al., 2018). The technique builds on a two-step process. First potential mysteries, in terms of phenomena not adequately explained through existing theory are identified through reflection on the data. Second, through abductive reasoning (using the triad described above), self-criticism, and interaction with other researchers, the explanation for the mystery is developed. Hence, a double-reflection, first a reflection on the interview data, then on the reflection of the reflection (i.e. reflexion), which distinguishes it from other qualitative methods, such as grounded theory, which require only one level of reflection (Van de Ven 2007). Thus, the analysis goes beyond traditional coding techniques, which passively mirror reality by trying to discover facts and meanings from the data only (Alvesson and Kärreman, 2007).

The technique's quest for several theoretical perspectives and subjective experiences to enrich reflexivity was satisfied through a diverse team of 13 researchers representing the seven country teams that collected the data in ten countries (Australia, Canada, China, Iceland, Iran, Finland, Germany, Norway, Lithuania, and the UK). Diversity was further supported through the participants' different experience levels and specialization areas in project management research. The diversity of the group members, their differences in reflexivity and self-critique mitigated the risk of insufficient grounding in existing theory and facilitated the "interplay among theory, researcher subjectivity, and empirical options that can encourage theoretical development through problematizing existing theory" (Alvesson and Kärreman, 2007, 1272).

During a two-day virtual data analysis workshop, the groups first worked in pairs to reflect on their data to derive at a first-order level of reflection (step 1). In step 2, each researcher presented the reflection from the first round to the larger team, and the whole team reflected on the sum of all reflections to derive a second-order level of reflection. The discussions in both steps fostered the search for alternative explanations of the identified phenomena, and

led to a convergence of understandings and a jointly agreed explanation of the overall phenomenon (Alvesson and Sköldberg 2009).

Results

As described above, the first round of data analysis (step 1) addressed the country level, the second step the global level. The interview data were analysed from the perspective of metagovernance, governance of networks, and network governance, using the theoretical lenses, described in the literature review section. The double reflective approach does not lend itself to the provision of quotations in research reports, like in studies using traditional coding. The findings were developed at a higher abstract level using the abductive approach discussed earlier for a common conceptual understanding and agreement of the findings among the group of researchers.

Mysteries identified at step 1 included:

a) The parallel existence of different networks for each of the interviewed organizations. Here questions about the diversity of networks and the coordination of intra- and inter-network activities arose. This was addressed in step 2 through the repetitive interpretation and analysis of the data from a process, organization and culture theory perspective combined with the researchers' own experiences. That led to the findings described in the section *The process for the governance of networks* below, and laid the foundation for the metagovernance and enablers for the governance of networks, as shown in Figure 3.

b) The different ways of network formation and the triggers thereof. Appendix 1 shows no patterns indicating network size or industry as a determinant for the type of network formation. Data indicated that countries' developments over time led to changes in preferences, such as from the dominance of Type I organizing of networks to the dominance of Type II in Scandinavia, with the reverse trend in Lithuania. Interpreting this mystery in step 2 from a metagovernance theory perspective revealed the crucial role of the five metagovernance dimensions, set by the countries' governments through their policies, by defining and redefining the types (and with it the size) of projects (i.e., meta-exchange), the competition or collaboration among participating organizations (meta-solidarity), the forms of governance setup allowed

for the networks (meta-heterarchy). This role of metagovernance is visualized in Figure 3.

c) The number of actors at different levels being mentioned by the interviewees as players in network governance. This raised questions about the organization and structure of the different players. Step 2 interpretation of the data, using the lens of metagovernance, governance of networks, and network governance, revealed the hierarchy shown in Figure 3. Its integration with bullets a) and b) above supported the development of the theory at the end of this article.

Three categories of governance were identified. First, the *metagovernance as context* identified the underlying conditions for networks to emerge. Second, the *governance of networks* identified the governance of the multiplicity of networks in which the assessed networks are embedded, and networks are formed and maintained. Third, *network governance* identified the governance of the joint execution of projects through a network.

Metagovernance as context for networks to be formed

Metagovernance is set by the owner or investor, such as a government. Depending on the metagovernance settings, different network topologies and related governance approaches are developed at the governance of networks layer. Metagovernance modes include:

- *Meta-exchange* for creating the purpose of a network, for example, influenced by the upcoming projects on the government's list of projects and its project portfolio management. Meta-exchange decisions include those for new markets, such as building a smart city, or extending existing markets, such as the railway network or the building of new schools.
- *Meta-organization* for deciding on the participating organizations. This includes decisions on the organizations to be involved. Examples include prioritizing local (national) organizations or setting up steering organizations, such as Special Purpose Vehicles (SPVs), to steer the project from a predominantly financial and legal perspective, thereby creating new organizations with new combinations of skills and resources.
- *Meta-heterarchy* for framing the power balance and structure of possible networks. The data showed differences by country sizes and cultures, such as a tendency for

hierarchical structures in large countries like Canada or the former Soviet countries like Lithuania, while democratic structures dominated in Iceland and the Scandinavian countries. To that end, the meta-heterarchy approach reflects the owner/investor attitude toward avoidance of governance failures either predominantly through 'the structural system' in terms of hierarchies or through individuals and their relations in terms of democratic approaches.

- *Meta-solidarity* for deciding on the particular mix-of organizations required to develop a shared understanding for joint service delivery in future projects. Examples include the emphasis on building and maintaining specific communities, such as by training organizations to use BIM or other new technologies independent of a specific project. Other examples include the CONCEPT program by the Norwegian government, which funds research on and knowledge dissemination of large project's governance by bringing together academics and practitioners within and across national borders
- *Balance of metagovernance modes* to minimize the risk for failure in the governance of a particular network, for example, emphasizing meta-solidarity to ensure that no relevant organization is left out in the update of new safety standards.

From the study's ontological perspective, metagovernance corresponds to the mechanisms in critical realism. These mechanisms give rise to events, which correspond to the formation of networks in this study.

Governance of networks

The organizations investigated maintain a portfolio of different networks to serve short-term and long-term goals. For example, Figure 1 shows a simplified picture of the different networks of a government's infrastructure agency, which executes several parallel projects, partly with the same networked organizations. At different points in time, this organization activates different networks. They may perform training and knowledge-sharing network activities between projects with the networked organizations. For example, training a subset of the networked organizations in new technologies or standards, such as for BIM or new safety standards, typically using a star-like structure with one trainer for all organizations simultaneously. At another point in time, for example, during tendering, information-sharing meetings are held with the networked organizations (potentially only a subset of those from

the knowledge-sharing network) to identify and select potential candidate organizations for a project. Here the initial star-like network structure develops into a meshed network, with some organizations joining forces, others bringing in new candidates, or bailing out. During that time, the network narrative develops for sensemaking, scope/requirements definitions, and the legitimacy for the network to exist. Finally, during project execution, the hybrid structure develops with large organizations as major players in a hierarchy on top and smaller companies as service providers networked at the hierarchy's end.

The formation of these networks is pursued by different means. In cases of public projects, an official formal call for tender is issued to ensure transparency and neutrality in the selection and composition of participating organizations. In private sector projects, an informal call for tender is often sent to a few selected firms as an invitation to submit their proposal.

Both emergent and orchestrated approaches for network formation were found. However, there are also hybrid approaches. The emergent formation is preferred for networks with a broader power distribution among the different players, leading to more democratic governance regimes. Hence a more powerful Type II governance through the networked organizations. The related formation process spans from the sheer chance of 'knowing someone who knows someone' to 'discussions about a project over a cup of coffee', or having worked together before. The main driver for joining an emergent network is the trust in the capability to master the upcoming project jointly with the partner organizations in the emerging network. Prior experiences in joint projects are major criteria for trust-building (Müller, Glückler, Aubry, and Shao 2013), but reputation and hearsay can also play a role.

Orchestrated networks are formed by the prime contractor through a deliberate process of evaluation and selection. These networks vary in their topology contingent on the number of organizations in the network and their particular position power. However, due to the powerful position of the prime contractor, these networks have a hierarchical component in accordance with Type I governance theory. For example, orchestrated networks with few players are typically led by a network administrative organization. Larger networks typically form a hierarchy at the top and have a network of different organizations at the lower end of the hierarchy. Some networks reported a two-stage governance process to foster fairness and efficiency in selection. The first step consists of assessing the candidate organization's qualifications for entering the pool of organizations for future projects. The second stage can lead to selection for a project, provided the member organization has not been selected for a particular period before and passed an annual performance evaluation successfully. Appendix

3 provides an excerpt from the analyses of emergent and orchestrated network formation in Step 1 and 2.

This reveals two types of networks: a) voluntary networks, where organizations want to participate, such as project execution (in order to reach their business objectives), and b) mandatory networks, where organizations have to participate in order to get the necessary certifications, which qualify them to participate in project networks. Mandatory networks include those for quality/safety standards, ISO certification, or technical skills of employees.

Table 3 distinguishes between mandatory and voluntary networks and their generic and project-specific nature. Depending on an organization's circumstances, the voluntary networks might be omitted, while the mandatory ones are required for qualification purposes (e.g., certificate for safety training).

	Generic	*Project specific*
Mandatory	Knowledge sharing (e.g., safety standards update)	Information sharing (e.g., during tendering)
Voluntarily	Knowledge sharing (e.g., BIM)	Project execution

Table 3: Mandatory and voluntary networks

Hence, with upcoming business opportunities, the need for network formation arises. In emerging networks, this typically leads to democratic collaboration between collaborating organizations. In orchestrated networks, this typically follows a selection process and leads to hierarchical or hybrid settings, depending on context factors like project size, complexity, variety of technologies, competencies, etc.

The process for the governance of networks

The analysis revealed a governance process, as depicted in Figure 2. It outlines, from left to right, how implementing the government's (or investor's) list of projects enables the metagovernance elements to become *mechanisms* in forming networks for projects. The

formation of each of these networks constitutes an *event* with some or all of the listed activities, leading to the particular *experiences* of the organizational players in the network.

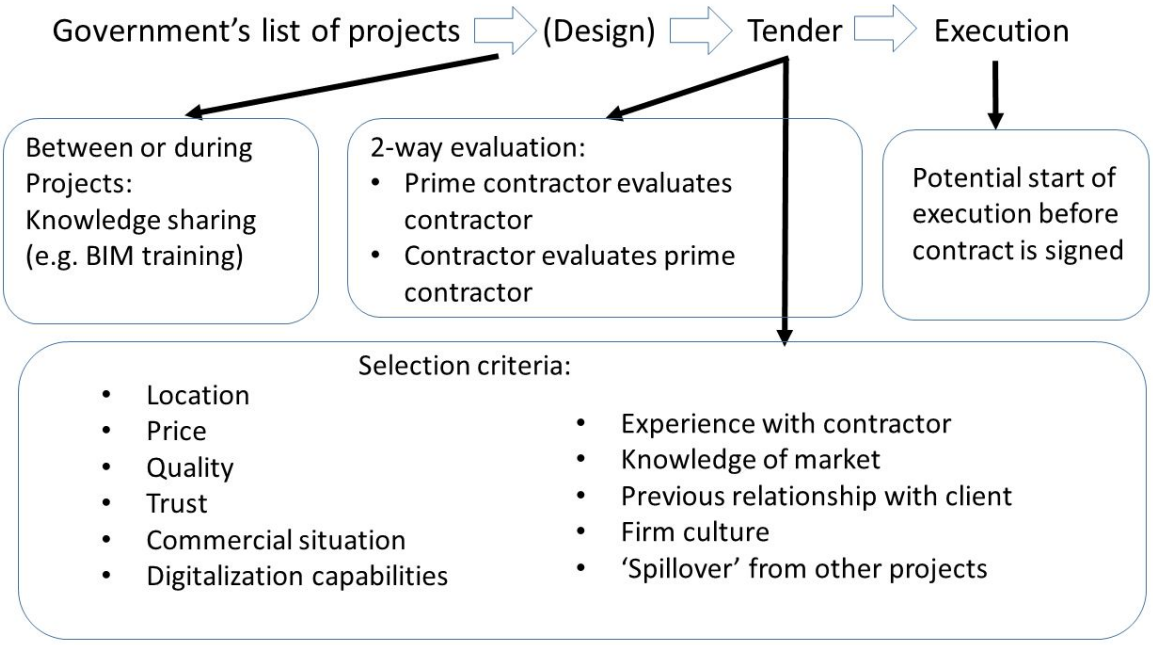

Figure 2: Example activities during the governance of networks

The emphasis on the individual steps in the process vary by metagovernance's use of predominantly emergent or orchestrated approaches to network formation. It starts with the government/investor's list of projects. Between these projects (and sometimes within a project), the major players like government builders address knowledge sharing and learning through network activities as described above. This is followed by either a design phase for the upcoming project or the issuance of a tender without prior design. Network activities during tendering include information-sharing meetings with possible contractors and a two-way evaluation of the parties. Here the prime contractor evaluates the possible contractors along several criteria, while also the possible contractors evaluate the prime contractor in order to decide for bidding or not. Prime contractors' evaluation criteria for contractors include location, price, quality, trust, commercial situation, digitalization capabilities, experience with the contractor, as well as its knowledge of the market, prior relationship with the client, firm culture, and noteworthy 'spill over' of different kinds from earlier projects (e.g. ethical behaviour). Especially prominent criteria for governing contractor selection are price, quality, and trust. While price is mentioned to play a role, it is offset by trust and

quality. Thus, higher prices of contractors are acceptable when justified by the expected quality.

The execution of a project through the network is again predominantly governed by trust. For example, the networking parties often commence work on their project prior to the contracts all being signed. Performance issues are handled in a similar vein, primarily in reference to the existing trust levels. The underperformance of network members is typically addressed by searching for ways to help the defaulting organization. In these cases, short-term and long-term measures emerge. Short-term measures include solving the problem through other network members but not punishing the failing member in an effort to ensure network performance. Long term, the reputation of the failing member is harmed, and they might not be considered for future projects. Applying contractual penalties is reserved as a measure of last resort, knowing it will not be supportive for the project and the relationship among the networked parties. Control, the complementary governance mechanism to trust (Müller 2017), is used only to the extent needed. It is typically executed simultaneously through peer-level observation and formal and informal reviews in meetings with the governing entities. This prevents less important issues from being escalated unnecessarily to higher levels of management, but ensures the identification of performance issues. The interviewees reported a general tendency of governance mechanisms developing over time from predominantly control-based to predominantly trust-based.

Network governance

The majority of networks assessed in this study had a hybrid topology consisting of a hierarchical top of the network and a more democratic network of independent organizations at the end of the hierarchy.

The hierarchical part is explained by MLG's Type I governance theory, which suggests having little to no overlap in responsibilities between Type I organizations in order to avoid responsibility and accountability clashes among governing parties, similar to what has been described by Bache, Bartle, and Flinders (2016) in the context of political science. The (dyadic) relationships among the hierarchically organized partners are explained by traditional governance theories, like agency theory (Jensen and Meckling 1976), stewardship theory (Davis, Schoorman, and Donaldson 1997), or transaction costs economics (Williamson 1985).

The governance of the networked organizations at the end of the hierarchy is of a more democratic nature and is explained through Type II governance, which allows the application of network governance theories, such as those by Provan and Kenis (2008). Thus, Type I governance lends itself to more formal governance approaches, while the formality of Type II is situation-dependent and spans from formal network governance to informal agreements between network actors/partners.

The link between Type I and Type II governance was described as taking place through clubs, agencies and/or boards. This was proposed earlier by Skelcher (2005) in political science and recently transferred by Šimkonis et al. (2021) into the realm of projects and is here supported through the interviews.

Examples for clubs included cases where representatives of independent networked organizations presented themselves as one company to foster trust and relationship building with the client. Other examples include the ad-hoc solving of technical issues, with network members joining voluntarily and immediately to avoid a project's delay. Relationships among the club members were characterized by mutual trust in capabilities and skills. Hence, clubs tend to occur in stewardship-types of governance contexts characterized by trustful relationships (Müller and Kvalnes 2017).

Examples of agencies include a railway construction project in Scandinavia, where ten working groups were formed as an interface between Type I and Type II governance. The prime contractor formed the groups (as agencies). Each of them was headed by a representative of the main beneficiary groups of the project while being staffed with employees from the networked contractors. The working groups reported to the prime contractor. This provided Type II level actions transparency to the Type I level governors and vice versa. The more formal relationship between Type I and II organizations balances both agency theory and stewardship theory approaches to governance, hence the more control-oriented with the more trust-oriented governance approaches (Müller and Kvalnes 2017).

Boards as interface units were found in projects that required formal handling of project internal and external governance-related issues. Examples include a construction project for a school in Scandinavia. Three boards were formed by the city government, aligned with the three advisory organizations for legal, technical, and financial matters, which reported to the city government. The boards put in place and enforced compliance with formal processes and policies for internal and external use, covering project stakeholders and the public. These

boards addressed Type I and Type II governance issues simultaneously. As such, they align closer with the project owner than the agencies or clubs and are often concerned with process compliance and overall correctness. This implies a more control-driven, agency like approach for boards (Müller and Kvalnes 2017). More details of the railway and the school project can be found in Šimkonis et al. (2021).

Figure 3 summarizes the findings by showing the link between the three governance layers and the enablers for their interaction.

Discussion

The study is the first to address three levels of governance in inter-organizational networks for joint project execution. The study identified the metagovernance modes at the disposal of project investors and the need to balance these modes in contextual dependency. Jessop's (2015) modes of metagovernance were supported by the findings. Differences in the balance of metagovernance modes are associated with different expressions of network formation and the related governance processes for project networks, such as indicated by Kapucu and Hu (2020). The project-specific networks with their particular composition of organizations were analysed using MLG to identify the means to govern the individual network. MLG integrated the otherwise separated streams of theories on hierarchical and network governance (Hooghe and Marks 2001) through the use of interface units of different levels of formality (Skelcher 2005). The findings theorize the governance arrangements needed for bridging the investor with the individual project by considering the neighbourhood networks required for professional, legal, and ethical project delivery. Thereby explaining governance setups that lead to decisions made at appropriate levels and in the best interest of the project (Turner 2020). For networks, the analysis revealed the means to achieve appropriate levels of flexibility, such as described by Denicol, Davies, and Pryke (2021), for example, by using clubs, agencies and boards.

Figure 3 depicts the theory derived from the study. In line with Whetten (1989) we describe the findings in the form of a model theory, structured by the what (the variables), the how (the interaction between the variables), the why (the reason behind the interactions), and the where/when/how (the contextual contingencies for the theory to hold).

The variables (the what) are the governance types, namely metagovernance (Jessop 2015), governance of networks (Kapucu and Hu, 2020), and network governance (Hooghe and

Marks 2001; Skelcher 2005). This is also their timely logical sequence. However, due to situational disturbances, they might recourse to earlier levels when needed or become nested into each other until all three governance types are in place.

The interaction between the three types of governance (the how) is by metagovernance setting the foundation and limitation for the governance of networks. It addresses four major dimensions through dedicated modes of metagovernance, which must be balanced in situational contingency. These modes are meta-exchange, meta-organization, meta-hierarchy, and meta-solidarity as suggested by Jessop (2015) and supported through this study's findings. The particular implementation of metagovernance modes defines the boundaries in terms of types of networks, types of networking, types of self-organization, and types of players respectively. This marks the interface between metagovernance and governance of networks.

Once triggered, governance of networks defines the governance requirements of the types of networks required, such as the topologies, accountabilities, and responsibilities of the different networks, their interfaces, collaboration, and coordination mechanisms across networks (Kapucu and Hu, 2020). Once these parameters are defined, network governance sets in by defining the ways each network internally collaborates, the governing mode (i.e., which Type II network governance to apply), the accountabilities and responsibilities of the individual network members, their communication and work policies as, for example, suggested by Provan and Kenis (2008).

The reasons behind these interactions (the why) lie in the impact of the higher-level actions on the lower-level scope of work (Jessop 2015). Each of the metagovernance modes affects particular aspects of the networks to be created. For example, meta-exchange defines the purpose of the networks and the need for them, meta-organization sets the limits and characteristics of organizations involved, meta-heterarchy sets the limits for centralized versus decentralized power distribution, and meta-solidarity sets the scope of collaboration in these networks. These modes provide the context for the governance of networks. For example, emphasis on emerging networks at the metagovernance level (using the meta-heterarchy mode) typically leads to more collaborative relationships at the governance of networks level, which in turn leads to less hierarchical structures at the network governance level.

Another example is the impact of the meta-exchange mode on the governance of networks. Decisions in this mode, such as relying on business partners to be fully trained, will affect the number and types of networks to be created at the governance of networks level. In this case, knowledge-sharing networks will be avoided. This reduces the number of networks at the governance of networks level and reduces the number of potential network members at the network governance level to only those organizations who have fully trained employees in the required subject areas (e.g. BIM).

The boundary conditions (the where/when/who) for the above theory to hold includes large-scale construction settings, often megaprojects, and the presence of relatively large networks, typically made up of more than 30 different organizations. Hence, the application of the theory is limited to major investments, such as those described by Drouin, Sankaran, van Marrewijk, and Müller (2021), as being of national, regional, or even global significance. Further limitations might be set by the investor's policies, such as those for public procurement, which prescribe processes and selection criteria, or the prioritization of projects in the investor's project portfolio management. Both affect governance of networks, thus becoming an enabler or disabler at the interface from metagovernance to the governance of networks. As mentioned earlier, organizations join networks because they trust the network can finish a project successfully. Hence, mutual trust becomes an enabler or disabler for organizations to join, just as the joining organizations' qualifications, such as digitalization competence, safety, quality certifications etc. These criteria influence the interface between the governance of networks and network governance.

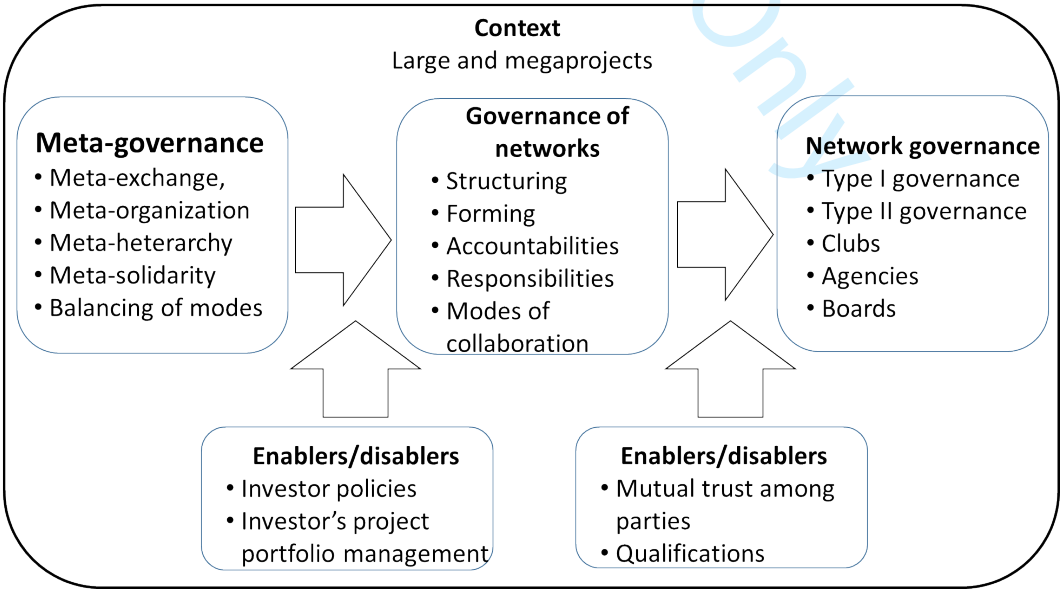

Figure 3: Framework model for multi-level governance of inter-organizational projects

Conclusion

This study investigated the governance of inter-organizational networks for repetitive project execution. Twenty-eight networks were assessed using 124 interviews in ten countries. The data were analysed using a reflexive abductive method. The results identified three governance layers, starting with metagovernance as the context within which the governance of networks takes place, which then provides the context for individual networks and their governance.

The study's contribution to knowledge is in developing the first draft of an overarching theory for the governance of inter-organizational networks for projects. As such, it extends the existing state of knowledge by integrating several governance layers into one theoretical perspective.

We can now answer the research question, which asked how these networks are governed. We identified three distinct but interrelated layers of governance. At the top is metagovernance as the context, such as a country's government. Through their decisions and policies, they provide metagovernance by legitimizing particular markets (meta-exchange), legitimizing the types of organizations (meta-organization), the level of freedom in network formation (meta-heterarchy), and the fostering of interactions among organizations (meta-solidarity). The investors (such as governments) execute their metagovernance by adjusting reflectively the emphasis on the individual modes to the objectives they pursue.

Metagovernance provides the context for Governance of Networks, where a variety of networks is created for different purposes, which together support better project goal accomplishment. These networks include knowledge-sharing networks, which are active between projects, and information-sharing networks, which are active during tendering for a specific project or execution networks for constructing a particular project outcome (see Figure 1). Governance of Networks decides on the formation, structures, accountabilities, responsibilities, and modes of collaboration among these networks. For example, the emergent, orchestrated, or hybrid network formation approach is contingent on the metagovernance dimension meta-heterarchy, which regulates the strictness in process and policy compliance. More restricted meta-heterarchy typically leads to more formally defined formation processes for networks, such as in orchestrated networks, which often develop into more hierarchical structures in their network governance. Contrarily, meta-heterarchy that

allows for freedom and spontaneity in network formation typically leads to emerging networks, which then apply more democratic network governance structures.

The theoretical implications of the newly developed theory include a first model that links governance layers from contexts like country levels to the governance of individual projects. It shows the variety of networks to be launched and coordinated to keep the network's ecosystem in terms of participating organizations and their skills to deliver joint projects successfully. The theory describes the link between governance layers and the integration of metagovernance and its modes with the governance of networks and its ways of forming networks to network governance, such as described in MLG. Using metagovernance theory from the political science in the realm of projects extended network theory for projects into a broader and more cohesive hierarchy of metagovernance, governance of networks, and network governance, together with the respective governance dimensions and their interfaces across layers. Governance dimensions for each of the governance modes were identified, and their relationship theorized, hence providing a new theory for the governance of inter-organizational networks for projects.

The dimensions of meta-exchange, meta-organization, meta-heterarchy, meta-solidarity, were shown to provide a suitable theoretical framework for metagovernance. Structuring and forming the network of networks, the related accountabilities, responsibilities, and modes of collaboration between the networks, and the different ways of network formation were explained in the governance of networks layer. Finally, MLG theory provided a framework for explaining network governance. Here, the distinction between Type I and Type II governance allows applying existing hierarchic/dyadic governance theories to the hierarchical part of a network and network theories to the networked part of the network structure. Both are linked through organizational units of different formality, ranging from ad-hoc ‘clubs’ to solve sudden issues in an informal way, or joint ‘agencies’ which are staffed by representatives from the project management group and the tier-level partners, or formal ‘boards’ set up by the investor to ensure correctness and formality in the process of managing and governing a project. The type of interface organization used is partly contingent on the agency versus stewardship setting, but also on other context parameters, such as public visibility. The parallel setup of several of these interface units is also possible. To that end, the study has transferred MLG from political science into the realm of projects and networks and demonstrated its suitability as a theoretical framework to explain how networks are governed for project delivery.

Managerial implications include managers' awareness of the range of options, such as different types of networks, their formation, their potential risks for governance failure, and the associated ways to optimize their organization's setting for better project delivery. This includes activities to optimize network outcomes by influencing the context dimensions, such as working actively on establishing powerful Type II organizations with more democratic structures by using emerging formation approaches to foster flexibility and resilience in the project. Other implications involve the deliberate choice of clubs, agencies, and boards to span gaps in governance's reach-out to individual actors, depending on the required formality given by the nature of the project and the issues at hand. A first influence was seen during the interviews when we asked organizations for network activities outside of projects, such as training on BIM. Some organizations had not considered this before and found it an appropriate way to improve the overall professionalism of their network, thus, they will try to implement it.

As in all studies, the present investigation has strengths and weaknesses. Among the former are the well-established theoretical frameworks of metagovernance and MLG, which are tested, albeit in other sectors, for many years and showed to be well applicable in project settings. Other strengths include the relatively large empirical sample and its focus on large projects only. Weaknesses are in the relative abstract level of the findings, which was necessary to build a higher-level theory that includes several governance levels and theoretical perspectives. Therefore, future research should address the next level of detail, such as the particularities of the link between the different governance layers and their governmentality. For example, by using or extending governmentality theories such as those by Dean (2010) and Müller, Drouin, and Sankaran (2019), who used concepts of visibility, techne, episteme, identification, and precept to explain the interface of different governance layers in organizational project management. Case studies will be required to strengthen and refine the above theory and investigate details, such as the weight and preference of selection criteria for network members and their contextual contingency. Finally, quantitative studies will be required to validate the above findings and generate more generalizable results and theories.

The applied methodology supported the broad theoretical horizon required to address the abstract concepts addressed in the study. As Alvesson and Kärreman (2007) indicated, diversity among the researchers in terms of career stages, fields of project-related studies, theoretical backgrounds, and experience in working on projects are a particular strength of

the method but also a challenge for the team members. The research team developed a shared understanding and acceptance of the findings by integrating perspectives in discussing rival explanations and changing theoretical lenses and paradigms.

This study's results provide a theory for the governance of networks for large and megaprojects. Knowledge of this will be essential for firms, industries, nations, and globally for mankind, to prosper in the face of enormous challenges like net-zero carbon, climate change, digital revolution etc., which must be solved through projects made up of networks of partners.

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Conflict of interest

There is no potential conflict of interest with respect to the research, authorship, and/or publication of this article

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Appendix 1: Case demographics

Case number	*Country*	Industry	*Network size*	*Participating organizations' role in network*	*Network geographical span*	*Network type*
1	Australia	IT	Medium	Client and contractors	National	Emerging
2	Australia	Construction	Medium	Contractors and consultants	International	Orchestrated
3	Australia	Construction	Medium	Prime contractor and sub-contractors	National	Emerging
4	Canada	Energy	Small	Owner, prime-contractor	National	Orchestrated
5	Canada	Energy	Small	Owner, prime-contractor, subcontractor	National	Orchestrated
6	Canada	Energy (oil)	Large	Prime-contractor, Subcontractor	National	Emerging
7	China	Construction	Large	Prime-contractor	National	Hybrid
8	China	Construction	Large	Prime-contractor	National	Hybrid
9	China	Construction	Large	Prime-contractor	National	Orchestrated
10	China	Coking	Medium	Prime-contractor	National	Orchestrated

11	China	Construction	Large	Prime-contractor	National	Hybrid
12	China	Manufacturing	Medium	Prime-contractor	National	Orchestrated
13	Germany	Construction	Large	Prime contractor	National	Orchestrated
14	Finland	Construction	Large	Prime contractor, advisor, subcontractor	National	Orchestrated
15	Iceland	Construction	Small	Network managers, advisors	National	Orchestrated
16	Iceland	Construction	Small	Prime contractor, advisor	National	Orchestrated
17	Iceland	Construction	Medium	Network managers, advisors	National	Orchestrated
18	Iceland	Construction	Large	Project owner, prime contractor, advisors	National	Orchestrated
19	Iran	Construction	Medium	Prime contractor, tier 2 contractor	National	Orchestrated
20	Lithuania	Construction	Medium	Prime contractor + tier 2 contractors	National	Orchestrated
21	Lithuania	Construction	Medium	Prime contractor + tier 2 contractors	National	Orchestrated
22	Lithuania	Construction	Large	Prime contractor + tier 2 contractors	National	Orchestrated

23	Lithuania	Construction	Large	Prime contractor + tier 2 contractors	National	Orchestrated
24	Norway	Construction	Medium	Prime contractor	National	Orchestrated
25	Norway	Construction	Medium	Tier 2 contractor	National	Emerging
26	Norway	Construction	Medium	Tier 2 contractor	International	Emerging
27	Norway	Construction	Small	Tier 2 contractor	International	Emerging
28	UK	Infrastructure	Small	Consultant	International	Emerging

Appendix 2: Interview questions

General questions: Tell us about….

1. The nature of your company, its business and your role therein
2. The inter-organizational projects, where partner organizations repetitively worked together. The role of you, your organization, and the governance of the network and project. Why this particular set of companies came together in this project?
3. This network: how many organizations, how often worked together before, nature of mutual dependency, the way risks are governed

Network design questions: Describe…

4. The design of the organizational network of your project. Who are the players, what is their power base, who are the most powerful players, what is their level of engagement? What is their motivation to participate in the network?
5. How these players interact with each other, how often and why?
6. Changes in design over time. What triggered such changes?

Governance questions:

7. How is this network governed? Examples of the ways the collaboration is setup, steered and maintained. Why and how were collaborating parties chosen? Which documents, policies, procedures, routines and norms or other means govern the network? How and by whom are goals agreed upon? How and by whom are resources distributed within the network? How and by whom is progress controlled?
8. Example for a situation that required governance intervention. How did network governance address the issue? What was the result of the intervention?
9. Which decisions are made within the organizations and which ones outside?

10. Who decides on these criteria? How is compliance controlled and enforced?
11. Were there cases of underperforming or otherwise "black sheep" organizations in the network in the past? How were they identified, issues made transparent, and what were the consequences. How are information about the performance of network members shared
12. Are there particular theories or philosophies that govern your network?
13. What is the role of trust and control in governance? Which of the two dominates? What circumstances cause a change in the current level of trust or control?
14. How did the network governance described above, change over time?
15. What are the pros and cons of the governance of this network?

Network performance questions:

16. Looking back at your last networked project, how successful was that in terms of time/cost/scope accomplishments, stakeholder satisfaction, reoccurring business

Appendix 3: Example of analysis of network formation

Step 1: Within country team (local)

Case	Interview	Interview (example)	Pattern	Theoretical framework (example)	Researcher experience (example)	Result (Step 1)
14	Owner	"Issuance of tendering documents is a strictly controlled process" for selection of partners.	Orchestrated formation dominates	Hellgren & Stjernberg (1995): Networks are strictly controlled at the management level, but difficult to control at their boundaries, as subcontractors contract out some of the work	Supported by several researchers' experiences in early stages of government or large private investment projects	Network formation is orchestrated in public or large private projects at the design and early implementation stages
	Partner	"Someone knows someone" to help in the project	Emergent formation dominates		Supported by several researchers' experience in the private sector	Network formation is emergent at the boundaries, and/or during implementation.

Step 2: Cross-country teams (global)

Country teams (examples)	Pattern	Theoretical framework	Researcher experience	Result
Scandinavia	Network formation depends on stage of project. Emergent formation increases over the years	House et al. (2001): Organizational practices are affected by cultural values. Quah & Jones (2018): Country-size and culture impact organizational practices and bureaucracies	Researchers' experiences supported all results, albeit in different and sometimes contrary circumstances, e.g. Lithuania versus Scandinavia	The preferred type of network formation (emergent or orchestrated) is determined at the metagovernance's layer through the meta-organization dimension. This dimension is influenced by established practices, government/investor policies, national cultures, and size of the project.
Lithuania	Orchestrating formation increases in recent years			
Canada	Orchestrated formation dominates			
Iceland	Emergent formation dominates			
China	Strictly orchestrated through advanced processes for identifying, using and controlling suppliers.			

A (meta)-governance framework for multi-level governance of inter-organizational project networks

Response to reviewers (r2)

We thank the reviewers for their insightful feedback. We have addressed all comments and outline in the following our response to them.

Editor:

I am delighted to inform you that your paper has now been accepted by Production Planning & Control.

Reviewer 1:

Congratulations to the authors! This is now a much better paper and I am happy to recommend it for publication.

Just a few minor comments which it should take about 5 minutes to deal with...

Reviewer's comment	Response to reviewer	Changes can be found on page…of the original Word document
The abstract is still slightly odd. It reads as though it is announcing a three layer framework and yet only referring explicitly to the top and bottom layer. I suggest you change 'steered by a layer' to 'steered by a middle layer'.	Done, following th ereviwer's suggestions	2
p.4 change 'help identifying patterns' to 'help identify patterns'. Then 'Hence provide suggestions' is ungrammatical.	a) changed, following the reviwer's suggestions. b) changed to: "This provides suggestions.."	3
p.18 "Focus was large and...."... this is another ungrammatical sentence.	Changed to: The focus was on large and…."	17
p.23 the yellow highlighted text is written awkwardly.... you mean, mechanisms as corresponding to generative mechanisms in the ontolological layer of the real?	Changed to: "From the study's ontological perspective, metagovernance corresponds to the mechanisms in critical realism. These mechanisms give rise to events, which correspond to the formation of networks in this study."	22

Reviewer 2:

Thank you for the revised version of the paper. I think you have addressed all my suggestions very well. The paper makes a very timely and valuable contribution to the literature on the governance of inter-organizational project networks and I am happy to recommend its publication. Congratulations on a very thought-provoking paper!

Charac-teristic	*Meta-governance*	*Governance of networks*	*Network governance*
Aim	Govern governed entities to avoid governance failures	Governing the network of networks	Govern a specific network and its management
Modes	Meta-exchange, meta-organization, meta-heterarchy, meta-solidarity, the balance of modes	Structuring and forming the network of networks, its accountabilities, responsibilities, and modes of collaboration.	Type I and Type II governance, plus clubs, agencies, and boards as interface units
Example tasks	Develop policies for public procurement	Governance of the multitude of networks, depending on the needs of each individual network to remain self-governing	Decision on interface organizations for Type I and II governance

Role	*Geography*	*Number of interviews*
CEO, Owner	CA, CH, DE, FIN, IR, IS, LT, NO, UK	21
Manager	CA, CH, FIN, IR, IS, LT, NO, UK	34
Project manager	AU, CA, CH, DE, FIN, IR, IS, LT, NO, UK	41
Assistant project manager	CA	2
Lawyer	FIN	1
Consultant	AU, IR	6
Procurement	AU, CH, FIN,	4
Engineer	AU, CH, IR	5
Construction manager	CH	3
Program manager	AU	3
Superintendent	CA	2
Client	AU	2
Total		124

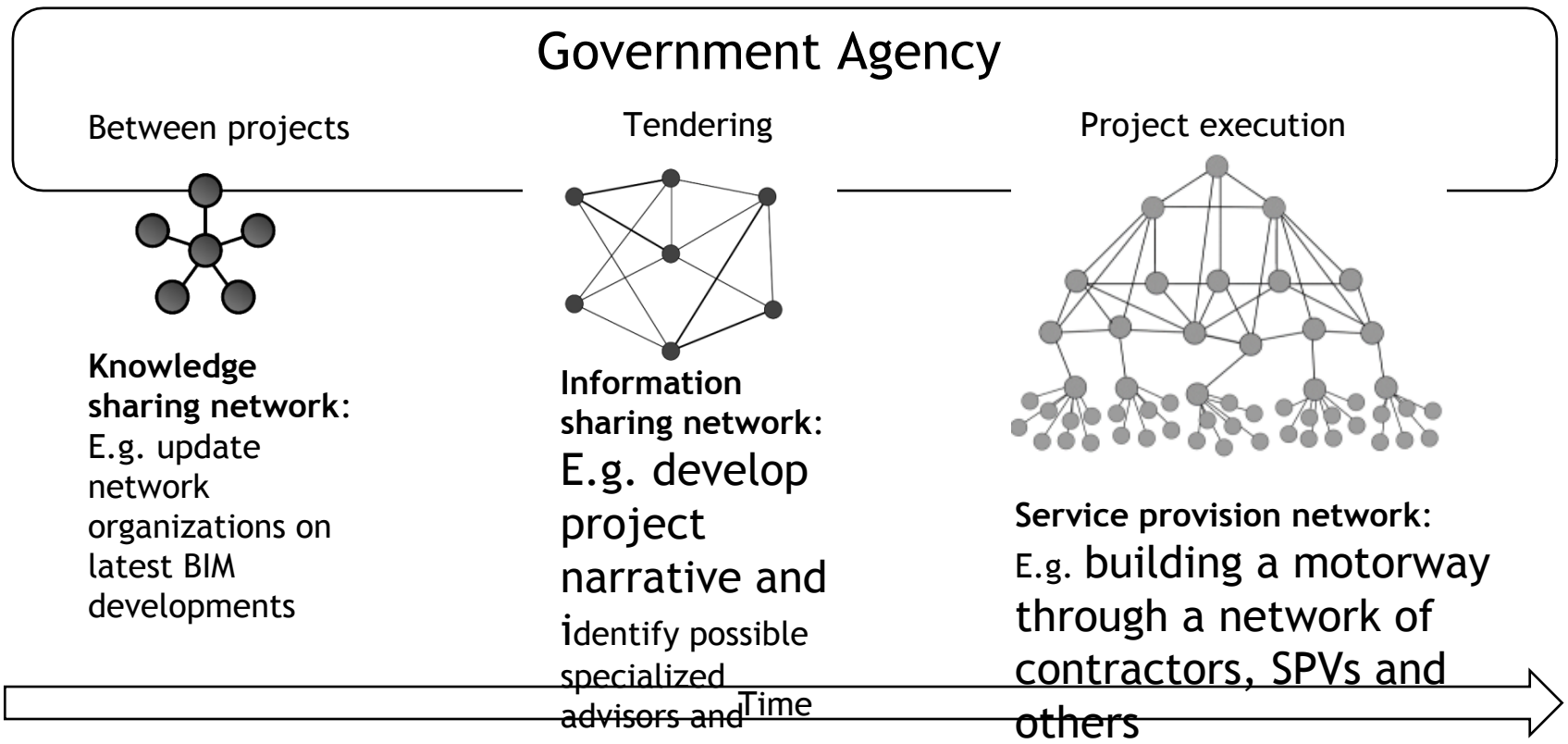
	Generic	*Project specific*
Mandatory	Knowledge sharing (e.g. safety standards update)	Information sharing (e.g. during tendering)
Voluntarily	Knowledge sharing (e.g. BIM)	Project execution

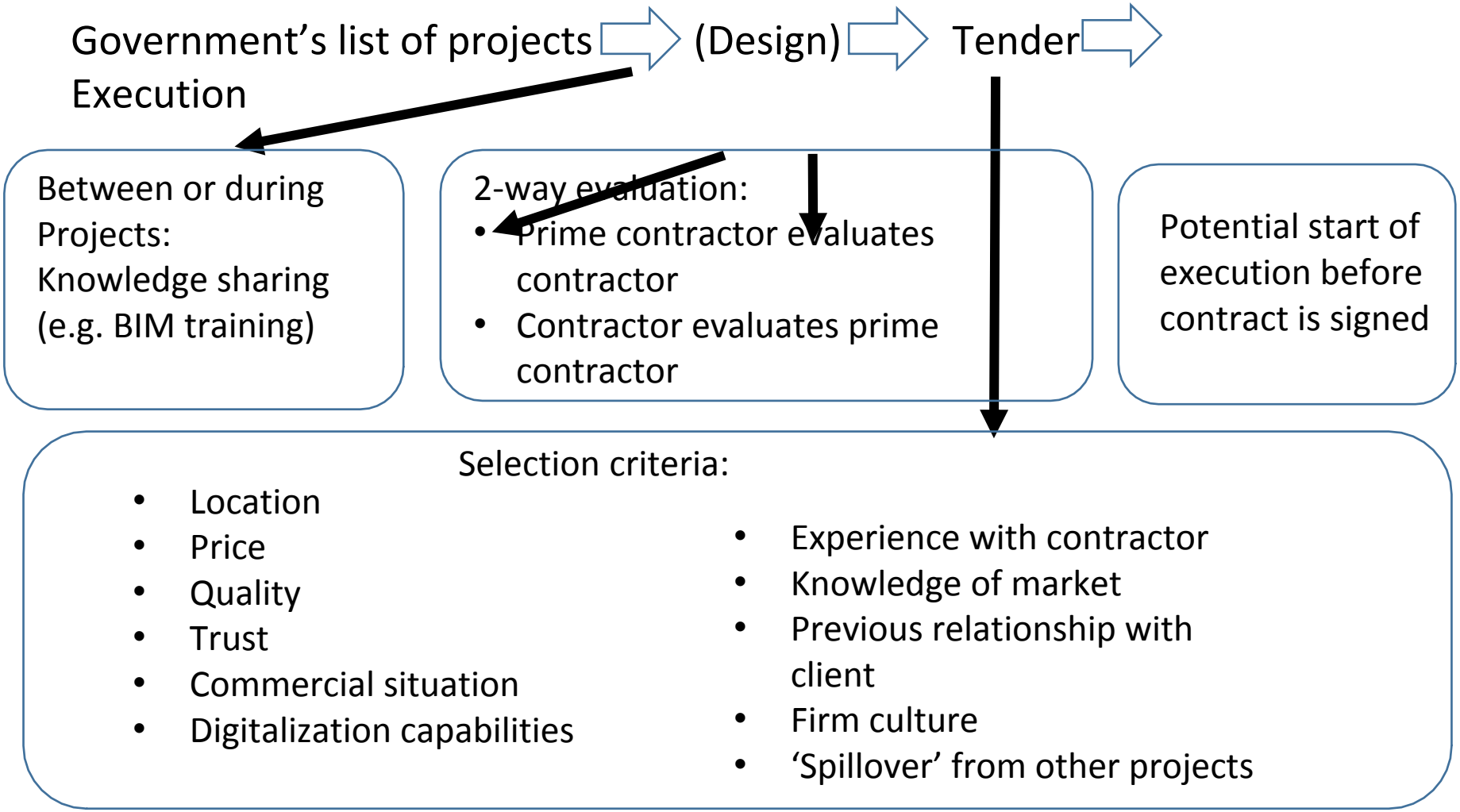
Case number	*Country*	Industry	*Network size*	*Participating organizations' role in network*	*Network geographical span*	*Network type*
1	Australia	IT	Medium	Client and contractors	National	Emerging
2	Australia	Construction	Medium	Contractors and consultants	International	Orchestrated
3	Australia	Construction	Medium	Prime contractor and sub-contractors	National	Emerging
4	Canada	Energy	Small	Owner, prime-contractor	National	Orchestrated
5	Canada	Energy	Small	Owner, prime-contractor, subcontractor	National	Orchestrated
6	Canada	Energy (oil)	Large	Prime-contractor, Subcontractor	National	Emerging
7	China	Construction	Large	Prime-contractor	National	Hybrid
8	China	Construction	Large	Prime-contractor	National	Hybrid
9	China	Construction	Large	Prime-contractor	National	Orchestrated
10	China	Coking	Medium	Prime-contractor	National	Orchestrated
11	China	Construction	Large	Prime-contractor	National	Hybrid
12	China	Manufacturing	Medium	Prime-contractor	National	Orchestrated
13	Germany	Construction	Large	Prime contractor	National	Orchestrated
14	Finland	Construction	Large	Prime contractor, advisor, subcontractor	National	Orchestrated
15	Iceland	Construction	Small	Network managers, advisors	National	Orchestrated

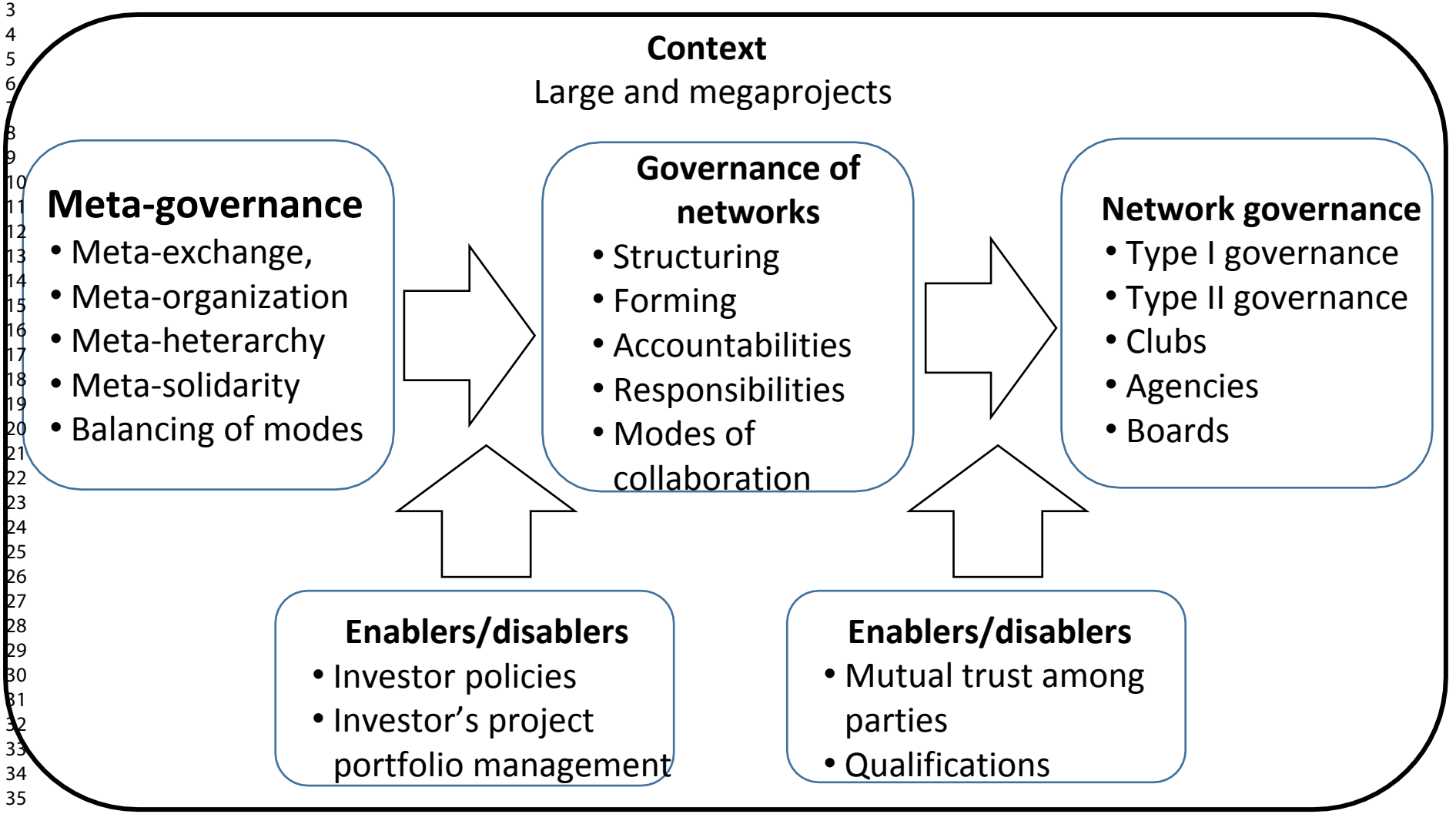
16	Iceland	Construction	Small	Prime contractor, advisor	National	Orchestrated
17	Iceland	Construction	Medium	Network managers, advisors	National	Orchestrated
18	Iceland	Construction	Large	Project owner, prime contractor, advisors	National	Orchestrated
19	Iran	Construction	Medium	Prime contractor, tier 2 contractor	National	Orchestrated
20	Lithuania	Construction	Medium	Prime contractor + tier 2 contractors	National	Orchestrated
21	Lithuania	Construction	Medium	Prime contractor + tier 2 contractors	National	Orchestrated
22	Lithuania	Construction	Large	Prime contractor + tier 2 contractors	National	Orchestrated
23	Lithuania	Construction	Large	Prime contractor + tier 2 contractors	National	Orchestrated
24	Norway	Construction	Medium	Prime contractor	National	Orchestrated
25	Norway	Construction	Medium	Tier 2 contractor	National	Emerging
26	Norway	Construction	Medium	Tier 2 contractor	International	Emerging
27	Norway	Construction	Small	Tier 2 contractor	International	Emerging
28	UK	Infrastructure	Small	Consultant	International	Emerging

Case	Interview	Interview (example)	Pattern	Theoretical framework (example)	Researcher experience (example)	Result (Step 1)
14	Owner	"Issuance of tendering documents is a strictly controlled process" for selection of partners.	Orchestrated formation dominates	Hellgren & Stjernberg (1995): Networks are strictly controlled at the management level, but difficult to control at their boundaries, as subcontractors contract out some of the work	Supported by several researchers' experiences in early stages of government or large private investment projects	Network formation is orchestrated in public or large private projects at the design and early implementation stages
	Partner	"Someone knows someone" to help in the project	Emergent formation dominates		Supported by several researchers' experience in the private sector	Network formation is emergent at the boundaries, and/or during implementation.

Country teams (examples)	Pattern	Theoretical framework	Researcher experience	Result
Scandinavia	Network formation depends on stage of project. Emergent formation increases over the years	House et al. (2001): Organizational practices are affected by cultural values. Quah & Jones (2018): Country-size and culture impact organizational practices and bureaucracies	Researchers' experiences supported all results, albeit in different and sometimes contrary circumstances, e.g. Lithuania versus Scandinavia	The preferred type of network formation (emergent or orchestrated) is determined at the metagovernance's layer through the meta-organization dimension. This dimension is influenced by established practices, government/investor policies, national cultures, and size of the project.
Lithuania	Orchestrating formation increases in recent years			
Canada	Orchestrated formation dominates			
Iceland	Emergent formation dominates			
China	Strictly orchestrated through advanced processes for identifying, using and controlling suppliers.			


Government Agency
Between projects
Tendering
Project execution
Knowledge sharing network: E.g. update network organizations on latest BIM developments
Information sharing network: E.g. develop project narrative and identify possible specialized advisors and entrepreneurs
Service provision network: E.g. building a motorway through a network of contractors, SPVs and others
Time


Government's list of projects
(Design)
Tender
Execution
Between or during Projects:
Knowledge sharing (e.g. BIM training)
2-way evaluation:
• Prime contractor evaluates contractor
• Contractor evaluates prime contractor
Potential start of execution before contract is signed
Selection criteria:
• Location
• Price
• Quality
• Trust
• Commercial situation
• Digitalization capabilities
• Experience with contractor
• Knowledge of market
• Previous relationship with client
• Firm culture
• 'Spillover' from other projects


Context
Large and megaprojects
Meta-governance
• Meta-exchange,
• Meta-organization
• Meta-heterarchy
• Meta-solidarity
• Balancing of modes
Governance of networks
• Structuring
• Forming
• Accountabilities
• Responsibilities
• Modes of collaboration
Network governance
• Type I governance
• Type II governance
• Clubs
• Agencies
• Boards
Enablers/disablers
• Investor policies
• Investor's project portfolio management
Enablers/disablers
• Mutual trust among parties
• Qualifications