
# A Practice-Based View of Interorganisational Collaboration: Operationalising Integrative Mechanisms in Ego-Networks

by

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# Abstract

Interorganisational Collaboration plays a central role in the production of infrastructure megaprojects. To date, few empirical studies examined how collaborative mechanisms are operationalised in the context of networks delivering complex projects. The objective of this thesis is to explore the operationalisation of integrative mechanisms through the deployment of practices in an ego-network delivering an infrastructure megaproject. An exploratory case study was conducted within the infrastructure industry using a multi-organisational perspective. A retroductive research approach, underlined by Critical realism was adopted. As part of this approach, 41 interviews were conducted, in addition to observations and document analysis. The findings show that collaboration within the ego-network took multiple forms, in accordance with the aims of each relationship. To this end, the findings demonstrate that the collaborative varied in terms of its deployed mechanisms and underlying practices. By going beyond the prevailing prescriptive accounts of the literature, this thesis provides a more nuanced view of how collaboration is operationalised in networks. In particular, it shows that the number, variety and nature of integrative mechanisms, and their underlying practices differed across the different relationships. It is the first known study to adopt a practice-based view of collaboration. Equally important, it provides a framework that captures how organisations learn to collaborate over time by conceptualising the interplay between the recursive, adaptive and emergent nature of collaborative practices. This research is thus one of the first known studies to uncover some of the complexities surrounding the way in which interorganisational collaboration are enacted in a complex project.



Keywords: interorganisational collaboration, integrative mechanisms, integrative practices, networks.

Declaration:

This thesis is Jonathan Canioni's (the author) own work. The entirety of this thesis is an original work developed by the author. Aspects of this work was presented in conference papers at Euroma 2020 and Euroma 2021. No part of this publication may be reproduced without the written permission of the author and copyright owner. This thesis was written for the solely for the PhD in Business and Management Programme at Warwick Business School, The University of Warwick, and was thus not submitted for a degree in any other university.

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From the onset of my PhD journey, I have always been aware of the importance of serendipity and perseverance, particularly in times of difficulties. Having little experience with conducting research, the first few months of my doctoral studies were characterised by all the stereotypical hurdles young researchers face. Yet, even in the most challenging times, I held to the belief and optimism that solutions would appear, should I look for them. "*A pessimist sees the difficulty in every opportunity; an optimist sees the opportunity in every difficulty*". These words, attributed to Sir Winston Churchill, characterised my doctoral journey and reflect the attitude I tried to maintain throughout this endeavour, despite the access challenges and effects of the COVID pandemic on my data collection. While many doctoral candidates found their experience to be a lonely one, I was grateful to have met and surrounded myself with invaluably helpful people who opened up both personal and professional opportunities. Serendipitous relationships played a determining role in the completion of my doctoral thesis. The support and advice of these people had a great impact on my professional and personal development. I would thus like to formally acknowledge these individuals.

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# 1 Introduction

Programmes and projects are the key organisational forms utilized when delivering major infrastructural and transformational improvement. Contemporary examples of these include The Queen Elizabeth Olympic Park, Heathrow Terminal 5, The Elizabeth Line and High-Speed Rail 2 (HS2). "*One of the biggest risks to large-scale infrastructure projects is conflict emerging between consortium partners who have not co-operated before*" (Plimmer 2016). Consequently, the Government's new public procurement strategy shifted from a cost-based to a more collaborative tendering process, to mitigate their relational risks (Construction Playbook, 2020). In general, the delivery of a complex project will be conducted by a multitude of organizations that work jointly (Davies and Brady 2000) and form collaborative interorganisational relationships to successfully deliver the project. While the concept of collaboration received significant attention in several fields of social sciences, such as Strategy (Gulati 1998), Management (Bensaou and Venkatraman 1995) and Operations Management (Cheng 2011, Chakkol, al. 2018), it is more often than not used as a generic term or a buzzword for describing the partnering phenomenon between alliance and/or joint venture partners.

While "*Inter-organizational forms of cooperation are characteristic of today's business world*" (Bachmann and Van Witteloostuijn 2009: 3), most of the literature explored the pre-formation and formation stages of partnerships (Albers *et al.,* 2016) by exploring how interorganisational dyads (see for e.g., Clegg *et al.,* 2002, Albers *et al.,* 2016, Chakkol *et al.,* 2018, Kapsali *et al.,* 2018) are governed (Chakkol *et al.,* 2018), rather than examining the operationalisation of collaboration per se. However, "*there is still much to be gained by understanding the complexity of what actually happens in a partnering relationship*" (Bresnen, 2007, 367). This thesis examines how collaboration is operationalised in the context of an ego-network delivering a complex infrastructure project, by empirically investigating how integrative mechanisms are deployed through a set of practices to achieve collaborative aims.

This chapter gives a brief overview of the remainder of the thesis by addressing the research problem and its rationale. It will then provide the aim and objective of the

work and the research question. Following this, an overview of the thesis will be outlined by illustrating the key points that emerged in this work.

## 1.1 The research problem

The construction and infrastructure industry are notorious for delivering complex projects above their target costs and behind schedule. Numerous policy documents, such as the Latham (1994), the Egan (1998) reports and the National Audit Office (2011) identified the fragmented and adversarial relationships between organisations as a key source of ineffectiveness and underperformance in large-scale infrastructure projects. Consequently, these reports recommended the government to shift from cost-based and competitive tender processes to long-term relationships supported by integrated project processes. More simply put, these reports advocated a shift from adversarial and fragmented relationships to partnering. Thus, the U.K. Government altered its public procurement strategy to more collaborative ways of working with contractors and their supply chain (Government Construction Strategy, 2016). Collaboration has now become the official procurement strategy for delivering Government sponsored construction programmes (Construction Playbook, 2020). This shift in the Government's strategy was reflected in the publishing of the NEC4 contracts by the UK Institution of Civil Engineers which introduced standardised Alliance Contracts to support integrated delivery teams for large-scale construction and infrastructure projects with the introduction of less adversarial pricing options, such as cost-reimbursable contracts (NEC4, 2017).

In parallel with the growing interest in collaboration from practice, the literature examining interorganisational relationships shifted from the economic and strategic motivations to form alliances consolidating their strategic positioning (see for e.g., Fusfield, 1958; Mead, 1967; Boyle, 1968; Pate, 1969; Berg & Friedman, 1980) towards the examination of the collaboration itself. Seminal literature defined collaboration as a phenomenon that explains the relationship between collaboration amongst partners and the institutional processes and structures they adopt (Astley & Fombrun, 1983; DiMaggio & Powell, 1983; Astley, 1984; Oliver, 1990). These largely explored formalised interorganisational relationships, such as joint ventures and

alliances. In an attempt to clarify what collaboration entails, early works investigated the governance of interorganisational collaboration to explain the economic rationales behind their formation and the role of contractual governance to incentivise collaboration (Levine & White, 1961; Litwak & Hoylton, 1962; Evan, 1966; Litwak & Rothman, 1970; Benson, 1975; Pfeffer & Nowak, 1976; Hall *et al.,* 1977, Herbert 1984). The adoption of economics-driven viewpoints such as the Resource-Based View and Transaction Cost Economics have shaped the interorganisational collaboration literature by providing theoretical foundations to explain the strategy and operations of alliances (Schepker *et al.,* 2014), their resource allocation mechanisms (Lambe *et al.,* 2002), the value creation potential (Ysuda, 2005) and their mechanisms for safeguarding and control (Spekman *et al.,* 1996).

Concurrently, alternative viewpoints, rooted in sociology emerged to theorise the formation process of partnerships through a relational approach (Suárez *et al.,* 2003). For example, scholars in strategy examined how organisations design alliances and joint ventures by referring to their social networks. These studies explored the role of information sharing (Gulati 1995, Ebers & Maurer 2016) and relational norms, such as trust (Gulati 1995, Maurer 2010, MacDuffie 2011) for sustaining collaboration. In addition, the social viewpoint examines the influence of organizational and individual behaviours on the characteristics of the collaborations. For example, Granovetter (1973) characterized interorganisational relationships as weak or strong. Strong IORs sustain over prolonged periods and exhibit high degrees of emotional intensity, trust, commitment and reciprocity between the stakeholders. Such relationships are thus contingent on relational or social dimensions.

Collaboration is thus a multidimensional concept, where "*the interaction of social and technical factors creates the conditions for successful (or unsuccessful) system performance*" (Walker, Stanton *et al.,* 2008). The interplay between the structural and relational dimensions of collaboration is a central discussion point within the governance literature. Recent research examined the effect and interactions of formal (contractual) and informal (relational) mechanisms for governing collaborations (see for e.g., Poppo & Zenger, 2002; Cao and Lumineau 2015, Wacker, Yang *et al.,* 2016, Chakkol, Selviaridis *et al.,* 2018) and for procuring complex performance (Caldwell

*et al.,* 2009). This interplay provided theoretical foundations for new definitions of collaboration.

The literature has largely explored the pre-formation and formation stages of partnering (Gulati *et al.,* 2013), largely within formalized dyadic relationships (Hong *et al.,* 2009). Our understanding of how collaboration is operationalised still remains a "black box" (Tompson & Perry, 2006; Fawcett *et al.,* 2012; Nikulina *et al.,* 2022), particularly in complex projects. While such projects are characterised by a multitude of interdependent vertical and horizontal relationships, research has largely examined dyads rather than networks (Hong *et al.,* 2009). Furthermore, research has mostly prescribed the mechanisms that support the partnering process during the pre-formation and formation stages (see for e.g., Clegg *et al.,* 2002, Albers *et al.,* 2016, Chakkol *et al.,* 2018, Kapsali *et al.,* 2018). Consequently, few studies examined how collaboration is operationalised and sustained. While some examined the production stage of complex projects (see for e.g., Tee *et al.,* 2019), these largely examine the surface level, that is the mechanisms of collaboration, rather than exploring how, why and to what effect these mechanisms are deployed within networks. However, "*there is still much to be gained by understanding the complexity of what actually happens in a partnering relationship (as opposed to prescribing what should happen)* " (Bresnen, 2007, 367). Given the scarce research on this topic, I argue that the operationalisation of collaboration per se still remains a black box. In particular, the need to understand how collaboration is operationalised within networks, to better understand the nuances provided by the deployment of collaborative mechanisms, remains under-researched in the literature.

## 1.2 The research objective

The collaboration literature acknowledges the role and importance of mechanisms for deploying collaborative relationships (see for e.g., Palmer, 1983; Gulati, 1995; Dyer & Singh 1998; Das & Teng 2000; Kale, 2005; Argyres & Mayer, 2007; Varshney & Oppenheim, 2011; Gulati *et al.,* 2012; Chakkol *et al.,* 2018, Tee *et al.,* 2019). It demonstrates that mechanisms dictate the degree to which exchange partners can, or not, align their goals (Ring & Van de Ven, 1994; Gulati *et al.,* 2012), combine their

resources (Das & Teng, 2000, Mitsuhashi & Greve, 2009; Nachum, 2010), communicate (Puranam, Raveendran, & Knudsen, 2012; Raveendran & Puranam, 2012) and share information (Argyres & Mayer, 2007) to support the goals of the partnership, and the collaboration itself (Chakkol *et al.,* 2018). The extant literature largely examines their outcomes (Zheng et al, 2008; Roehrich *et al.,* 2009; Cao and Lumineau 2015; Davies *et al.,* 2016; Wacker, Yang *et al.,* 2016; Chakkol *et al.,* 2018; Tee *et al.,* 2019), rather than examining the mechanisms themselves. Thus, little is known on how these are deployed and operationalised. In addition, while complex projects exhibit a multitude of interdependent relationships (Ramasesh & Browning, 2014), the extant literature largely examines formalised and dyadic partnerships (Hong *et al.,* 2009), rather than examining how collaboration is deployed in a project network.

In light of these conclusions, research examining collaboration in the context of complex projects needs to consider three avenues. Firstly, there is a need to conduct empirical research by examining the interorganisational networks delivering projects. By shifting the attention away from formalised and dyadic relationships towards the key relationships as these unfold, a more nuanced view of collaboration could be elicited. Secondly, while the role of interorganisational mechanisms for sustaining collaborative partnerships is well documented, there is a need to empirically demonstrate how and why these mechanisms operationalise collaboration. Rather than prescribing what mechanisms organisations should deploy to govern their collaborations, a deeper exploration of how these are operationalised will provide insights to better understand the "black box" of collaboration. Lastly, the concept of collaboration and mechanisms themselves are more often than not, ill-defined and used either as buzzwords or used interchangeably with partnering, cooperation and coordination (Pajunen, 2008; Castañer & Oliviera, 2020). Furthermore, the theoretical framing of the extant literature is often disjointed (Gulati *et al.,* 2012). There is a need to provide definitional and conceptual clarity regarding these concepts, to adopt more comprehensive theoretical foundations to the field of interorganisational collaboration.

The objective of this research is to explore the operationalisation of collaboration through the deployment of mechanisms in the context of an ego-network delivering a complex infrastructure project. This work defines ego networks as the set of companies

and organisations that have a direct relationship with the focal organisation (Provan *et al.,* 2007). It aims to identify how collaboration is operationalised in networks, as opposed to formal and dyadic partnerships. In doing so, it will identify both the process of the deployment and the outcome of mechanisms across a set of relationships. This work will further our understanding of "*the complexity of what actually happens in a partnering relationship*" (Bresnen, 2007, 367), and thus delve into the collaborative "black box" (Tompson & Perry, 2006; Fawcett *et al.,* 2012; Diaz-Kope *et al.,* 2015).

## 1.3 Structure of the thesis

The structure of the remainder of this thesis is as follows: Chapter 2 will present a review of the literature, which will provide the theoretical foundations for both the research questions and the adopted conceptual framework. Chapter 3 will present the research methodology adopted for this thesis. It will describe the use of critical realism and the retroductive research strategy for this case study. The findings of the thesis are described and discussed in Chapter 4. This section will describe the findings related to the deployment of mechanisms, their operationalisation through practices, and how practice recursiveness, adaptation and emergence drives interorganisational learning. The comparison and contrasting of the findings with the extant literature will be addressed in Chapter 5. The discussion chapter will highlight the theoretical propositions of this thesis and will elaborate and extend the conceptual framework adopted by this thesis by integrating the findings. Chapter 6 will conclude this chapter, by providing a succinct overview of the research problem and the study's rationale and by detailing the manifestations of social realism. It will then detail the theoretical and practical contributions of this doctoral thesis. Lastly, the limitations of this work and suggestions for future research will be presented.

## 1.4 Summary of the Introduction

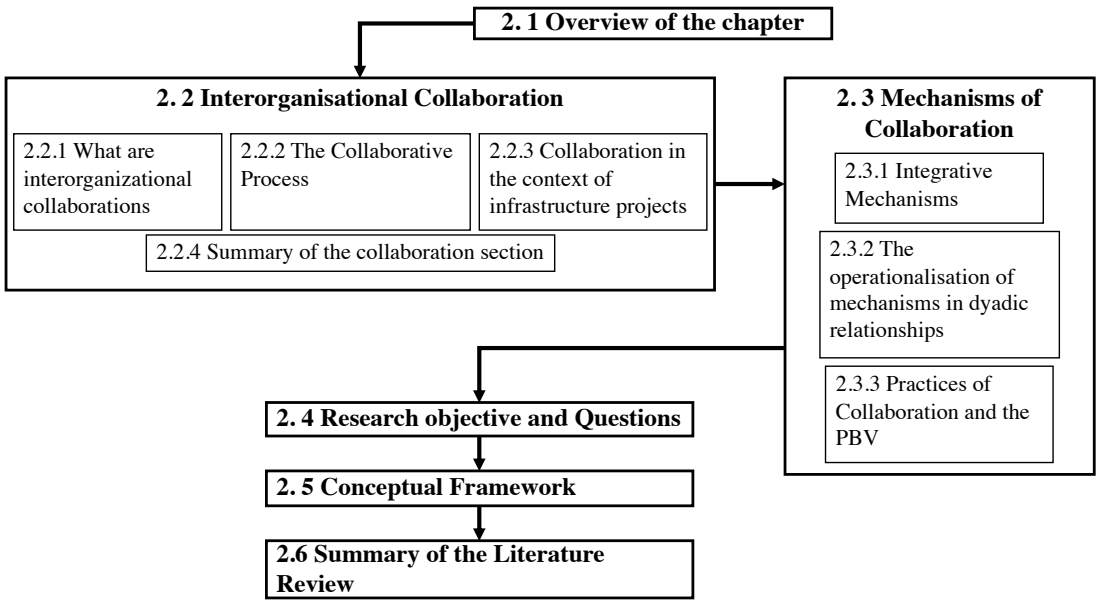
This chapter introduced the research problem and its resulting research objective. It also provided a succinct description of the remaining chapters of this work. The following chapter provides a review of the interorganisational collaboration and complex project literatures to elicit the research questions and conceptual framework that theoretically ground this thesis.

# 2 Literature review

## 2.1 Overview of the chapter

This chapter outlines the development of the research objectives, questions and conceptual framework through the analysis and synthesis of the interorganisational collaboration research. To do so, section 2.2 will present the extant literature related to collaboration, to define and delineate the concepts and dimensions of this thesis. This is of particular importance since collaboration is often a 'fuzzy term', (Gulati *et al*., 2012; Tee *et al*., 2019; Castañer & Oliviera, 2020). Section 2.3 will explore the literature related to integrative mechanisms in interorganisational settings. This section will thus demonstrate how outcomes are attained through the deployment of mechanisms that compose the collaborative process which constitutes the theoretical grounding of this work. It will demonstrate that to truly understand the complexity of collaboration, research should go beyond prescriptive accounts of collaboration by exploring how outcomes are driven by practices. Figure 1 serves as an illustration of the structure of the chapter. The arrows in the figure represent the sequence of the sections. In Section 2.4 the research objective and questions are elicited based on the conclusions drawn from the literature. In the light of these, a conceptual theoretical model is proposed and explained in Section 2.5.

Figure 1: Structure of the literature review



## 2.2 Interorganisational Collaboration

Since the 1990s, researchers observed an increasing trend of more collaborative forms of interorganisational arrangements. "*Inter-organizational forms of cooperation are characteristic of today's business world*" (Bachmann and van Witteloostuijn 2009: 3). In complex projects, collaboration was observed in a wide range of sectors, ranging from defence (Caldwell & Howard, 2014), infrastructure (Tee *et al.,* 2019), shipbuilding (Ruijter *et al.,* 2021), healthcare (Thrasher *et al.,* 2010; Roehrich & Lewis 2014) and aeronautics (Kijima, 2001; Salvetat *et al.,* 2013). In fact, collaboration has become the preferred method for managing interorganisational relationships and the delivery of the works (Acha *et al.,* 2004; Davies & Hobday, 2005; Chakkol *et al.,* 2018). In the U.K. more specifically, collaboration has become the Government's policy for public procurement in defence, infrastructure, construction and healthcare (Transforming Public Procurement, 2016). As a consequence of the importance of interorganisational collaboration in the business environment, the phenomenon of collaboration has received continued attention by researchers in Strategy (see for e.g. Kogut, 1988; Cravens *et al.,* 1993; Gulati *et al.,* 1995; Poppo & Zenger, 2002; Goerzen, 2007; Lavie *et al.,* 2012; Kretschmer & Vanneste, 2017), Management (see for e.g. Levine & White, 1961; Benson, 1975; Bradley, 1980; Brouthers *et al.,* 1995; Das & Teng, 2000; De Rond, M., & Bouchikhi, H. 2004; Schilke & Goerzen, 2010; Schepker *et al.,* 2014; Dittrich, & Seidl, 2018) and Operations Management (see for e.g. Miller & Hobbs, 2005; Martinsuo & Ahola, 2010; Davies, & Mackenzie, 2014; Cao & Lumineau, 2015; Fawcett *et al.,* 2015; Chakkol *et al.,* 2018).

Yet, while interorganisational collaboration is a well-researched phenomenon, collaboration itself is regularly used as a buzzword (Huxham & Vangen, 2001; Ploetner & Ehret, 2004; Bedwell *et al.,* 2012), and more often than not, lacked conceptual clarity (for a review, see: Castañer & Olivera, 2020) and was ill-defined (Heide & Miller, 1992). Collaborative "*arrangements go by many names: strategic alliances, partnerships, collaborations, networks*" (Chen *et al.,* 2010: 381). The aim of this section is thus to define collaboration in the context of this research, by examining the evolution of the interorganisational collaboration literature.

### 2.2.1 What are Interorganisational Collaborations?

*Contextual and strategic antecedents as drivers of early collaboration research:*

Following World War II, US economists observed that the formation of joint ventures and alliances "*was accentuated by the overly restrictive anti-trust system*" (Vonortas, 1997: 579). Researchers observed that this trend was accelerating (Boyle, 1968), and between 1972 and 1983, more than 2000 joint ventures between American multinationals were reported (Balakrishnan & Koza, 1989). Three co-existing fields of economic research emerged based on these observations. First, economists argued that domestic and international joint ventures and alliances were the "*multinationals' responses to host-government demands*" (Balakrishnan & Koza, 1989: 4). These works examined how legislative drivers related to the restrictions of mergers and acquisitions and oligopolistic situation of rents influenced the formation of joint ventures and formalised alliances (Fusfield; 1958; Friedman and Kalmanoff, 1961; Pate, 1969; Franko, 1971; Beamish, 1984; Contractor and Lorange, 1988; Jorde & Teece, 1990). Secondly, other works examined the determinants, or antecedents, such as resource scarcity, resource independence, resource and capability complementarity, market power and risk sharing that led to the formation of alliances (Fusfeld, 1958; Mead, 1967; Boyle, 1968; Pfeffer and Nowak, 1976; Berg and Friedman, 1980; Duncan, 1982; Harrigan, 1985; McConnell and Nantell, 1985). Building upon these two streams of research, the third field conducted comparative analyses between joint ventures and internalisation for organisations diversifying their business portfolio, by using transaction costs economics (Buckley and Casson, 1988; Hennart, 1988; Kogut, 1988; Balakrishnan & Koza, 1989). These works showed the benefits of forming collaborative interorganisational relationships when transaction costs and acquisition costs of assets and resources are significant. Therefore, early works in economics examined the contextual (legislative and institutional) and strategic (resource acquisition, transaction costs) drivers that explain the formation of joint ventures. Nevertheless, these studies failed to explain the organisational drivers that influence the design of partnerships. Building upon these foundational works, the literature moved towards explaining the different processes at play in alliances.

*Interorganisational collaboration as a structural and relational process:*

To understand the underpinnings of joint-ventures management scholars and organisational sociologists, explored their social dynamics. In this context, research explains interorganisational collaborations (hereafter IOC) as a field phenomenon (Benson, 1975; Astley and Fombrun, 1983; Astley, 1984; Bresser and Harl, 1986) where institutional drivers, such as the macro-economic, legislative and industrial environments drive organisations to collaborate (Levine and White, 1961; Hall *et al.,* 1977; Litwak and Hoylton, 1962; Litwak and Rothman, 1970; Pfeffer, 1972; Fombrun and Astley, 1983; Herbert, 1984 ; Koza, 1988) and influence the structure of collaborations through an isomorphic process (Evan, 1966; DiMaggio and Powell, 1983). For example, Evan (1966) proposed the notion of organisational sets to describe the interactions and dealings between organisations and their environment, in terms of their network of organisations, to theorise the formation of alliances. These interactions resulted in interdependencies between these organisations, where their power dynamics dictated both the choice of partners, the interorganisational structures they adopted and their propensity to change. The notion of organisational sets and networks was further described by early institutional theorists studying collaborations who suggested that the formation of joint ventures, in terms of their structures and their formation patterns, were isomorphic by nature where organisations adopted the prevailing structures and mechanisms of their institutional fields, such as the industries in which these operate (Benson, 1975; Bresser and Harl, 1986; DiMaggio and Powell, 1983). Furthermore, the notion of organisational interactions led to the development of normative, field-based studies, examining the social interactions and the deployment of relational mechanisms that occur in the context of joint ventures, such as trust, honesty, and information sharing (Harrigan, 1985, 1986; Killing, 1986; Balakrishnan & Koza, 1989; Oliver, 1990; Gulati, 1995, Doz, 1996).

Despite the breadth of theoretical lenses adopted within these economic and management fields of research, these studies converge on how collaboration is defined. They equate collaboration with "*various forms of network organizations*" (Ring & Van de Ven, 1994 p.90), and largely explore highly formalised exchange relationships such

as equity-based joint venture. Moreover, seminal literature in collaboration elicited four defining aspects of collaborations, that is i) their pre-formation dynamics (Klijn *et al.,* 2010)—which refers to the organisational and/or interorganisational motivations to form alliances; ii) their formation dynamics (Gulati, 1995a, Gulati 1995b; Garcia-Pont & Nohria , 2002) —that is their adopted hierarchical and organisational structures iii) their post-formation dynamics (Reuer *et al.,* 2002) — that is the outcomes of the collaboration in terms of the combining of their resources and the building of relational norms, and iv) their temporary nature (Parkhe, 1993) where these terminate (Reuer *et al.,* 2002) either due to their failure or the unilateral retraction of partners (Reuer *et al.,* 2005). Therefore, based on these early efforts, collaboration can be defined as temporary and formalised interorganisational relationships created to deliver specific joint outcomes.

Furthermore, these works paved the way for the elicitation of two complementary views of collaboration research: the structural view and the relational view (Madhok, 1995, Powell, 1998; Faems *et al.,* 2008). The former is rooted in transaction costs economics (TCE) and "*rests on the assumption that alliance partners tend to act opportunistically*" (Faems *et al.,* 2008: 1054). As a consequence, the structural perspective suggests that the performance of the partnership depends upon the design and quality of its structure (Pisano *et al.,* 1988; Pisano, 1990; Hennart, 1991; Williamson, 1991; Parkhe, 1993; Oxley, 1997; Sampson, 2004; Hennart, 2006; Faems *et al.,* 2008). Conversely, the relational perspective is theoretically grounded in social exchange theory and argues that the performance of alliances is based on trust-based relationships (Faems *et al.,* 2008), and is thus driven by the quality of the relationship's relational processes and relational norms (Larson, 1992; Ring & Van de Ven, 1992; Zaheer & Venkatraman, 1995; Gulati, 1995; Uzzi, 1997; Dyer & Singh, 1998; Salk, 2005)

Since these economics and management studies were the foundation of the IOC literature, these have shaped the approaches adopted by social science research that explain IOCs. These works influenced the theoretical positioning in the field of interorganisational relationships. Subsequent studies largely focused "*on one of three aspects of collaborative relationships: predisposing conditions for collaboration,*

*developmental processes, and perceived collaborative outcomes (Bryson, Crosby, and Stone 2006; Selsky and Parker 2005; Gray and Wood 1991)"* (Chen, 2010: 382).

### *The relational and structural dimensions of antecedents*

Broadly, studies exploring the conditions of collaborations examined the antecedents of alliance formations (see for e.g., Oliver 1990; Tsang, 1998; Guo and Acar 2005; Gazley 2008). For example, these works examined factors such as information sharing within networks and triadic closure (Gulati *et al.,* 1995a; Gulati *et al.,* 1995b), repeated ties (Gulati *et al.,* 1995a; Gulati *et al.,* 1995a; Zollo *et al.,* 2002; Tedova & Knoke, 2002; Bouncken, 2011; Manning & Sydow, 2011; Zheng & Yang, 2015; Defillippi & Sydow, 2016), resource scarcity, dependency and/or complementarity (Sirmon *et al.,* 2007; Hitt *et al.,* 2010; Gruber *et al.,* 2010; West, 2014; Liu *et al.,* 2016) influencing the pre-formation of alliances. The theoretical positioning of these works builds upon either the structural or relational perspective of alliances. For example, the Resource-Based View (RBV) proposed by Hitt *et al.,* (2010) suggests that resources are a determining factor for competitive advantage, and these "*are rare, valuable, hard or impossible to imitate or duplicate, and hard to substitute*" (Bromiley & Rau, 2015: 96). Consequently, research adopting the RBV suggest that partner selection in the context of IOCs is dictated by the complementary nature of the resources and capabilities that firms possess (see for e.g., Hitt *et al.,* 2010; Gruber *et al.,* 2010; West, 2014; Liu *et al.,* 2016). Therefore, these studies build upon the structural perspective stemming from early economic research demonstrating the role of determinants, such as resources for the formation of collaborative interorganisational relationships (Fusfeld, 1958; Mead, 1967; Boyle, 1968; Pfeffer and Nowak, 1976; Berg and Friedman, 1980; Duncan, 1982; Harrigan, 1985; McConnell and Nantell, 1985). Conversely, studies examining the social dynamics and direct and/or indirect interactions of prospective partners during the pre-formation stage of partnerships (see for e.g. Gulati *et al.,* 1995a; Gulati *et al.,* 1995b; Zollo *et al.,* 2002; Tedova & Knoke, 2002; Bouncken, 2011; Manning & Sydow, 2011; Zheng & Yang, 2015; Defillippi & Sydow, 2016) build upon the relational perspective elicited by the literature that examined the social processes of partner selection and the building of relational norms (see for e.g. Evan, 1966; Harrigan, 1985, 1986; Killing, 1986; Balakrishnan & Koza, 1989; Oliver, 1990; Gulati, 1995, Doz, 1996).

### *The relational and structural dimensions of the developmental process of collaboration:*

The literature examining the second aspect of collaboration research, the developmental process of collaborations (Chen, 2010), explored the how alliances are formed and how these are governed (Chen, 2010; Oliver, 1990; Doz, 1996). For example, these studies examined the mechanisms deployed by partnering organisations for sharing information (see for e.g. Oliver, 1990; Doz, 1996; Rindfleisch & Moorman, 2001; Narasimhan & Nair, 2005; Argyres & Mayer, 2007), for combining their resources (Teng, 2007; Wiklund & Shepherd, 2009, Bouncken, 2011), for making joint decisions (Brouthers *et al.,* 1995; Johnston *et al.,* 2004; Taylor, 2005; Todeva & Knoke, 2005) and for building mutual norms such as trust, respect and reciprocity (see for e.g. Oliver 1990; Doz 1996; Thomson and Perry 2006; Chen 2008). By exploring the collaborative process, this strand of the literature builds upon both the descriptive frameworks conceptualised by early management scholars explaining IOCs (Astley, 1984; Astley and Fombrun, 1983; Evan, 1966; Fombrun and Astley, 1983; Hall *et al.,* 1977; Herbert, 1984 ; Koza, 1988; Levine and White, 1961; Litwak and Hoylton, 1962; Litwak and Rothman, 1970; Pfeffer, 1972), and early institutional theories describing the isomorphic process of collaborative structures (Benson, 1975; Bresser and Harl, 1986; DiMaggio and Powell, 1983). The theoretical foundations of these studies varied in accordance with the dimensions these explored. For example, the structural perspective and TCE were often used to explain the adaptive nature of contractual arrangements, such as the antecedents and manifestations of adaptation mechanisms (Reuer & Ariño, 2002; Ariño *et al.,* 2008; Xu & Mayer, 2013) or the implications of structural mechanisms on the alliance's performance (Lunnan & Haugland, 2008; Cui *et al.,* 2011). Conversely, the relational perspective and social exchange theory were often adopted to explain the role of socially derived mechanisms for the building of relational norms (Narasimhan & Nair, 2005; Thomson and Perry 2006; Argyres & Mayer, 2007; Chen 2008).

*The role of relational and structural mechanisms for achieving outcomes:*

Lastly, studies examining the third aspect —how partners achieve their perceived collaborative outcomes— identified the role of collaborative mechanisms to fulfil the goals and performance outcomes of partnerships (Gray, 2000). Similarly to the previous aspects of collaboration, the theoretical framing, in terms of the relational or structural perspective, varied in accordance with the nature of the explored mechanisms to explain the performance outcomes. For example, studies adopting the relational perspective examined the role of relational governance mechanisms (Ferguson *et al*., 2005; Lee, & Cavusgil, 2006; Gurcaylilar-Yenidogan, T., 2017; Bicen *et al*., 2021) and socially derived mechanisms (Johnston *et al*., 2004; Lavie *et al*., 2012; Prajogo *et al*., 2021) for maintaining trust and for the allocation of resources to the partnership. These studies suggest these relational mechanisms are the antecedents of trust and therefore of the partnership's performance outcomes. Conversely, studies adopting the structural perspective examined the role of contractual mechanisms (Nielsen, 2010; Roehrich & Lewis, 2014; Kapsali *et al*., 2018) and the structural design of the partnership in terms of its processes (Jap & Anderson, 2007; Chen, 2010) and its hierarchical structures (Goerzen, 2007; Caldwell & Howard, 2014; Le *et al*., 2021), in allocating and combining resources. These studies thus suggest that these structural mechanisms and their adaptation (Reuer *et al*., 2002) are the antecedents of performance outcomes.

By adopting either the relational or structural perspective when examining IOCs, these studies contributed to our understanding of collaboration by eliciting a variety of structural and socially derived interorganisational mechanisms to explain the life cycle of IOCs (Chen *et al*., 2010). In addition to these contributions, these works also contributed to the conceptualisation of the phenomenon of collaboration itself. Rather than examining collaboration in the sole context of joint ventures and formalised partnerships, they explored the dynamics of collaboration in broader sets of interorganisational relationships. For example, scholars examined collaboration in the context of healthcare (Lawrence *et al*., 2002; Hardy *et al*., 2003; Gobbi & Hsuan, 2015), public-private partnerships (Kapsali *et al*., 2018; Aben *et al*., 2021), R&D and innovation projects (Sampson, 2004; Lakemond *et al*., 2006; Olander *et al*., 2010). More particularly, in the field of Operations Management, scholars examined

collaboration in the context of supply chains (Liu *et al.,* 2009; Martinsuo & Ahola, 2010 ; Mello *et al.,* 2015), new product development (Petersen *et al.,* 2005; Badir *et al.,* 2012; Ates *et al.,* 2015) and complex projects (Davies *et al.,* 2016; Chakkol *et al.,* 2018; Kapsali *et al.,* 2018). Rather than equating collaboration to joint ventures, new definitions of collaboration emerged by examining non market B2B relationships.

### *Collaboration as non-market based B2B relationships:*

By adopting either the relational or structural perspective when examining IOCs, studies elicited a variety of structural and socially derived interorganisational mechanisms to explain the life cycle of IOCs (Chen *et al.,* 2010). In addition to these contributions, these works also contributed to the conceptualisation of the phenomenon of collaboration itself. Rather than examining collaboration in the sole context of joint ventures and formalised partnerships, they explored the dynamics of collaboration in broader sets of interorganisational relationships. For example, scholars examined collaboration in the context of healthcare (Lawrence *et al.,* 2002; Hardy *et al.,* 2003; Gobbi & Hsuan, 2015), public-private partnerships (Kapsali *et al.,* 2018; Aben *et al.,* 2021), R&D and innovation projects (Sampson, 2004; Lakemond *et al.,* 2006; Olander *et al.,* 2010). More particularly, in the field of Operations Management, scholars examined collaboration in the context of supply chains (Liu *et al.,* 2009; Martinsuo & Ahola, 2010 ; Mello *et al.,* 2015), new product development (Petersen *et al.,* 2005; Badir *et al.,* 2012; Ates *et al.,* 2015) and complex projects (Davies *et al.,* 2016; Chakkol *et al.,* 2018; Kapsali *et al.,* 2018). Rather than equating collaboration to joint ventures, new definitions of collaboration emerged. The conceptualisations of collaborations vary in accordance with the aspect of interorganisational partnering these studies explore. For example, when considering the predisposing conditions of collaboration, Phillips *et al.,* (2000) provided an inclusive definition of collaboration as: "*a co-operative relationship among organizations that relies on neither market nor hierarchical mechanisms of control*" (Phillips *et al.,* 2000 p.24). They argued that three aspects differentiate collaboration from other organisational structures. First, collaboration is an interorganisational phenomenon defined by the interplay between institutional processes and structures and the collaboration itself. Second, they suggest that collaborative arrangements are not dictated by market structures, but by a negotiation related to the nature of the

sought-after outcomes of the partnership and the roles of partners for achieving these. Lastly, their "*definition of collaboration excludes relationships that involve the use of control through legitimate authority (Ouchi, 1980)*" (p.25). Based on these three characteristics, Phillips *et al.,* (2000)'s definition is theoretically rooted in institutional theory, where "*collaboration does not occur in a vacuum"* (p.23). Hence, conceptualisations of collaboration should examine the interplay between the interorganisational arrangement and the wider institutional field in which these operate.

Conversely, studies examining the developmental process of collaboration propose alternative conceptualisations and definitions of collaborations. For example, the governance literature defines IOC in terms of its governance arrangements (see for e.g. Olander *et al.,* 2010). In this context, IOCs can be defined by their formalised and/or contractual arrangements for delivering agreed upon joint outcomes (see for e.g., Dyer *et al.,* 2001; Yli-Renko *et al.,* 2001; Wu *et al.,* 2006; Hoetker, & Mellewigt, 2009). These works argue that collaboration is the phenomenon that result from the interplay between formal governance mechanisms (Reuer & Ariño, 2000; Nielson, 2010) and their subsequent adaptation (Oxley, 1997; Reuer & Ariño, 2002; Ariño *et al.,* 2008) to fulfil the desired results of the partnership (Luo, 2005). They therefore suggest that collaborations rely upon three characteristics. The first is related to their formal mechanisms, such as planning (Palmer, 1983; Das & Teng, 2000; Pittino & Mazzurana., 2013; Gulati *et al.,* 2012), defining responsibilities for tasks (Okhuysen & Bechky, 2009), resource pooling (Kogut 1988) coordinating activities (Dekker, 2004; Okhuysen & Bechky, 2009; Varshney & Oppenheim, 2011) and control (Pisano, 1989; Williamson, 1991; Kale *et al.,* 2000; Bachmann, 2001; Luo, 2006; Gulati *et al.,* 2012) which partners implement to mitigate the risk of opportunism and skirting (Luo, 2006; Gulati et al;, 2013). The second relates to the renegotiation and adaptation of these mechanisms to adapt to the exogenous and endogenous factors affecting the relationship such as changes in the partner(s)'s strategic orientation (Oxley, 1997; Reuer & Ariño, 2002; Ariño *et al.,* 2008). Lastly, the degree of success of their implementation and adaptation dictates the realisation of outcomes and therefore the successful implementation of collaboration. Therefore, studies adopting the structural view define collaboration through theoretical perspectives and research paradigms that

examine interorganisational relationships at the level of the governance and administration mechanisms to explain performance outcomes (see for e.g., Kapsali *et al.,* 2018).

Conversely, studies adopting the relational view argue that IOCs are defined by socially derived mechanisms (Joshi, 1995; Joshi & Arnold, 1997; Lee, 1998; Artz & Brush, 2000; Narasimhan *et al.,* 2008) and relational governance (Zaheer, & Venkatraman, 1995; Joshi & Campbell, 2003; Zhang *et al.,* 2003; Ferguson *et al.,* 2005; Poppo *et al.,* 2008) that exchange partners deploy. These works suggest that successful collaborative outcomes depend upon the deployment of informal governance mechanisms designed to develop relational norms such as trust (Anderson and Narus, 1990; Oliver, 1990; Doz, 1996; Ariño *et al.,* 2005), honesty (Balakrishnan & Koza, 1989; Ryu *et al.,* 2007), information sharing (Gulati, 1995; Ness, 2009), integrity (Kaufmann and Dant, 1992; Kaufmann and Stern, 1988), solidarity (Boyle *et al.,* 1992) and harmony (Macneil, 1980). By exploring collaboration as a social phenomenon, these studies suggest that relational governance and socially derived mechanisms are the antecedents of collaborative outcomes, where the process of collaborating is embedded in the interactions of partners within these structures (Lambe *et al.,* 2000; Zhang *et al.,* 2003; Ariño *et al.,* 2005;). Thus, scholars adhering to the relational view suggest that theoretical perspectives and research paradigms that examine the interactions of partners and/or the social mechanisms they deploy should be adopted to study collaborations (Parkhe, 1993; Cullen *et al.,* 2000; Bresnen, 2008).

Therefore, the early literature's examination and conceptualisation of IOCs evolved over time. The early economics and sociology literature conceptualised collaborations through their temporary nature, their life cycle and their formal structures —that is the formalisation of the relationships through joint ventures or formal alliances. In this context, collaboration was largely examined as a reactive interorganisational phenomenon to adapt to the institutional and legislative context. Building upon these early studies, management scholars examined the interorganisational level of collaboration. By drawing on either the relational view or the structural view of alliances, scholars defined collaboration as a social or structural process respectively, by identifying the underlying social or technical mechanisms that

partners deploy to fulfil exchange specific goals. To do so, these works either examined the pre-formation dynamics (antecedents), the formation dynamics (developmental process) or the outcomes of collaboration. Recent literature in the fields of Operations Management (see for e.g. Cao & Lumineau, 2015; Davies *et al.,* 2016; Chakkol *et al.,* 2018; Kapsali *et al.,* 2018), Strategy (see for e.g. Handley & Angst, 2015; Kretschmer & Vanneste, 2017) and Management (see for e.g. Malhotra & Lumineau, 2011; Fan & Zietsma, 2017) examined the interplay between the relational and structural dimensions of collaborations and/or between the three aspects of partnerships.

### *The interplay between structural and relational mechanisms*

Traditionally, governance research examined either the role of formal governance mechanisms for combining and aligning resources (see for e.g. Klein *et al.,* 1978; Williamson, 1985; Joskow, 1988; Williamson, 1991; Klein, 1996; Fehr & Gachter, 2000; Reuer & Ariño, 2007; Kapsali *et al.,* 2018) or relational governance for instilling relational norms and building social capital (see for e.g. Gulati, 1995b; Uzzi, 1997; Bernheim & Whinston, 1998; Dyer and Singh, 1998; Adler, 2001) to achieve the performance outcomes of the collaboration (Poppo & Zenger, 2002). However, recent literature examining the governance of collaboration shifted from exploring either the relational or the structural view of exchange governance to examining the interplay between the formal and relational governance mechanisms (see for e.g., Poppo & Zenger, 2002; Cao & Lumineau 2015; Gurcaylilar-Yenidogan, 2017; Chakkol *et al.,* 2018; Galvin *et al.,* 2021). For example, while relational mechanisms were often seen as substitutes of contractual governance mechanisms, Poppo and Zenger (2002) demonstrated the complementary nature of governance mechanisms, where partners couple their formal governance mechanisms with relational ones. They observed that partners "*employ greater levels of relational norms as their contracts become increasingly customized* [and] *employ greater contractual complexity as they develop greater levels of relational governance*" (p.721). They suggest that this interplay between relational and formal governance mechanisms is generative and is a source of improvement in the collaboration.

Building upon these results, Cao and Lumineau (2015) support this complementary view of relational and contractual governance by showing that the complementary nature of relational and formal governance positively impacts the performance of collaborations by reducing opportunism and by improving partners' satisfaction. In addition to identifying the relationship between complementary governance and performance, the authors also suggest that the institutional environment —in terms of the legal environment and the power distance between organisations— have a moderating effect on the generative effect of formal and informal governance. Conversely, they show that "*collectivism (the opposite of individualism) positively moderates the contracts–trust relationship*" (p. 28). Lastly, they also argue that the nature of interorganisational relationships, in terms of their type (horizontal or vertical) and length, also have a moderating effect on the interplay between the governance mechanisms and performance where "*relational governance are complementary in vertical IORs but independent in strategic alliances and cross-border IORs*" (p.31).

Therefore, Poppo and Zenger (2002) and Cao and Lumineau (2015) demonstrated that the structural and relational view of alliances co-exist in interorganisational relationships, through complementary governance mechanisms. Furthermore, while Poppo and Zenger view collaborations as having similar structures, Cao and Lumineau suggested that the type of relationships and the institutional context mediate the efficacy of the complementary governance mechanisms. Other works thus examined how institutional drivers shape the governance of collaborations. For example, Chakkol *et al.,* (2018) examined how the ISO 44001 for collaboration impacts the relational and formal governance mechanisms deployed in exchange relationships. They found that collaboration standards formalise relational practices and support the creation of flexible contracts through the inclusion and implementation of contractual provisions dedicated to coordination and adaptation. By reflecting the institutional context of large-scale projects related to the macro-cultures and the norms embedded in its organisational network (Jones *et al.,* 1997; Manning and Sydow, 2011), they argue that the standard operates at an institutional level. Consequently, they expanded the interplay between the institutional context and the governance of collaborations identified by Cao and Lumineau (2015) by showing the role of the standard for reducing information asymmetry, involving the community, managing the supply

chain relationships, developing customer engagement and for instilling project practices. Lastly, Chakkol *et al.,* (2018) argue that the adoption of institutionalised standards "*emerged as specific responses to prior performance failures associated with competitive bidding and the resulting fragmented, adversarial relationships*" (p.1011).

Therefore, Poppo and Zenger (2002), Cao and Lumineau (2015) and Chakkol *et al.,* (2018) demonstrate the complementary and generative role of formal, relational and institutional governance mechanisms in collaborative relationships. By examining how collaborations are governed, these works showed that these dimensions not only coexist but are jointly deployed to improve collaborative relationships. These studies define collaboration in terms of the deployment, operationalisation and adaptation of joint relational, structural and institutional governance mechanisms to attain collaborative outcomes, thus suggesting a processual definition of collaboration. Yet, these works largely overlooked the role of governance in achieving the desired performance outcomes of partnerships. The effect of governance on performance outcomes of relationships remains ambiguous in these studies. Other works examined the role of collaborative governance in the wider collaborative process. For example, Gurcaylilar-Yenidogan (2017) showed that prior ties and relational norms complement contractual arrangements and mitigate failure in partnerships. They find that "*informal norms from prior ties result in enhancing efficiency of interorganizational exchange relationships with a consistent and effective management of operational risks from external environment*" (p.567). Other studies show that the complementary or substitutable nature of governance mechanisms have different performance outcomes depending on the typology of relationships, such as temporary project-based partnerships (Arranz & De Arroyabe, 2012; Suprapto *et al.,* 2016; Kapsali *et al.,* 2018) or long-term supplier-client (Blome *et al.,* 2013; Um & Kim, 2019; Um & Oh, 2020; Zhang *et al.,* 2020; Belhady *et al.,* 2021) collaboration. For example, Um and Oh (2020) argue that the perceptions of the influence that formal and informal governance have on performance and collaborative efficacy vary in accordance with the position of the partner in the supply chain. They argue that clients view these as complementary and as drivers of collaboration and performance, while suppliers view these as substitutable, where the strength of the partnership is dictated by relational

governance. Zhang *et al.,* (2020) find that "*contractual enforceability substitutes relational governance in affecting supplier performance*", and that the institutional environment mediates this relationship. Conversely, in the context of projects, other studies demonstrate that relational governance leads to higher performance outcomes than formal governance mechanisms (Parker & Brey; 2015; Suprato *et al.,* 2016). For example, "*comprehensiveness in formal contractual governance has a stronger negative association with collaboration costs* [and therefore performance] *than relational governance does*" (Parker & Brey; 2015: 1653). Similarly, Kapsali *et al.,* (2018) show that relational governance and contractual contingencies have a complementary effect and are drivers of operational performance. However, they suggest that relational governance mechanisms substitute classical contracts (for safeguarding and control) to drive operational performance in the context of projects, since the temporary nature of the partnership reduces the scope for control and requires more interorganisational flexibility.

By examining the interplay between the governance of collaborations and their performance outcomes, in terms of their operational performance (Kapsali *et al.,* 2018), quality of the collaboration (Om & Oh, 2020) and collaboration costs (Parker & Brey, 2015), these works demonstrate that the complementary and substitutable nature of formal and relational governance mechanisms are context dependent. They show that the type of relationship (vertical vs horizontal), its temporality (project-based vs long-term) and the wider institutional context moderate the relationship between governance and performance. By examining the collaboration in terms of governance and outcomes, these studies show that partners deploy structural and relational mechanisms to fulfil specific collaborative outcomes. While these works contribute to the conceptualisation of collaborative processes and collaborative outcomes, they only consider one dimension of collaboration —that is its governance. However, to truly understand "*the nuanced complexities involved in assessing heterogeneously dispersed resources and bringing complimentary competencies together*" (Fawcett *et al.,* 2012: 44) research should examine the underlying processes that lead to collaborative outcomes, that is the *black-box* of collaboration (Kadefors, 2004; Petersen *et al.,* 2005; Tompson & Perry, 2006; Fawcett *et al.,* 2012).

### 2.2.2 The collaborative process

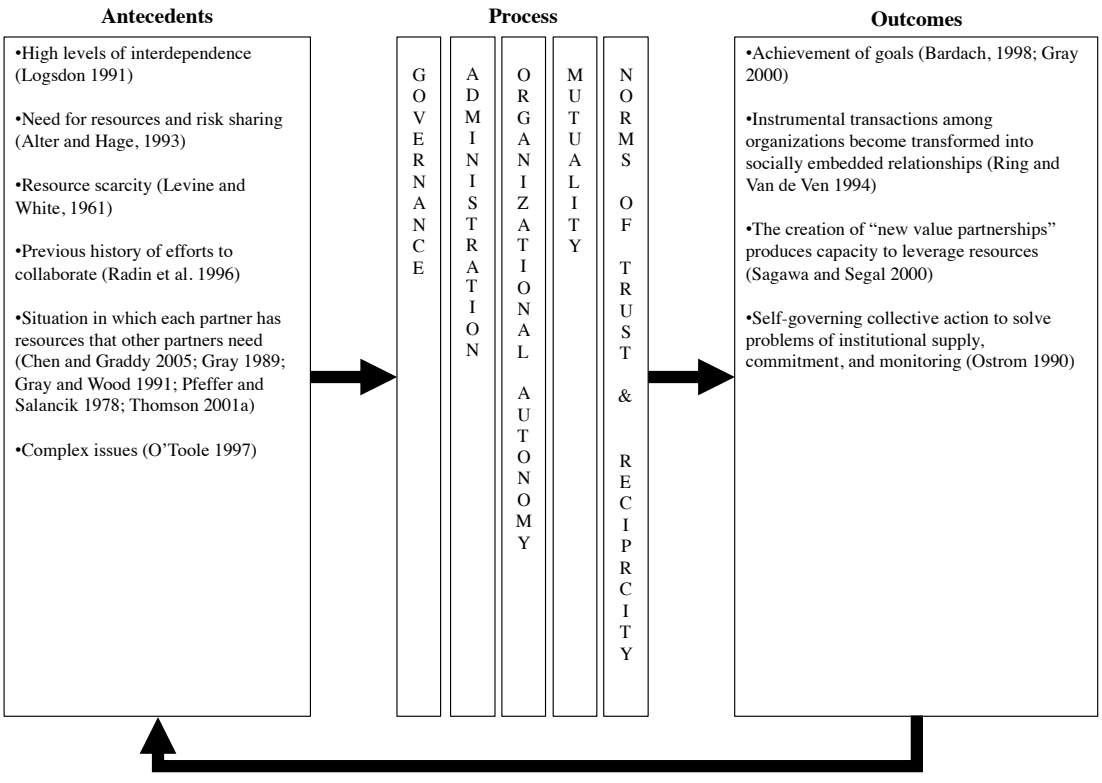
Different studies proposed models to explain the black box of collaboration. For example, Fawcett *et al.,* (2012) identified two cycles in the context of collaborations: the momentum and the balancing. The former relates to how momentum in interorganisational relationships is built through an iterative cycle between collaborative intent, interactions, commitment, and capability building. They argue this cycle is affected by the wider institutional context, such as changes in the collaborative environment. The second relates to how organisations balance the tension between collaborative enablers (cultural, structural and/or commitment) and collaborative resistors (entrenched, emerging, cultural and/or structural) to mitigate (or not) the impact of resistors on the building of the collaborative outcomes and capabilities. Therefore, the authors argue that the success and/or failure of collaborations is defined by the ability of exchange partners to deploy relational and structural processes rooted in their interactions to support collaborative enablers and mitigate resistors. They argue that this process is composed of structural (mechanisms and processes), cultural and behavioural elements that need to be managed.

The multidimensional nature of collaboration is also reflected in the Tompson and Perry (2006) model for explaining the collaborative "*black box*" (p.21) which examines the antecedents, collaborative process, and outcomes of collaborative relationship. They defined collaboration as a process, where it "*occurs over time as organizations interact formally and informally through repetitive sequences of negotiation, development of commitments, and execution of those commitments*" (p.21). They suggest that the black box of collaboration, that is the process through which organisations collaborate, is composed of five variable, dynamic and interdependent dimensions. The first relates to the governance of the collaboration, to deploy structural mechanisms of information sharing, communication and joint decision making. The second relates to the administration of the collaboration, which entails the structures partners put into place to operationalise the governance. The third, organisational autonomy, encompasses the mechanisms to reconcile and balance the dichotomy between the organisational goals —*self-interest*— and the ones of the partnership —*collective interest* (p.26). The fourth relates to mutuality, that is the process through which partners create mutually beneficial relationships for combining

their resources in the interest of the partnership. Lastly, the norms dimension encompasses the mechanisms and interactions that support the building of reciprocity and trust. Therefore, their definition of collaboration draws upon both the *structural* and *relational* views of IOCs and encompasses its three aspects (antecedents; process; outcomes). Lastly, they suggest that the organisational autonomy dimension relates to agency, where partners protect their own identity within the collaborative context, through mechanisms of control. Therefore, they argue that the degree of success of exchange partners is dependent on their ability to reconcile individual interests with collective interests (Tompson & Perry, 2006).

However, both Fawcett *et al.,* (2013) and Tompson and Perry's frameworks assume that collaborative interorganisational relationships are designed, if not identically, similarly.

Figure 2: The Antecedents- Process- Outcomes framework of collaboration




Source, Tompson & Perry, 2006

Therefore, collaboration is a complex phenomenon characterised by a multitude of institutional, relational, and structural dimensions. While IOCs were originally defined by the formalised institutional structures they adopted, most notably joint ventures and

alliances (Ring & Van de Ven, 1994), recent research explored how collaboration was deployed in other typologies of institutional structures (see for e.g. Arranz & De Arroyabe, 2012; Blome *et al.,* 2013; Suprapto *et al.,* 2016; Kapsali *et al.,* 2018; Um & Kim, 2019; Um & Oh, 2020; Zhang *et al.,* 2020; Belhady *et al.,* 2021). In addition, the literature elicited five defining aspects of collaborations, that is i) their pre-formation dynamics (Klijn *et al.,* 2010), ii) their formation dynamics (Gulati, 1995a, Gulati 1995b; Garcia-Pont & Nohria, 2002), iii) their post-formation dynamics (Reuer *et al.,* 2002) and iv) their temporary nature (Parkhe, 1993) and the collaborative outcomes in terms of the performance of the relationship itself (Um & Oh, 2020; Zhang *et al.,* 2020) and their goals (Um & Oh, 2020; Zhang *et al.,* 2020). On a theoretical perspective, different views emerged to explain how collaboration occurs. The structural perspective suggests that the performance of the partnership depends upon the design and quality of its structure (Pisano *et al.,* 1988; Pisano, 1990; Hennart, 1991; Williamson, 1991; Parkhe, 1993; Oxley, 1997; Sampson, 2004; Hennart, 2006; Faems *et al.,* 2008). Conversely, the relational perspective is theoretically grounded in social exchange theory and argues that the performance of alliances is based on trust-based relationships (Faems *et al.,* 2008) and is thus driven by the quality of the relationship's relational processes and relational norms (Larson, 1992; Ring & Van de Ven, 1992; Zaheer & Venkatraman, 1995; Gulati, 1995; Uzzi, 1997; Dyer & Singh, 1998; Salk, 2005). Lastly, scholarship also examined the institutional processes that influence the formation and structure of collaborations (Evan, 1966; Benson, 1975; Astley and Fombrun, 1983; DiMaggio and Powell, 1983; Bresser and Harl, 1986). This view defines the collaboration through the interplay between the institutional drivers and the collaborative process, and thus suggest that collaboration is an institutional phenomenon. While these were traditionally examined separately, recent literature examined the interplay between the relational, structural and institutional dynamics of partnerships to explain the end-to-end process of collaboration (see for e.g. Kadefors, 2004; Petersen *et al.,* 2005; Tompson & Perry, 2006; Fawcett *et al.,* 2012; Diaz-Kope et al, 2015) and its governance (see for e.g. Poppo & Zenger, 2002; Cao & Lumineau, 2015; Chakkol *et al.,* 2018; Kapsali *et al.,* 2018) and the achievement of collaborative outcomes.

Therefore, IOCs are defined by their antecedents and/or motivations to form collaborations, the institutional drivers that affect their adopted structure, the collaborative process, and the attainment of their collaborative outcomes. Collaboration is thus a multi-dimensional phenomenon, characterised by the interplay between structural and relational mechanisms to achieve collaborative outcomes. These works argue that the ability of partners to align their interests and combine their resources and capabilities to produce the outcomes of the partnership rely upon the deployment of relationally and structurally driven mechanisms (see for e.g. Poppo & Zenger, 2002, Cao & Lumineau, 2015, Tee *et al.,* 2019). This suggests that the interplay between the relational and structural dimensions of collaboration drive the collaborative outcomes. Building upon the structural and relational views of collaboration, Tee *et al.,* (2019) and Nikulina *et al.*, (2022) suggest that the collaborative process is defined by interplay between these relational and technical facets.. They argue that the successful attainment of collaboration is dependent on the ability of partners to deploy relational and structural integrative mechanisms for the purpose of achieving their collaborative outcomes. Therefore, they distinguish the process —collaborating through the deployment of relational and structural mechanisms— from the outcome: the attainment of collaboraitve aims. Thus, the following subsections will explore the role of integrative mechanisms in the collaborative process.

### 2.2.3 Collaboration in the context of complex infrastructure projects

IOC has been explored in a variety of fields and contexts. Operations Management scholars notably examined collaboration in the context of complex projects, such as large-scale infrastructure projects (Vangen *et al.,* 2015; Davies *et al.,* 2016; DeFillippi and Sydow, 2016; Chakkol *et al.,* 2018; Tee *et al.,* 2019). Such projects are notoriously complex to manage and deliver (Miller & Hobbs, 2000; Cooke-Davies, 2004) and are therefore '*often beset with delays*" (Eriksson *et al.,* 2017: 1512). These are complicated (Ning & Ling, 2015) due to their novelty in terms of product and processes (Sauser *et al.,* 2009; DeFillippi & Sydow, 2016), their temporary nature (Davies and Hobday, 2005), their scale in terms of resources and the size of the product (Ramasesh & Browning, 2014), the volume and variety of organisations involved in their delivery

(Davies and Hobday, 2005; Chakkol *et al.,* 2018; Tee *et al.,* 2019) and the multiplicity of perspectives and goals for defining and producing the project (Vangen *et al.,* 2015; DeFillippi and Sydow, 2016). In addition, infrastructure megaprojects are inherently complex, in terms of the variety and interactions of the element that compose their systems and subsystems (Browning *et al.,* 2006; Ramasesh & Browning, 2014).

Ramasesh *et al.,* (2014) demonstrated that projects are generally composed of five *subsystems* which encompass a set of components, which they refer to as elements: the *product*, the *process*, the *goals*, the *organisations* and the *tools*. In the context of infrastructure mega-projects, the *product* itself encompasses a high volume and a high variety of interdependent deliverables and components (the *product* elements), such as complex engineering designs, demolitions, construction and rerouting of utilities (see for e.g., Davies & Brady, 2000; Davies *et al.,* 2016; Tee *et al.,* 2019). Due to the complexity of the requirements of the product and their associated risks, large-scale infrastructure projects are commonly delivered by a multitude of interdependent exchange partners and their teams- the *organisations* (Davies & Hobday, 2005). To successfully deliver the *product* and its extensive resource requirements (Miller & Hobbs, 2005), the different *organisations* must "adapt, integrate, and reconfigure [their] internal and external competences, resources, and routines" (Davies *et al.,* 2016: 26), that is, the underlying elements of the *process* and the *tool* subsystems. These projects are thus characterised by the complexity of the elements, and their interconnected nature. Element complexity refers to a high volume of differentiated activities, processes, resources, goals, teams and interorganizational relationships that are necessary for the production of projects (Simon, 1962; Baccarini, 1996; Bar-Yam, 1997; Vidal *et al.,* 2011; Ramasesh & Browning, 2014). It examines the multiplicity and volume of the different elements within its five subsystems. Conversely, relationship complexity refers to the variety of vertical and horizontal interdependencies between these elements (Baccarini, 1996; Chu *et al.,* 2001; Jacobs & Swink, 2011; Ramasesh & Browning, 2014). Relationship complexity thus refers to the interactions and interrelatedness of the different elements of its five subsystems. Therefore, the success or failure of such projects is driven by the ability of partners to manage the complexity resulting from the volume, differentiation and interconnections of the processes and tools deployed by the different organisations to produce the

product. These constitute the operational risks of the project (Gulati *et al.,* 2012). Following Gulati et al.'s (2012) conceptualisation of collaboration, the adaptation, integration and reconfiguration of the *processes* and *tools* across the different *organisations* refer to their ability to coordinate their actions.

In addition, Fellows and Liu (2012) noted that construction projects are often beset by fragmented relationships, notably due to conflicting *goals* between exchange partners, which leads to conflicts and claims during the production of the *product*. The multiplicity of organisations results in a wide range of incongruent objectives and goals across a variety of interdependent stakeholders (Williams, 1999), which constitute a risk to the delivery of the *product*. Due to their time span, the *goal* and the *product* and *organisations* in infrastructure projects are subject to change to adapt to internal and external requirements, which suggests that such projects are dynamic (Assaf and Al-Hejji, 2006) and require the realignment of goals. Fragmented relationships constitute a core challenge to the delivery of projects, particularly when partners have no prior ties, and are often the cause of their unsuccessful delivery (Chakkol *et al.,* 2018). Therefore, the success or failure of such projects is driven by the ability of partners to manage the complexity resulting from the volume, differentiation and interconnections of interorganisational relationships, and their respective teams, to produce the product. These constitute the relational risks between different organisations (Gulati *et al.,* 2012). Consistent with Gulati et al.'s (2012) conceptualisation of collaboration, the joint pursuit of *goals* and their subsequent adaptation across the different *organisational* interfaces refers to their ability to cooperate.

Therefore, as complex projects, large-scale infrastructure programmes "*require an exceptional level of organizational and managerial capability because of their complexity*" (Davies & Mackenzie, 2014: 2), which can be achieved through high degrees of integration (Baccarini, 1996; Martinsuo & Ahola, 2010), through the effective coordination of actions and resources (Gholz *et al.,* 2018) and embedded cooperation (Gil & Tether, 2011). To match the complexity of large-scale infrastructure projects, organisations increasingly adopt collaborative inter-organizational relationships (IOR) for their delivery due to the multiplicity of

organisations involved in their delivery (Acha *et al.,* 2004; Davies & Hobday, 2005; Chakkol *et al.,* 2018). In the context of projects, "*conflict, hostility and litigation between contractors are commonplace*" in adversarial relationships (Bishop *et al.,* 2009). Drexler and Larson (2000) found that adversarial interorganisational structures delivering complex infrastructure projects were characterised by instability and deteriorating relationships, where 70% of these had to change their structures to adopt more collaborative ways of working. Conversely, they found that projects "*that began as formal partnerships were the most stable with over two thirds ending as they began*" (p.293), and these better managed the relational risks of such programmes. Collaboration emerged "*as specific responses to prior performance failures associated with competitive bidding and the resulting fragmented, adversarial relationships*" (Chakkol *et al.,* 2018: 1011).

Following the adopted definition of collaboration for this research, complex projects require organisations to pursue both cooperative and coordinative outcomes to manage the relational and operational risks.

### 2.2.4 Summary of the collaboration section

This chapter served as a review of the interorganisational collaboration literature. The first subsection provided a review on the conceptual foundations and early definitions of collaborative interorganisational relationships. The review shows that the definition of collaboration evolved over time. Early economics and sociology research equated IOC to their adopted formal structures, notably equity based joint ventures, as a reactive strategy to institutional changes. Consequently, these works largely explored the antecedents of collaboration (Berg and Friedman, 1980; Duncan, 1982; Harrigan, 1985; McConnell and Nantell, 1985) and their formation dynamics (Balakrishnan & Koza, 1989; Oliver, 1990; Gulati, 1995, Doz, 1996). Furthermore, these studies led to the emergence of three complementary views of collaboration research in the literature: the structural, the relational (Madhok, 1995, Powell, 1998; Faems *et al.,* 2008) and the institutional views (Evan, 1966; Benson, 1975; DiMaggio and Powell, 1983; Bresser and Harl, 1986; levering *et al.,* 2013; Chakkol *et al.,* 2018).

Following these seminal studies, research adopted broader conceptualisations of collaboration by examining other typologies of interorganisational relationships, such

as formal and informal alliances (see for e.g.), supply chain collaboration (see for e.g.) and project-based collaborations (see for e.g.). Consequently, the definition of collaboration shifted from its formal structures to "*a co-operative relationship among organizations that relies on neither market nor hierarchical mechanisms of control*" (Phillips *et al.*, 2000 p.24). The literature acknowledged that IOCs could adopt different institutional structures to match their antecedents and fulfil their outcomes (Diaz-Kope *et al.*, 2015). Furthermore, on a theoretical level, these works examined the interplay between the relational, structural, and institutional dimensions of collaboration (see for e.g. Poppo & Zenger, 2002; Cao & Lumineau, 2015; Chakkol *et al.*, 2018). Therefore, these studies defined IOC through its process, that is the socially and structurally derived mechanisms implemented by exchange partners to achieve collaborative goals.

The last sub-section examined the role of collaborative interorganisational relationships in the context of complex projects. Building upon the adopted definition of this research, this part demonstrated that the success and failure of such projects was contingent on the ability of partners to manage the interplay between the relational and structural dimensions of collaboration (Willamson, 2002; Assaf and Al-Hejji, 2006; Fellows and Liu 2012; Cao & Lumineau, 2015; Davies *et al.*, 2016; Tee *et al.*, 2019; Nikulina *et al.*, 2022) to manage the relationship and operational risks resulting from the volume, variety and interdependence of the goal, tasks and process (Ramasesh & Browning, 2014; Davies *et al.*, 2016; Tee *et al.*, 2019).

The reviewed literature thus suggests that IOCs are multi-dimensional and are characterised by their cooperative and coordinative outcomes and the deployed processes to achieve these. The literature shows that the collaborative process entails the deployment of a set of relationally and/or structurally driven mechanisms to manage the operational and relational risks of both the partnership and the complex project. The success or failure of collaborative outcomes relies upon the effective operationalisation of these mechanisms. Thus, the examination of these mechanisms is necessary to understand how partners collaborate.

## 2.3 Mechanisms of Collaboration

The reviewed interorganisational collaboration literature suggests that the process through which partners attain their collaborative outcomes relies upon the deployment, operationalisation, and adaptation of a set of relationally and structurally driven mechanisms. While several studies examined the interplay between mechanisms and performance, these largely examined the role of either relationally driven or structurally driven mechanisms. Few studies examined how these drive collaborative outcomes. Therefore, this section will review the interplay between relational and structural mechanisms with collaborative outcomes. The aim of this section is to draw conclusions from the literature to elicit this thesis's research questions and develop its conceptual framework. To do so, sections 2.31 and 2.3.2 will identify the technical and relational mechanisms that drive collaborative outcomes. These sections build on Tee et al. (2019) delineation of mechanisms based on their structural or relational intent and Nikulina et al. (2022) classification of mechanisms (Governance and Amdinistration, Support and Joint-Work). Following this, section 2.3.3 will demonstrate the need to move away from the prevailing view of mechanisms in dyadic collaborations to a multi-layered view of collaborative mechanisms across the different interorganisational relationships that compose a focal organisation's ego-network. This section will therefore introduce Pajunen's (2008) hierarchical conceptualisation of mechanisms, to explore their lower level, that is their underlying practices. Finally section 2.3.4 will build upon Jarzabkowski's (2004) strategy as practice and Bromiley and Rau's (2014) practice-based view to explain the performance variations of organisations and collaboration. Furthermore, this section will define the features of practices (the activity, the actor and its performing) used in the context of this work.

### 2.3.1 Integrative mechanisms

Collaboration in project poses a multitude of challenges to exchange partners. First, there is an inherent tension between the temporary nature of projects that require effective collaboration from the onset (Chakkol *et al.,* 2018) and the time frames required to develop collaborative norms, practices and cultures (DeFillippi & Sydow, 2016; Chakkol *et al.,* 2018; Xu *et al.,* 2021). Secondly, collaborations are strategically and operationally complex (Larsen *et al.,* 2021). These are costly (Eriksson, 2015), and require partners to extensively change, adapt and align their capabilities, resources, processes and behaviours (Gadde & Dubois, 2010; Davies *et al.,* 2016; Hietajärvi & Aaltonen, 2018; Tee *et al.,* 2019). These difficulties are exacerbated by the variety of stakeholders with differing cultures and strategic goals involved in the delivery of the project (Eriksson, 2015; Thomson *et al.,* 2009). Project complexity grows in accordance with the volume and interdependence of organisations, teams, processes and tasks (Ramasesh & Browning, 2014). The management of these risks and attainment of collaborative outcomes, requires partners to integrate their organisations (Nikulina *et al.,* 2022). "*Integration refers to the process of combining different subsystems into a unified whole*" (Tee *et al.,* 2019: 52). In the context of complex projects, integration is a key challenge to partners that collaborate (Staudenmayer *et al.,* 2005; Jones & Lichtenstein, 2008; Srikanth & Puranam, 2011). As project complexity grows, partners adopt increasingly complex "*sub-divisions to manage this growing interdependence*" (Tee *et al.,* 2019: 52), which increases the challenge to integrate these divisions and manage their interdependence. Consequently, organisations typically design, transfer and operationalise a variety of integration mechanisms to manage the increased complexity (Baccarini, 1996; Tee *et al.,* 2019; Nikulina *et al.,* 2022).

Studies have examined the role of integrative mechanisms to support the collaboration process in different stages of their life cycle. For example, during their formation stage, partners implement mechanisms to negotiate and agree upon the structure, inputs and outputs of the alliance (Gulati *et al.,* 2013). These constitute the *governance and administration mechanisms* (Chakkol *et al.,* 2018; Nikulina *et al.,* 2022). Similarly, during the production stage, partners deploy mechanisms to align their understanding of what collaboration entails in their projects and how they should

collaborate (Connaughton & Collinge, 2021). These constitute the *support mechanisms* (Bayliss *et al*., 2004; Nikulina *et al*., 2022). Lastly, during the production stage, partners deploy mechanisms to align their efforts to produce the collaboration's outputs (Meng, 2012; Gulati *et al*., 2013; Bygballe & Swärd, 2019; Tee *et al*., 2019). These constitute the *joint work mechanisms* (Nikulina *et al*., 2022). The interplay between these mechanisms and relational norms is an inherent feature of the collaborative process (Bresnen, 2009; Cao & Lumineau, 2015; Chakkol *et al*., 2018; Nikulina *et al*., 2022). While relational norms are often seen as emerging over time (Bresnen, 2009; Hartmann & Bresnen, 2011; DeFillippi & Sydow, 2016; Xu *et al*., 2021; Nikulina *et al*., 2022), mechanisms are engineered to facilitate the integration of organisations, their teams and their operations (Okhuysen & Bechky, 2009; Gulati *et al*., 2012; Eriksson, 2015; Tee *et al*., 2019). The following subsections will provide a short overview of the role of the three types of integrative mechanisms that make part of the collaborative process.

### *Governance and Administration Mechanisms:*

The role of Governance and Administration mechanisms in the collaborative process and in supporting the attainment of collaborative outcomes is a well-researched phenomenon (see for e.g. Dyer, 1996; Poppo & Zenger, 2002; Lee & Cavusgil, 2006; Blome *et al*., 2013; Cao & Lumineau *et al*., 2015; Chakkol *et al*., 2018; Benítez-Ávila *et al*., 2019; Aben *et al*., 2021; Bicen *et al*., 2021; Galvin *et al*., 2021) and receives continued attention from project management and operations management scholars (see: call for papers in the Journal of Operations Management 2021). The governance of collaboration refers to the structures, processes, rules that enable collaboration (Thomson *et al*., 2009; Klimkeit, 2013; Vangen *et al*., 2015; Chakkol *et al*., 2019). In essence, these are the mechanisms partners deploy to enable the collaborative process. The administration mechanisms define "*the roles, responsibilities, and control procedures within the established collaborative structures*" (Nikulina *et al*., 2022: 801). In essence, these are the mechanisms that translate governance into actions to control, manage and enact the relationship (Thomson *et al*., 2009; Sedwick, 2017; Nikulina *et al*., 2022).

These mechanisms are implemented at different levels of the collaboration. At a higher level, these *define the parameters of the collaboration*, by dictating the adopted organisational (Ireland *et al.,* 2002) and ownership structures (Spekman *et al.,* 1998) of the partnership, through the contractual arrangements. These structural and relational mechanisms align the interest of partners (Liu *et al.,* 2009; Donada *et al.,* 2012; Cao & Lumineau, 2015; DeFillippi & Sydow, 2016; Chakkol *et al.,* 2018) and mitigate relational risks (Gulati *et al.,* 2012). For example, diverging goals hinder the ability of partners to adapt to one another's products, processes and purposes, thus resulting in interorganisational conflicts (Turner, 2001). Therefore, the parameters of the collaboration should be designed to mitigate these risks. Governance and Administration mechanisms such as equity investments and joint ventures reduce opportunistic behaviour through the mutual exchange of hostages (Kogut, 1988, Rerup *et al.,* 2019) and by mitigating the risks of information leakage and misappropriations of resources (Gulati *et al.,* 2012), resulting in the alignment of goals and the balancing of power dynamics. Similarly, contractual arrangements formalise the roles and responsibilities of partners and how they will combine their resources to match the complexity of the project or desired outputs (Hoetker, & Mellewigt, 2009; Kapsali *et al.,* 2018). For instance, these can detail how partners are expected to contribute to the production of specific outputs, and provide enforceable requirements in terms in terms of their operational performance (Kapsali *et al.,* 2018), quality of the collaboration (Om & Oh, 2020) and collaboration costs (Parker & Brey, 2015). Thus, the governance and administration mechanisms that define the parameters of the collaboration provide a signal for partners to "*communicate their ability to meet each other's needs*" (Malhotra & Lumineau, 2011: 983) and to align their behaviours by demonstrating their willingness to collaborate (Poppo & Zenger, 2002; Cao & Lumineau, 2013). These are thus deployed to facilitate integration at an inter-organizational level. Examples of mechanisms can be found in Table 1: Governance and Administration mechanisms

In addition, governance and administration mechanisms elicit the *partnership's day to day management*. These mechanisms detail the hierarchical management of the collaboration and the degree of integration of partners in the decision-making process. For example, some partnerships have independent and autonomous boards or steering

committees to manage the decision-making process related to the collaboration (Thomson *et al*., 2009). In such scenario, the collaboration is a temporary organisation, with its own management and executive team (Hietajärvi *et al*., 2017) that oversees and directs the collaboration and the project it delivers (Connaughton & Collinge, 2021). The administration of the different managerial levels can reflect this structure. For instance, these can adopt joint groups for the planning of the project (Mayer & Argyres, 2004; Argyres *et al*., 2007; Davies *et al*., 2016; Hietajärvi *et al*., 2017), and integrated project teams for the delivery (Chakkol *et al*., 2018; Tee *et al*., 2019. Conversely, other partnerships adopt steering groups where their members depend solely on their parent organisation (Gulati *et al*. 2013*)*. These are thus deployed to facilitate integration at an executive level (c.f. Table 1: Governance and Administration Mechanisms)

Furthermore, the governance and administration mechanisms provide bounding *procedures that detail how the collaboration should interact and operate* (Nikulina *et al*., 2022). For example, these mechanisms elicit the communication procedures communicate (Connaughton & Collinge, 2021), detail the metrics defining the accuracy, adequacy, reliability and timeliness of information (Chen *et al*., 2011), provide explicit problem-solving processes (Galeazzo & Furlan, 2019) and risk-management procedures (Gulati *et al*., 2013; Davies *et al*., 2016; Friday *et al*., 2018). Communication mechanisms are often described as drivers of successful collaborations (see for e.g. Mohr & Spekman, 1994; Monge *et al*., 1998; Srikanth & Puranam, 2011; Badir *et al*., 2012). These mitigate the risks of interpersonal (Löhr *et al*., 2017) and interorganisational conflicts (Davis, 2016), promote clarity and visibility over the strategic (Doz, 1996) and operational objectives (Chakkol *et al*., 2018) and support decision-making (Butler, 2010; Van der Kamp *et al*., 2022). Communication and the quality of the shared information are antecedents for the development of relational norms such as trust (Cullen *et al*., 2000; Kadofers, 2004), commitment, reciprocity (Bendoly & Swink, 2007; Montoya-Torres & Ortiz-Vargas, 2014), goal alignment (Monge *et al*., 1998; De Man & Roijakkers, 2009; Galvin *et al*., 2021) as well as performance (Rindfleisch & Moorman, 2001; Johnston *et al*., 2004; Narasimhan & Nair, 2005). Conversely, poor communication were found to be drivers of conflicts (Hardy & Phillips, 1998) and operational failures (Gulati *et al*., 2013).

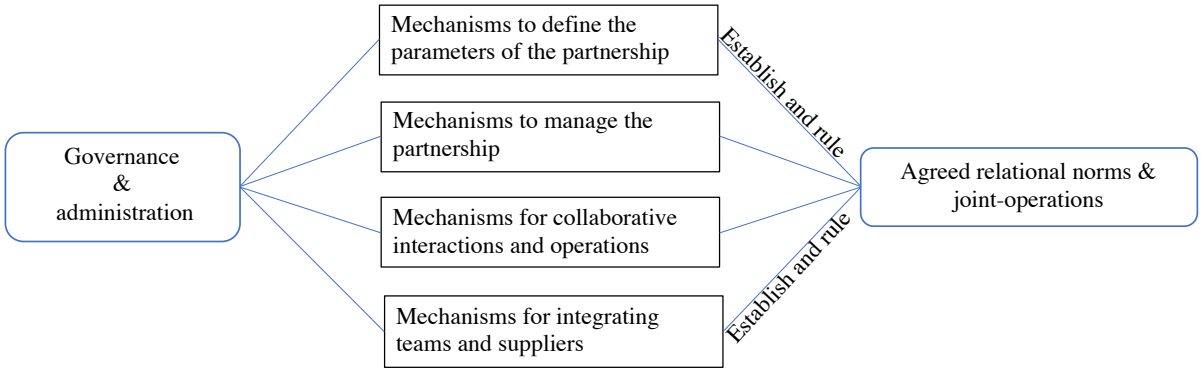
In addition, the ability of partners to manage risks is often described as a determining factor for the long-term success of collaborations (Das & Teng, 1996; 1999; Gulati *et al.,* 2012; Hietajärvi *et al.,* 2017). While both IOCs and complex projects exhibit high volumes of differentiated technical and relational risks (Baccarini, 1996; Das & Teng, 1996; Ramasesh & Browning, 2014), the ability of partners to jointly share these risks will influence their ability to sustain collaborative outcomes (Gulati *et al.,* 2012). The governance and administration mechanisms for collaborative interactions and operations detail often entail risk management procedures related to enterprise, financial and relational risks. For example, partners often deploy the mechanisms for sharing the financial risks of the partnership to mitigate conflicts (Oliver, 1990). Misaligned and/or imbalanced risk management may exacerbate opportunism (Gulati *et al.,* 2012) and erode the development of relational norms (De Man &. Roijakkers, 2009). Conversely, the effective behavioural alignment of partners is contingent on a fair sharing and control of the financial, relational and operational risks (Dekker, 2004; Gil & Tether, 2011). The effective sharing of risks was found to be a signal of trust, reliability and commitment to the relationship (Das & Teng 1996; Molm *et al.,* 2000; Davies *et al.,* 2016; Friday *et al.,* 2018). Shared risk mechanisms are contingent on the effective design and quality of collaborative structures (Pisano *et al.,* 1988; Pisano, 1990; Hennart, 1991; Williamson, 1991; Parkhe, 1993; Oxley, 1997; Sampson, 2004; Hennart, 2006; Faems *et al.,* 2008). Therefore, the governance and administration mechanisms for collaborative interactions and operations facilitate the integration of organisations on an operational level. Examples of such mechanisms can be found in Table 1: Governance and Administration Mechanisms

Lastly, since fragmented and adversarial relationships pose significant risks to the success of projects (Latham 1994; Egan 1998; National Audit Office, 2011), the governance and administration mechanisms can detail how *teams and suppliers are to be integrated in the collaboration*. The degree of integration or fragmentation of suppliers and/or individuals across projects adopting collaborative deliveries differs (Bygballe *et al.,* 2015; 2016; Prentice *et al.,* 2019; Sedgwick, 2017). Some project governance defines the procedures for selecting individuals based on their collaborative experiences to build the delivery teams (Bresnen & Marshall, 2002).

These projects typically adopt fully integrated teams (Chakkol *et al*., 2018; Tee *et al*., 2019). Similarly, governance mechanisms can detail how to select suppliers based on thier prior successful collaborations (Bresnen & Marshall, 2002; Connaughton & Collinge, 2021; Eriksson, 2015; Hietajärvi *et al*., 2017). The extent to which suppliers and/or subcontractors are integrated in the delivery process differs across projects. In some projects, collaboration extends solely between the client and the main contractors, such as in Public Private Partnerships (see for e.g. Jajja *et al*., 2017; Santos & Cabral, 2022). In other projects, collaboration extends to the supply chain (see for e.g. Mello *et al*., 2015), where the governance and administration agreements are designed to include suppliers in the integrated teams (Hietajärvi *et al*., 2017; Connaughton & Collinge, 2021; Nikulina *et al*., 2022). Examples of such mechanisms can be found in Table 1: Governance and administration mechanisms

Therefore, the objectives of Governance and administration mechanisms are to define the relational and technical parameters of the relationships, to detail the management of the partnership, provide structure for both the interactions and operations and to integrate teams and suppliers. The governance and administration mechanisms therefore provide the rules to formalise the agreed upon relational norms and joint operations (see fig. 3 below).

Figure 3:The Role of Ggovernance and Administration Mechanisms




Adapted from Nikulina *et al*. 2022[1]

[1] The descriptive labels and objectives of were developed by the author based on the literature

Table 1: Governance and Administration Mechanisms[1]

| | Mechanism[2] | Examples |
|---|---|---|
| Governance & administration | To define the structure and boundaries of the collaboration | ● Organisational structure (Ireland et al., 2002); Ownership structures (Spekman et al., 1998).<br>● Alignment of interests of partners (Liu et al., 2009; Donada et al., 2012; Cao & Lumineau, 2015; DeFillippi & Sydow, 2016; Chakkol et al., 2018)<br>● Mitigation of relational risks (Kogut, 1988; Turner, 2001; Gulati et al., 2012; Rerup et al., 2019)<br>● Formalising the roles and responsibilities of partners (Hoetker, & Mellewigt, 2009; Parker & Brey, 2015; Kapsali et al., 2018; Om & Oh, 2020) |
| | To define the day-to-day management the partnership | ● Leadership and decision-making structure (Thomson et al., 2009; Hietajärvi et al., 2017; Connaughton & Collinge, 2021).<br>● Joint groups for planning (Mayer & Argyres, 2004; Argyres et al., 2007; Davies et al., 2016; Hietajärvi et al., 2017)<br>● Integrated project teams for the delivery (Chakkol et al., 2018; Tee et al., 2019) |
| | To define collaborative interactions and operations | ● Communication and information sharing procedures (Chen et al., 2011; Srikanth & Puranam, 2011; Badir et al., 2012; Löhr et al., 2017; Connaughton & Collinge, 2021),<br>● Problem-solving mechanisms and risk management (Hennart, 2006; Faems et al., 2008; Gulati et al., 2013; Davies et al., 2016; Friday et al., 2018; Galeazzo & Furlan, 2019) |
| | To integrate suppliers and/or teams | ● Behavioural contracting procedures (Bresnen & Marshall, 2002; Connaughton & Collinge, 2021; Eriksson, 2015; Hietajärvi et al., 2017)<br>● Team selection procedures (Bresnen & Marshall, 2002)<br>● Team integration procedures (Dewulf & Kadefors, 2012 Hietajärvi et al., 2017; Bygballe & Swärd, 2019; Connaughton & Collinge, 2021) |

### *Support mechanisms*

Support mechanisms entail the processes and procedures that "*help collaboration to emerge (develop), maintain and improve (or recover)*" (Nikulina *et al.,* 2022: 801). While the governance and administration mechanisms are designed and implemented during the pre-formation and formation stages of collaborations for the duration of the relationship (Kapsali *et al*., 2018; Prajogo *et al.,* 2021), the support mechanisms are designed during the production stage and are deployed when deemed necessary by the exchange partners (Bayliss *et al.,* 2004; Kinulina *et al*., 2022). These integrative mechanisms therefore aim to support partners in learning what collaboration entails and how to collaborate (Connaughton & Collinge, 2021), through *sharing collaborative knowledge* to create a mutual understanding of collaboration and *incentives to engage collaboratively* between teams.

[2] These labels where summarised from the literature

Early research identified that success of the collaborative process "*relies on a learning mechanism*" (Morrison & Mezentseff, 1997: 352). Iftikhar and Ahola (2020) demonstrated that knowledge sharing mechanisms varied in terms of the scope and their nature. They argued that these "*include knowledge sharing tools, both formal and informal; types of knowledge, i.e. tacit and explicit knowledge; and levels of units such as individuals, teams, organizations (internal knowledge sources) and the interorganizational level (external knowledge sources)*" (p.1367). These mechanisms are deployed in different levels of the collaboration to sustain specific outcomes. For example, shared learning mechanisms are found to support partners in aligning their incentives and goals (Doz, 1996; Morrison & Mezentseff, 1997) and to help them "*learn how to cooperate for mutual benefit*" during production (Todeva & Knoke, 2005: 134). These mechanisms reinforce relational norms and the openness to new ideas and problem solving (Crossan & Inkpen, 1995; Bohlin & Brenner, 1996; Doz & Hamel, 1998; Dyer & Singh 1998; Kale *et al.,* 2000; Lee & Cavusgil, 2006; Gulati *et al.,* 2012). Therefore, a "*strategic alliance that incorporates "shared learning" encourages a foundation of trust and mutual commitment*. […] *With this perspective, conflict will be minimal as organizations will be able to adapt*" (Morrison & Mezentseff, 1997: 356). In addition to relational outcomes, the complexity of large-scale infrastructure projects often forces partners to leverage on their specific knowledge to deliver tasks (Miller & Hobbs, 2005; Davies *et al.,* 2016; Tee *et al.,* 2019). Thus partners deploy interorganisational knowledge sharing mechanisms develop and combine their capabilities (Davies *et al.,* 2016). In addition, research suggests that knowledge sharing is an antecedent of problem solving (Galeazzo & Furlan, 2019), efficiency and performance (Estrada *et al.,* 2016) in collaborations. The literature identified different support mechanisms for sharing knowledge. Some are interactional, such as workshops (Ruijter *et al.,* 2020; Connaughton & Collinge, 2021), team events (Bresnen & Marshall, 2002; Dewulf & Kadefors, 2012; Eriksson, 2015; Nikulina *et al.,* 2022) or through the formal meetings and interactions of teams (Iftikhar and Ahola, 2020). Conversely, other mechanisms aim to identify, develop and improve collaborative knowledge through assessments and training (Thomson et al., 2009; Dewulf & Kadefors, 2012; Bygballe & Swärd, 2019). Examples of such mechanisms can be found in Table 2: Support mechanisms

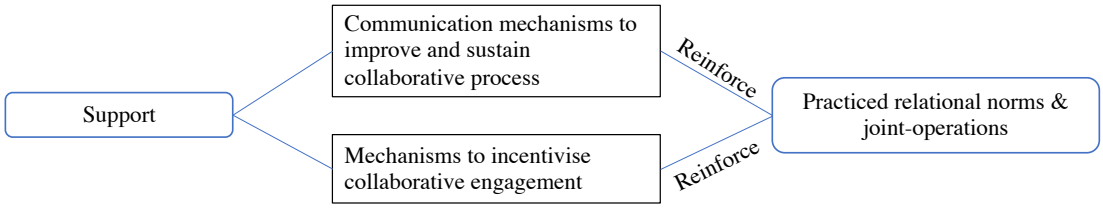
In addition to sharing collaborative knowledge sharing, in projects, exchange partners have been observed to deploy mechanisms to incentivise teams to engage collaboratively (see Nikulina *et al*., 2022). While the Governance and administration mechanisms detail incentives for partners to align their strategies, operations and resources to avoid skiting (Gulati *et al*., 2012), support mechanisms provide incentives for teams to engage collaboratively (Nikulina *et al*., 2022). Some incentives to engage collaboratively are technical, such as collaborative goal setting and key performance indicators to monitor and measure how teams collaborate (Hietajärvi *et al*., 2017). Incentive systems that reward collaboration have been observed in complex construction and infrastructure projects to mitigate the risk of fragmentation between the organisations and their delivery team (Dewulf & Kadefors, 2012; Hietajärvi et al., 2017). For example, Chakkol et al. (2018) demonstrate that incentives in projects are increasingly non-financial "*to motivate the individuals to shift their mind-sets and ways of working from a focus on the organisation's interests, to a focus on collaboration*" (p. 400).

Other alliances deploy support mechanisms to incentivise teams in resolve disagreements collaboratively (Galvin et al., 2021). Such mechanisms are commonly used to align the interests and behaviours of partners when facing complexity (Howard & Caldwell, 2014). In addition, to incentivise collaborative engagement, complex project often adopt integrated delivery models (), where the exchange partners and their teams are collocated and/or share offices (*Tee et al*., 2019; Nikulina *et al*., 2022). These mechanisms reinforce collaborative behaviours by enabling partners to build inter-personal relationships solve problems jointly (Kokkonen & Vaagaasar, 2018). These support mechanisms are instrumental in driving collaborative engagement, by supporting the emergence of collaborative cultures, driving in-person formal and informal collaborative activities, improving relationships and develop trust (Bresnen & Marshall, 2002; Bygballe & Swärd, 2019; Bygballe et al., 2015; Dewulf & Kadefors, 2012; Kokkonen & Vaagaasar, 2018).

Therefore, the objectives of Support mechanisms are to reinforce the relational and technical drivers of the relationships and to promote an environment where collaboration can be practiced by the exchange partners' teams. Examples of such

mechanisms can be found in Table 2: Support mechanisms. The support mechanisms therefore encourage the relational norms and joint operations that exchange partners agreed upon through their governance and administration mechanisms (see fig. 3 below).

Figure 4: The role of support mechanisms




Adapted from Nikulina *et al*. 2022[3]

[3] The descriptive labels and objectives of were developed by the author based on the literature

Table 2: Support mechanisms

| Mechanisms | Example |
|---|---|
| communicating to sustain and improve collaborative process | ● Formal and informal interactions for aligning incentives and goals (Doz, 1996; Morrison & Mezentseff, 1997)<br>● Formal interactions to improve structural collaboration at different hierarchical levels (Todeva & Knoke, 2005: 134)<br>● Formal and informal interaction to reinforce relational norms; openness to new ideas and problem solving (Crossan & Inkpen, 1995; Bohlin & Brenner, 1996; Doz & Hamel, 1998; Dyer & Singh 1998; Kale et al., 2000; Lee & Cavusgil, 2006; Gulati et al., 2012).<br>● Formal and informal interaction to leverage partner's specific knowledge to deliver tasks (Miller & Hobbs, 2005; Davies et al., 2016; Tee et al., 2019), develop and combine their capabilities (Davies et al., 2016).<br>● Assessments and training (Thomson et al., 2009; Dewulf & Kadefors, 2012; Bygballe & Swärd, 2019). |
| Incentivising collaborative engagement | ● Formal goals and KPIs for collaboration (Hietajärvi et al., 2017; Nikulina et al., 2022)<br>● Team incentives (financial and non-financial) for collaboration (Dewulf & Kadefors, 2012; Hietajärvi et al., 2017; Chakkol et al., 2018)<br>● Collaborative issues/problem resolution (Howard & Caldwell, 2014; Galvin et al., 2021)<br>● Integrated delivery (Kokkonen & Vaagaasar, 2018; Tee et al., 2019; Nikulina et al., 2022) |

### *Joint-Work mechanisms*

While the Governance and administration and Support mechanisms codify and reinforce collaborative behaviours to integrate organisations and teams, the joint-work mechanisms are deployed to integrate the processes and systems to produce project outputs. This requires the "*deliberate and orderly alignment or adjustment of partners' actions to achieve jointly determined goals*" (Gulati *et al.,* 2012: 12). The successful delivery of tasks requires persistent and organised efforts from partners to operate the relationship (Heath & Staudenmayer, 2000; Kretschmer & Puranam, 2008). Joint-work mechanisms are thus deployed to enable the orderly alignment of actions by developing shared plans for *planning and controlling* the delivery of the project and producing it through *shared production*. Examples of such mechanisms can be found in Table 3: Joint-work mechanisms

Early collaboration research often viewed shared planning as an antecedent of alliance performance (Palmer, 1983; Das & Teng, 2000; Mayer & Argyres, 2004). In IOCs, joint-work mechanisms for shared planning vary in accordance with the aims of the

project and the extent of integration partners envision. For example, partners elicit strategic plans to define and operationalise their shared goals and underlying performance outcomes (Gulati *et al.,* 2012). These are translated into in operational plans to implement relationship and/or project specific structures, such as modularity, to support collaborative goals and produce the project (Tee *et al.,* 2019). By jointly planning the sequencing of actions (Palmer, 1983; Das & Teng, 2000) and of the production process (Davies *et al.,* 2016; Tee *et al.,* 2019), partners can the monitor and control of the relationship and the project (Tee *et al.,* 2019). The dynamic nature of alliances and projects requires partners to plan for contingencies (Mayer & Argyres, 2004; Argyres *et al.,* 2007) to maintain a degree of flexibility to adapt to emergent issues (Skipper *et al.,* 2014) and to adapt and modify plans during the production (Hietajärvi *et al.*, 2017; Pargar *et al.,* 2019). The modification and adaptation of plan is contingent on partners jointly monitoring the actual versus the expected performance of the relationship and the project (Williamson, 1991; Luo, 2006). Thus joint-work mechanisms for shared planning can include procedures for monitoring and controlling the performance of the project in accordance with the plans (White & Lui, 2005; Hietajärvi *et al.*, 2017). Shared reporting is commonly used for the control of outcomes (White & Lui, 2005; Chakkol *et al.,* 2018), where "*outcome control mechanisms specify outcomes to be realized by the IOR and by its partners and monitor*" performance (Dekker, 2004: 32). Dekker (2004) argued that cost controls support the efficiency of the partnership, by identifying areas of savings. Consequently, partners can improve the performance of the alliance through the deploying of innovations. Furthermore, the deployment of such mechanisms moderates the impact of partners' negative perceptions of reliability and/or commitment and supports the allocation of resource (Jap & Shankar, 2000), supports decision making (Hamel, 1991; Davis *et al.,* 2016) and reduces opportunism (Gulati *et al.,* 2012).

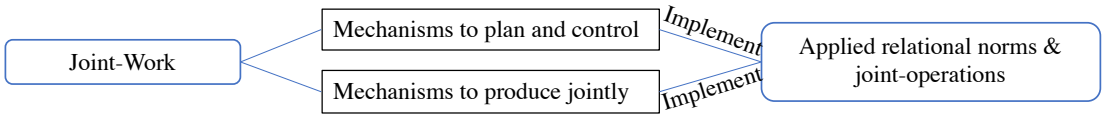
In addition to eliciting procedures for the planning and control of the project, joint-work mechanisms also detail how teams produce its tasks. This research defines these as the *shared production*, which refers to the joint-work mechanisms that permit the productive combining of activities and capabilities, and joint decision making to pursue their strategic and operational goals (Das & Teng 2000; Gulati *et al.,* 2012, Tee *et al.*, 2019). The degree effectiveness and efficacy of the shared production such as

task decomposition and allocation drive the success or failure of alliance (Puranam *et al.,* 2012; Raveendran & Puranam, 2012). For example, Tee *et al.,* (2019) showed that projects can be broken down into specialised tasks and outputs combined the standardisation of basic components to drive efficiency. In their context, the project teams were allocated in accordance with this decomposition and were thus specialised with their module. In addition to how tasks are allocated to teams and their degree of specialisation, joint work mechanisms for production also encompass the systems that partners deploy (Gulati *et al.,* 2012; Raveendran & Puranam, 2012) and combine to enable the efficient realisation of products (Winroth, 2004). The production systems refer to the tools and capabilities deployed by organisations to produce complex projects (Bensaou & Venkatraman, 1995; Ramasesh & Browning, 2014). Much of IOC research examined production systems such as interorganisational systems for sharing production related data (Zhang & Cao, 2018), integrating partners (Fawcett *et al.,* 2011), communicating to support production objectives (Chi & Holsapple, 2005) and manufacturing strategies (Davies *et al.,* 2016; Tee *et al.,* 2019) and for controlling and combining activities and outputs (Gulati *et al.,* 2012). The literature suggest that the deployment of shared systems is driven by expectations of efficiency, agility, innovation, stability, and legitimacy (Chi & Holsapple, 2005; Zhang & Cao, 2018). For example, commonly explored systems include building information modelling (BIM) systems to manage the integration of tasks (Hietajärvi *et al.*, 2017). While joint work mechanisms for the shared production are an antecedent of performance, these also rely upon the effective communication and decision-making structures adopted by partners (Bendoly & Swink, 2007; Nielsen, 2010; Le *et al.,* 2021). For example, the empowerment of team leaders supported a faster turnaround in decision making, and thus positively impacted the performance of collaboration in projects (Badir *et al.,* 2012). Furthermore, shared production can be replicated across projects and partnerships to mimic previous performance outcomes (Goerzen, 2007; Davies & Brady, 2000; Davies *et al.,* 2016).

Lastly, joint work mechanisms for the shared production can also encompass alliance termination procedures to manage transitions (Reuer & Zollo, 2005). In the context of projects, collaborations are temporary and thus require formalised termination mechanisms (Sydow & Braun, 2018). "*By definition a temporary*

*organization has a built-in termination mechanism*" (Lundin & Söderholm, 1995: 449), and these mechanisms appear to be institutionalised in interorganisational projects (Sydow & Braun, 2018). Partners can terminate the alliance should the performance of partners shirk from their contractual obligations (Carson *et al*., 2006; Gulati *et al*., 2012) or to facilitate the orderly disengagement of partner when the partnership was successful (Reuer & Zollo 2002).

Figure 5: The role of Joint-work mechanisms




Adapted from Nikulina *et al*. 2022[4]

Table 3: Joint-work mechanisms

| | **Mechanisms** | **Example of mechanisms** |
|---|---|---|
| Joint Work | to plan and control the delivery of the project | ● Joint planning of the sequencing of actions (Palmer, 1983; Das & Teng, 2000) and of the production process (Davies et al., 2016; Tee et al., 2019) at different hierarchical levels<br>● Joint monitoring and control of the relationship and the project (Tee et al., 2019).<br>● Contingency plans to adapt (Mayer & Argyres, 2004; Argyres et al., 2007; Skipper et al., 2014; Hietajärvi et al., 2017; Pargar et al., 2019).<br>● Shared reporting is commonly used for the control of outcomes (White & Lui, 2005; Hietajärvi et al., 2017; Chakkol et al., 2018) |
| | to produce the tasks and outputs of the project | ● Task decomposition and allocation to teams (Puranam et al., 2012; Raveendran & Puranam, 2012).<br>● Specialisation and/or standardisation (Tee et al., 2019)<br>● Systems combining (Bensaou & Venkatraman, 1995; Gulati et al., 2012; Raveendran & Puranam, 2012; Ramasesh & Browning, 2014; Hietajärvi et al., 2017; Zhang & Cao, 2018) |

[4] The descriptive labels and objectives of were developed by the author based on the literature

### *The role of integrative mechanisms in the collaborative process*

While the previous sections discussed the Governance and administration, Support and Joint-Work mechanisms independently, these are not deployed in isolation. Rather, inter-organisational collaboration relies on the interplay between sets or subsets of mechanisms (Bygballe *et al.,* 2015; Cao & Lumineau, 2015; Galvin et al., 2021). The deployment of integrative mechanisms, their objectives, their enactment and their interplay constitutes the collaborative process (Nikulina *et al.,* 2022). The composition and combination of integrative mechanisms are unique to their respective collaborative project (Bygballe et al., 2015; 2016; Prentice et al., 2019; Sedgwick, 2017), adjust over time (Nikulina *et al*., 2022) and evolve in accordance with the relational needs and experience of the collaborating organisations and teams (Bygballe et al., 2015; Hietajärvi et al., 2017).

The three categories of mechanisms are connected in a '*hierarchical way*' (Nikulina *et al*., 2022: 805). The Governance and administration forms the framework of processes and procedures that rules and controls the collaborative process (Thomson et al., 2009; Chakkol et al., 2018). These are implemented first and are often during the pre-formation and formation stages of the collaboration (Lee & Cavusgil, 2006; Ruijter et al., 2020; Connaughton & Collinge, 2021; Nikulina et al., 2022). The mechanisms of Support translate and reinforce the rules and envisioned relational norms by creating an environment where these can be practiced (Eriksson,2015; Hietajärvi *et al*., 2017; Kokkonen & Vaagaasar, 2018; Bygballe & Swärd, 2019). Lastly, Nikulina et al. (2022) argue that the Joint-work mechanisms permit the implementing and application of relational norms for producing tasks. They argue that these enable a feedback loop where collaborative successes and failures enable changes and adaptations in both Governance and administration and Support mechanisms to build and sustain relational norms.

While prior works showed the role of mechanisms for establishing, controlling, reinforcing and enacting relational norms, the literature does present significant limitations. Firstly, the collaboration literature historically and predominantly examined how projects and relationships are governed (e.g. Joskow, 1988; Zaheer & Venkatraman, 1995; Oxley, 1997; Joshi & Campbell, 2003; Ferguson et al., 2005; Lee

& Cavusgil, 2006; Blome *et al*., 2013; Chakkol *et al*., 2018; Benítez-Ávila *et al*., 2019; Aben *et al*., 2021; Belhadi *et al*., 2021). These works largely examined the effect of collaboration of performance or the development of relational norms. Few studies examined the interplay between mechanisms and outcomes, thus providing little evidence to explain the collaboration process.

In addition, research examining inter-organisational collaboration and the role of mechanisms are often limited by their methodologies. The majority of studies still examine inter-organisational dyads to explain collaboration (see for e.g. Um & Oh, 2020; Van der Kamp, 2022) rather than examining multi-stakeholder networks that are commonly adopted in projects (Tee *et al*., 2019). Therefore, their findings are inherently difficult to generalise beyond their cases (Prentice *et al*., 2019). Furthermore, much of the research loosely defines both collaboration and mechanisms. This failure to define what mechanisms and/or collaborative outcomes are, what they entail and how these differ from other constructs (see for e.g. Wu et al., 2006; Estrada et al., 2016; Tee et al., 2019; Belhadi et al., 2021; Nikulina et al., 2022) as well as collaboration itself, contributes to the "*confusing landscape*" of collaboration research (Thomson et al., 2009: p.24). Thus research should address in more detail the theoretical foundations of mechanisms and collaborative outcomes to explain the collaborative process, which starts by examining networks and the underpinning elements that define mechanisms. The following sections provide explanations related to these common issues.

### 2.3.2 The operationalisation of mechanisms in dyadic relationships

"*The three categories of these mechanisms – Governance and administration, Support, Joint work activities - provide an arena for relational norms to be developed and agreed, and for collaborative behaviours to be practiced and implemented*" (Kikulina *et al*., 2022: 807). However, prior literature examining the deployment of collaborative and/or integrative mechanisms in interorganisational setting adopted one of two strategies. First, some compared interorganisational dyads across different projects and/or sectors to understand the influence a set or subset of mechanisms have on specific collaborative outcomes (see for e.g., Bendoly & Swink, 2007; Jap &

Anderson, 2007; Caldwell & Howard, 2014; Albers *et al.,* 2016; Aaltonen & Turkulainen, 2018; Kapsali *et al.,* 2018; Prajogo, 2019; Aben *et al.,* 2021). Comparative studies thus prescribed the mechanisms that enable performance outcomes. While these studies provide an understanding of the salient and common mechanisms of collaboration, these fail to examine how these are enacted, or embrace the role of the uniqueness of certain mechanisms and contexts to explain collaboration (Bresnen, 2009; Hong *et al.,* 2009; Bygballe *et al.,* 2015; Sedgwick, 2017; Prentice *et al.,* 2019). Conversely, other works examined the unique features of specific collaborative dyads. They demonstrate that projects are unique, and that consequently partners also deploy unique mechanisms to their project (see for e.g. Bygballe et al., 2015; 2016; Sedgwick, 2017; Prentice et al., 2019). While these studies provide highly nuanced analyses of the contextual features and dynamics of collaboration, their results may not be generalisable. Regardless of the adopted strategy, prior research largely examine dyadic and formalised partnerships, such as JVs and alliances (cf. Hong et al., 2009). In addition, these address collaboration through their governance and administration (see for e.g., Poppo & Zenger, 2002; Cao & Lumineau, 2013; Caldwell & Howard, 2014; Chakkol et al. 2017; Kapsali et al. 2018), rather than through their production stage. Thus current research is constrained by its strategies and its lens. Bresnen (2007) argued that research would gain in exploring the complexities and underlying dynamics within relationships. Furthermore, Hong *et al.,* (2009) argue that to understand the nuances of these dynamics, research should focus on networks, rather than dyads to compare and understand how and why collaborative mechanisms are deployed and co-evolve. Examining ego networks, that is a set of companies and organisations that have a direct relationship with the focal organisation (Provan *et al.,* 2007) would enable both comparison across different dyads to capture nuances, saliency and uniqueness, and examine how mechanisms co-evolve over time. A notable example is Tee *et al.,* (2019) who showed why and when integrating practices are deployed across the different organizational boundaries of a large-scale project to support coordinative and relational outcomes.

While the extant literature identified the role of integrative mechanisms to sustain collaborative outcomes, these are often ill-defined (see for e.g. Inkpen & Beamish, 1997; Olander *et al.,* 2010; Gulati *et al.,* 2012; Salvetat *et al.,* 2013, Nikulina *et al.,*

2022). For example, Li et al (2014) equate information sharing mechanisms with information sharing activities. Yet, what these entail remains equivocal. Other studies (see for e.g. Lawson *et al*., 2008; Matthews & Marzec, 2012; Yim and Leem, 2013) argued that prolonged social interactions were conducive to the sharing of information, yet how these occur seems to lack empirical investigation. Methodologically, the majority of aforementioned studies examined the correlation between mechanisms and performance outcomes, to prescribe what mechanisms organisations should deploy to sustain collaboration (Bresnen, 2007). For instance, information sharing and/or information sharing mechanisms are often adopted as dependent (Bendoly & Swink, 2007; Wu *et al*., 2014) and/or mediating variables (Mohr & Spekman, 1994) in collaboration research. Consequently, few studies examined how integrative mechanisms are operationalised in exchange relationships.

The lack of conceptual clarity regarding mechanisms is not unique to the IOC Literature, rather it is a prevalent issue across social sciences. "*Indeed, the concept 'mechanism' has become regularly used – almost a buzz- word – in research focusing on explaining organizational change*. […] *However, in most cases mechanisms, per se, are not defined at all or the definitions have remained vague and even contradictory*" (Pajunen, 2008: 1449). Mechanisms have four characteristics. Institutional theorists argue that the first two characteristic are that mechanisms produce outcomes and are composed of component parts (Glennan, 2002; Bechtel & Abrahamsen, 2005). Thirdly, this productive activity is dependent on its two-level hierarchical structure, where the higher level—that is the productive aim and outcome— and their component parts (Glennan, 2002; Bechtel & Abrahamsen, 2005) which are the entities such as organisations, teams or individuals and activities (Machamer *et al*., 2000; Glennan, 2002; Tabery, 2004). These activities "*can be individuated by their properties or their mode of operation*" (Pajunen, 2008: 1452), that is by their features —purpose, properties, and design— and performing by participant (Feldman & Pentland, 2003). The combination of these practices and entities constitutes the mechanism and accordingly, component parts cannot be isolated from one another (Craver, 2001; Bechtel and Abrahamsen 2005). The fourth characteristic is that the performing of mechanisms can be accurately modelled to explain organisational processes (Pajunen, 2008). For example, let's consider a

process improvement mechanism. The higher-level aim of the mechanism is to improve the performance of a or several given processes. For the mechanism to be operationalised, its component parts will be combined and performed. In this example, entities can entail the project managers, operations managers and teams involved in the mechanisms, and the activities can entail data collection, modelling, benchmarking, transformation planning and trialling. The combining of these activities operationalise the mechanism and its modelling (workflow) can be modelled.
Thus, the underlying practices of collaboration should be explored to understand how integrative mechanisms are operationalised to sustain outcomes.

However, the literature examining practices in collaborative context is still very much nascent. For instance, in IOC, practices and routines are hypothesised as static and stable entities that partners deploy to further the activities of the alliance (Zollo *et al.,* 2002; Schilke & Goerzen, 2010; Rerup *et al.,* 2019). Furthermore, these are often characterised as "*repeatable solutions by recycling experience from one project for others in the same line of business*" (Davies & Brady, 2000, p. 932). However, the management and strategy literature demonstrate that practices are dynamic entities (Feldman & Pentland, 2002), which are transferred, adapted and in some cases emergent within organisational units (Jarzabkowski, 2004). Conversely, how entities interact in practices to operationalise mechanisms remains an unexplored area in IOC research. To open the "black box" of collaboration (Tompson & Perry, 2006; Fawcett *et al.,* 2012) and understand the process of collaborative strategies (Nikulina *et al.,* 2022)) research should examine the component parts of mechanisms, that is their practices and interactions of participants. While being hitherto unexplored in the IOC literature, the practice based view (Bromiley & Rau, 2014) provides a compelling narrative to explain the processual phenomenon of collaboration developed by Tompson and Perry (2006) and Nikulina *et al.* (2022).

### 2.3.3 Practices of collaboration and the PBV

Much of the literature examining the technical dimension of alliances and joint ventures adopted the resource-based view (RBV) to frame pre-formation and formation dynamics. The RBV contends that competitive advantage stems from the uniqueness and inimitability of an organisation's resources and capabilities (Bromiley

& Rau, 2016). Consequently, collaboration studies adopting theoretical lenses in the tradition of the RBV argued that the success and failure of partnerships is dictated by the combining of complementary resources and capabilities (see for e.g. Teng, 2007; Wiklund & Shepherd, 2009; Lioukas *et al*., 2016). While these studies show the effect of resource on performance, these fail to explain how organisations combine these — that is the process and practices for combining resources— and it leads to performance outcomes. These works therefore overlooked the presence of "human actors and their actions" (Jarzabkowski & Spee, 2009: 70). More recent studies examined how exchange partners combine their efforts and build relational norms by deploying practices to operationalise integrative mechanisms. For example, Tee et al. (2019) showed that exchange partners complement the modular design of their projects with integrating practices to support collaborative outcomes.

Several studies mention the role of practices in fostering collaboration (see for e.g. Hartmann & Bresnen, 2011 Chakkol *et al*., 2018; Benítez-Ávila et al., 2019; Bygballe & Swärd, 2019; Nikulina *et al*., 2022), both in internal and interorganisational projects. For example, Bygballe and Swärd (2019) argued that partnering practices drive collaboration over time, through a "*mutually constitutive relationship between top-down structural interventions and an emergent and social learning process"* (p.162). Nikulina et al. (2022) showed that practices deployed provide the environment in which actors establish relational norms and these in turn bring about collaboration. While prior research uncovered that some projects do not deploy collaborative practices (Dewulf & Kadefors, 2012), others show that certain practices, such as integrated teams and colocation (Bresnen & Marshall, 2002; Dewulf & Kadefors, 2012; Bygballe et al., 2015; Kokkonen & Vaagaasar, 2018; Bygballe & Swärd, 2019; et al., 2019) are common in projects. Chakkol et al. (2017) argued that institutional drivers such as the BS1100 and ISO44001 institutionalised certain practices in interorganisational projects. However, some these works seem to conflate the concepts of mechanisms and practices, and sometimes even routines. In such cases, these terms tend to describe generative constructs in interorganisational settings. For instance, Tee et al., (2019) adopt the terms integrative practices and integrative mechanisms interchangeably, to describe activities and contexts that generated relational norms and behavioural alignment between partners.

Therefore, to understand how collaboration as a strategy —that is a way of working— is operationalised to deliver projects, research should delineate these terms. To do so, the 'practice-based view' (PBV) (Bromiley & Rau, 2014; Jarzabkowski *et al*., 2016) and 'strategy as practice' (Jarzabkowski, 2004) provide a theoretical lens to explain the process through which a strategy, in this case collaboration, is operationalised- that is practiced. The examination of practices is a "*promising lens to explain performance variation*" (Li *et al*., 2022: 13). Bromiley and Rau (2014) define practices as activities that organisations execute to achieve their desired performance outcome. They argue that the competitive advantage of companies are derived from these practices and how these are combined. Therefore, to understand how the performance is achieved, they argue that research should isolate and examine practices. Furthermore, Bianco et al., (2023) argue that not only do practices explain the variation in performance between organisations, but also that these are imitable. They argue that "*practices are exchangeable within the industry. As a result, several organizations can adopt similar practices, and all will experience performance improvement*." (p.2). Therefore, the institutionalised practices of collaboration identified by Bygballe and Swärd (2019), Chakkol et al. (2017) and Nikulina et al., (2022) should explain the performance of collaborative relationships.

However, the definition of practices offered in the PBV excludes two components— the actors and the implementation— making it rather restrictive. Practices are inscribed in the cognition and action of participants and these exist only as they are implemented and performed (Jarzabkowski *et al*., 2016). Therefore, the actors (entities) that enact (perform) the practice (activity) are theoretically inseparable. Thus, it is the "*day-to-day activities of any firm or organization* [that] *influence* […] *performance"* (Dubey et al. 2022: 2) in which teams interact for "*collaborative behaviours to be practiced and implemented*" (Nikulina *et al*., 2022: 798). Consequently, the outcomes of practices are contingent on who is involved and how (Jarzabkowski *et al*., 2016) and thus have unique attributes. These features of practices thus resonate with Pajunen's (2009) conceptualisation of mechanisms, where the mechanisms are activated by a or several activities (practices) that are performed by entities. Yet, little research has been conducted to examine how and why mechanisms converge or differ across

collaborative relationships and how these influence the performance of the collaboration.

## 2.4 Research objective and questions

The extant IOC literature, which largely focuses on dyadic relationships has overlooked the complexity of what actually happens in collaborations (Bresnen, 2007; Hong *et al.*, 2009). To understand the complexity of the collaboration, research should focus on networks, rather than dyads to understand how collaboration is deployed in the context of interorganisational networks (Hong *et al.*, 2009) in complex projects (Chakkol *et al.*, 2018). "*Instead of focusing on the firm itself* […], *it becomes important to focus on the value-creating system where different actors (suppliers, business partners, allies, customers) work together to co-produce value*" (Windahl and Lakemond, 2006, p. 809).

Furthermore, the literature has largely explored collaboration by prescribing what should happen in IOCs, rather than examining the underlying dynamics of collaboration (Bresnen, 2007). For example, when examining collaborative mechanisms, research largely explored how their deployment led to collaborative outcomes (cf. Inkpen & Beamish, 1997; Lawson *et al.*, 2008; Olander *et al.*, 2010; Gulati *et al.*, 2012; Matthews & Marzec, 2012; Salvetat *et al.*, 2013; Yim and Leem, 2013) rather than examining how these are operationalised through their component parts (Pajunen, 2008). Consequently, this thesis' research objective is:

*to explore the operationalisation of collaboration through the deployment of integrative mechanisms in the context of an ego-network delivering a complex infrastructure project.*

Accordingly, I propose the following research questions to address the research objective and understand how collaboration is operationalised in a network. Since the extant literature has mostly explored formalised dyadic relationships (cf. Chapter 2.2.1), the first research question is necessary to identify whether mechanisms are deployed across all relationships and whether these lead to the same outcomes. I propose the following question:

RQ 1: *How and why are projects outcomes attained through the deployment of collaborative mechanisms in the ego network?*

Secondly, since practices and entities compose mechanisms (Pajunen *et al*., 2008), research should examine the interactions of participants in the context of practices to understand how collaborative outcomes are attained. Therefore, I propose the following question:

RQ 2: *How and why do practices and interactions of entities operationalise collaborative mechanisms?*

Lastly, while the IOC literature examined practices as static and repeatable solutions for attaining economies of repetition across projects (see Zollo *et al*., 2002; Goerzen, 2007; Davies *et al*., 2016; Spencer *et al*., 2019), the management and institutional theory literature (cf. Feldman & Pentland, 2003; Pentland & Feldman, 2005; Biesenthal *et al*., 2019) largely views these as dynamic entities, that have recursive, adaptive and emergent qualities (Jarzabkowski, 2004). Therefore, to understand why practices are deployed to support specific mechanisms and whether these are dynamic entities or not, I propose the following question:

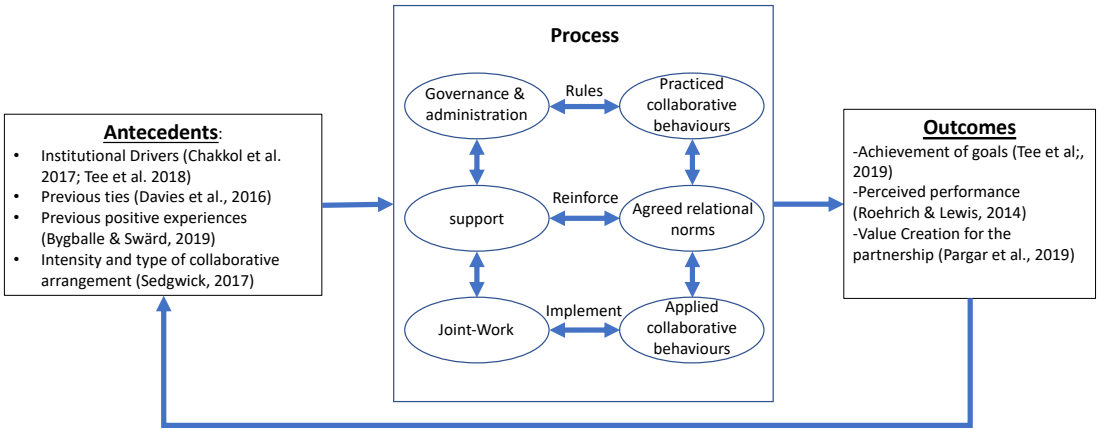
RQ 3: *How and why do practices influence the perceived performance of interorganisational collaborations*?

The next section proposes the conceptual framework that illustrates the linkages.

## 2.5 A conceptual framework for collaboration in complex projects

In light of the conclusions from the literature, the research objectives and questions, the conceptual framework adopted for this study is presented in the following figure. The blue arrows on the framework denote the causal relationships identified in the literature, while the black arrows denote the linkages between the different identified dimensions.

Figure 6: Conceptual Framework




Adapted from Thomson & Perry, 2008 and Nikulina *et al*. 2022

This conceptual framework combines the dimensions elicited by Thomson & Perry's (2008) Antecedent-Process-Outcome framework with Nikulina et al. (2022) modelling of integrative mechanisms. Following the review of the literature, the elements within Thomson & Perry's model were updated with contemporary literature. The design and implementation of the collaborative process between exchange partners is influenced by a set of antecedents. These include the institutional drivers, such as collaborative standards (Chakkol *et al.*, 2018) and institutionalised mechanisms of collaboration (Bygballe & Swärd, 2019). Furthermore, to reproduce the success of prior relationships partners transfer processual elements of their prior alliances (Gulati et al., 2013; Davies et al., 2016; Bygballe & Swärd, 2019; Tee et al., 2019). Lastly, the extent and intensity of the collaboration (Gulati et al., 2013), where partners adopt inter-organisational structures of varying degrees of integration to deliver the project (Sedgwick, 2017). The design of the collaboration, in terms of its governance and administration, support and joint-work mechanisms will be influenced by these antecedents (Nikulina et al., 2022), which in turn impact the development of relational norms. The success or failure of the

collaborative process will in dictate the outcome of the relationship, in terms of the achievement of goals (Gulati et al., 2013; Tee et al., 2019), the perceived performance of the collaboration (Roehrich & Lewis, 2014) and the value created by partners (Pargar et al., 2019). These outcomes will therefore influence their subsequent of collaborations.

# 3 Research Methodology

## 3.1 Overview of the chapter

The purpose of this chapter is to explain and justify the methodology adopted for this thesis. To do so, this chapter begins by explaining the philosophical foundations of this work. Section 3.2 will justify Critical Realism as the research philosophy by explaining its epistemological and ontological (depth realism) foundations. Conclusions are drawn based on the works of the founding fathers of the field, Russell Keat, John Urry and Roy Bhaskar. Following this, the single case study research method used in this thesis will be described and justified. Next, Section 3.3 explains the adopted retroductive research strategy. Then, the case study design will be described by defining the research objectives and boundaries and explaining fieldwork preparation, data gathering and its subsequent analysis and dissemination. The final section will evaluate the trustworthiness of the research by evaluating the methods with Hirschman's (1986) five and Strauss and Corbin's (1998) four criteria. Section 6 will justify the trustworthiness and replicability of the study. Section 3.7 summarises this chapter.

## 3.2 Philosophical assumptions of the research: Critical Realism

"*Approaches to social enquiry are concerned with both the logics used to develop new knowledge -with the steps and procedures that this involves- and with the philosophical and theoretical ideas and assumptions about what constitutes social reality and how knowledge of it can be produced*" (Blaikie, 2007: 5)

While the research objective drives the process of social sciences, the construction and expansion of knowledge itself relies upon the philosophical and theoretical assumptions embraced by the social scientist. How our social environments can be understood, described, and theorised has been the subject of rich debates within research communities. The increased focus on the epistemological and ontological assumptions of social science research led to the (re)development of new theoretical and therefore methodological perspectives within social enquiry (Blaikie, 2007).

For example, to break with the orthodox American sociology, which was rooted in Positivism and thus aimed to understand causal explanations of the social order, other philosophies (re-)emerged to challenge the "objectivity" of social sciences. Philosophical branches rooted in interpretivism, such as Ethnomethodology were developed to examine the social interactions and reasoning used by ordinary members of society to "*make sense of, find their way about in, and act on the circumstances in which they find themselves*" (Heritage, 1984: 4). By examining "*how members of society go about the task of seeing, describing and explaining order*" (Zimmerman and Wieder, 1071: 289), ethnomethodology is thus not concerned with causally explaining patterns or actions. The concept of objectivity was thus central to these methodological works. For example, scholars espousing Hermeneutics, such as Schleiermacher, Dilthey or Heidegger argued that social reality is not objective as it is driven by the subject's rationalisation and reconstruction of meaning that will define this reality (Gadamer, 1989). In addition, since social researchers are also part of the social environment, what constitutes reality will also be subject to their interpretations of the meaning(s) portrayed by their subjects (Popper, 1972). Therefore, these theoretical stances proposed diametrically opposed approaches to social inquiry, where Positivism regards *"reality as consisting of discrete events that can be observed* […] [and] *assumed that there is order in this reality can be summarized in terms of constant conjunctions between observed events or object"* (Blaikie, 2007: 112), while hermeneutics regards reality as the lived experience and interpretations of social actors (Bauman, 1978).

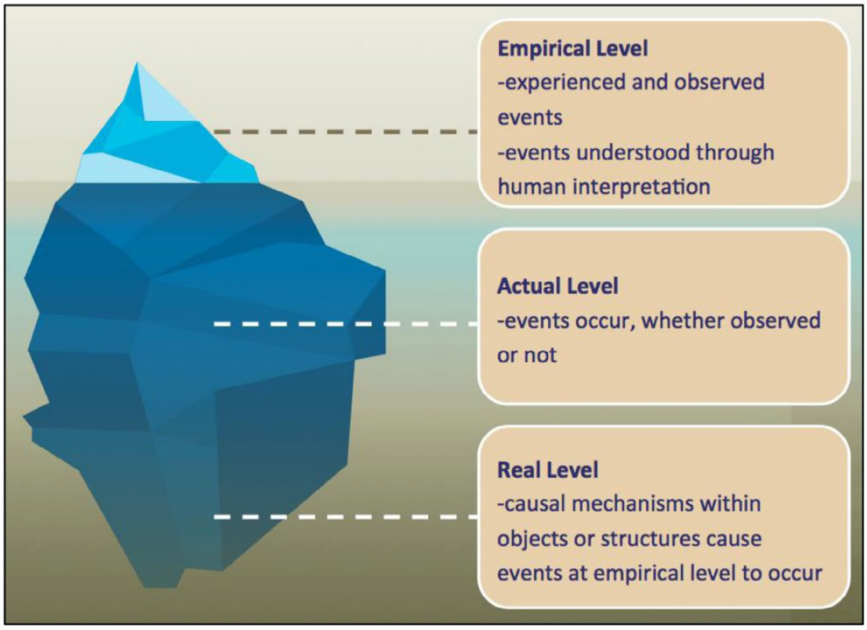
In an attempt to create a middle ground between these philosophical stances, a British tradition, Critical Realism, emerged in the 1970s. Critical realists argue that social sciences are "*concerned with the ontological questions of what kind of things there are and how these things behave*" (Blaikie, 2007). The adoption of realism in social sciences was driven by natural scientists Harré and Bhaskar, who theorised the use of realist principles in the social sciences (Harré & Secord, 1972; Harré, 1974; Bhaskar 1979). Critical realists argue that while social objects can be studied scientifically, their examination cannot adopt the same methods as natural sciences (Bhaskar, 1979). For example, in social sciences, "*it is impossible to close the system experimentally in order to isolate a single mechanism as in the natural science*"

(Belfrage & Hauf, 2017: 254). Critical realism is based on the principle that the 'real' nature of reality cannot be reduced to our understanding of that reality (Fletcher, 2017). In other terms, ontology is not reducible to epistemology. This, for critical realists, is due to humans being "*unable to fully understand or observe this reality, and that our knowledge of reality is fallible*" (Wynn & Williams, 2012: 789). In this respect, Critical Realism can be conceptualized as a "*middle ground*" 'Blaikie, 2007) or a "*third way*" (Fairclough, 2005; Belfage & Hauf, 2017) between positivism and interpretivist research paradigms. Bhaskar (1998) critiqued the reduction of reality to human knowledge in positivist and interpretivists research, where knowledge is a lens in the former and a container in the latter. "*In contrast, Critical Realism treats the world as theory-laden, but not theory-determined*" (Fletcher, 2017: 4). In critical realism, theory provides the explanation of the linkages between the chain of events and/or a conceptualization of the social mechanisms or structures (Blaikie, 2007). In this sense, theory enables researchers to move towards reality by identifying the causal mechanisms that drive the social phenomenon, where theory is formed through the rationalization of such events (Archer *et al.,* 1998). Thus, knowledge is accumulated "*in terms of theories, which can be more or less truthlike*" (Danermark *et al.,* 2002, p. 10). Bhaskar thus suggests that in Critical Realism, ontology should be prioritized over epistemology.

The aim of critical realism is to understand the generative structures and mechanisms that cause particular patterns of events that may be observed (Outhwaite, 1983). In this sense, Bhaskar (1978) argued that these structures and mechanisms are the tendencies that social objects have to act in a determined way in determined circumstances. To uncover these generative structures, Critical Realism proposes that 'reality' is composed of three levels of reality: the *empirical,* the *actual* and the *real*. The domain of the empirical refers to events that social actors can observe and experience (Blaikie, 2007). These "*can be measured empirically and are often explained through 'common sense', but these events are always mediated through the filter of human experience and interpretation*" (Fletcher, 2017: 183). The *empirical* level is thus concerned with transitive objects, such as concepts, structures, models developed to explain, sometimes causally, certain aspects of reality (Outhwaite, 1987; Blaikie, 2007; Fletcher, 2017). The *actual* level refers to the events that occur whether,

or not these are observed, experienced or interpreted. The *real* level refers to the causal structures and mechanisms that produce the events occurring at the empirical level (Bhaskhar 1978; Archer *et al*., 1998; Blaikie, 2007; Fletcher, 2017). In this sense, these mechanisms are the intransitive objects that make up the natural world. Bhaskar (1979) argued that these causal mechanisms "*exist only in virtue of the activities they govern and cannot be empirically identified independently of them*" (p. 48). Thus, the aim of critical realism is to "*explain social events through reference to these causal mechanisms and the effects they can have throughout the three-layered 'iceberg' of reality*" (Fletcher, 2017: 183). The metaphor of the iceberg (see figure 4: Iceberg metaphor of Critical Realism) was adopted by Fletcher (2017) to explain that these layers of reality constitute a whole and are thus not independent properties that are more or less real. Rather, these constitute a whole and are part of a same entity.

Figure 7: Iceberg metaphor of Critical Realism




Source: Fletcher, 2017: 183

Lastly, one of the tenets of Critical Realism is that social science is not neutral since "*it consists of a practical intervention in social life, and it logically entails value judgement*" (Bhaskar, 1983: 275-6). Critical Realism distinguishes the meaning of an act from the intentions or motives to performing it (Bhaskar, 1983; Blaike, 2007). Thus, researchers should postulate the explanatory or generative mechanisms in the domain of the real, to then demonstrate- or refute- their existence (Outhwaite, 1987).

This requires the adoption of research methodologies that permit iterations between the different levels of reality. Consequently, Bhaskar argued that the role of the researcher was thus to critique, correct and probe the accounts of social actors to delineate the beliefs and actions of social actors. Lastly, Critical Realism acknowledges that our knowledge is imperfect, due to bounded rationality (Saxena, 2019) and thus, social research should not attempt to seek definitive truths rather should improve the current understanding an interpretation of the reality of a social object (Blaikie, 2007). The following section will explain how the retroductive strategy aligns with the philosophical assumptions of Critical Realism.

## 3.3 The retroductive research strategy: single case study of an ego-network

The literature review argued that our understanding of how collaboration is operationalised in the context of projects is still equivocal. Indeed, our current understanding of collaboration remains at the higher level, that is the outcome of collaborative mechanisms. Therefore, to truly understand the generative process that leads to the sustaining of collaborative outcomes, Critical Realism requires the use of a theory as a starting point for the research. By adopting Pajunen's (2008) conceptualisation of mechanisms, the theoretical starting point of this research refers to the lower level of mechanisms- that is the interactions between the practices and participants that operationalise it. Thus, the initial theory of this critical realist research is that collaborative mechanisms and their outcomes are driven by the deployment of collaborative practice. However, Bhaskar (1979) argued that research must "*avoid any commitment to the content of specific theories and recognize the conditional nature of all its results*" (p. 6). Consequently, the theoretical starting point should support a deeper analysis to corroborate, elaborate or refute the validity of the initial theory.

Since Critical Realism aims to extend and improve our interpretations of reality rather than finding definitive truths, it requires research methods and strategies that permit a "*deeper analysis that can support, elaborate, or deny that theory to help build a new and more accurate explanation of reality*" (Fletcher 2007, 184). Furthermore, this research aimed to understand how collaboration was operationalised in networks delivering complex projects rather than dyadic interorganisational relationships. Therefore, to provide the required level of depth to uncover the different layers of

reality that constitute the phenomenon of collaboration, this thesis adopted a case-based research strategy (Yin, 2009). The use of qualitative case studies generates *intensive* knowledge of cases (for more information, please refer to Danermark *et al.,* 2002: 158–163), to explore of nature, motives and idiosyncrasies of social action. Yin (2009) described various rationales for adopting single in-depth case studies. For instance, the use of counter-intuitive cases is particularly useful to empirically validate or refute research hypothesis to generate new theoretical insights. Conversely, extreme cases enable research to capture uncommon or unique situations to generate theories about extraordinary social events or interactions. Lastly, representative cases "*capture the circumstances and conditions of an everyday or commonplace situation*. […] *The lessons learned from these cases are assumed to be informative about the experiences of the average person or institution*" (Yin, 2002, p. 41). This research aims to explore how collaboration is operationalised in ego-networks through the deployment of practices. Thus, while it requires a case setting that fulfils the research parameters, the case itself should be representative, in order to understand the typical generative mechanisms. Consequently, this research adopts Yin's (2002) rationale for a single representative case study approach, that is a typical, yet revelatory case.

The adoption of single case studies enables researchers to generate greater depth in their study (Meredith, 1998). The use of representative single case studies is thus widely advocated by critical realist research (see for e.g., Danermark *et al.,* 2002; Fletcher, 2007; Papachristos & Adamides, 2016; Armstrong, 2019). For example, Baharmand *et al.,* (2022) argue that the use of a representative single case study examining an ego-network provides "*a promising avenue to embed research in the reality of the field"* (p.1). Similarly, Vincent (2008) adopted an in depth, single case study to examine the role of agency in shaping the social processes in inter-organisational networks. While case-based research usually adopts inductive or deductive designs (Yin, 2002), this research, in line with Critical Realism adopts a retroductive design. Since "*Inductive reasoning commences with the observation of specific instances and seeks to establish generalisations;* [whilst] *deductive reasoning commences with generalisations, and seeks to see if these generalisations apply to specific instances"* (Hyde, 2000, p. 82), retroduction supports an iterative research

design. This research follows both Bhaskhar (1979) and Fletcher's (2007) suggestions for building retroductive case designs.

The first step of retroduction is to explain the regularities of an observable phenomenon to discover the structures and mechanisms that sustain it. In this research, the regularities are the attainment of cooperative and coordinative outcomes, where the mechanisms and structures refer to the structural and relational mechanisms that drive these. The second step refers to the building of a hypothetical model, generated from the literature. In the case of this research, this model was presented in Section 2.5. The third step refers to the empirical testing of the model, through qualitative and/or quantitative methods. The testing aims to tease "*out further consequences of the model (i.e. additional to the phenomenon we are trying to explain), that can be stated in a manner open to empirical testing*" (Blaikie, 2007: 83). This generates an iterative process between data collection and analysis and the refinement of the model to explain the linkages between the different levels of reality. The following sections will describe how retroduction was adopted for the case study design.

## 3.4 Process for Case Study Design

Effective research planning and design are essential for conducting a case study (Yin, 2002). To conduct effective critical realist case studies, the design of the study requires "*disciplined scientific imagination*" (Blaikie, 2007). This research adopts Willis' (2019) methodological framework and Danermark *et al.,* (2002) guidance for critical realist research. The framework is presented in Figure 5: The Project research design. The adopted process respects the following seven cyclical steps:

1) Description of the concrete phenomenon: This stage describes the theoretical phenomenon explored in the research through an initial conceptual model elicited through the review of the literature (c.f. section 2.5). To this end, this stage first delineates the research parameters adopted for the study, that is the elicited 'factors' that produce or facilitate the phenomenon (Lawson, 1998: 156). It thus involves the preparation of the fieldwork, case selection, sampling criteria and data gathering.

2) Data collection and inductive coding: This stage encompasses the qualitative data collection, that is the interviewing, observations and collecting of archival data

and their subsequent analysis. The analysis involves the inductive coding of interview transcripts to concurrently generate categories and themes and to combine themes with the deductive theories elicited from the literature.

3) Analytical resolution: This stage involves the inductive and deductive interpretation of the data. The aim is to distinguish the underlying aspects, dimensions and dynamics linking the identified themes and labels.

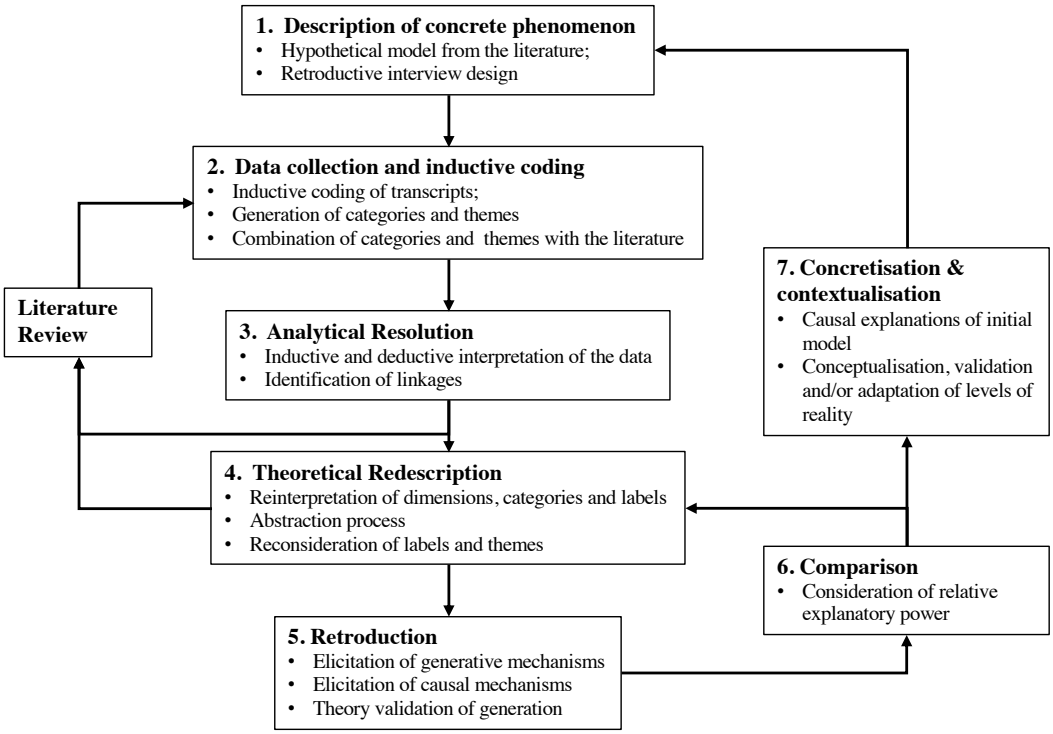
4) Theoretical redescription: this stage involves the reinterpretation of the different aspects and dimensions of the model. This requires an abstraction process (simplification) of the linkages between and across dimensions informed by the coded themes and categories. This stage also requires the consideration and/or reconsideration of new theoretical explanations to describe the phenomenon.

5) Retroduction: the stage elicits the generative mechanisms that drive the phenomenon. It requires the identification and interpretation of the causal and explanatory mechanisms to validate or generate theories.

6) Comparison between the theoretical redescriptions and the retroduction: this stage involves the consideration of the relative explanatory power of the mechanisms identified in steps 4 and 5.

7) Concretisation & Contextualisation: This step applies the "*retroduced generative mechanisms*" (Willis, 2019: 454) to causally explain the concrete phenomenon identified in the initial model, in order to adapt or modify the causal linkages between the levels of reality.

Figure 8: The Project research design




### 3.4.1 Fieldwork preparation

For this research, the adopted model was conceptualised through the review of the inter-organisational collaboration literature such as Tee *et al*., (2019) and Nikulina et al., (2022)'s conceptualisations of the collaboration as the interplay between relational and technical processes, Thomson and Perry's (2006) antecedent- process-outcome framework and Pajunen's (2008) conceptualisation of mechanisms as a two-levelled hierarchy. The theoretical model adopted for this case research was thus theoretically driven by the literature and the adopted research questions. Furthermore, the parameters also included the levels of analysis explored in this research (Yin, 1994). This research adopted an interorganisational level of analysis to understand how collaboration is deployed and operationalised in an ego-network. The analysed social objects varied in accordance with the level of reality this research addressed. On the empirical level, this research examined the outcomes of integrative mechanisms.. However, on a lower level, it examined the interorganisational interactions through the design and performing of practices.

Furthermore, this stage encompassed the design of the fieldwork preparation to examine the model's validity. This includes the case selection and sampling techniques adopted for the research and the necessary sources of evidence.

### *3.4.1.a Case selection:*

Case selection concerns the selection strategy and criteria, both on organisational and individual levels (Patton, 1990). Due to the nature of this research, purposive sampling was adopted "*to sample cases/participants in a strategic way so that those sampled are relevant to the research questions that are being posed*" (Bryman, 2012, p. 418). Bryman (2012) argued that different sampling techniques could be adopted in accordance with the nature of the research question and research design. Due to the critical realist stance adopted in this research and the retroductive research strategy, the collected data required to happen over time to enable the elicitation of patterns across processes as these unfold (Pettigrew, 1997; Lawson, 1997; Langley *et al.,* 2013). The collection of data thus requires a case in which the theoretical predispositions of the model are likely to occur and where emergent data can be collected to capture the nuances of the social phenomenon (Archer *et al.,* 1998). This research therefore adopted a theoretical sampling technique, in order to refine rather than generalise theory. Since the retroductive research process requires iterations between the data collection, the data analysis and the literature to refine the theoretical model, the iterative nature of theoretical sampling mirrored the research stance and design of this work. Indeed, theoretical sampling "*is iterative in the sense that it is not a one off but an on-going process that entails several stages*" (Bryman, 2012, p. 419). Lastly, one of the methodological challenges of Critical Realism concern theoretical saturation (Danermark *et al.,* 2002), where the iterations between the different levels of reality push researchers to continuously peel "*the layers of the proverbial onion*" (Blaikie, 2007, 83). Through theoretical sampling, data collection should be maintained until theoretical saturation is reached (Glaser & Strauss, 1967), that is when subsequent interviews have "*both formed the basis for the creation of a category and confirmed its importance; there is no need to continue with data collection in relation to that category or cluster of categories*" (Bryman, 2012, p. 420).

### *3.4.1.b Sampling criteria*

In addition, to examine the different layers of reality, this research required a structured sampling criterion to identify the context, industry, case company, collaborative arrangements, individuals and secondary data sources. The following table provides the explanation of the sampling criteria.

To conduct this research, several organisations were contacted to secure access for this thesis. The contact was facilitated by the Institute for Collaborative Working (ICW) who shared the details of the research with organisations that fit the criteria. The securing of access proved to be a particular challenge, due to the scarcity of large-scale programmes. While several organisations signalled their interest in the research, these were unable to commit to the access to the project sites, their suppliers, and the client. Furthermore, the securing of access in the defence industry was found to be particularly challenging due to the right to know, and access difficulties to projects, key suppliers, interviewees, and archival sources.

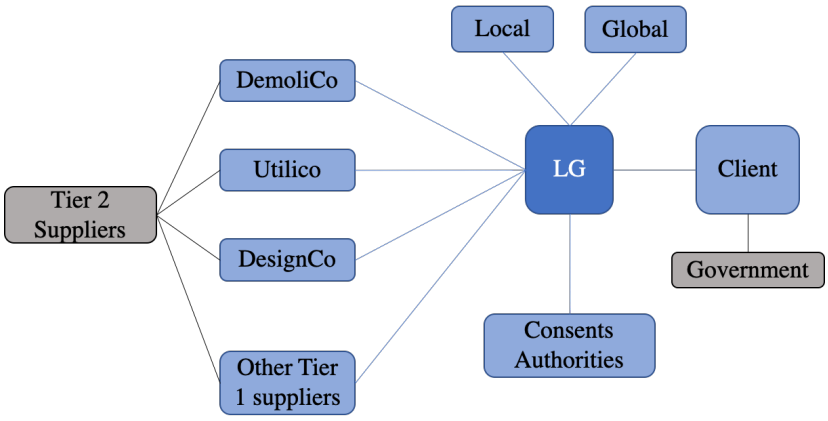
Table 4: Sampling Criteria

| **Level** | **Criteria** | **Justification** | **Sampling technique** |
|---|---|---|---|
| Context | Large-scale complex project entailing high volumes of differentiated yet interdependent tasks and organisations | This study builds on our lack of understanding on how collaboration is operationalised in an ego network delivering a complex project | Theoretical |
| Industry | Infrastructure, construction or engineering | This study examines government sponsored mega-projects (Davies *et al.*, 2014; Tee *et al.*, 2019) | Theoretical |
| Case company | Tier 1 contractor delivering a complex project collaborating with multiple tier 2 suppliers | Since this work requires the examination of networks, it requires a company that is delivering a complex project in partnership with horizontal and/or vertical partners | Theoretical |
| Collaborative arrangement | The relationships deployed between the focal organisation and the ego-network should rely upon collaborative arrangements as opposed to market arrangements | The theoretical context of this work is the operationalisation of collaboration. It thus requires partners to adopt collaborative strategies, which are signalled by the contractual arrangements | Theoretical |
| Individuals | Individuals at organisational interfaces | Participants need to be involved in the delivery of the project and/or the management of the relationship(s) | Theoretical, opportunistic & snowballing |
| Secondary data | Relevant documents only | the relevance of documents needs to be assessed to extract relevant information to triangulate data (Yin, 2009) | theoretical |

Based on this selection criteria, this research was conducted in the context of one of Europe's largest government-sponsored rail infrastructure projects (Criteria 1 & 2). The government created a company -which this work refers to as the Client- to manage the delivery of the project and its project. Due to the magnitude of the works, the Client divided the project in several sectors. The management of the works in each sector was awarded through a bidding process to distinct managing contractors. The government and the Client mandated collaboration for the project and its supply chain, through collaborative contracts in the NEC3 and ISO 44001 certifications (Criteria 4). The focal organisation for this work, LG, is a joint venture between two large infrastructure companies, Local and Global (Criteria 3). LG was one of the main contractors and was responsible for the project in a major urban area. This included several demolitions projects, utilities works and construction work, such as the building of stations, tunnels and rail systems. Due to the variety of tasks, LG onboarded specialised suppliers to leverage their expertise for delivering work products. These included a demolitions company (DemoliCo), a utilities engineering firm (UtiliCo) and an engineering for designing infrastructure blueprints (DesignCo). These companies (Local, Global, UtiliCo, DemoliCo, DesignCo and the Client) are the constituting organisations of LG's ego-network. During data collection, Local Government organisations (Consents Bodies) were included in the collaborative ego-network.

The following figure (Figure 9: LG and its ego-network) maps LG and its ego-network.

Figure 9: LG and its Ego-Network




Access was provided in January 2019, following an initial interview conducted with the head of collaborative learning of the case organisation in December 2018. The

organisation agreed to provide access to all their project sites, internal personnel and to their suppliers and their client. While initial access was granted in January 2019, the exogenous circumstances of the project severely disrupted the access to sites. These were the project review from November 2019- January 2020, during which all non-essential activities related to the production of ongoing work packages were put on hold, as well as the COVID 19 pandemic and its subsequent lockdowns, that changed the nature of the data collection.

#### *3.4.1.c Sources of evidence*

Yin (2002) described six sources of evidence in case-based research. These are documentation, archival records, interviews, direct observations, participant observation and physical artefacts. This research's primary data collection relied upon interviews. Since Critical Realism requires both systematic data collection methods and rich accounts from social actors, interviews provided the grounds to elicit the generative interorganisational mechanisms that operationalised collaboration. This research thus adopted semi-structured interviews, where the checklist of topics to be covered related to the dimensions elicited in the conceptual model (Robson, 2011). Semi-structured interviews provide flexibility in relation to the working, order, flow and inclusion of unplanned questions. The interview protocols developed for this research can be found in appendix A: Interview protocols. This research adopted 4 versions of the interview protocol, due to the iterations between the data, the model and the literature, to refine the questions and to understand the different levels of reality described by Critical Realism.

However, to triangulate the results, other data collection methods were adopted for assessing the reliability of the accounts and thus of the data (Yin, 2002; Blaikie, 2007; Bryman, 2012; Fletcher, 2017). The interviews were therefore complemented by secondary sources of data, which were field and participant observations, company archives and documents.

### 3.4.2 Data Gathering

Qualitative interview data were collected between July 2018 (negotiation of access) to September 2021, in addition to secondary data collected from 2016 to 2021. Primary interview data were collected from project executives, project managers and specialized consultants working for LG, the client and/or the sub-contracting companies explored in the different dyads. 41 interviews were conducted for this research with 36 interviewees.

These followed a semi-structured interview approach, using two interview protocols (Appendix 1A and 1B). The first protocol was designed based on the constructs elicited from the existing governance literature and was used during the project's pilot study, with the aim to identify the practices deployed in the project that operationalise the mechanisms. The second protocol was built upon the preliminary findings of the 8 interviews conducted during the pilot study and the literature. The second interview protocol was designed to elevate the findings from the rough description of the practices to examine the recursive and adaptive nature of practices, their interplay with project complexity and the embeddedness of the inter-organizational collaboration.

The selection of interviewees followed carefully designed sampling criteria. The first criterion entailed the level of experience and responsibility of the interviewees. This research focused on project executives who manage the production of the product (Project director, delivery director, area managers), project managers who deliver the components of the product (project managers and area leads), project managers who oversee the process for delivering the product (sustainability managers, system managers, collaboration managers and consents managers) as well as individuals who participate in the delivery of the components (engineers and controllers) and manage interorganisational relationships (commercial managers). Secondly, the interviewees originated from different project sectors (Sectors 1 to 4), to match the project's organizational design. Some interviewees spun across different sectors, due to the nature of their work (project directors, environment, consents, commercial and compliance). The third criterion entailed the nature of the interviewee's work, which had to span across organizational boundaries. Lastly, since the inter-organizational practices deployed in the different dyads are the unit of analysis of this work, interviewees had to be involved in these practices.

The 41 semi-structured interviews were conducted by the author and constitute essential and evidential data for this study. Interviews were conducted in the different LG offices as well as online by using Microsoft Teams, and typically lasted from 60 to 90 minutes. While all interviewees consented to being recorded, two were conducted in environments with significant background noise, where digital recording could not be achieved. Detailed notes were taken during and immediately after these two interviews. All interviews were conducted in English and were transcribed by the lead researcher. The following table describes the interviews conducted for this research.

Table 5: List of interviewees

| Position | Company | Sector | Area | Dates | Interview Duration | Number of interviews |
|---|---|---|---|---|---|---|
| Area Manager 1 | Global | West | Utilities | May-19 | 01:10:01 | 1 |
| Area Manager 2 | Local | Central 2 | Construction | May-21 | 01:07:39 | 1 |
| Behavioural Consultant | Client | N/A | Partnership management | Nov-21 | 01:43:21 | 1 |
| Business Systems Manager | Local | Central 1 | Operations | May-19 | 00:54:12 | 1 |
| Collaborative systems manager (Client) | Client | N/A | Partnership | Nov-20 | 01:24:21 | 1 |
| Collaborative working system manager | Global | North | Partnership management | Jan-19<br>Apr- 19<br>Sept-19<br>Mar-2021 | 00:50:56<br>00:32:20<br>00:38:11<br>01:03:43 | 4 |
| Commercial Director | Global | North | Commercial | Jun-19 | 01:14:39 | 1 |
| Commercial Manager 1 | Global | West | SCM | Apr-19 | 00:59:58 | 1 |
| Commercial Manager 2 | Local | West | Commercial | Sep-19 | 00:54:22 | 1 |
| Consents Manager | Global | Central 1 | Consents | Apr-19 | 01:59:36 | 1 |
| Area Manager 3 | Global | West | Demolitions (Programme) | May-20 | 01:03:51 | 1 |
| Area Manager 4 | Global | Central 1 | Utilities (Programme) | May-19 | 01:08:42 | 1 |
| Area Manager 5 | Local | Central 2 | Construction (Programme) | May-19 | 00:58:45 | 1 |
| Area Manager 6 | Global | Central 2 | Construction (Programme) | May-19 | 00:52:09 | 1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Delivery Director 1 | Global | Central 1 | Programme management | Feb-21 | 01:08:32 | 1 |
| Delivery Director 2 | Global | North | Programme management | Jun-19 | 00:48:07 | 1 |
| Delivery Director 3 | Global | West | Programme management | Apr-19 | 01:03:48 | 1 |
| Senior Engineer 1 | Local | West | Demolitions | Apr-19 | 00:51:54 | 1 |
| Environmental manager 1 | Global | West | Sustainability | Jun-19 | 01:23:14 | 1 |
| Environmental manager 2 | Global | North | Sustainability | Mar-21 | 01:04:45 | 1 |
| Head of collaborative learning | Global | North | Partnership management | Dec-18<br>Jan-19<br>Sep-19 | 01:06:34<br>00:43:12<br>00:38:05 | 3 |
| Head of compliance | Global | Central 2 | Compliance | Mar-21 | 01:06:31 | 1 |
| Head of consents | Local | North | Consents | Apr-21 | 01:12:47 | 1 |
| Head of social sustainability | Global | North | Sustainability | Mar-21 | 00:56:46 | 1 |
| Lead engineer sub-contractor | Sub-contractor | West | Utilities | Apr-19 | 00:46:11 | 1 |
| Office Manager | Global | West | Office management | Apr-19 | 01:06:14 | 1 |
| Operational Excellence & Transition Director | Global | Central 2 | Operations | Mar-21 | 00:54:47 | 1 |
| Project manager Sub-contractor | Sub-contractor | West | Utilities | Jan-21 | 01:02:50 | 1 |
| Project Controller | Sub-contractor | West | Controls and reporting | Apr-19 | 00:46:45 | 1 |
| Project Controls Manager | Local | Central 1 | Controls and reporting | May-19 | 00:58:11 | 1 |
| Project Director 1 | Global | Central 1 | Portfolio Management | | 00:40:56 | |
| Project director 2* | Global | Central 1 | Portfolio Management | Feb-21 | 01:13:31 | 1 |
| Senior Collaboration Lead (Client) | Client | Central 1 | Partnership management | Sep-21 | 00:28:32 | 1 |
| Senior Engineer / technical lead | Global | West | Demolitions | Apr-20 | 00:56:39 | 1 |
| Senior Procurement Manager | Local | Central 2 | SCM | Jun-19 | 00:53:32 | 1 |
| Utilities Lead 1 | Local | Central 1 | Utilities | Apr-21 | 01:02:31 | 1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Utilities Lead 2* | Global | Central 1 | Utilities | Jul-19 | 01:15:29 | 1 |
| 36 interviewees | 5 companies | 4 sectors | 14 areas of work or job functions | Apr.2019 to Sept. 2021 | Avg: 01:03:50 Shortest: 00:28:32 Longest: 01:59:36 | 41 interviews |

During the site visits when the physical interviews were conducted, observation data from practices as these occurred and field notes were also collected by the lead author. Additional observation data were collected in different events where LG employees and managers from their parent organization presented their practices to internal and external stakeholders. Lastly, observational data were also collected during a series of pan-industrial events and professional events where the parent companies were sharing and comparing their practices and *lessons learnt* with other organizations. These events and their objectives are described in Table 16 Observational data.

Table 6: Observational Data

| Location | Type of observation | Scope | time |
|---|---|---|---|
| Central 2 | Progress meeting | Construction designs meeting | 2,5 hours; 5 times |
| West | Progress meeting | Demolitions meeting | 3 hours; twice |
| West | Progress meeting | Utilities meeting | 2 hours |
| Central 1 | Progress meeting | Construction designs meeting | 2,5 hours; twice |
| Central 1 | Reporting meeting | project controls meeting | 3 hours; 3 times |
| Central 1 | Site observation | Shared office | 3 days |
| Central 2 | Site observation | Shared office | 5 days |
| West | Site observation | Shared office | 6 days |
| West | Toolbox talk | Observation of practices | 1 hour; 2 times |
| London | Behaviours & Attitudes SIG | Knowledge sharing | 3 hours per month over 3 years |
| N/A | APM presentation | Project presentation | 1 day |
| N/A | Share & Learn | Knowledge sharing | 3 hours |
| N/A | Collaborative award event | Awards | 5 hours |
| N/A | Collaborative award event | Awards | 5 hours |
| N/A | Collaborative award event | Awards | 5 hours |

Lastly, archival data related to the project were collected from LG, the parent companies and the client (Table 17: Archival Data). This sample of 67 archival data sources include governance documents, guidance documents, collaborative management plans, collaborative certification (ISO 44001), project maps, project organisational charts, collaborative assessments and internal analyses of the inter-

organizational collaborations. These data revealed the strategic drivers for engaging in inter-organizational collaboration for the project as well as a set of institutionalized practices deployed by the organizations to support collaborative mechanisms and outcomes. Therefore, archival data provided triangulation of the information collected during the interviews and observations.

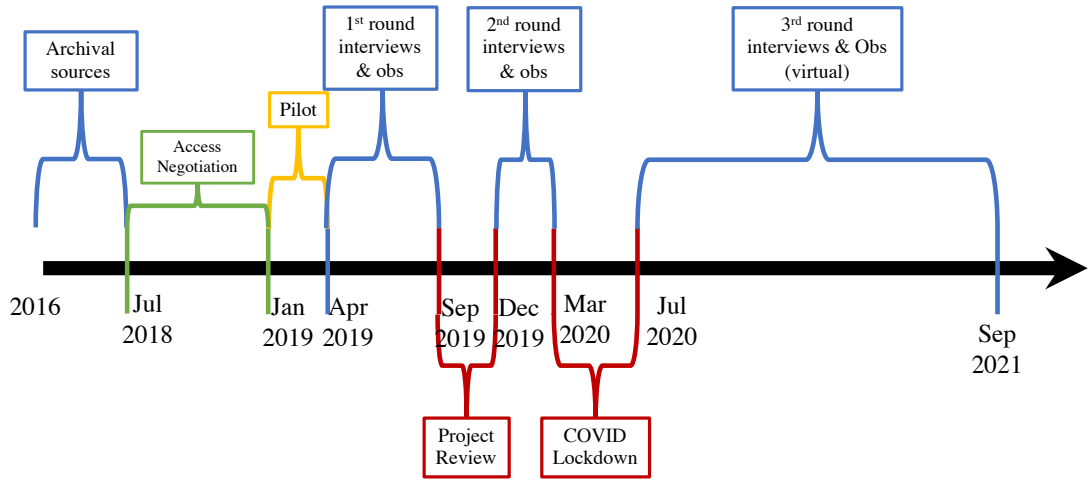
Table 7:Archival Data

| **Document type** | **Type** | **Relationship** |
|---|---|---|
| NEC Contracts | Contractual | LG-Sub |
| Code of construction practice | Contractual | LG-Client-Sub |
| Environmental code of practice | Informal | LG-Client-Sub |
| Programme Supplier Guidelines | Informal | LG-Client-Sub |
| Programme Sustainability approach | Informal | LG-Client-Sub |
| Alliance Principles | Contractual | LG-Client |
| Corporate Collaborative Objectives 3 | Contractual | LG-Client |
| Environmental Factsheet (KPIs) | Contractual | LG-Client |
| Knowledge Management 1 | Contractual | LG-Client |
| Programme Air Quality | Contractual | LG-Client |
| Tier 1 EW RMP | Contractual | LG-Client |
| Programme Collaborative Objectives | Informal | LG-Client |
| Programme Management of Traffic during construction | Informal | LG-Client |
| Programme Planning Memorandum | Informal | LG-Client |
| decisions-and-next-steps | Research | LG-Client |
| Programme Report | Research | LG-Client |
| Strategic Case 1 | Research | LG-Client |
| Strategic Case 2 | Research | LG-Client |
| Collaboration Working Objectives | Contractual | LG |
| Communication Plan | Contractual | LG |
| Corporate objectives | Contractual | LG |
| CRMP 1 | Contractual | LG |
| CRMP 3 | Contractual | LG |
| CRMP 4 | Contractual | LG |
| CRMP 2 | Contractual | LG |
| Past Project RMP | Contractual | LG |
| RMP 1 | Contractual | LG |
| RMP2 | Contractual | LG |
| Collaborative Skills and development | Informal | LG |
| Management-case | Research | LG |
| Project Org. Charts 1 | Operational | LG |
| Project Org. Charts 2 | Operational | LG |
| SIG Presentation | Presentation | LG |
| Skills Development report | Research | LG |
| Constructability Draft | Research | LG |
| Economic case 1 | Research | LG |
| Economic case 2 | Research | LG |
| Economic case 3 | Research | LG |
| Environmental research Central 1 | Research | LG |
| Environmental research Central 2 | Research | LG |
| Environmental research North | Research | LG |
| Environmental research West | Research | LG |

| | | |
|---|---|---|
| Environmental research Route | Research | LG |
| EW Business Case | Research | LG |
| Collaboration Project Register | Operational | Global |
| Policy report | Research | Client |
| Programme Community engagement strategy | Operational | Client |
| Programme Economic Case (Central) | Research | Client |
| Programme Economic Case (National) | Research | Client |
| Programme EW business case | Research | Client |
| Programme SC BIM | Operational | Client |
| Programme skills and employment | Operational | Client |
| Project from-concept-to-reality | Research | Client |
| Supply_Chain_BIM_Upskilling_Study__June_2013 | Research | Client |
| Government Response to consultation | Policy | Client |
| Conference_2014 Chairman Speech | Presentation | Client |
| Conference_2014 Transcripts Head of Collab | Presentation | Client |
| Conference_2014 Transcripts Head of Sustainability | Presentation | Client |
| Conference_2014 Transcripts Operations Director | Presentation | Client |
| Meet the [Contractor] presentation | Presentation | Client |
| Presentation: Programme Collaboration | Presentation | Client |
| Supply Chain Conference Transcript Speech CEO, 2019 | Presentation | Client |
| Supply Chain Conference Transcript Speech Commercial, 2019 | Presentation | Client |
| Supply Chain Conference Transcript Speech Strategy, 2019 | Presentation | Client |
| Supply chain event slides, 2017 | Presentation | Client |
| Supply chain event slides, 2019 | Presentation | Client |
| Programme Act | Contractual | All |

Data collection occurred through different stages between April 2019 and September 2021, while the negotiation for access started in July 2018. The access to the field and interviewees was temporarily put on hold during two periods. The first occurred between September and December 2019, where the project as out under review by the government. The second occurred during the first COVID 19 lockdown (March 2020). Due to the COVID pandemic, all interviews and observations were held virtually. The following figure provides a timeline of the data collection.

Figure 10: Data collection timeline



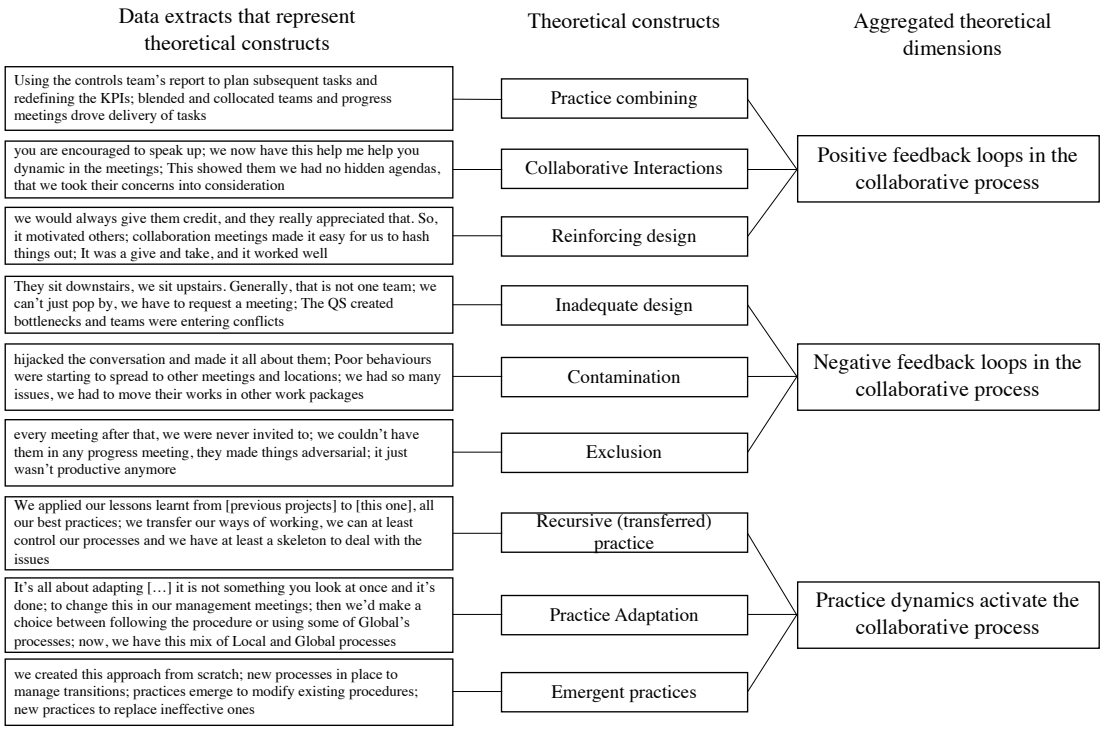

### 3.4.3 Data Analysis

The data analysis followed an iterative process. The initial coding was conducted in parallel with the data collection (Glaser & Strauss, 1967) through a thematic coding approach (Nowell *et al.*, 2017). The aim of the approach was to identify, organize, describe, and analyse themes found in the dataset (Braun & Clarke, 2006). The data was structured to inductively construct general narratives concerning the mechanisms of collaboration and to identify the technical and relational practices , their enactement and their outcomes as mentioned by the interviewees (Miles & Huberman, 2004). The aim of this work was not to measure or quantify outcomes. Rather, it was to understand how the enactement of practices and their combining shaped narratives of collaborative success and failure. Therefore, these are rooted in the perceptions of interviewees. The themes and labels were created through an iterative process between the data and the constructs extracted from the governance and the project management literatures. This process permitted "*diagramming to make sense of the theme connections*" (Nowell *et al.*, 2017:4) to provide contextual understanding of how the mechanisms of collaboration were deployed in the project. The following table (Table 8: Thematic codes) details the themes and labels used for this research.

These were then deductively coded to assess the validity of the original map and thus enable retroduction. To validate these initial findings, a preliminary report detailing these interactions was created and sent to LG. Conflicting views emerged from the interviews/different parties. When these related to the tasks, a follow-up question was asked during a subsequent validation workshop or interview. In other cases, conflicting

views related to perceptions of the antecedents, collaborative processes (ostensive nature of mechanisms, interactions, development of norms, behaviours) and/or outcomes (performance, conflict, delays). In such contexts conflicting views were coded and mapped to provide nuance to the dynamics of collaboration in the project, by showing either individual differences, group differences (for example different sectors and offices) or organisational differences (conflicts).

Figure 11: The coding structure




A workshop was organized with board members and the collaborative relationships manager to verify findings. Regular validation meetings were organised with the collaborative relationships managers to examine the validity of the perceived outcomes versus the KPIs deployed for the project. The coding of interview transcripts was conducted by the lead author and was verified by the project supervisors, where divergences were discussed until an agreement was reached.

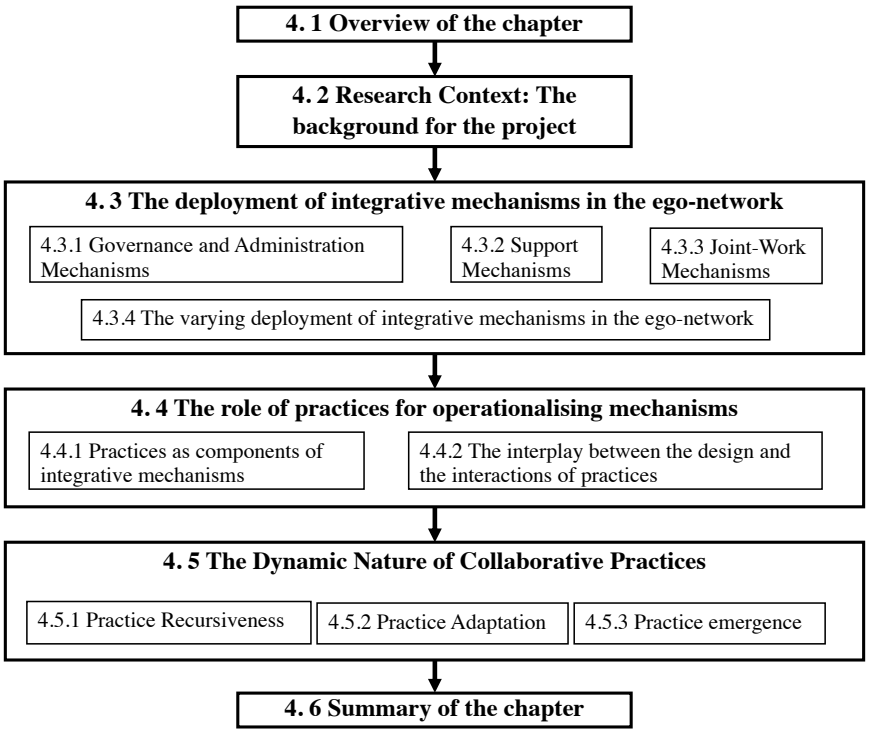
Separate descriptive coding was conducted to define and describe the relationships between the themes and the deployed practices in the project. This stage permitted a contextual understanding of the interactions of the LG teams with inter-organizational partners engaging in the practices.

# 4 Findings

## 4.1 Overview of the chapter:

This chapter presents the results of the case study, which follow the order of the research questions. The overview of the case project is detailed in Chapter 4.2. It is then followed by the explanation of the deployment of collaborative mechanisms in the each of the exchange relationships of the ego-network and will then provide a cross-case analysis. Chapter 4.4. explains how the mechanisms were operationalised through a set of joint practices and through the interactions of the personnel from the various organisations. Chapter 4.5 explores the recursive, adaptive and emergent nature of practices and their role for the building of collaboration within and across projects. Chapter 4.6 summarises the findings. Figure 6 serves as an illustration of the structure of the chapter.

Figure 12: Structure of the Findings section



## 4.2 Research Context: The background for the project

The project was a unique large scale infrastructure investment aimed to modernise and build the rail transport network within the UK. The Client organisation was created by the government to manage the delivery of the entire programme. Not only was this organisation new, but "*is composed of a mix of civil servants and consultants. So, the division is roughly around 1/3 civil servants, where some came from the MoT and others were hired from different companies like Network Rail, and the rest are consultants on long term-contracts*" (Collaborative Systems Manager, Client). The Client received a broad mandate to produce the project, in terms of its goals and its process, and is given clear authority over the organisation subsystem for delivering the works. Since the Client does not have the necessary knowledge and capabilities to deliver the project, it outsourced the design, production, and the project's supply chain management to four Joint venture, including LG, which are the managing contractors in their respective areas (Commercial Manager 1). the Client "*adopted a Two Stage / Early Contractor Involvement model for Design and Build, where the detailed design/build element would be on a NEC Option F (management contract) basis. This recognised the low level of maturity of the design provided [by the Client]"* (Document: Business Case). Due to its complexity, complicatedness and long timespan, the project was divided into three phases (Document: Programme Report, 2016). Each phase was further divided into a set of programmes that are composed of a multitude of complex projects. The delivery of these programmes was awarded through a bidding process to six joint ventures. The client did not award the managing contractor based purely on costs, but also on relational measures, such as the bidder's demonstration of collaborative competencies (Collaborative Principles).

To be awarded the bid(s,) managing contractors were required to adopt equity-based joint ventures. The focal organisation, LG, was formed a year prior to the beginning of the bidding for the project by two construction companies: *Local* and *Global*[5]. Local is a UK-based construction company that largely delivers engineering projects within Great Britain and Ireland. Conversely, Global operates on a global scale. It is more than 10 times larger than Local in terms of revenue. Local and Global

[5] The names of the companies were changed to protect their anonymity, in line with GDPR and our non-disclosure agreement contract

(LG) have more than 30 years of experience in forming partnerships, such as joint ventures and alliances to deliver complex projects in the U.K. (Document Collaborative Relationship Programme Register (CRMP). Local and Global are concurrently delivering four large scale infrastructure and construction projects, through collaborative relationships, such as equity-based joint ventures and formal alliances (Document CRMP). To match the requirement of the bid, LG renewed its partnership to demonstrate their ability to manage the prevailing operational relational risk of complex infrastructure projects (Head of collaborative learning).

The focal organisation of this research, LG, successfully bid for the enabling works and main works for the south area and was responsible for producing the entire portfolio of complex projects related to the two bids. The contracts between the client and the JVs defined the role of the managing contractor. The main contractors were responsible for managing the relational and technical aspects of the project and its delivery which was "*very similar to the client*" (Project Director 1).

LG's portfolios were composed of thousands of work packages which were individual projects, categorised in four areas of work (Document Project Organisational Chart):

- *Demolitions*: demolition works of high rises, warehouses and houses around the hubs and the route.
- *Utilities*: utilities diversion work within dense urban areas, installation of utilities in the hub locations (sector Central 1 & 2 and sector West).
- *Construction*: construction of cut and cover tunnels, bored tunnels, portal, and shafts and
- *Enabling works*: Archaeological work, site clearance work, traffic management, security, and ecological works

These work packages were also highly differentiated in terms of their complexity, variety, and their costs. These work packages —notably regarding designs, demolitions and utilities— were complex projects, due to the variety of outputs, resources and stakeholders involved in the delivery (Project Director 1). The renewal of the joint venture was motivated by the complicatedness and complexity of the project and by their capacity to leverage upon their complementary resources and capabilities. In addition to the high volume and variety of capabilities and resources,

the project's financial risks required expertise, experience in managing projects, and financial stability (CRMP and Operational Excellence & Transition Director, LG). The Utilities lead 2 noted:

> "*One of the big challenges we have is our margins are actually very low […], so yeah, we receive hundreds of millions for the different tenders, but our costs nearly match that. So, the financial risk is really on us when we [*produce outputs*] until we actually get paid, you know we need to hire staff, get our entire procurement in place, and do some work before we receive any invoices. That is why we were brought in,* […] *we have a lot of experience to deal with this type of work"* (Utilities Lead 2)

The JV was therefore created to manage the complexity related to the breadth, variety and interconnectedness of the work packages, the areas, and sectors, and to manage the operational and relational risks. As noted in the CRMP:

> "*The high cost, extended duration, potentially high and relatively unknown risk and the complexity of [ the project] all make a strategic collaborative relationship essential to delivering a successful project and developing a productive client relationship*." (CRMP, page 5)

To manage the high volume of outputs, the project was organised in five sectors, from which four were geographical (North, West, Central 1 and Central 2) and the last — Routes— encompassed the works for the construction of the main tunnelling project (Document: Project Organisational Chart). Each sector was responsible for producing the components of all work packages for all four areas of work within their geographical location. In terms of management, each sector was managed by Delivery Directors, who oversaw the production of all outputs within the geographical sector. The work packages that composed the product exhibited high degrees of complexity in terms of their interconnectedness and their unique nature. For example, the demolitions area in sector Central 1 encompassed over 100 interconnected work packages that differed in terms of their complicatedness. Table 18 provides the layout of the sectors and areas of work of the project with examples of work packages.

Table 8: Project sectors, areas of work and work packages

| Sector | Enabling Works Project (area of work and task example) | Main Works Project (area of work and task example) |
|---|---|---|
| **North** | **Demolition**: warehouses, houses<br>**Utilities**: design, excavation, diversion installation | **Construction**: tunnelling, bridges, train station |
| | **Construction:** bridges, road diversion | **Enabling works**: Engineering designs |
| **West** | **Demolition**: warehouses, office buildings<br>**Utilities**: design, excavation, diversion installation | **Construction**: Tunnelling, roads<br>**Enabling works**: Engineering designs |
| **Central 1** | **Utilities**: design, excavation, diversion installation<br>**Enabling Works**: insulation of neighbouring houses, archaeological & geological excavations | **Construction**: Train station, tunnelling<br>**Enabling works**: Engineering designs |
| **Central 2** | **Utilities**: design, excavation, diversion, installation<br>**Enabling Works**: insulation, engineering designs, sustainability scheduling and design | **Enabling works**: Engineering designs, environmental planning |
| **Route** | **Utilities**: design, excavation, diversion, installation<br>**Enabling Works**: archaeological & geological excavations, relocation of residents | **Construction**: Tunnelling, roads<br>**Enabling works**: Engineering designs |

The project exhibited high degrees of complexity in terms of stakeholders. To produce the thousands of inter-dependent work-packages that composed the project, the project was delivered by a multitude (1000+) of contractors, subcontractors, consultants, and independent designers. Collaboration across the supply chains was an essential aspect of the client's delivery of the project. The client argued that "*collaboration as being the absolute foundation for risk management in the supply" (*Document FAQ:17), where the client will leverage on the knowledge and experience of its suppliers to "*identify and assess inter-company risks that would otherwise be missed*" (ibid).

In addition to being signalled as integral to the effective risk management of the project, the client argued that it was also their preferred inter-organizational structure for delivering, by promoting the integration of suppliers who were required to adopt "*the most appropriate mechanisms to encourage collaboration to assist us in system integration of the* [work] *packages" (*Ibid:22).

These collaboration requirements were inscribed in the bids as well as in the project's act, which defined and formalized the legal boundaries and obligations of the project and clarified the mandate of the client. In addition, the production of the project regularly affected the public freeway and required the closing and rerouting of the public transport system, roads, and pedestrian areas. It required the support of both the local (boroughs and London City Hall) and central governments (Ministry of Transport). The management of these relationships dictated the successful delivery of the works.

For example, delays in the production of these tasks would have affected the subsequent work-packages (Area Manager 3), as well as other areas of work (Utilities lead 1). As the Head of Consents argued:

> "*During one of our meetings, representatives of [neighbouring university] informed us that their students were entering their examination season. […] So, we consulted with [the client] and we decided to change the scheduling for part of the [demolitions work], because […] it would completely disrupt [the university]. So, […], we merged part of the utilities work with the main works, that would start in September, so of course it created some delays and we had to work around this, but we also got a lot of goodwill from the community*" (Head of Consents, LG)

Therefore, the complexity in this project was defined by both the volume and variety of tasks and stakeholders and their interdependence. While collaboration was contractually mandated in the project, the data suggest that that a plurality of contracts co-existed in the supply chain, where some were collaborative by design and others were cost-based (Behavioural Consultant).

Collaboration was deployed with key strategic suppliers and stakeholders who had a high degree of influence over the works (Document; CRMP 2). Conversely, cost-based procurement was deployed with suppliers that had little influence over the works. The Commercial manager 2 noted that:

> "*Collaboration takes a lot of time and management, so* [LG] *deployed different types of contracts. So, with our core supplier, say* [UtiliCo, DesignCo and

DemoliCo] *we have ECIs* [Early Contractor Involvement] *and NEC option C contracts, because we have to collaborate with them* […] *because it is more efficient. Now if you take* [supplier], *we have an NEC option A* [cost-based contract], *because we contract them when the plans and designs are done, so they only have to produce* [components]"

This research identified 3 categories[6] of stakeholders where collaborative forms of contracts were deployed, due to their influence over the production process, the product's deliverables and/or the goals of the project: the focal organisation, the main contractor-client and LG and key subcontractors and LG. In addition, the Project Act, that is the overarching legal framework for the works, required managing contractors to engage collaboratively with Consents Authorities and local governments. These organisations constitute LG's ego-network for delivering the project. The relationships, contractual arrangements and aims of each relationship are presented in the following table (Table 19: LG's collaborative ego-network).

The effective delivery of project outputs in each sector and area of work relies upon LG's ability to collaborate with these stakeholders. The following subsection will describe the findings related to the operationalisation of mechanisms in the context of these different relationships.

While Local and Global replicated some of their cooperative and coordinative mechanisms for the project due to their experience working together, LG had no prior partnerships with the Client. "*We had to collaborate with a company that basically didn't exist a year prior to the bidding process. That made it challenging when it comes to collaboration, because they didn't have processes, barely had a culture and they were still figuring out what to do*" (Delivery Director 2). Collaboration was adopted as the core strategy for delivering the programme. The adoption of collaboration was motivated by the shift in government policy, where collaboration between government entities and its supply chain became an institutional requirement (Construction Playbook & Programme Collaborative Objectives). In addition, collaboration was

[6] How LG operationalised collaboration with these stakeholders will be explained in the following sub-sections

adopted to replicate the benefits observed in previous construction and infrastructure programmes. "*Recent successfully delivered programmes and projects in the UK have all had high degrees of collaborative working*" (Presentation: Programme Collaboration).

Table 9: LG's contractual relationships with its collaborative ego-network

| **Relationship type & entities** | **Contractual arrangement** | **Aim** | **Source** |
|---|---|---|---|
| Main Contractor (Local & Global) | Equity Joint Venture | Fully integrated joint venture where the partners share the risks (operational, strategic, financial) and rewards of the project | -Project Director 1<br>-Collaborative working system manager<br>-Commercial Manager 1 |
| Main Contractor-Client (LG-Client) | NEC Option F (Management Contract) then option E (cost reimbursable) Collaboration Agreement | Two-stage cost reimbursable contract promoting partnering where LG creates the work packages and manages the tendering process | -Behavioural Consultant<br>-Senior Collaboration Lead (Client)<br>-Commercial Manager 1 & 2<br>-Project Director 1 |
| LG-Subcontractors (LJGV &<br>-DemoliCo<br>-UtiliCo<br>-DesignCo) | -Early Contractor Engagement (ECI)<br>-NEC Option C (target cost contract) | Target cost contract with shared rewards based on the fulfilment of the activity schedule and financial management of the project | -Commercial Manager<br>-Project manager Sub-contractor<br>-Commercial Managers 1 & 2 |
| LG-Local Authorities (LG &<br>-MoT<br>-Boroughs<br>-City Hall) | Project Act | Legally mandated collaboration where local and national government entities and grid authorities are required to engage and collaborate with the main contractors | -Head of Consents<br>-Consents manager<br>-Head of Compliance<br>-Project Director 2 |

As previously mentioned, collaboration across the supply chain was a contractual requirement. Clause 1.1.3 of the Collaboration Agreement denoted that "*The Employer requires the Contractor (including Subcontractors of any tier) and Others, to collaborate closely in becoming a high performing, innovative team, achieving new standards in infrastructure design and delivery"*. However, collaboration in this project was not deployed with all the organisations in the supply chain, rather between the Tier 1 contractors and key subcontractors.

> "*We don't collaborate with every company we procure work from* […], *it doesn't mean that we are uncollaborative either, but collaboration is a specific way of working* […]. *We deployed collaborative contracts only with our core*

*supplier, ECIs and cost reimbursable contracts. So, for the E.W. contracts you have some design houses, two demolitions companies and three utilities*." (Collaborative Working System Manager).

While LG has worked with some of these contractors before, this project was the first time LG adopted more extensive collaborative contracts and systems with these suppliers:

> "*Construction and infrastructure are a small world, there is only a handful of companies nationally that have the scale to produce a project of this magnitude, and we have worked with most* [of them]. *But we never deployed collaboration with so many sub-contractors* […] *for a single programme"* (Senior Procurement Manager).

Furthermore, while Local and Global and LG and the Client deployed collaborative mechanisms to manage the entire delivery of the works, collaboration between LG and Sub-contractors was bound to individual projects (work packages):

> "*When we onboard subcontractors, it is for specific work-packages that were put up for bids, so the specifications were already defined. They had to demonstrate their technical capabilities and their ability to deliver it at or below the target cost*. […] *We also measured their behaviours* […] *to make sure they were collaborative*" (Commercial Director).

Therefore, the scope and duration of the relationship was not of the same magnitude as those between LG-Client.to operationalise collaboration with these sub-contractors, LG replicated and transposed some of its integrative mechanisms with its subcontractors.

The last type of interorganisational relationships identified in the ego-network were between LG and the Consent Authorities. The production of the project regularly affected the public freeway and required the closing and/or rerouting of the public transport system, roads, and pedestrian areas as well as the access to the national grid (utilities, water, communications). These required obtaining consents from both local authorities (Boroughs, and Town Halls) and the Ministry of Transport.

The Client was granted the legal authority to "*to affect or change rights of way*" to produce the project outputs (Projects Act). The project act constituted a legal framework to which all involved parties, including the Consent Authorities to abide to. Despite the project act, the local authorities had significant power related to obtaining consents. Local authorities could erect "*a wall of bureaucracy, so they can actually delay us from getting consents […] [by asking] us to provide them with more documents to grant us the permits*" (Consents manager). Consequently, LG identified consent authorities as "*high-risk external relationships*" due to their "*potential high impact to the project*" and LG's low "*ability to influence the relationship for a positive impact*" (RMP). The management of interfaces with local authorities were therefore essential for the project's process and maintain deadlines.
To do so, LG deployed a set of integrative mechanisms for deploying collaborative relationships with Consent Authorities.

## 4.3 The deployment of integrative mechanisms in the ego-network

Section 4.3.1 describes how integrative mechanisms for the Governance and administration were deployed across the ego-network. Section 4.3.2 introduces the Support mechanisms and 4.3.3 the Joint-Work mechanisms. Section 4.3.4 describes how and why the deployed mechanisms varied across the different relationships of the ego-network.

### 4.3.1 Governance and administration mechanisms

This section details the Governance and administration mechanisms that were deployed in the ego-network. Consistently with the Government's public procurement strategy, the Client required collaborative governance mechanisms to be deployed across the supply chain. These mechanisms aimed to define the structure and boundaries of the relationships, establish the day-to-day management of the works, define the interactions and operation and integrate suppliers. To show how the mechanisms are deployed in each relationship, each subsection will examine how the varying categories of mechanisms were deployed in each relationship.

*Mechanisms defining the structure and boundaries of the collaborations*

Due to the volume and variety of tasks, this project required several key contractors and subcontractors to work jointly to produce work products. For this project, the Client's role was to envision and integrate the work products managed by its main contractors. As the main contractor, LG had to manage the production of the works and "*organise the supply chain and put the work packages up for bids* […] *to make sure* [The Client's] *requirements are being met*" (Senior Procurement Manager). One of the core activities between LG and the Client and Local and Global was "to map and plan the different relationships we need for the project, understand who will do what, and how" (Collaborative Systems Manager). The role and responsibilities of the key subcontractors was to produce the specialised tasks in partnership with LG. This required the different relationships in the ego-network to define the structures and boundaries of the collaboration to produce the works. Therefore, the first Governance and administration mechanisms deployed in the ego-network considered the structures an boundaries of the collaborations

For this project, LG repeated the formal governance mechanisms and structure which they used in their previous joint ventures: "*the governance has always been there; it hasn't changed for the past 10-12 years.*" (Interviewee 1). The JV itself is contractually governed by a Joint Venture Agreement, the Alliance Principles, the CRMP and a Memorandum of Understanding that details how the alliance will operate in the context of the project. These define the structures and boundaries of the collaboration, such as the equity ownership of the partnership as well as the leadership structure of the venture for producing the product and elicits "*the roles and responsibilities of each team around developing and maintaining a collaborative relationship*" (CRMP, Section 3.3). As managing Contractor, LG was responsible for managing the relational and technical aspects of the project and its delivery (Interviewee 1). To do so, the exchange partners leverage their capabilities to oversee specific areas or sectors of work. The CRMP denotes that Global's main capabilities deployed for the project include their in-house design capabilities, urban infrastructure and engineering knowledge, financial stability, and human resources. Conversely, Local's main capabilities include their rail, tunnelling and viaduct design and

engineering expertise as well as their systems. Since neither partner have the internal capabilities and/or resources to manage the delivery of the project alone, the adoption of a JV where responsibilities were divided equally was necessary to match the interdependencies in terms of the deliverables of the product (Document: CRMP 2). The expertise of each company affected how responsibilities were allocated. For example, Location North was "*more Local heavy […], you know their engineers were much more familiar with the type of work to be done there, but other sites were pretty even"* (Lead engineer 2). Thus, the division of responsibility based on the operational due diligence and the integrated delivery model were instrumental in maintaining an efficient production of the project.

In addition, due to the volume and variety of work-packages and their underlying tasks, the project required "*a considerable amount of resources, more than any other project we delivered*. […] *so we are talking about personnel, from engineers, to specialised designers, site team, project controllers, quantity surveyors, a lot of money for our project and supply chain expenses and then all sort of material costs, so offices, machinery etc*." (Commercial Director). To match the resource requirements of the programme, LG deployed contractual mechanisms to manage the allocation of resources, their combining, and their optimisation. By leveraging the respective expertise of its parent companies, LG's resource allocation became a source of efficiency in the project. In addition, the contractual arrangements —the risk management plan, the JV agreement and the CRMP— defined the procedure for the allocation of resources related to the joint procurement process. "*So, when we onboard suppliers or subcontractors, LG carries the financial risk, because we pay for the works and then the Client reimburses that cost, that is all part of our cost reimbursable contract. So, as you can imagine, we have huge trade receivables, and so we need to have liquidity for the interim period. So, our JV agreement sets a minimum we need to carry over, and corporate from both companies are obliged to provide the funds*." (Commercial Manager 2). These mechanisms were thus deployed to control the resource allocation and ensure that LG maintained a buffer for business continuity.

However, the project's complexity presented a significant financial risk for LG and the Client. The effective management of risks was identified as one of the nine enablers

of project success (Supplier Guidelines). The joint venture was deployed to manage the project's risk, where: "*the high cost, extended duration, potentially high and relatively unknown risk and the complexity of the* [Project] *all make a strategic collaborative relationship essential to delivering a successful project and developing a productive client relationship*" (CRMP 3). The project's financial risks required expertise, experience in managing projects, and financial stability (CRMP and Operational Excellence & Transition Director, LG). The Utilities lead 2 noted:

> "*One of the big challenges we have is our margins are actually very low […], so yeah, we receive hundreds of millions for the different tenders, but our costs nearly match that. So, the financial risk is really on us when we [*produce outputs*] until we actually get paid, you know we need to hire staff, get our entire procurement in place, and do some work before we receive any invoices. That is why we were brought in,* […] *we have a lot of experience to deal with this type of work"* (Utilities Lead 2)

The project was initially governed by an NEC4 option F contract "*which were target costs, lump sum*" (Commercial Director) contracts for the individual contracts in each area of work. While these were intended to support collaboration by empowering LG to make strategic and operational decisions, these had the opposing effect:

> "*Weighted* [everything] *on the contractor's side in terms of risk* […] *and therefore we would put on contingencies into those projects, when really, we didn't need to. From a client point of view, they were asking why we're doing this because you don't really need to do that.* [The] *result of that was we basically changed contract and signed an agreement to change the contract last year, that's made it much easier and basically take the risk away from us in a way, so therefore we're not building contingencies and we therefore have a much clearer view in terms of budgets and time*" (Project Director 1)

The changes in the allocation of the financial risk, due to the contractual transition from the Option F to the option E was instrumental in the development of trust-based relationships. Through the Option E, "*the moment we switched to that option E there was no hidden agendas or strategic business decisions to hide behind. We were all*

*working together. And that really changed everything, we really started to collaborate*" (Commercial manager). Therefore, the changes adopted in the management of the risk, trough the modification of the contractual arrangements was a driver of collaborative outcomes, such as transparency and trust and it mitigated LG's financial exposure to the programme. This in turn mitigated opportunism and hidden agendas. While the change in contractual arrangements was successful in "*taking it away from* [LG]", the data indicates that the financial risks for the project were mitigated through contractual obligations that were diffused throughout the supply chain, where "*we took away the financial risks from our suppliers. If they didn't have that hanging over their head, you can really unlock collaboration*" (Commercial manager 2).

To mitigate the risk of disruptions within the E.W. contracts and across the programme, the client required LG to deploy a structured disengagement process internally as well as a process for managing transitions with the Client. The mechanisms deployed between LG and the Client were similar to those deployed between Local and Global. These were designed to ensure business continuity and maintain an efficient delivery throughout the duration of the works, by mitigating impacts on the wider programme. Two mechanisms were identified in the data. The first related to the disengagements related to the works and inspired by the ISO 4001's exit strategy. The aim of the procedure was to manage transitions and the interdependencies of the outputs. Indeed; "*the client wants to make sure that if we finish say a utilities work package, it won't affect the delivery of subsequent ones. So, we check what the new one entails, and if there is a risk, we flag it, and then the team that handles the work package can make adjustments. So they are not taken by surprise, they can modify their works to not suffer from disruptions or delays*" (Project Director 2).

Lastly, to manage transitions related to the allocation of key personnel, the Client imposed a joint assessment mechanism related to changes in personnel. The aim of the mechanism was to control the allocation of key LG personnel, in the case of their re-allocation to other works within the programme or their exit due to resigning or reallocations to other works. Indeed:

"*For a programme of this length, there is bound to be a lot of changes in personnel. The client doesn't want bad surprises, because they assessed the behaviours of our leadership. So any changes have to be agreed by the client. We have a behavioural assessment for any executive coming in and we have to prove their competency. In my example, when I replaced [Project Director 1], around 70% of the works left in the E.W. were utilities, and I was the lead for the biggest utilities work packages. My background and experience reassured the client, and I had good relationships with them, so they accepted*." (Project Director 2).

To avoid replicated past situations were efficiency reduced towards completion, this mechanism was deployed to mitigate operational disruptions related to changes of personnel and to maintain efficiency and the project deadlines. "*In a lot of long-term projects, main contractors deploy their best people at the beginning, but the closer you get to completion, the more you see that they were replaced by less experienced people. Consequently, these projects tend to drag on because of the loss of competence*" (Behavioural Consultant, Client).

Table 10: Mechanism for defining the structure of the partnership

| **Mechanisms** | **L-G** | **LG-Client** | **LG-Sub** |
|---|---|---|---|
| Business Continuity mechanism | ✓ | ✓ | |
| Contractually binding mechanism for resource sharing and allocation | ✓ | | |
| Contractually binding mechanisms for financial risk management | ✓ | ✓ | ✓ |
| Disengagement mechanisms | ✓ | ✓ | |
| Division of responsibilities | ✓ | ✓ | |
| Joint operational due-diligence | ✓ | | |
| Joint planning of interfaces | ✓ | ✓ | |
| Integrated delivery | ✓ | | |

### *Day to day management mechanisms*

In addition to defining the structure and boundaries of the collaborations, the data suggests that the Governance and administration mechanisms detailed how each relationship was to be managed on the day-to-day. One of the core considerations of the day-to-day management mechanisms was to manage the operational risks of the project. Significant attention to health and safety was driven by the reputational risks such accidents would generate for the Client. "*Health and safety at* [Client organisation] *means caring for our collective workforce, our passengers, and the public, by creating an environment where no one gets hurt*. […]." (Supplier Guide). The contractually binding health and safety standards focused on seven areas of health and safety risks, that considered the workforce, the sites, the community, and the supply chain (ibid), which LG had to abide to. These risks were inscribed in the programme's Construction Code of Conduct, which all organisations within the programme's supply chain had to abide to. These also considered the endogenous and exogenous risks of the project and detailed a high-level process for mitigating these. The process and procedure adopted by LG for the programme was negotiated with the Client, to ensure their "*compliance with the health and safety requirements*" (Head of Compliance). On an operational level, the mechanisms related to the management and allocation of resources and the risk of operational conflicts. These were either contractual mechanisms, where the clauses define the responsibilities of partners in terms of their inputs (CRMP 2) or relational mechanisms at the board level, where executives negotiate the management, adaptation, and allocation of resources (Document CRMP, Project Director 1, Commercial Manager 1).

Furthermore, the data suggests that the hierarchical structure of the project, and the management of the different areas of the works were designed to match the complexity of the project, in terms of the interdependencies of outputs (Project organisational chart). In addition, strategic joint management mechanisms were deployed for the high-level decision making for the project. Indeed "*when it comes to the decision-making process,* [the executives'] *expectation is by the time it comes to us and especially to me, any issues have been ironed out; we just want to hear by exception if there are any things you need to elevate.*" (Project Director 1). By adopting a hierarchical process for decision making, LG's board and executives were only

responsible for making "*the high-level decisions, those that can affect the client or have trickle down effects on the rest of the project*. […] *together* [with risk, commercial, directors and the client] *we reassess the planning, the procurement strategy and the like to be able to continue the works*" (Collaborative Working System Manager). Therefore, the joint management mechanisms deployed by LG decoupled the operational and the strategic decision-making process, to support a more efficient delivery of the works.

However, while operational decisions were made by the LG, the Client was actively involved in the strategic decisions for the project. LG "*makes the decisions when it comes to the work packages. We were hired because the management of the production is our core business, so the Client trusts us to make the right decisions*" (Commercial Director). However, the data showed that on the back of Client the collated financial and operational reporting, LG and the Client conducted deployed joint strategic decision-making mechanisms to improve and/or reorganise the delivery of the project. "*Our project is huge, but* [The Client] *has another 4 or 5 like this in the country. So they see the whole works, so the information we report is useful for them to decide how to better use resources. Maybe they will divert some works because another location is not up to speed*." (Project Controller). These strategic changes could be a challenge to the perennity of the JV. Therefore, the LG deployed mechanisms to jointly elicit and adapt strategic goals. Strategic changes occurred both internally and externally. For example, in 2020, Global sold its U.K. infrastructure division, and LG had to adapt to this strategic change (Project Director 1). Regarding external changes, the goals in terms of requirements and objectives of the project and the process have evolved and were expected to evolve during its production (Project Director 2). For example, in the early stages of production, the project was put under review by the government, to re-examine its economic value, in terms of its forecasts and its costs (Document: Economic Case). The review had several consequences on the project, which were not forceable in its early stages or during the formation stage of LG. Notable changes included the reorganisation of the organisational structures of the project to reduce its operational costs, which led to a change of mandate for LG (Collaborative System Manager, Client); the installation of noise-insulation for households in the vicinity of work site to mitigate community disruptions, which led to unforeseeable delays to the demolitions (Head of Social Sustainability, Global and Collaborative Working System

Manager, Global) and an entire section of the project- the construction of a train line between two hubs, with one of these to be designed and produced in 2024- were discontinued from the project's delivery (Document: Economic Case).

Considering LG and the client, the partners deployed alignment mechanisms to manage the inherent *uncertainty* of the project, in terms of both the goals and behaviours for the delivery of the works. Considering the former, the goals of the project were initially ill-defined and lacked clarity. These related only to the target cost and delivery time frame for the programme. However, "*when Parliament voted the bill, the MoT defined the overall cost and timeframe of the works, and a rough design of what it would look like. Now they didn't go in the depth of what the project entailed,* […] *they didn't define the work-packages yet. So, the first thing we had to do was to define this with the Client. And I won't lie to you, at times it was a challenge, because* [the Client] *had this behemoth project to deliver, and they didn't know how to do it*" (Project Director 2).

Therefore, to create goal alignment and a "*shared vision*" (Behavioural Consultant, Client), LG and the Client co-created a set of operational and relational goals for the project. While the operational goals and KPIs were developed for the joint delivery of the technical aspects of the project, the relational goals were deployed to manage the inter-organisational relationship. The co-creation process led to clarity over the scope of the project and the expectations related to the inter-organisational relationship. To create these, LG and the client ran a series of workshops to:

> "*Create a common vision for the EW, so that meant we had to define the parameters of the programme from the top down. What we wanted to achieve, what it meant in terms of resources, how we would package the work. Then we looked at how we would engage with the client throughout the project, so what were the red lines, how we should communicate and escalate issues and the like* […]. *So, we put all our cards on the table, total transparency, total clarity over what was expected*" (Project director 2)

These workshops led to the creation of an LG-Client Relational Plan, that elicited the "*expectations of both parties*" (Ibid) and included contractual clauses to mitigate the risk of opportunism, both from the Client and LG. "*This protocol stipulates what we*

*can and cannot do, contractually it is a two-way street. We cannot deviate from it, and neither can* [the Client]. *Ultimately, it shows we are committed to the project for the long run*" (Collaborative Working System Manager). Consequently, the protocol led to the creation of a single strategy that reconciled the visions of both organisations. The following table lists the identified mechanisms for the day-to-day management of the partnership.

Table 11: Mechanism for the day-to-day management of the partnership

| Mechanisms | L-G | LG-Client | LG-Sub | LG-CA |
|---|---|---|---|---|
| Contractually binding mechanisms for operational risk management | ✓ | ✓ | ✓ | |
| Joint strategic decision-making mechanism | ✓ | | | |
| Joint elicitation of goals | ✓ | ✓ | | |
| JV structure | ✓ | | | |
| Managerial hierarchy | ✓ | ✓ | ✓ | ✓ |
| Integrated delivery | ✓ | | | |

### *Mechanisms for defining collaborative interactions and operations*

The third type of Governance and administration mechanisms refers to the ones that define how the desired behaviours and interactions in the joint operation. LG inscribed the expected behaviours in their Alliance Principals, which was used as a contractually binding document to govern the relationship. It explicitly lists the expected behaviours of Local and Global's executive teams and operational teams. The Collaborative Working System Manager noted that:

> "*If we want the right relationship with Local, it really comes down to having the right behaviours. So, we fleshed out what we meant by collaborative behaviours at the onset, and we elevated that to a core value in our alliance principles. […] and we had to make sure that* [personnel] *actually walk the talk"*

In addition to eliciting behaviours in the Alliance Principals, the CRMP denoted procedures for managing, monitoring, and improving behaviours. The operationalisation of the behavioural alignment mechanism was a challenge for the organisation. For example, the head of collaborative learning argued that:

"*One of the core risks* [LG has] *is behaviours. We know that behaviours are important, and we know that we have to align them. But* […] *behaviours are not tangible, and we have a lot of difficulty to monitor them and steer them at every level of the JV*".

To monitor behaviours, LG replicated the mechanisms they implemented in their previous collaborative projects. These mechanisms included contractually mandated behavioural measurements, to monitor the evolution of the perceived trustworthiness, integrity and reliability of partners and relationally driven mechanisms to steer behaviours and remediate deviations from the alliance principles. For example, behavioural feedback loops were implemented to evaluate the quality of the relationships following key interaction points, such as board meetings, collaboration meetings and relational issues solving meetings (Commercial manager 2). The information collected was used by Collaboration Co-ordinators who carried out "*ad hoc meeting assessments to track and feedback to team members on what behaviours should be displayed more and what behaviours should be seen less*" (CRMP) and for the internal Collaborative Recognition Scheme (Head of Collaborative learning)

Furthermore, during the tendering process, the client tested the behaviours of LG's leadership teams and interface managers. The tests signalled the behavioural expectations the client had for the relationship with LG. "*On the back* [of the tests], *we created a behavioural plan with different resources* [such as] *online resources, workshops, lunch and learns, to make sure we would exhibit the behaviours* [the client is] *looking for*" (Head of Collaborative Learning). The mechanism enabled LG and the client to align their behaviours for the delivery of the programme. The behavioural alignment of project personnel was a core consideration of LG's and the Client's contractual arrangements. Clause 1.15 stated: "*The Employer recognises that Collaboration does not result solely from the implementation of systems and operating models alone. The Contractor and [programme] Civils Contractors (including Subcontractors of any tier) are required to demonstrably align their behaviour with the Employer's values*" (Collaboration Agreement). It supported the development of relational norms, such as transparency, trust, and commitment. "*When we first started to engage with* [the Client], *we had to demonstrate that we were not in it for ourselves,*

*we were there as partners*." (Head of Collaborative Learning). In addition, the LG-Client relationship management plan mitigated the risk of adversarial interorganisational relationship by instilling a one-team mentality in the project. It enabled them to "*move away from the normal client contractor relationship to one where it is much more, we are team working together to deliver this. Now in pockets we do still see this sort of parent and child relationship, but we're quite happy to push back and say that is not really what we want. I think what has gone well is that trust was instilled in* [the programme] *right from the onset*" (Project Director 1).

Furthermore, to comply with the Collaboration Agreement's contractual clauses, LG and the subcontractors deployed a set of alignment mechanisms and procedures "*to monitor, measure and review performance in terms of […] behaviours and trust*" (ibid). These were inscribed in their Collaboration Implementation Plan. In terms of the aligning of behaviours, the contractual arrangements deployed between LG and subcontractors also integrated the collaborative principles and clauses from the Collaborative Agreement. In addition to complying with the client's collaborative requirements, these clauses justified the deployment of the behavioural alignment mechanisms adopted in the contracts.  the Collaborative Agreements required LG to establish "*processes to monitor, measure and review performance in terms of outputs, risk, alignment, behaviours and trust*". The behavioural alignment was operationalised through the onboarding procedure deployed during the bidding process, the contractual arrangements for the production process and the collaborative meetings for the improving of the relationship. Similarly to the bid awarding between the Client and KGJV, the onboarding procedure included the behavioural assessment of subcontractors. "*We assessed the behaviours of prospective sub-contractors before awarding the bids.* […] *We had a series of workshops and test to see how well, or not, they collaborate in project settings*" (Collaborative Working Systems Manager). The behavioural assessment provided the "*baseline on which we monitored the behavioural development of the supply chain*" (Head of Collaborative Learning).to align or re-align LG's and the subcontractors' behaviours, collaboration meetings were deployed for providing feedback related to the relationship. "*Every week, sometimes two weeks, we have a mandatory collaboration meeting. We raise all the commercial or engineering issues that are happening on the works because of the relationship* […]. *So for*

*example, if someone behaves in way that is not collaborative, we can flag this and then* […] *that helps us to improve the way we work with the supply chain*" (Senior engineer). Furthermore, behavioural surveys were deployed to measure the development of collaborative behaviours in the context of the works. These compared the baseline scores the subcontractor and LG personnel achieved during the behavioural assessments of the bids with the quarterly assessments to monitor the positive/negative evolution of behaviours. "*We are very aware of the importance of behaviours for successful collaboration, so we had to measure these to make sure we were going in the right direction*" (Head of collaborative learning).to improve the relationship and mitigate relational risks, LG deployed behavioural workshops, to realign specific behaviours that were flagged in the meetings and the behavioural surveys (ibid). The following table lists the identified mechanisms for establishing collaborative interactions and operations.

Table 12: Mechanism for establishing collaborative interactions and operations.

| Mechanisms | L-G | LG-Client | LG-Sub | LG-CA |
|---|---|---|---|---|
| Alliance Principles to define the collaboration | ✓ | | | |
| Behavioural procurement mechanism | ✓ | ✓ | ✓ | |
| Contractually binding mechanisms for relational risk management | ✓ | ✓ | | |
| Issues management procedure | ✓ | ✓ | | |
| Problem Solving procedure | ✓ | | ✓ | |
| Joint planning and onboarding of the supply chain | ✓ | ✓ | | |
| Integrated delivery | ✓ | | | |

### *Mechanisms to integrate suppliers and teams*

The final governance and administration mechanism refers to the ones that enable the integration of suppliers and teams in the project. LG deployed integration mechanisms to create a "*one team culture and root out the us versus them mentality that creates unproductive relationships*" (Area Director 2). Two dimensions of integration mechanisms were implemented in the relationship. The first was the integration of teams, which was supported by the geographical proximity of personnel and the team composition. The 50-50 structure adopted by the LG was also deployed

at the operational level, where teams were composed of the same number of Local and Global personnel and project managers (Area Manager 1; 2; Delivery Director 1; 3). "*Across the project, there has been a pretty fair mix, [so] they feel a bit more part of a team*" (Commercial Manager 1). In addition, during wider project events (Toolbox talks) and corporate presentations (APM presentation, Collaborative award events, Share & Learn), LG "*kept on reinforcing that we are a team and that we are working together*" (Area Manager 4). This narrative was prevalent in LG, where the notion of a 'one team culture' was described by most interviewees. Furthermore, the offices within each sector were at a close proximity to one another. The Lead Engineer argued that this supported cross functional collaboration, where for example the "*temporary works and the management office, they were not far away, so it was a 5-10 minute walk, so we could go and see them if we needed to*", which was conducive to "[integrating] *them to the project, it was easy to go and see them and for them to come by when we were facing issues. So, it included them in the process*, […] *when in past projects they were like a separate business*".

The second dimension of integration related to the processes deployed by LG for both recruitment and production. New hires were recruited by LG's blended Human Resource team, under an LG contract (Office Manager). "*I'd say around a third of the people here are new hires, so they never worked with either Local or Global*. […] *So, they don't know who works for who, so for them it is just LG. So, it is easy for them to integrate, because they are not used to our way of working or Global's one*." (Utilities lead 1). The processual integration was facilitated by a single production system. LG doesn't "*have competing ways of working, because we deployed one system. So, we really have one team, one system and one way of working and this really means that we are not just a joint operation […] we are a single company where we have to work together. It makes the relationship smoother*" (Delivery Director 2). In terms of the allocation of human resources —personnel— LG adopted a joint selection and personnel allocation process. The different roles for the project were simultaneously posted on Local and Global's H.R. platforms to provide the same opportunities to personnel from both organisations (Head of Collaborative Learning). The selection process started when multiple individuals from both organisations applied for the role, and "*LG do run a process where* [they] *advertise all of the roles that* [they] *have, and*

[they] *anonymise CVs*" (Project Director 1). LG assessed individuals based on their experience where "*the relevance of the CV of the person coming through is absolutely crucial. but generally, we tried to keep the balance between, and […] have the best person for the job*" (ibid). In addition, since the project was delivered through the use of an integrated JV, LG deployed behavioural assessment to assess the collaborative skills of all personnel. "*Working in a JV is very different, so you need people who can adapt to this setting and who are good at creating individual relationships. So, we were all assessed on this before being assigned to the role*" (Utilities lead 1). In addition to the recruitment process, the allocation of personnel and roles was also relational. "If comes along and says: "*for this package we have a fantastic guy for it" I would accept that, and they would do the same. So, it is a bit of a mixture in there. We got some processes in there, particularly when we are bringing new people in, we go with recommendations for best man for the job, but a lot of it is about relevance of the CVs and experience*" (Project Director 1)

Furthermore, for this project, the Client contractually required that key suppliers in each programme were collocated to support their integration to "*avoid fragmented relationships*" and to support "*collaborative working throughout the supply chain*" (Code of Construction Practice). However, the collocation was initially deployed solely for the suppliers, and the Client's teams and offices were separate from the supply chain. at "*the beginning of the project, there was a clear separation between us and the client. So we were not in the same offices, and we had to request meetings, or they would summon us. So that was not conducive to collaboration*" (Collaborative Working Systems Manager), and "*initially, I wouldn't say collaboration was that strong*" (Commercial Manager 1).

Consequently, the LG and the client were unable to build relational norms on the field, rather the lack of integration was observed as being the cause "*of frustrations. We didn't have major conflictual scenarios, but you had this build-up of episodic tensions, because our people thought* [the client] *was arrogant or trying to take advantage of us. And we were receiving a lot of requests by our teams on how to approach the situation* […], *how to diffuse the tensions to avoid escalations*" (Head of Collaborative Learning). To mitigate the risk of conflict, within a year following the

start of the project, LG and the client decided to adopt colocation and geographical proximity to support the building of commitment and trust. Indeed:

> "*When we started sharing the offices, our people saw that* [the Client's] *teams were struggling with the project, because they didn't have the bandwidth to do the work. So, they understood that the issues they faced were not because of arrogance, but simply because* [the client teams] *had thousands of things to do and were maybe overwhelmed.* […] *By being there, we could actually help them, support them, and it started a lot of productive discussions quite spontaneously*" (Head of Collaborative Learning)

Similarly, collocation was extended to the strategic subcontractors' delivery teams. The Early contractor Involvement enabled the development of a one team mentality by involving the subcontractors early in the delivery of the project. Considering the colocation, the data suggests that the proximity between the different organisations' delivery teams was conducive in operationalising collaboration and integration.

> "*I think that the main thing is to bring in people early, making them part of the team. That involves engagement* […] *like all being in the office together. Not having your contractors sitting outside and your other contractor in another office around the corner. Everyone together* […] *working together to deliver the same thing. It helps with improved relationships, it helps to remove your adversarial approach, the old school hierarchy between contractor and client. It starts to get people to think more of a one team one goal sort of mentality*" (Commercial manager 1)

However, despite sharing offices, certain locations still maintained a separation between LG's teams and the Client's. This separation was perceived as creating relational barriers and division between the partners' teams and a "us versus them" mentality:

> "*The shared offices really helped to create a collaborative environment in* [sectors North, West and Central 2], *but here* [Central 1*], it can be a bit more complicated. So* [the client teams] *sit in the eastern part of the office, and we cannot access it, we don't have the badges for it. And you'll notice*

*that contractors and sub-contractors have different lanyards from* [the Client teams]. *It sorts of creates this us and them dynamic. But now they trust us enough to raise these small issues, and little by little, we can improve the relationship*" (Collaborative Working Systems Manager)

Interestingly, the same phenomenon was also reported in Location West, where the Subcontractors and LG's teams were separated and were relational barriers.

In addition, since fragmentation was a core risk for the project, behavioural procurement mechanisms were deployed between LG and the Client and LG and sub-contractors to onboard and integrate suppliers more effectively. The Client implemented contractually mandated behavioural assessments to evaluate the collaborative behaviours of all Tier 1 contractors. Their aim was to "*identify and forecast the behavioural risks that can occur through the contract with the key tier one JVs*" (Behavioural Consultant). The identification of relational risks was instrumental in LG's and the Client's co-development of relational risk management procedures. LG and the Client "*co-designed a process to manage conflicts in the programme, to make sure these don't escalate and that we don't spend our time in arbitration or mediation, and god forbid, in litigation*" (Commercial Director).

In addition, the behavioural procurement process was also a contractual obligation for Tier 1 contractors —in this case LG— for the on-boarding of their strategic sub-contractors. These were outlined in the relational management plan was integrated in "*our contractual arrangements, like this we don't get in we said you said situations. It is a clear, contractually valid step by step approach*" (Project Director 1). Its aim was to identify the initial collaborative behaviours of sub-contractors, to control and improve the relationship over time (Senior Procurement Manager). This mechanism was implemented to jointly evaluate sub-contractors in accordance with a set of behavioural and relational dimensions.

"[LG] *jointly tested the behaviours of prospective suppliers. So, we did this in two phases, we put* [Local and Global] *in separate rooms and conducted a day of workshops with the suppliers. So, we measured things like trust, reliability, integrity, leadership, ethical management, and collaborative maturity between Local and the suppliers and Global and the suppliers.* [Then we] *repeated the process with different exercises to measure the*

*same factors but this time with LG and the suppliers."* (Behavioural consultant).

The following table lists the identified mechanisms for integrating teams and suppliers.

Table 13: Mechanism for integrating teams and suppliers.

| Mechanisms | L-G | LG-Client | LG-Sub | LG-CA |
|---|---|---|---|---|
| Capability based procurement | | ✓ | ✓ | |
| Formal HR allocation process | ✓ | | | |
| Informal HR allocation process | ✓ | | | |
| Joint onboarding of teams | ✓ | ✓ | ✓ | |
| Joint planning and onboarding of the supply chain | ✓ | | ✓ | |
| Integrated delivery | ✓ | | | |

### *Governance and Administration mechanisms: Conclusion*

Therefore, the findings suggest that the mechanisms for the governance and administration differed across the relationships that constitute LG ego-network (Cf Table: Governance & Administration mechanism in the ego-network). It showed that the volume and variety of tasks and how strategic the relationships were perceived for the delivery of the works influenced the volume and variety of mechanisms deployed. Some mechanisms were unique to certain relationships while others were deployed to fulfil multiple objectives, over multiple relationships

The following table shows how these mechanisms were combined in the different relationships of the ego-network.

Table 14: Governance & Administration mechanism in the ego-network

| Mechanisms | Objective | L-G | LG-Client | LG-Sub | LG-CA |
|---|---|---|---|---|---|
| Contractually binding mechanisms for operational risk management | day-to day management | ✓ | | ✓ | |
| Hierarchical mechanisms for managing the project | day-to day management | ✓ | ✓ | ✓ | ✓ |
| Joint strategic decision-making mechanism | day-to day management | ✓ | ✓ | | |
| Joint elicitation of goals | day-to day management | ✓ | ✓ | | |
| JV structure | day-to day management | ✓ | | | |
| Managerial hierarchy | day-to day management | ✓ | ✓ | ✓ | |
| Business Continuity mechanism | structure and boundaries | ✓ | ✓ | | |
| Contractually binding mechanism for resource sharing and allocation | structure and boundaries | ✓ | | | |
| Contractually binding mechanisms for financial risk management | structure and boundaries | ✓ | ✓ | ✓ | |
| Disengagement mechanisms | structure and boundaries | ✓ | ✓ | | |
| Division of responsibilities | structure and boundaries | ✓ | ✓ | | |
| Joint operational due diligence | structure and boundaries | ✓ | | | |
| Joint planning of interfaces | structure and boundaries | ✓ | ✓ | | |
| Alliance Principles to define the collaboration | interactions and operations | ✓ | | | |
| Behavioural procurement mechanism | interactions and operations | ✓ | ✓ | ✓ | |
| Contractually binding mechanisms for relational risk management | interactions and operations | ✓ | ✓ | | |
| Issues management procedure | interactions and operations | ✓ | ✓ | | |
| Problem Solving procedure | interactions and operations | ✓ | | ✓ | |
| Capability based procurement | integrate suppliers and/or teams | | ✓ | ✓ | |
| Formal HR allocation process | integrate suppliers and/or teams | ✓ | | | |
| Informal HR allocation process | integrate suppliers and/or teams | ✓ | | | |
| Joint onboarding of teams | integrate suppliers and/or teams | ✓ | ✓ | ✓ | |
| Joint planning and onboarding of the supply chain | integrate suppliers and/or teams and interactions and operations | ✓ | | ✓ | |
| Integrated delivery | integrate teams, structure and boundaries and interactions and operations | ✓ | | | |
| | number of mechanisms | 23 | 14 | 9 | 1 |

### 4.3.2 Support mechanisms

This section details the Support mechanisms that were deployed in the ego-network. While the Governance and administration mechanisms provided the structures to define the relationship, manage the day-to-day, define expected behaviours and integrate partners, these must be reinforced during the life cycle of the collaboration. Therefore, Support mechanisms were deployed to reinforce collaborative behaviours through knowledge sharing mechanisms to improve the collaborative process and incentive mechanisms to sustain behaviours. The following sub-section describes the findings related to these Support mechanisms.

#### *Communication mechanisms to sustain and improve the collaborative process*

For collaboration to be sustained during the production of the project, the exchange partners in LG's ego-network deployed a set of communication mechanisms for reinforcing behaviours and for maintaining the joint-operation.

Firstly, LG identified open communication as a core enabler of effective collaborative relationship (CRMP). Communication was one of the eight key collaboration principles identified by the Client to support collaborative outcomes across the programme (Collaboration Agreement). "*We cannot have collaboration without communication. If the Client doesn't know what we are doing and how we are doing it, they cannot do their job. An vice versa. If the Client doesn't tell us what is happening, then we cannot manage the project.*" (Project Director 2). Therefore, they deployed formal communication and information sharing mechanisms related to the project throughout the relationships. LG's approach relied upon relational mechanisms in the context of the different meetings deployed at the different levels of the JV. The importance of communication was highlighted by both the formal governance mechanisms and the interviewees' experiences. The findings show that the nature of open communication mechanisms varied in accordance with their aims. Two natures of open-communication mechanisms were identified.

The first considers the mechanisms deployed to support the relational dimension of the JV and thus to build relational norms. LG relied upon either face-to-face settings,

such as meetings and events during the delivery of the project, or through the virtual means, such as chat platforms, deployed for the project (Lead engineer). Before the COVID outbreak, the use of chat platforms was seen as counterproductive. The Utilities manager suggested that communicating through chats were *"a waste of time*" and a source of tensions due to the varying interpretations of the messages "*because* [they] *all have a ton of things to do, and sometimes* [they] *misinterpreted messages, so it was common to have tensions just because of the chats*". Therefore, LG personnel preferred face-to-face, either formally through meetings or through informal discussions. Furthermore, the data suggests that the willingness of partners to communicate affected the relational risks of the relationships. "*One of the dangers of alliances is if the different partners try to avoid conflicts by not communicating what they think. So, it builds up frustrations, and then, when there is a conflict, it blows out of proportion*" (Area manager 2). The interviewees argued that interpersonal communication "*resolves issues, so it is not about conflict avoidance but problem solving.* […] *That can be about the relationship, if Local thinks we are not behaving in the expected way, they can tell us, and we can do something about it. And that type of honesty builds trust and down the line it also reduces the risk of real conflicts*" (Utilities Lead 1). Therefore, open communication mitigated the risk of conflictual relationships by building relational norms based on trust and honesty.

The second nature of open communication refers to the operational and technical dimensions of the project, such as the planning, the advancements of the works and the innovations that occurred in the project. the Project Director 2 noted that:

> "*You cannot have collaboration without open communication because you cannot have clarity. If we do not communicate what we want, how we want things done then we leave the door open to everyone, you know Local, Global, the Client or our subcontractors to make assumptions, which can be wrong. And that is bad management […] that leads to mistakes and a lot of times to conflicts*"

The data suggests that the operational communication mechanisms were deployed at two levels of the project: within the sectors and/or areas and across the sectors and/or areas. Considering the former, the open communication mechanisms were deployed to provide clarity over the tasks to mitigate the delivery risks and support joint problem-

solving. In terms of clarity and delivery risks, mechanisms were deployed to provide an overview of the project to the different teams involved in the delivery of work packages, to mitigate both relational risks (conflicts) and delivery risks. For example, "*On a weekly basis we bring in all the project managers for the* [demolition work package] *to* […] *communicate the milestones and the challenges* [...]. *By knowing where we have delays and where we are on schedule or even at times ahead of schedule,* [we] *can start to support one another. So of course, it brings about collaboration, and our teams are not taken by surprise, so we can avoid a lot of conflicts*." (Area Manager 4).

Furthermore, open communication was described as being a driver of problem solving by aligning behaviours during the production of the works. The instilling of an environment where individuals are encouraged to communicate both their ideas and their concerns "*led to creative solutions"* (Lead Engineer) and mitigated "*conflicts because frustrations were kept bottled up*" (Utilities Lead 2). "*We don't want a culture where people are afraid of communicating openly, because we could miss some opportunities or actually fail to deliver certain work packages"* (Delivery Director 2).

LG also deployed structural communication mechanisms across the sectors and areas of work of the project. For example, LG deployed notice boards and newsletter (field notes) which they disseminated throughout the shared office and thus the JV and the Client and the. The project boards were positioned in areas where LG personnel regularly crossed, such as in the vicinity of break rooms and the cafeteria. These were installed for individuals to provide informal feedback related to either the relationship or the works, through the use of post-its. "*The notice boards become a fun way for people to communicate around the project. So essentially, the board represents the sector, and the different teams put up post-its with questions, remarks, feedback and sometimes events. So, people really engaged with that*, […] *it nearly became a game and it definitely made people more interested in the overall project*" (Utilities lead 1).

Formal events were also organised across the project locations for the project leadership to communicate on the advancements of the project. For example, the Enabling Works events were used by the leadership team (executive directors, delivery

directors and area managers) to present the milestones and innovations that occurred in the previous month and discuss the upcoming works. The meetings were designed to be participative where "*different people* [contributed] *to that team briefing*, [they]*'d have somebody that would present how their teams were doing on the work. So, it was presented everybody, there was somebody from each company. So, it was presented by everybody in that Alliance. And people were encouraged to ask questions and to speak out. It was really to show that* [it] *doesn't matter who you work for we're all got the same goal*." (Office manager)

At the onset of the project, the relationship with Consent Authorities were adversarial, due to the behaviours of both LG and the Client vis à vis the community leaders. LG was "*keeping them in the dark. Whenever we needed consents,* [LG and the Client's engineers] *were going to them, basically with the* [Project Act] *in hand and tried to force them* […]. *Obviously, this didn't work, they wanted to know exactly what we were going to do, which is normal, because they are accountable to their community*" (Consents Manager). In order to mitigate the conflictual relationship that arose from these attitudes, LG implemented a process that required the consents team to be the interface between project engines and Local Authorities. "*We wanted to have a single interface between our teams and the Local Authorities. Before, we had project managers from every area requesting meetings, and it was messy, and we took too much of* [Local Authorities] *time, so it was unproductive. […] So the consents team handles all of the communication"* (Collaborative Working System Manager).

The consents team deployed open communication with the local authorities, in order to mitigate the risk of relational conflicts. These mechanisms related to two dimensions: the relational communication and programme communication. The former was deployed to "*renew trust and transparency. We were not seen as reliable partners; we were seen as bullies. And that is not good for our reputation, and it's terrible for the relationship*" (Consents Manager). In order to mitigate these risks, LG deployed both feedback loops and monthly Authorities meetings. "*We needed a platform to communicate with the local authorities. We started these* [i.e., monthly Authorities] *meetings to start a discussion"* (Head of Consent). These discussions led to the elicitation of all the concerns local authorities had for the project:

"*When we knew their worries, we could start more meaningful communications around the project. It showed them we heard them; we were trying to solve these concerns.* […] *Some things we could definitely take on board, you know like not having ongoing works during or around* [community events]. *Others we just couldn't, we needed the access to the grid by a certain date, or we needed scaffolding. There was no way around it. But it showed them we listened and that we knew our approach was not right* […]. *Because we communicate, we now have this help me help you dynamic in the meetings, which is always better*" (Consents manager).

Therefore, the meetings were deployed to support transparent relationships and renew trust, by "*showing them we actually are reliable, we do what we say*" (ibid).

Conversely, the programme communication was deployed for both parties to their respective needs and have visibility over upcoming works. The head of consents argued that "*without visibility*, [Local Authorities] *don't know what to expect* […] *and that inevitably leads to conflicts*". In order to provide visibility, LG deployed quarterly programme presentations where both LG and Local authorities would present their upcoming works and communicate their requirements. The Local authorities needed to:

"*Understand what we were doing, why we were doing it in that way and how it would affect them. Because we used to brandish the Act, their response was to brandish their procedures, to slow us down. Now our approach is to go to them and tell them: look, this is what we need to do. How can we set this up? What do you need to do? Can we help?"* (Consents Manager).

These meetings were instrumental in the development of transparency and relational norms such as trust and reciprocity. In terms of trust, the Head of consents argued "*they only started to trust us when they saw we were reliable, and that meant whatever we discussed in the meetings, we had to act on it* […]. *This showed them we had no hidden agendas, that we took their concerns into consideration*". In terms of reciprocity, the meetings enabled the partners to find mutually beneficial solutions to the various issues. For example, "*after a few months we got to a relationship where*

*we were helping one another*. [For example], *we re-arranged some of the utilities work and included some of theirs in it. In a way we scratched their back, so they scratched ours. It was a give and take, and it worked well"* (Consents manager)

Lastly, the information shared between partners differed across the ego-network. While the information shared between LG-Subcontractors and LG-Consents Authorities was largely operational, LG shared all financial information both internally and with the client. The lack of transparency was identified as a source of inter-organisational conflicts, and the sharing of information was described as a conflict mitigation mechanism. "*Because we share our financial and operational data, we show we have no hidden agendas, so when we need to address certain changes, all partners know it is being done in good faith. What that means is* […] *things get less conflictual, it is about problem solving*, […] *not about taking advantage of each other*" (Delivery Director 2) In addition, due to the transition between a lump-sum contract (NEC F) to a cost-reimbursable one (NEC E), LG and the Client adopted an open book accounting system for the project. The Client "*has complete visibility over our costs, we are completely transparent. Like this they see we have nothing to hide, that we have no contingencies. So that eliminates foul play, and it shows them they can trust us*" (Project Director 1). In addition, the client also provided all Tier 1 contractors with "*the project's financial statements. So the Tier 1 contractors can see the resources. So they know they will get paid on time and in full for all the works. Now of course, this information cannot be diffused in the rest of the supply chain*" (Collaborative System Manager, Client). In addition, to monitor the ongoing costs of the project, LG and the Client deployed joint reporting mechanisms to control and forecast the project's expenditure and mitigate conflicts:

> "*Transparency is key. If we don't share the financial information, no one can manage the financial risks, so we share everything. And because of that, we don't end up in situations were any party can say they were unaware of certain costs. So that sorts out a lot of commercial issues we might have. They see we manage the costs well and that we are not pulling a curtain over their eyes* [that there are] *no hidden agendas"* (Commercial Manager 2).

The following table lists the identified communication mechanisms to reinforce collaboration in the ego-network

Table 15: Communication mechanisms to sustain collaboration in the ego-network

| Support Mechanisms | LG | LG Client | LG Sub | LG CA |
|---|---|---|---|---|
| Financial information sharing | ✓ | ✓ | | |
| Formal communication and information sharing | ✓ | ✓ | ✓ | ✓ |
| Informal interactions | ✓ | ✓ | ✓ | ✓ |
| Intra-sectorial communication | ✓ | ✓ | ✓ | |
| Inter-sectorial communication | ✓ | ✓ | ✓ | |
| Joint onboarding of teams | ✓ | ✓ | | |
| Joint training | ✓ | ✓ | ✓ | |
| Shared offices | ✓ | ✓ | ✓ | |

### *Mechanisms for incentivising collaborative engagement*

While communication mechanisms helped to sustain collaborative behaviours and improve the process, LG also deployed mechanisms to incentivise organisations and teams to engage collaboratively when producing to the works. Some incentives were relational while others were structural. For example, to support "*collaborative working throughout the supply chain*" (Code of Construction Practice) the colocation of the delivery teams was deployed from the project's onset. It enabled the development of a one team mentality by involving the subcontractors early in the delivery of the project. Considering the colocation, the data suggests that the proximity between the different organisations' delivery teams was conducive in operationalising collaboration and integration.

> "*I think that the main thing is to bring in people early, making them part of the team. That involves engagement* […] *like all being in the office together. Not having your contractors sitting outside and your other contractor in another office around the corner*." (Commercial manager 1)

Over time, colocation was one of the main mechanisms to reinforce collaborative behaviours.

The benefits of collocation on the collaboration were perceived as being conducive to the development of "*a one team culture. I think the fact* [the Client] i*s a new organisation, our way of working rubbed on them thanks to our shared offices*" (Utilities Lead 2). In addition, the effect of the colocation on the development of collaboration was observed as being immediate:

> "*I was really blown aback, this really revolutionized, for me, this project, because we now are sitting in the same office as* [The Client], *working together with* [the Client] *as if they were part of Global or Local,* […] *they know what we are getting, we know what they try to achieve. Then the collaboration just turned around, like a table flipped, and […] that was quite a game changer.* […] *the moment we switched to that*, [we] *were all working together for a common goal and* […], *there was nothing to hide behind you know. All you could do was row together to achieve the common goal*." (Commercial Manager 1)

In addition, to incentivise collaboration across the project's relationships, LG deployed a set of behavioural management mechanisms to monitor and reinforce collaboration between organisations and teams. While some were organisational, others were deployed at an individual level. For example, LG replicated behavioural measurements, to monitor the evolution of the perceived trustworthiness, integrity and reliability of partners and relationally driven mechanisms to steer behaviours and remediate deviations from the alliance principles. Behavioural feedback loops were implemented to evaluate the quality of the relationships following key interaction points, such as board meetings, collaboration meetings and relational issues solving meetings (Commercial manager 2). The information collected was used by Collaboration Co-ordinators who carried out "*ad hoc meeting assessments to track and feedback to team members on what behaviours should be displayed more and what behaviours should be seen less*" (CRMP) and for the internal Collaborative Recognition Scheme (Head of Collaborative learning).

Similarly, to reinforce the behaviours tested during the behavioural procurement stage, LG and the Client deployed quarterly relationship assessments, where their teams would rate the relationship across a set of cultural, operational, and behavioural factors (Head of collaborative learning). "*The quarterly assessments tell us a lot about how we perceive one another. We really deployed it to learn more about ourselves and about the main contractor, so we can improve the way we do things, the way we deal with them. If we do it well, we will see improved relationships*" (Senior Collaboration Lead, Client). In addition, to demonstrate collaboration in the supply chain, quarterly behavioural monitoring mechanisms were also deployed with the supply chain. These

included assessments, reports and collaboration awards. Yet, the process was a challenge for LG where the head of collaborative learning argued that:

> "*One of the core risks* [LG has] *is behaviours. We know that behaviours are important, and we know that we have to align them. But* […] *behaviours are not tangible, and we have a lot of difficulty to monitor them and steer them at every level of the JV*".

On an individual level, behaviours were only tracked within LG and as of 2020, between LG and the client. Annual appraisals were conducted at all levels of the JV. For example, the head of collaborative learning explained that LG was attempting to have collaboration as "*part of our DNA. So we have to guide it, reinforce it and measure it. All our annual appraisals look at collaborative behaviours, and some are also intertwined with other competencies. We take it seriously when it comes to professional development because our clients want this more and more".* However, these mechanisms did not extend to the supply chain.

The following table lists the incentive mechanisms for reinforcing collaborative engagement in the ego-network

Table 16: Mechanism for incentivising collaborative engagement in the ego-network

| Support Mechanisms | L-G | LG Client | LG Sub | LG CA |
|---|---|---|---|---|
| Shared offices | ✓ | ✓ | ✓ | |
| Behavioural management (Individual) | ✓ | | | |
| Behavioural management (Organisational) | ✓ | ✓ | ✓ | |
| Control for relationship management | ✓ | ✓ | | |
| Formal interactions to reinforce collaboration | ✓ | ✓ | ✓ | |
| Joint stakeholder engagement | ✓ | ✓ | | |
| Managerial hierarchy | ✓ | ✓ | ✓ | |
| Personnel Integration | ✓ | ✓ | ✓ | |
| Team composition | ✓ | | | |

*Support mechanisms: Conclusion*

Therefore, the findings suggest that the Support mechanisms differed across the relationships that constitute LG ego-network (Cf Table: Support mechanism in the ego-network). It showed that the volume and variety of mechanisms deployed in an interface were influenced by the relational needs of the project, in terms of required information, duration of the relationship and integration needs for sustaining the one-team culture.

The following table depicts where and why support mechanisms were deployed between exchange partners.

Table 17: Governance & Administration mechanism in the ego-network

| Support Mechanisms | Objective | LG | LG-Client | LG-Sub | LG-CA |
|---|---|---|---|---|---|
| Financial information sharing | communicating to sustain collaboration | ✓ | ✓ | | |
| Formal communication and information sharing | communicating to sustain collaboration | ✓ | ✓ | ✓ | ✓ |
| Informal interactions to reinforce collaboration | communicating to sustain collaboration | ✓ | ✓ | ✓ | ✓ |
| Intra-sectorial communication | communicating to sustain collaboration | ✓ | ✓ | ✓ | |
| Inter-sectorial communication | communicating to sustain collaboration | ✓ | ✓ | ✓ | |

| | | | | | |
|---|---|---|---|---|---|
| Joint onboarding of teams | communicating to sustain collaboration | ✓ | ✓ | | |
| Joint training | communicating to sustain collaboration | ✓ | ✓ | ✓ | |
| Shared offices | incentivise collaborative engagement | ✓ | ✓ | ✓ | |
| Behavioural management mechanism (Individual) | incentivise collaborative engagement | ✓ | | | |
| Behavioural management mechanism (Organisational) | incentivise collaborative engagement | ✓ | ✓ | ✓ | |
| Control mechanisms for relationship management | incentivise collaborative engagement | ✓ | ✓ | | |
| Formal interactions | incentivise collaborative engagement | ✓ | ✓ | ✓ | |
| Joint stakeholder engagement | incentivise collaborative engagement | ✓ | ✓ | | |
| Managerial hierarchy | incentivise collaborative engagement | ✓ | ✓ | ✓ | |
| Personnel Integration mechanisms | incentivise collaborative engagement | ✓ | ✓ | ✓ | |
| Team composition | incentivise collaborative engagement | ✓ | | | |
| | Number of support mechanisms | 16 | 14 | 10 | 2 |

### 4.3.3 Joint-work mechanisms

This section details the Joint-work mechanisms that were deployed in the ego-network. While the Governance and administration mechanisms and the Support mechanisms were deployed to define and structure the relationship and reinforce collaboration respectively, the Joint-work mechanisms were deployed to jointly-produce the project tasks. To this end, Joint work mechanisms were deployed to plan and control the delivery of the works and to produce work packages. The following sub-section describes the findings related to these Joint-work mechanisms.

#### *Mechanisms for task planning and control*

The first type of mechanism concern those that were deployed to plan and control the production of the project. This research identified nine mechanisms throughout the different relationship of the network. Due to the complexity of the works, in terms of its scale and variety and interdependence of work-packages, the project required "*extensive planning* […] *to manage the entire project"* (Project director 1). Three planning categories were identified in LG's ego-network: the strategic, the operational and the relational. The former considered the high-level planning of the portfolio of

projects, in terms of its overall strategic and financial objectives, its layout and its procedures.

In terms of the strategic plans, LG and the Client developed the high-level planning of the portfolio of projects, that is its overall strategic and financial objectives, its layout, and its deadlines. The strategic planning was the first joint activity conducted by LG and the Client. These planning meetings were implemented to:

> "*Transform the original project design into a workable project*. […] *we worked with the client to define all the requirements of the project, so if you want these were the project specifications. Then we looked at how these translated into actual work-packages. Our planners worked for months with LG to have a list of works that we needed to conduct. These were like blueprints of what the project entailed. The challenge was then to organise the work, there were hundreds of work packages,* […] *in different geographical locations. So we had to find the most efficient way of delivery this and at the same time we had to plan these in a way where disruptions wouldn't affect the entire works. So that is how we got to our current sectors and areas of work. We bundled everything in a way that made sense"* (Commercial Director)

These specifications entailed the financial targets for the different work-packages, their deadlines, and their requirements in terms of their quality (Delivery Director 1). However, "*the quality of the works was very difficult to pinpoint. You have all the engineering specifications,* [and] *also the environmental impact of the work packages. We worked a lot with* [the Client's] *environmental teams and planners to evaluate the impact of the works on the country's natural reserves, its fauna and flora and the water resources. So the sustainability plans were an integral part of the overall planning process*" (Environmental manager 1).

These led to the development of the original planning for the works, and detailed the portfolio's technical, financial, and environmental targets. These were contractually binding and were used to assess the planned versus realised value of the works (Commercial manager 1). LG was responsible for organising the portfolio into a set of

manageable projects and to organise the tendering for these projects. The strategic planning of the project was conducted "*as soon as we were awarded the bid, we started to plan how we were going to organise the works: how to design the sectors and the areas, and what* [work-package] *to complete first, so really the sequence and the structure*. […] *Now, the big challenge was for the planning to be reliable for the next five to ten years, but flexible enough to be adapted to the changes in the project*." (Delivery director 1). The planning was conducted "*over the first few months. We had a team of project managers working with the different area directors and delivery directors to create a template of what the project would look like. So, they took the Client's requirements and build the project around these. We then submitted our plans to the client, and this started a back and forth with them and their consultants until we had a workable solution*" (Collaborative working system manager). This suggests that the strategic planning depended on feedback loops between LG and the Client.

In terms of the planning process, the procedure for delivering was inscribed in the LWoW's Planning System. "*[…] Consistency was key. We had to have a unified approach for the planning so having the LWoW was very handy, because all our templates and documentation followed the same format. That made it easier for the client*" (Delivery Director 2). The strategic planning led to the configuration of the sectors, the areas of work (Area Manager 5) and the projects (work packages), where LG "*package work so rather than having one project we have about 90*" (Project Director 1). The work packages were then individually put up for tendering for subcontractors.

However, due to the time span of the project as well as its uncertainties. In terms of the temporality of the works, "*this project is set to carry on for a decade or two and a lot of things will change during that time. So, our initial planning had to bear that in mind. We tried to create flexible templates, in case of political or economic shifts*" (Project director 2). Therefore, the original contracts included modification mechanisms to adapt the planning to exogenous changes:

> "*The contracts had provisions for modifying the targets. You know the feasibility was contingent on the information we had at that time, so things like geological reports, the grid plans in the different urban areas et*

*cetera. But these were not always accurate, some were made before the war, so we had contingencies in place"* (Commercial Director).

The shared planning was an ongoing mechanism. To continuously adapt the planning of the project, the Client collected feedback from LG to improve their "*procurement approach, including how we plan to package and contract, as well as the perceived risks. By inviting their supply chain to provide input, direct organisations can help us achieve maximum market appetite and efficiency in delivery."* (Supply Chain Guide).

The second considered the planning and sequencing of the activities within the work-packages. While the client was actively involved in the strategic planning, LG "*makes the decisions when it comes to the work packages. We were hired because the management of the production is our core business, so the Client trusts us to make the right decisions*" (Commercial Director). The operational planning followed LWoW Planning Procedure, to control the quality and consistency of the joint plan, and to enable their monitoring and control.

In addition, due to the volume and variety of tasks for delivering the project, LG and the Client had to "*plan the way they were going to work together, how they would deploy our processes and engage for this project*" (Collaborative System Manager, Client). To do so, LG and the Client conducted relational planning activities to elicit the management of the inter-organisational interfaces. The development of the relational plans between LG and the Client followed the same mechanisms as those deployed between Local and Global. These contractually "*set out the way we were going to work together. We created a template to avoid the classic supplier-client relationship to one where we function as a partnership and deliver things together. We put this plan in the contract, so we'd be obliged to abide by it. It makes things clear and efficient*, […] *it clarifies how they request work, how we sequence it, how we modify it if it isn't conformant to the specs. So yeah, it makes things efficient*" (Commercial manager 2).

These planning activities thus concerned the operational dimension of the projects' planning. To ensure the consistency of the planning across the sectors and areas of work, LJGV standardised its planning process with the supply chain. "*Whatever work package you're looking at, we always deploy the LWoW Supply chain planning procedure, because we need everything to be consistent, we can't leave room to*

*interpretation, so it is quite a locked process*" (Project Director). When subcontractors are awarded a work package contract, they are provided with "*all the operational information, all the KPIs, all the specifications, it is much more detailed than the bids*" (Commercial Director). Subsequently, LG and subcontractors examine the feasibility of the original plans, to adapt these and their KPIs to the "*realities of the field*" (ibid). Indeed:

> "*LG 's expertise is to manage, our jobs to deliver. They tell us what they want, but we say how it is going to be done, […] that is our core business, so if we say something is not possible to be done in that way, it is not possible*. […] *when they brought us in under the ECI, we helped them rethink the specs for the project, and of course the KPIs for it to be more realistic*" (Project manager, UtiliCo).

The original plans for the portfolio and the projects were transposed by LG to these relationships, but these were adapted through the interactions of LG planners and subcontractors, to match the changes in the projects' structures and/or deadlines:

> "*The planning changes all the time because some areas can accumulate delays, or because certain communities or political leaders slow down the project. So, we have to adapt to these changes, and communication with the supply chain is essential*. […] *we need to involve them in the planning meetings, or they won't be able to deliver. We don't do this perfectly everywhere; it is still work in progress"* (Project Director 2).

In addition to the operational planning, LG and the subcontractors deployed relational planning mechanisms to manage their interfacesLG implemented relational plans for configuring and managing the "*project interfaces. So, we have to plan when to onboard our suppliers and how to manage the interface itself*. [The Commercial managers] *work with our interface managers to create a roadmap. […] So, all our charts in the* [LWoW] *system show which sub-contractor is responsible for managing the work package, it shows their KPIs and who we have internally to manage the relationship*." (Commercial manager 2). The relational planning was deployed for "*ensuring efficiency in the supply chain*" (ibid), by managing the interdependencies between the suppliers and for delivering the product.

The relational plans were designed to maintain efficiency during the delivery of the works, by mitigating the risks of disruptions due to commercial conflicts and by managing the organisational interdependencies to mitigate the risks of overlaps. While "*commercial conflicts in projects of this magnitude are inevitable"* (Commercial director), the relational plans provide contractually binding processes for solving conflicts (ibid):

> "*Within six months of the starting date, the senior executive responsible for Collaboration produces the Contractor's Relationship Management Plan and submits this plan to the Project Manager for acceptance. The Relational Management Plan* […] *details the processes to monitor, measure and resolve conflict between the Contractors (including Subcontractors of any tier) and Others*." (Collaboration Agreement)

Before starting the mediation, adjudication, arbitration litigation process inscribed in the project's Code of Construction and Construction Act, LG and sub-contractors are required to follow the process deployed in the RMP and provide evidence that the conflict could not be solved internally. "*The whole intention of the relational plans and the conflict resolution procedure is that the works don't halt. The job doesn't lose out in the result. You can* […] *get the dispute done and carry on with the works, and that is the intention. It is supposed to be better for the parties because there's less friction at the end of the day* […] *and the 3rd party makes the decision, and it is full and final, and it is binding*." (Commercial manager)

In addition, to avoid the duplication of work and/or of resources, LG deployed an interface management system to plan the procurement of related to the activities within work packages. Indeed:

> "*When we finalise the plans for a work-package, we have a project diagram and a Gantt chart that map out all the activities and all the resources* […]. *It shows the activities that* [LG] *will produce and the ones done by subcontractors.* […] *And then you have some where it is not really clear, it might be co-delivered, or we might want to outsource it.* […] f*or these, we have a process to make sure we don't have two project managers send an*

*instruction to the subcontractor* […]. *Like this we don't duplicate works, especially if the works overlap with another work package*" (Lead Engineer)

Furthermore, to ensure the works followed the strategic, operational and relational plans, LG deployed several control mechanisms. LG deployed shared delivery mechanisms to monitor and control the project and manage the project's task interdependencies. The shared delivery of the works mechanisms was deployed to ensure the production was "*consistent with the requirements set by the client and the tendering documents*" (CRMP 2), to establish the joint monitoring and control of the quality of outputs and to deploy consistent processes for improving the delivery. "*We have different safeguards in our system to make sure everything we submit* […], *plans, designs, or engineering works* […] *pass the conformance process. Even though we sometimes have to modify our work, it cannot lead to major reprocessing*" (Operational Excellence & Transition Director). To monitor and control the quality of outputs, in terms of their costs, deadlines and scope, LG embedded the Quality of Scrutiny in the LWoW systems to maintain a consistent delivery of the works across the project locations (Quality of Scrutiny). To deploy the mechanism, LG developed both strategic KPIs, to measure and control the financial performance and the target-times for the delivery of outputs across the sectors and areas of work (Corporate Collaborative Objectives) and project based KPIs, to control the quality of the work packages in terms of their requirements (Senior Engineer/ Technical Lead). "*Our job essentially is to capture the advancements of the work packages, for project managers and area managers to know how they are doing. Then we collate everything in a more strategic report for the sector managers and the board. So really you have two reports to provide all the information for* [LG*] to make their decisions* […] *on how they are going to continue with production*" (Project Controller).

Furthermore, the shared reporting was deployed to monitor the advancements of the works, by comparing the expected value and the realised value of at the levels of the work packages, the areas, the sectors, and the overall programme. "*The reporting was designed to make sure the Client gets all the financial information they need to make their decisions. The report has to be digestible, so we have different sections, some that give the high-level strategic information, so the overall performance of the*

*sectors and areas, and then the work package related information*" (Project Controls Manager). For the reporting to be systematic across the different portfolios of the programme, the Client originally imposed its reporting template and procedure, for it to capture the data the required (Project Controller). However:

> "*The format of the reports was inadequate for the project, where "it was quite obvious that the people at* [client organisation] *who developed the template did not know the intricacies of project controls in a more complex setting. And I suspect they didn't really go to their own project managers, because a lot of the data that we were supposed to collect was completely misaligned with the KPIs and specification of the works. So, we did what we could, but the reports were not accurate*." (Project Controls Manager).

The shared reporting led to the creation of a monthly controls report that presented "*all the information that describe the realities of the advancements of the work*, […] *the costs of individual work packages, whether they are on schedule, if the requirements are met*." (Project Director 2). The report was used to support both LG's and Client's decision-making process, by providing the necessary data. For the report to reflect "*what is actually happening on the job*" (Project Director 1), LG and the Client both set out their requirements, in terms of the KPIs to be measured, to provide a reporting template. The template enabled decision-making at the different hierarchical levels of the JV. The misalignment between the original templates and the realities of the project were a source of conflict, delays, and reprocessing. Furthermore, neither LG nor the Client were able to use the data for the monitoring and control of the project. Thus, this "*made it difficult to make decisions, because* [LG and the Client] *couldn't see what was actually happening*" (Area director 2) and "*the reporting meetings turned into I said you said type of thing, this number is not right, you know it was terrible. So, we switched all that off and said look this is our project report*, [the Client] *and LG you both do it your way and you come and tell us what is actually happening on the job*" (Project director 1). Therefore, the reporting template was adapted to the needs of the project. To do so, LG and the Client elicited new operational and financial KPIs for the sectors and areas of the E.W. and M.W. contracts (Collaborative Working System Manager). Furthermore, the project controls team redesigned the reporting templates to match these KPIs with the realities of the field. They "*went through all the KPIs and we built the template around it. Because we collect the information from project*

*managers, we also included them in the process, to find the best way to collect the information, you know to not be a hinderance*" (Project Controls Manager). By adapting the template to the needs of the project, LG and the Client are "*getting some very good data out of this now*" (Project Director 1), which enabled the gathering of usable data for "*making the right decisions for the sectors. We look at the strategic information with the Client, and on the back of this, we can make tailored modifications, and see how they affect the delivery*" (Area Director 1)

The reporting was conducted by a reporting team composed of project controllers from both organisations. Therefore, the aim of the report was to monitor and control the advancement of the works to support decision making, project improvements and the overall efficiency of the project.

Table 18: Mechanism for Planning and Controlling the works

| **Mechanisms** | **LG** | **LG-Client** | **LG-Sub** | **LG-CA** |
|---|---|---|---|---|
| Business Continuity mechanism | ✓ | ✓ | | |
| Consents procedure | | | | ✓ |
| Operational risk management | ✓ | | ✓ | |
| Control mechanisms for production efficiency | ✓ | | ✓ | |
| Disengagement mechanisms | ✓ | ✓ | | |
| Joint inventory management | ✓ | | | |
| Joint planning of task mechanism | ✓ | ✓ | ✓ | |
| Joint procurement process | ✓ | | | |
| Quality Control mechanisms | ✓ | ✓ | ✓ | |

### *Mechanisms for joint production*

Finally, LG deployed mechanisms to enable the production of the tasks through the combining of resources, knowledge and expertise. The shared production mechanism related to the process through which LG delivered output. First, LG deployed a joint production system, Local's LWoW, which provided the processes and procedures for creating, delivering and signing-off work products. The system "*hosts all of the documentation that we need, and all of the steps we need to complete before sending a design for approval*" (Lead Engineer). In addition to defining the procedure for

delivering work products, the system also had safeguards to mitigate the risks of reprocessing and the non-conformance of outputs to the project requirements. "*The LWoW flags any missing documents or templates for the components. For instance, if you take a utilities project, it maps out all of the steps that our engineers have to do. They have to submit and validate the documents for each step, so they cannot send the entire design without having all of the documents*" (Business Systems Manager). Therefore, the system was deployed to ensure that the quality of work products was consistent with the project requirements, and to support efficiency.

LG adopted Local's system, rather than Global's for three reasons. First, "*if Local and Global used their systems, the documentation and work products would have different format, and we would have to run all over the place. So that is not efficient* […] *and it would be difficult to keep track of everything and* [the client] *would not see us as a reliable partner*" (senior engineer). Secondly, the interviewees argued that in terms of processes, Local and Global "*more or less use the same process*" (Project Director 1) where "*95% of the processes from Global and Local are pretty much identical, so it was what I was used to*" (Lead Engineer). The similarities between both systems therefore required little adaptation from Global personnel and it enabled the JV "*maintain efficiency throughout the project*" (ibid). Lastly, LG adopted of Local's system due to regulatory issues. "*The way* [Global's] *system is set up; it was impossible to deploy it for this project.* […] *We have different access restrictions, and Local's* executives […] *required the full access.* […] *they would also have access to our entire bid strategy for projects we are bidding on, sometimes in competition with Local. So, we would have been in breach of competition law*" (Collaborative Working System Manager). The LWoW system was thus deployed as the sole production system for the works.

Despite being the deployed system for the project, LG adapted the procedures and underlying templates to match the needs of the project. For example, "*when the two forms conflicted, let's say when Global insisted on one process being followed and Local on another, we'd have discussions in the team and go with whichever was more safe, or which was held at a higher standard*" (Lead engineer). This resulted in a hybrid system that encompassed both Local's processes and procedures and Global's. The adaptation of the production system was conducted to support the most efficient

delivery of the project as possible, by leveraging the specific capabilities of partners. Local and Global are both "*experts in* [their] *own areas. So* [Global's] *expertise is really urban engineering, and* [they] *are one of the best design houses in the country. Local has been managing rail infrastructure projects for decades. So, when work packages are in their areas of expertise, we always listen to their experience. If Local think their process is the way to go, it is the way to go. And vice versa*." (Project Director 2).

In addition to deploying a joint system, the shared production process also entailed contractually mandated meetings to combine the work products within teams and across teams. These encompassed a set of weekly meetings to support the production of the project (Progress meeting, Project manager meetings, Area Meetings, Sector Meetings). For example, the aim of the progress meeting was to "*combine the individual work products.* […] *Our engineers will come to the meeting with their templates and designs, and then we look at how we combine them for the BIM. So, it is all about problem solving, if we see an issue with someone's work, we all work together to find a way to work around* […] *to solve the problem*" (Utilities lead 1). This process was replicated throughout LG's hierarchical levels. While the progress meetings were deployed to combine the work products within a team, the Project manager meetings were deployed to combine the work products within the work package (Utilities lead 2; Area Manager 1). Similarly, the Area meetings were deployed to combine the area's work-packages within a sector, and finally the Sector meetings were deployed to combine the entire work products of the program (Area manager 1; Area Manager 2). The aim was to "*make the production process as smooth and as efficient as possible* […]. *By the time the works get to me, the project managers should have solved the majority of problems, so we avoid standstills"* (Area manager 1).

Additionally, due to the variety of projects within the portfolio, the effective delivery of the works required LG to combine their expertise and knowledge and to diffuse the innovations within and across projects (CRMP). "*As individual companies, we don't have the resources and the knowledge to deliver every aspect of the program, that is why we did a JV*" (Project Director 1). Thus, "*combining the expertise of the individual parent companies and forming a JV with a single vision and values will*

*provide a strong, stable, experienced team, able to innovate and share knowledge needed to deliver the complexities of the* [programme]" (RMP). Furthermore, since the Client was newly formed organisation, knowledge sharing was described as an essential aspect for managing the complexity of the works.

> "*The client relies on* [Local and Global's] *combined expertise and experience to produce the programme. Their approach was really productive, they acknowledge that we are experts and want us to help them develop their capabilities*" (Project Director 2).

Lastly, due to the variety of work packages, and their specialised nature, LG relied upon the knowledge of its sub-contractors to produce the outputs. Therefore, the successful delivery of the works was contingent on the ego-network's ability to share their knowledge and expertise. Furthermore, to deliver the works at the level of quality required by the Client, the combining of knowledge within the JV was seen as a "*core strategic factor for the programme's success*" (Knowledge management plan). The data suggests that the knowledge and expertise of partners was leveraged during the initial planning stages of the project in order for either Local or Global to:

> "*Take the lead in their area of expertise*. […] *In* [Sector North], *the majority of the project is about urban infrastructure. Now this is really Global's area of expertise, so the sector manager is* [from Global]. *But there is also a lot of tunnelling work there, so for the Routes area, we have* [Area Manager], *who is from Local. The idea was to create experienced teams who could steer the project in the right direction*" (Project Director 2)

During its production, the data suggests that the sharing of innovations was operationalised through the deployment of contractual mechanisms and through the trialling of new ways of working in the project. Contractually, the Collaborative agreement provided an explicit process for diffusing innovations in the different project locations. In addition, both the client and LG were provided with financial incentives to the entire supply chain to find innovations that could be applied to the project to reduce its operating costs and to improve its efficiency, in terms of deadlines. The benefits of these incentives on collaboration differed across the different LG-subcontractor dyads. For example, sustainable innovations were generated by

DemoliCo, in order to reduce the costs of noise insulation and particle emissions that would affect the air quality (Area Manager 3). The Environmental manager 1 noted:

"*When we were planning the demolitions of* [high rises in sector Central 1], *we had to limit environmental disruptions to comply with the Client's requirements. That meant noise reduction and especially the management of dust. That was a big challenge, because we had to* […] *reverse engineer the building to bring it down step by step. […] it was very expensive. But DemoliCo came to use with new insulation materials that could be deployed to cover the building. So they presented their case, and explained how it would work, and proved they could do it below the target cost. […] we trialled it on a smaller building in* [Sector North], *and the results were above and beyond our expectations.* […] *it became our standard practice for these types of demolitions*"

Conversely, other subcontractors resisted innovations despite the contractual incentives. The push-back and reticence of subcontractors to deploy these innovations were due to perceptions that these might be disruptive to their process:

"*Most contractors were happy to deploy small things, like E.V fleets on the sites. But when it came to more fundamental changes, they were pushing back very aggressively. For example, we wanted to use another method for excavations in* [Utilities Work Package, Central 2], *which was a bit cheaper on the long run but much more efficient for achieving the environmental targets. They never wanted to take the risk, the discussion was going nowhere, because it wasn't what they were used to. So we missed out a lot on this. It was used in other* [programmes], *but not here. It was disappointing because it was financially and environmentally better*" (Environmental manager 2)

Lastly, innovations were diffused through the supply chain events, where subcontractors were given the opportunity to share their "*best practices. It was interesting, we could see different innovations in areas that had nothing to do with us, but that we could definitely apply. And we did for some of them*, […] *it really made people more aware that we don't have to always be the ones innovating, others can do*

*it for us, and we still get the benefits, we can reduce our costs with something that is tired and trialled*" (Area manager 1).

In addition to sharing innovations, LG and the subcontractors also deployed mechanisms to share their expertise to improve their processes and capabilities. This was achieved through the interplay between structural and relational mechanisms. For example, LG's procurement process assessed the competencies and capabilities of its prospective suppliers, and their colocation drove the sharing of knowledge. LG "*measured the knowledge and capabilities of our suppliers with the project* [specifications], *so we knew which supplier was the best for every piece of work we had. When we* [grouped] *everyone in the shared offices, we made sure that they would be sitting together.* […] *that had a clear impact on problem solving, they would discuss and find solutions together, because they were complementary.* […] *you cannot believe how much we learnt"* (Lead engineer).

Table 19: Mechanism for Producing the works

| **Mechanisms** | **L-G** | **LG-Client** | **LG-Sub** | **LG-CA** |
|---|---|---|---|---|
| Common production procedures | ✓ | | | |
| Decision making procedure | ✓ | ✓ | | |
| Empowerment of operational managers | ✓ | | | |
| Formal communication and information sharing | ✓ | ✓ | ✓ | ✓ |
| Formal interactions to produce tasks | ✓ | | ✓ | ✓ |
| Informal communication for producing tasks | ✓ | ✓ | ✓ | ✓ |
| Innovation deployment mechanism | ✓ | | ✓ | |
| Knowledge combining mechanisms | ✓ | | | |

*Joint work mechanisms: Conclusion*

Therefore, the findings suggest that the Joint-work mechanisms differed across the relationships that constitute LG ego-network (Cf Table: Joint Work mechanism in the ego-network). It showed that the volume and variety of mechanisms deployed in an interface were influenced by the volume and variety of tasks to be co-produced, the planning and control needs and whether the knowledge of partners required to be combined and integrated to produce the works.

The following table depicts where and why support mechanisms were deployed between exchange partners.

Table 20: Joint Work mechanism in the ego-network

| **Mechanisms** | **Objectives** | **L-G** | **LG-Client** | **LG - Sub** | **LG - CA** |
|---|---|---|---|---|---|
| Business Continuity mechanism | Planning and control | ✓ | ✓ | | |
| Common production procedures | Joint production | ✓ | | | |
| Consents procedure | Planning, control | | | | ✓ |
| Operational risk management | Planning and control | ✓ | | ✓ | |
| Control mechanisms for production efficiency | Planning and control | ✓ | | ✓ | |
| Decision making procedure | Joint production | ✓ | ✓ | | |
| Disengagement mechanisms | Planning and control | ✓ | ✓ | | |
| Empowerment of operational managers | Joint production | ✓ | | | |
| Formal communication and information sharing | Joint production | ✓ | ✓ | ✓ | ✓ |
| Formal interactions to produce tasks | Joint production | ✓ | | ✓ | ✓ |
| Informal communication for producing tasks | Joint production | ✓ | ✓ | ✓ | ✓ |
| Innovation deployment mechanism | Joint production | ✓ | | ✓ | |
| Joint inventory management | Planning and control | ✓ | | | |
| Joint planning of task mechanism | Planning and control | ✓ | ✓ | ✓ | |
| Joint procurement process | Planning and control | ✓ | | | |
| Knowledge combining mechanisms | Joint production | ✓ | | ✓ | |
| Quality Control mechanisms | Planning and control | ✓ | ✓ | ✓ | |
| | Number of support mechanisms | 16 | 7 | 9 | 4 |

### 4.3.4 The varying deployment of integrative mechanisms in the ego-networks

The findings showed that the volume and configuration of integrative mechanisms differed across the ego-network's relationships. The data demonstrated that Local and Global combined significantly more integrative mechanisms than the other relationships. It showed that the volume, variety and combining of deployed mechanisms was driven by the roles and responsibilities of the partners and how strategically important they were perceived by LG. For example, it showed that Local and Global deployed a higher number and variety of governance and administration mechanisms (23) than between the client (14) and subcontractors (9). This is due to LG's responsibilities in managing and producing the entire portfolio of projects, for the entire duration of the works and the adoption of a JV as an interorganisational structure. Therefore, the integration needs were broader than with other relationships. Similarly, while the relationship between LG and the Client was perceived as being the most strategic and it spanned for the duration of the entire project, fewer tasks were produced jointly by the partners. Consequently, the relationship did not require the same extent of integration mechanisms as between Local and Global. The following table shows the variations between categories of mechanisms deployed in the different relationships that constitute the ego-network.

Table 21: The volume of integrative mechanism in the ego-network

| Mechanisms | L-G | LG-Client | LG-Sub | LG-CA |
|---|---|---|---|---|
| **Governance and administration** | **23** | **14** | **9** | **1** |
| Structure and boundaries | 8 | 5 | 1 | 0 |
| Day-to day management | 6 | 4 | 3 | 1 |
| Interactions and operations | 7 | 3 | 3 | 0 |
| Integrate suppliers and/or teams | 5 | 2 | 3 | 0 |
| **Support** | **16** | **14** | **10** | **2** |
| Communicating to sustain collaborative process | 7 | 7 | 5 | 2 |
| Incentivise collaborative engagement | 9 | 7 | 5 | 0 |
| **Joint work** | **16** | **7** | **9** | **4** |
| Planning and Control | 8 | 4 | 4 | 1 |
| Joint production | 8 | 3 | 4 | 3 |

Furthermore, the findings suggest that some mechanisms were unique to certain relationships while others were deployed in the supply chain. For example, the common production procedures were only deployed between Local and Global. These

were embedded in the LWoW to help streamline the production process for the entire project. The data suggests that the mechanism was not deployed between LG and the Client nor LG and Subcontractors, due to their roles in the project. The former's responsibility was to oversee the delivery of the entire project, rather than produce work packages. Conversely, the subcontractors were onboarded to produce specialised work and therefore required their own processes. Thus, certain mechanisms are unique to match the specific integration needs of a relationship.

Conversely, other mechanisms were common to multiple relationships. For example the support mechanisms such as the Formal and Informal interactions to reinforce collaboration were common to all relationships. These are therefore antecedents of collaborative outcomes throughout the network. Similarly, some mechanisms overlapped between several categories. For example, the Business Continuity mechanism was deployed both for the continued administration of the works and to maintain efficiency in the joint-production. Therefore, these mechanisms are not operationalised in a vacuum, rather, these are linkages in the collaborative process. The following table shows the combination of these mechanisms both across the categories of integrative mechanisms and the relationships that constitute the ego-network.

Table 22: The combination of mechanisms in the ego-network

| Mechanisms | G&A | Sup | JW | LG | LG-Client | LG-Sub | LG-CA |
|---|---|---|---|---|---|---|---|
| Alliance Principles to define the collaboration | ✓ | | | ✓ | | | |
| Behavioural management (Individual) | | ✓ | | ✓ | | | |
| Behavioural management (Organisational) | | ✓ | | ✓ | ✓ | ✓ | |
| Behavioural procurement | ✓ | | | ✓ | ✓ | ✓ | |
| Business Continuity | ✓ | | ✓ | ✓ | ✓ | | |
| Capability based procurement | ✓ | | | | ✓ | ✓ | |
| Common production procedures | | | ✓ | ✓ | | | |
| Consents procedure | | | ✓ | | | | ✓ |
| Contractually binding resource sharing and allocation | ✓ | | | ✓ | | | |
| Contractually binding financial risk management | ✓ | | | ✓ | ✓ | ✓ | |
| Contractually binding operational risk management | ✓ | | | ✓ | | ✓ | |
| Contractually binding relational risk management | ✓ | | | ✓ | ✓ | | |
| Control of production efficiency | | | ✓ | ✓ | | ✓ | |
| Control of relationship | | ✓ | | ✓ | ✓ | | |
| Decision making procedure | | | ✓ | ✓ | ✓ | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Disengagement | ✓ | | ✓ | ✓ | ✓ | | |
| Division of responsibilities | ✓ | | | ✓ | ✓ | | |
| Empowerment of operational managers | | | ✓ | ✓ | | | |
| Financial information sharing | | ✓ | | ✓ | ✓ | | |
| Formal communication and information sharing | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Formal HR allocation process | ✓ | | | ✓ | | | |
| Formal interactions to produce tasks | | | ✓ | ✓ | | ✓ | ✓ |
| Formal interactions to reinforce collaboration | | ✓ | | ✓ | ✓ | ✓ | |
| Hierarchical managing of the project | ✓ | | | ✓ | ✓ | ✓ | ✓ |
| Informal communication for producing tasks | | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Informal HR allocation process | ✓ | | | ✓ | | | |
| Informal interactions to reinforce collaboration | | ✓ | | ✓ | ✓ | ✓ | ✓ |
| Innovation deployment | | | ✓ | ✓ | | ✓ | |
| Integrated delivery | ✓ | | | ✓ | | | |
| Inter-sectorial communication | | ✓ | | ✓ | ✓ | ✓ | |
| Intra-sectorial communication | | ✓ | | ✓ | ✓ | ✓ | |
| Issues management procedure | ✓ | | | ✓ | ✓ | | |
| Joint elicitation of goals | ✓ | | | ✓ | ✓ | | |
| Joint inventory management | | | ✓ | ✓ | | | |
| Joint onboarding of teams | ✓ | ✓ | | ✓ | ✓ | ✓ | |
| Joint operational due diligence | ✓ | | | ✓ | | | |
| Joint planning and onboarding of the supply chain | ✓ | | | ✓ | | ✓ | |
| Joint planning of interfaces | ✓ | | | ✓ | ✓ | | |
| Joint planning of task | | | ✓ | ✓ | ✓ | ✓ | |
| Joint procurement process | | | ✓ | ✓ | | | |
| Joint stakeholder engagement | | ✓ | | ✓ | ✓ | | |
| Joint strategic decision making | ✓ | | | ✓ | ✓ | | |
| Joint training | | ✓ | | ✓ | ✓ | ✓ | |
| JV structure | ✓ | | | ✓ | | | |
| Knowledge combining | | | ✓ | ✓ | | ✓ | |
| Managerial hierarchy | ✓ | ✓ | | ✓ | ✓ | ✓ | |
| Operational risk management | | | ✓ | ✓ | | ✓ | |
| Personnel Integration | | ✓ | | ✓ | ✓ | ✓ | |
| Problem Solving procedure | ✓ | | | ✓ | | ✓ | |
| Quality Control | | | ✓ | ✓ | ✓ | ✓ | |
| Shared offices | | ✓ | | ✓ | ✓ | ✓ | |
| Team composition | | ✓ | | ✓ | | | |
| **Total Number of mechanisms** | **24** | **16** | **17** | **50** | **30** | **26** | **6** |

To achieve the collaborative and project outcomes, the different relationships in the ego-network deployed a set of integrative mechanisms. The following section describes how these mechanisms were operationalised through a set of practices that compose the mechanisms themselves

## 4.4. The role of practices for operationalising mechanisms

To achieve collaborative outcomes, the partners in the ego-network deployed a set of Governance and administration, Support and Joint-Work mechanisms. However, their operationalisation did not occur in a vacuum, rather it was dictated by the operationalisation of practices. These practices composed the mechanisms and were designed to execute their aims. The data analysis identified over a hundred practices that operationalise the integrative mechanisms. Due to the volume of practices identified during the research, this section will describe the identified dynamics through a representative subset of these practices. The full list of practices can be found in Appendix C: Additional evidence.

This section presents the findings related to the practice level of the integrative mechanisms. It demonstrates that - mechanisms are composed of a set of combined practices in which exchange partners' personnel interacted. Therefore, this section will explain how outcomes were attained or not through their design and interactions. Section 4.4.1 elicits these practices and addresses how and why these were deployed. Section 4.4.2 examines how the interplay between the design of these practices and the interactions of individuals supported collaborative outcomes or not.

### 4.4.1 Practices as components of integrative mechanisms

This research identified 126 activities that either participant or archival sources referred to for operationalising the integrative mechanisms. To operationalise the integrative mechanisms, the relationships in the ego-network deployed a variety of activities that were combined to pursue the relationship outcome. As explained in Section 4.3, the number and variety of mechanisms deployed in the different relationships of the ego network varied in accordance with the strategic and operational objective of partners. Some mechanisms (for example programme communication and operational information sharing) were deployed in all relationships in the ego-network. Others were deployed between a set of relationships (for example team integration) and lastly, some were unique to certain relationships (for example the joint HR

allocation process). Consequently, the quantity and variety of practices differed in accordance with the quantity and variety of mechanisms deployed in the various relationships.

The data suggest that a set of practices were deployed across multiple relationships in the ego-network. For example, to mitigate conflicts, build relational norms (trust, honesty and reliability) and align behaviours, the colocation of delivery teams was adopted as a practice across all relationships in the ego-network except for LG-Consents authorities. "*We are all sharing the same offices, so you have everyone here, Local and Global engineers, our subcontractors, and* [the client's] *designers. It's all about being one team, delivering the project together. […] it's easier to trust the people you work with if you see them* [and] *engage with them every day"* (Office manager).

Similarly, the 'toolbox talks' were deployed to operationalise the operational communication mechanism for providing clarity and visibility to the site teams and communicate operational information. This practice was common between LG-subcontractors and Local and Global, where:

> "*everyone that was working on site that day would meet before work started, so at 7:30. That would be sub-contractors, CSJV and engineers, not necessarily the agents or sub-agents, and performance, so the supervisors that would meet in the Canteen. They'd discuss what is going on in the whole works area for that day. So it would show an overview of what is happening in each area of site*" (Lead Engineer)

Therefore, the findings suggest that these practices, deployed commonly across the different relationships in the ego-network, were standardised and replicated to support relationship outcome.

In addition, the data suggest that another set of practices was deployed in a single relationship in the ego-network. The uniqueness of such practices was driven by two considerations. First, certain relationships deployed unique mechanisms to support their specific strategic, operational and/or relational aims. The behavioural and strategic information sharing and the processual alignment mechanisms were deployed

only between Local and Global. Therefore, the practices that composed these were also unique. For example, the strategic information sharing mechanism was deployed to support the development of transparency, reliability and relational norms, such as trust and honesty. To operationalise this mechanism, Local and Global deployed two practices, the co-development and sharing of procurement reports and programme advancements reports.

> "*if our strategies are not aligned, we won't have a sense of direction, so we must share even the most strategic information*. […] *So every month we create a single procurement report, which we also give to our corporate offices*, […] *to show how we used our resources* […]. *So that information is only for our executives*" (Project director 2).

Second, other practices were unique to certain relationships despite common mechanisms. For example, all relationships in the ego-network deployed operational communication mechanisms. Yet, the monthly authorities' meetings and the community steering groups were only operationalised between LG-Local authorities (Head of Consents). Since the relationship between LG and boroughs was adversarial, these meetings were deployed to "*renew trust and transparency*" (Consents manager) and create "*a platform to communicate with the local authorities*" (Head of Consents). Another example considered the planning meetings deployed between LG and subcontractors for the Early Contractor Involvement contracts. While the behavioural alignment mechanism was deployed across various relationships in the ego-network, this practice was only deployed between the joint venture and subcontractors. UtiliCo's Lead Engineer stated that they were onboarded

> "*under an ECI, […], so the idea is* [to] *bring* [in]*the contractor early to do all the documentation, all the early* [project] *paperwork, so it is all done for the construction to start*. […] *Early in, we engaged with them about planning our works, so we had weekly meetings. They did that to make us collaborate"*. Furthermore, the commercial manager noted that "*one of the key points of the ECIs is to bring our subcontractors early to prepare the work. We want to see how they work, how they collaborate, so we can steer the right behaviours before we get in the thick of* [the project]."

Therefore, these unique practices were deployed either to support exchange specific mechanisms or to operationalise the strategic, operational and/or relational needs of specific relationships in the ego-network.

Lastly the data suggest that some practices were deployed to support the aims of multiple mechanisms across multiple relationships. For example, the colocation practice was not only deployed in multiple relationships but it also was a component part of multiple mechanisms. The Collaborative Working System manager noted that colocation "*instilled a one-team culture*. [Consequently] *the relationships between our teams was less conflictual, they're about problem solving and moving forward together. So, it doesn't feel like we are two separate entities* […], *LG is its own business*". Therefore, This suggests that colocation operationalised the Support mechanism (personnel integration) for incentivising collaboration. In addition, the Lead Engineer remarked that "*sharing an office is obviously one of the biggest ways to collaborate* […]. *That was probably the most helpful one. They were all aspiring you to learn the process and* […] *push things through and help you out if you needed to*". This suggests that colocation operationalised the Joint-work mechanism informal communication for producing tasks. Lastly, the Commercial manager suggested that colocation "*helps with improved relationships, it helps to remove your adversarial approach, the old school hierarchy between contractor and client*". This suggests that colocation also operationalised the internal risk management mechanism, by mitigating relational risks.

Similarly, when considering the progress meetings, these were formal meetings deployed to solve emerging issues related to the production of work-packages. The Lead engineer noted:

"*If you are undertaking a risk in a job or if a problem had arisen, then you'd flag it in the progress meeting*. […] *we'd sit down and discuss in detail to find solutions*. [Demolico's] *engineers were really good to have in the meetings, because they have more experience, so most of the time, they already faced these problems, and they could help us on the designs*"

Since LG and the Subcontractors were responsible for producing the project outputs, the Client rarely "*came to the progress meeting, it was only for very important ones, like the* [Central 1 Hub] *design ones*. […] *I think it was because they wanted to see the results, how we got there wasn't really their concern. They didn't want to micro-manage us*" (Delivery Director 1). This suggests that since the role of the Client was to manage the delivery of the programme, they did not participate in practices that related to the production of the outputs. Rather, the joint activities they participated in were "*strategic by nature. They don't have the time, bandwidth or expertise to sit on all of our meetings*" (Project Director 2).

Therefore, the nature and variety of deployed practices across the different relationships matched the roles and responsibilities of the partners. Since LG depended on the experience and expertise of subcontractors for producing outputs, they deployed a set of practices to support the production aims of the project. Conversely, since the Client shared the managerial responsibilities of the project with its tier one contractors (such as LG), they deployed a set of practices for the monitoring and control of the programme's advancements and for combining the work packages in each area of works. Therefore, these unique practices were deployed across different relationships to operationalise a set of mechanisms.

In addition, the data also suggest that the complexity and uncertainty of the project also dictated the volume and variety of practices deployed between the partners for producing the tasks. For example:

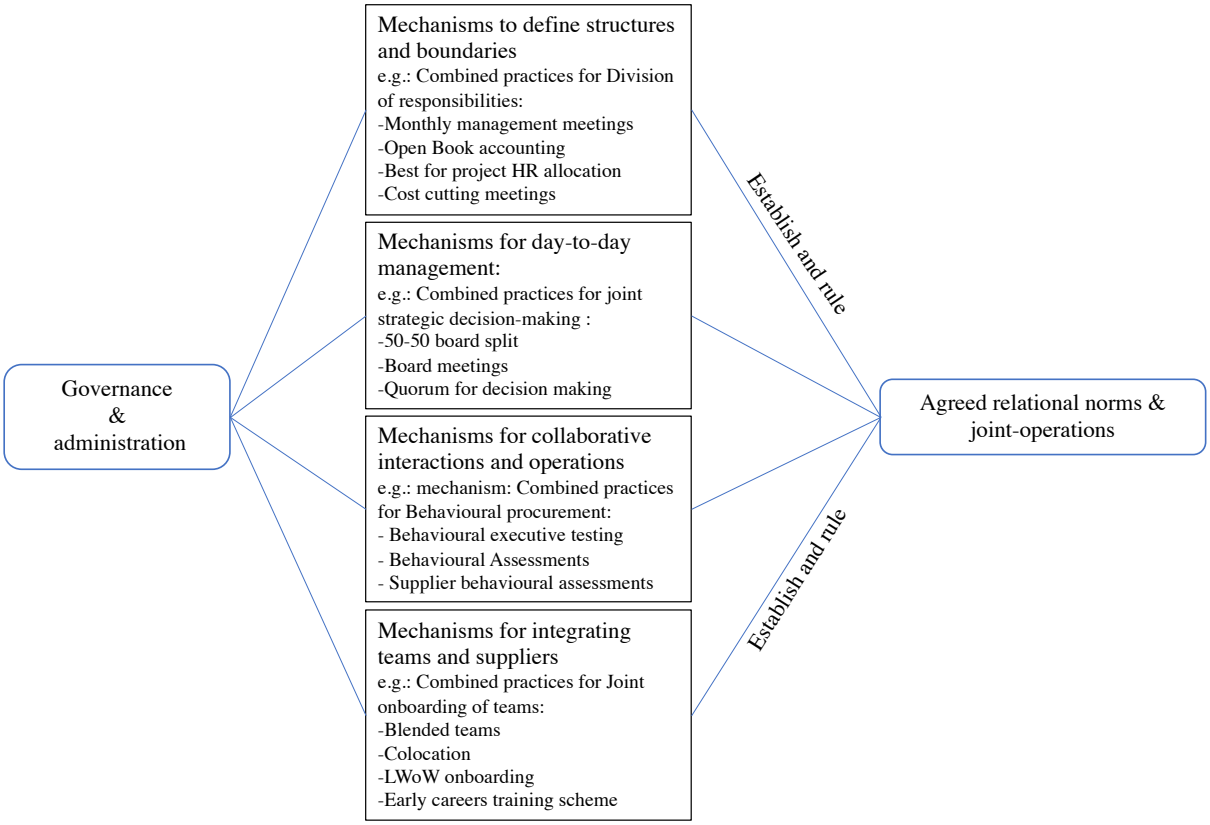
> "*demolitions is much more complex that what people imagine, especially in an urban environment*. […] *When you retro engineer a building that was made decades ago, you don't know what you are actually going to find. The plans are mostly wrong,* […] *not the architecture, but everything that has to do with utilities, asbestos etc*. [the High rise] *was modified hundreds of times by the owners and the tenants*. […] *What that means is we couldn't rely on our existing processes."* (Area Manager 3)

Due to the complexity of the demolitions, LG deployed a joint procedure for the management of the demolitions. It entailed a set of practices related to "*health and safety, especially fire hazards and accidents due to the changes with the* [utilities]"

(Lead engineer) as well as the engineering and design documentation that would be adopted for the demolitions process. These were inscribed in the 'LWoW demolitions procedure'. As a consequence of the complexity and uncertainty of the works, LG had to rely "*on the expertise of DemoliCo. They have a lot more experience with these types of work, so we really relied on their engineers*" (ibid). The data showed that this "*work package was very strategic probably one of the more complex ones in the E.W. […] so we needed a different approach with* [DemoliCo]" (Area manager 3). Thus, LG adopted blended teams with this subcontractor in sector Central. "*We actually integrated the demolitions engineer in our teams. The* [demolitions] *work package needed constant work so it was more manageable to have them with us through the entire process*" (Delivery Director 2). The data showed that the only subcontractors with whom LG deployed the blended teams' practice were DemoliCo and DesignCo, due to the complexity of their respective work packages. Furthermore, the data indicated that to produce the work package, LG and DemoliCo had to increase the regularity of progress meetings, due to the project's uncertainty. The lead engineer argued: "*If you are undertaking a risk in a job or if a problem had arisen, then you'd do a meeting that you'd organize. You know kind of a next step, or for the later updates. And we had a lot for this project, I'd say around two to three a week, because we were facing a lot of technical difficulties*".

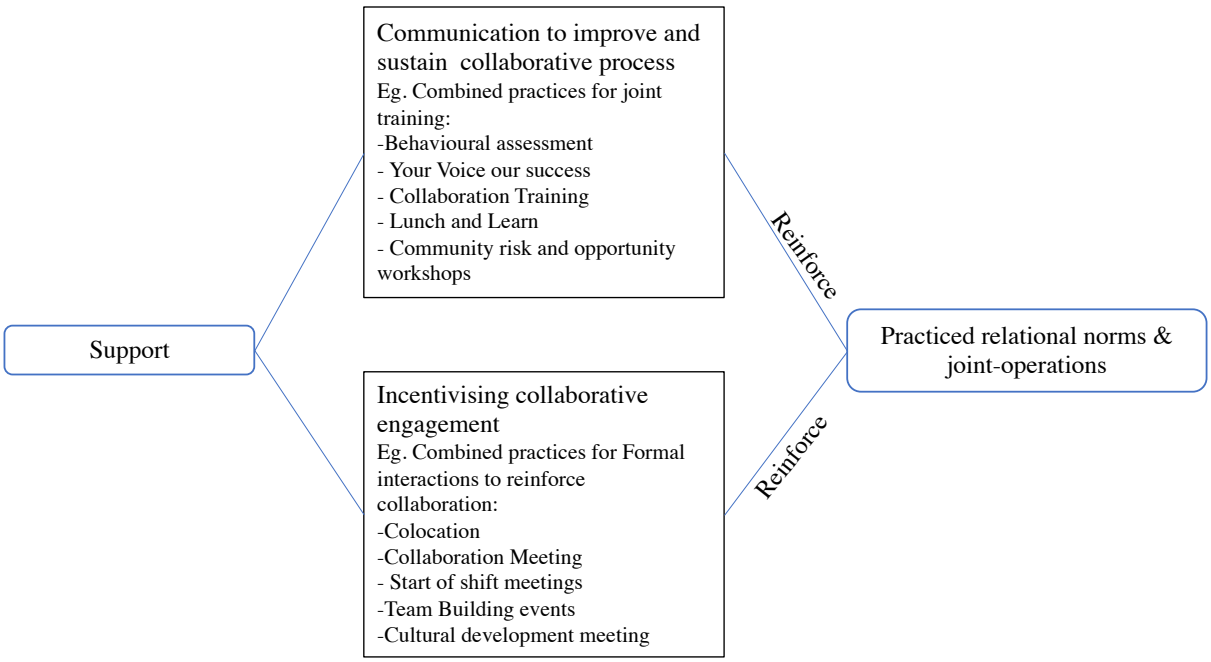
The findings suggest that the Joint-work mechanism 'formal interaction for producing tasks' was operationalised through the combining of several practices, that is the LWoW procedure, the blended teams, the colocation, health and safety procedure and the progress meeting. The complexity and uncertainty of the joint-tasks thus led to a higher volume and variety of practices to manage operational risks and deliver the output. Consequently, the data showed that the volume and variety of practices reflect the exchange specific aims and outcomes, and the project specific risks. The following figures provides examples of how practices were combined to operationalise mechanisms.

Figure 13: The combining of practices to activate Governance and Administration mechanisms:



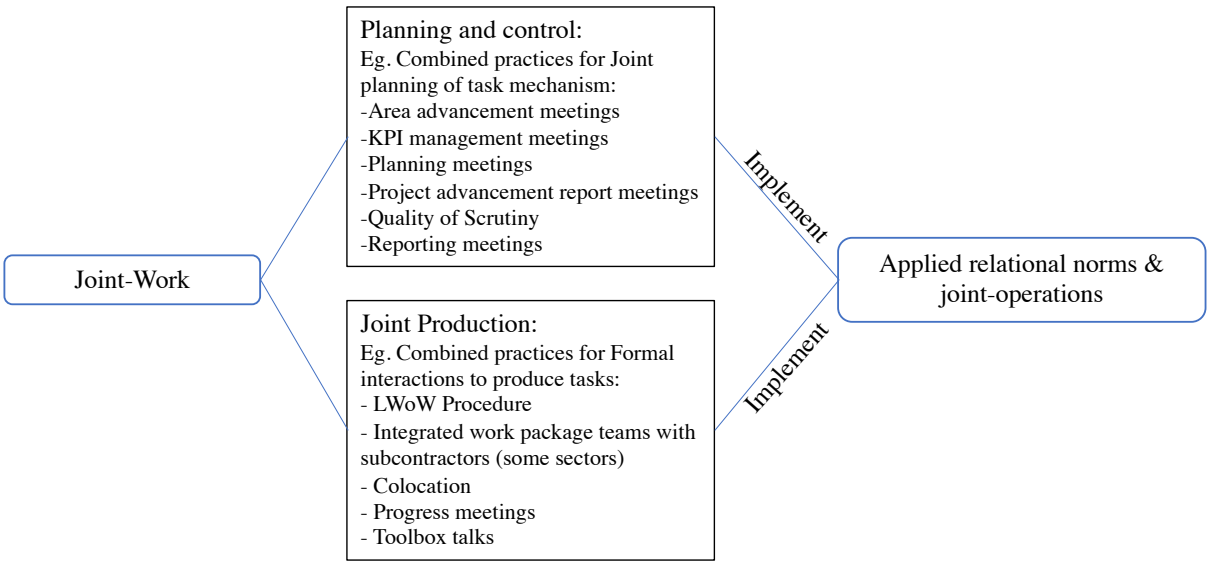

For example, to operationalise the joint strategic decision-making mechanisms, Local and Global required decisions to be perceived as fair and unanimous. To do so, they combined structural and relational practices to support that aim. First, they adopted a board composed of an equal amount of Local and Global executives that met at least on a monthly basis. The Board meetings were conducted in a 'neutral' space and required the attendance of all executives or their proxy. Any strategic decision required both a quorum and a unanimous vote and was binding for both Local and Global.

Figure 14: The combining of practices to activate Support mechanisms:




Similarly, the joint-training mechanism in the Support category was operationalised through the combining of behavioural assessments and/or surveys to identify training needs, and the implementation of mandatory workshops to reinforce desired behaviours.

Figure 15: The combining of practices to activate Joint-Work mechanisms:




Therefore, the findings suggest that the operationalisation of mechanisms is contingent on the deployment of a set of combined practices. The findings showed that the deployed practices in the different relationships of the ego-network varied in accordance with the nature of the mechanism they operationalised. Consequently,

some practices were unique to some relationships, others were unique to specific mechanisms and lastly some were transversal. It also showed that mechanisms that were common across different relationships could be operationalised differently, in accordance with the practices deployed. Therefore, the collaborative process is driven by the practices that activate mechanisms. However, the data suggests that the perceived performance of the process is dependent on the interplay between the design of the practice and the interaction of individuals in these.

### 4.4.2 The interplay between the design and the interactions of practices

The data showed that the attainment of collaborative outcomes was contingent on the interplay between the design and performing of practices. Two sets of practices were identified in the data that exhibited different dynamics. The first set of practices was designed specifically to support the aims of their respective mechanism(s). The second set was designed for other purposes, but the interactions of its participants brought about relationship outcome. The following parts will describe the aforementioned dynamics.

For the deployed practices to sustain integrative mechanisms and outcomes, these had to be performed by the personnel from the organisations. The data suggested that the design and aims of practices influenced and were influenced by the interactions of their participants. In terms of their design, a set of practices was deployed specifically to sustain relationship outcome. For example, the monthly 'authorities' meetings' were implemented to mitigate the relational risks between LG and Consent Authorities and to develop relational norms. To support these aims the practice was designed to encourage interactions:

> "[LG] *booked the room, which was outside of our project offices, so […] we were* [in] *neutral territories. And we said* […] *we're going to ask for you to work with us on* [selecting] *the way forward.* […] *And we printed out all of these different* [layout] *options, plastered the wall with them. And we actually made it a stand-up meeting. So, we made sure that as opposed to just people, you know, looking disinterested, we got them on the feet, and we took them through each option* […]. *And eventually, we*

[highlighted] *the pros and the cons. Once we consider all the other ways, we created 14 options, 14 different variations to get us from there today, which they created with us"* (Consents manager).

The practice was designed to be conducive to interactions both between LG planners and Consents personnel and the borough's staff, but also between the individuals and the artefacts (i.e. plans and post-it notes). While its design was conducive to these interactions, the attitudes and behaviours of individuals dictated the success of the practice. Indeed, the Head of consents noted:

"*At the end of the day, you try and run great activities in these meetings, but it is really about how people behave* [that is] *going to make it a success or a waste of everyone's time. We were fortunate with the* [authorities' meetings] *because everyone actually contributed, everyone got involved. Of course, we had to diffuse the tension at the beginning, and that meant letting them do the talking* […] *we started by asking them what we were doing wrong. And of course, it was a bit of a* [LG] *bashing, but it started the conversation we were looking for, and we knew that if we were defensive, it wouldn't work. So, we listened noted everything down and then confirmed all of this with them.* […] *and having* [Area Director 3] *there, you know an executive, meant that we were taking it seriously. It reassured them. The rest of the meeting became very productive, they got to say their piece,* [and] *saw we were not challenging their views* [but] *acknowledging that we were wrong. So, when it came to the* [planning exercise], *they were open to contribute and they really did, no one just sat there, it was a really nice experience"*

Furthermore, the Consents meetings were designed for the project controllers to combine their individual reporting for the creation of the monthly controls report and to improve the delivery of the tasks, both in terms of the process and the report itself. The Project Controller noted that:

"*for the project controls* [meeting] *will go through the agenda, and usually that is looking at last month's performance. So* [Controls Manager] *will look at what we did, what his thoughts are, the feedback from the client, what they*

*would like to see and how, next month going forward what new procedures and steps are. We would also go over what each individual person's results for each parcel* […] *what* [their] *figures and thoughts are* […] *and we the select what goes in the report or not* […]. *I have already got a list of all the issues I worry about and will raise it at the meeting, and the other project controls people will go and hone it out for us to be in a better position for next month.* […] *we do this to look at our processes and procedures".*

The reporting meeting was thus designed to enable the interactions of its participants to reach the desired coordinative outcomes (i.e., efficiency joint decisions, improvements and adaptation). However, the attaining of these goals was dependent on the interactions of participants during the meetings. The Project Control manager stated that

"*essentially, these meetings are all about finding more productive ways to collect and present the data.* […] *So, we always try to improve the reporting process, to make it easier for us and also for the quantity surveyors and project managers that share the information.* […] *We all have to agree on that process, because ultimately, the project controllers are all doing their part separately, so they all need to be able to follow that* [process]"

Both the observations and the interviews suggest that the joint decision making related to the adaptation of the reporting process requiring participants to interact effectively. For example:

> "*I think generally these are really good, really efficient.* […] *you'll always get a mixture of individuals. Generally, everyone is quite open to ideas, and listen and you know yes, no, let's have a think about that, oh that is brilliant. You'll always get someone who might say, "look this is how I work" and not explain themselves fully, but the majority of the time, it is always well explained.* […] *Sometimes, it is a bit hectic. Let's use that word. 90% of the time it is fine, other times it is just like whoever are the leaders on that they'll sort of say "we are going to do this" and sort of go on a tangent, and like you'll have to chill them out a bit, but generally I'd*

*say it is fine, people are quite calm, you know productive*" (Project Controller)

During the observed meetings, the interactions were characterised by mutual support, where the project controllers shared their experience and solutions to the issues raised by the team. Therefore, the data showed that the design of the practice and the interactions of its participants were aligned, and thus permitted the sustaining of outcomes.

Thus, outcomes can only be attained if the design of the practice is conducive to its performing, in terms of the interactions of its participants. The design of the practice and the interactions of its participants thus drove the desired relationship outcome. The practice, in terms of its sequence and its described activities, provided the sought after 'platform' on which LG could communicate with the local authorities. In addition, the behaviours and attitudes of its participants were aligned with both the practice's design and its aims.

Secondly, this work found that some practices were deployed to operationalise integrative mechanisms, but their design was inconducive to the desired interactions. For example, the colocation practice was designed to develop relational norms (trust, honesty and mutual support), transparency and problem solving through direct interactions. Therefore, it was operationalised to manage and mitigate relational risks between Local and Global, LG and the Client and LG and Subcontractors. However, its implementation, in terms of the office layouts, differed across the different locations of the project, which led to differences in the attaining of relationship outcome. In terms of the design, the colocation in sector 2 was conducive to the interactions since LG, subcontractors and the Client shared an open plan office where: "*we removed all the drywall partitions to make a big open space. So, the meeting rooms you see in the centre are for everyone. Otherwise, we all sit together, it's very horizontal. It is all about having an easy access to everyone you need*" (Delivery Director 1). In addition to the physical layout of the office, the design of the colocation also considered the allocation of teams where these were "*grouped by* [area of work], *they all sit side by side. So, here you have the designers for the hub, here the utilities and on that side,*

*you have the engineers for* [construction and tunnelling]" (Area manager 6). Therefore, in Central 2 the design of the colocation was conducive to the desired interactions between the teams from the various organisations.

Conversely, the design of the colocation practice was inconducive to relationship outcome in sectors Central 1 and West. For instance, the leadership teams from both LG and the client, as well as the delivery teams for the Central 1 demolitions and construction were co-located in the main Central 1 office (programme headquarters). However, the building had partitions which separated the Client and LG teams. The digital access to the Client's area was not extended to LG personnel. Therefore, while LG and the Client were co-located they were

> "*not really sharing offices. So* [the Client] *is isolated from all other managing contractors.* […] *if we need something, we can't just pop by, we have to request a meeting, and then they either come down here or we are allowed in. It's a bit as if we were in different offices, it doesn't help with collaboration*"

Similarly, the offices in Sector West occupied two floors, where the Client teams and LG executives and senior teams were located in the podium (floor 1), while LG's support staff, controller and planners as well as all subcontractor teams were located on the second floor. This was observed as being inconducive to the sustaining of the desired relationship outcome. The negative effects of the practice's design were observed between LG and subcontractors where:

"*the big buzzword was collaboration.* […] *LG, they sit here, in this building. Go down to the podium and ask them who works up here, they don't know, ask people here who works in the podium, and they won't know.* […] *They sit downstairs, we sit upstairs. Generally, that is not one team.*" (Lead-Engineer, Subcontractor).

The detrimental impacts of the practice on collaboration were also observed between LG teams and the Client, where participants compared the current programme with past projects where:

> "[Past project leaders] *worked with everybody, they sat in our office* […]. *Here* [the client] *is separate from us. It's very difficult to get into the podium* [floor 1] *they're inaccessible.* […] *a lot of people do struggle with*

*collaboration here*. […] *so, there is a lack of communication"* (Office manager).

Additionally, the data showed that some practices were sources of poor perceived performance due to their design, the 'Quality of scrutiny' process was deployed to determine whether client requirements were met and to ensure that the produced outputs complied with the construction code. "*All of the client requirements for the different projects are basically translated in a set of KPIs,* […] *some are technical* […] *others are about the costs. The Quality of scrutiny is ultimately the process to see if all the boxes are checked when we submit the entire work package"* (Area Manager 5). At the onset of the project, 'Quality of Scrutiny' assessed the entire work package which consisted of the collated outputs, that is the different deliverables produced by the delivery teams. However, the design of the process meant that if certain elements of the work package required any changes, "*none of the documents could receive the sign-off*" (Operational Excellence and Transition Director). Furthermore, the lead time between the submission of the documents, their verification through the quality of scrutiny and their signing-off was perceived as being inefficient. For instance, "*we delivered the said documentation and* […] *we never had any feedback on that documentation*. […] *we were left sitting around for 7 or 8 weeks doing nothing* […]-*that is not conducive to a good environment"* (Lead Engineer, Subcontractor). The design of the process was a source of commercial conflicts between LG and Sub-contractors, where "*we had a lot of issues where it took too long to give the feedback to our utilities contractors. So, it wasn't efficient and sometimes the entire work package was stalled because of single document*" (Commercial Manager). For instance:

> "*when you come back for getting paid well actually, because* […] *we have got a code for each deliverable, so a time gets attributed to each of these deliverables, so they look at my time and say, "well look, you have 20 days but, how has it taken 20 days to produce those documents". That sort of interrogation. So again, ultimately, it all comes down to the money and that is what prevents collaboration*" (Lead engineer, Subcontractor)

The design of the practice was therefore inconducive to the effective combining of activities and the monitoring of the quality. In addition, it led to conflicts between LG and subcontractors. Thus, the design of the practice was misaligned with the desired interaction and effective attaining of outcomes.

Therefore, the data showed that the same practice can be transferred across project sector and locations, but its design can vary. When its design is supports its desired outcomes and is conducive to interactions, these allow individuals to jointly attain relationship outcome. Conversely, when their design restricts interactions, individuals are unable to collaborate effectively.

Furthermore, other practices did not permit the attaining of goals despite their design, for example, the weekly collaboration meetings that were deployed to support the team integration and alignment mechanisms. The meeting was deployed to proactively solve relational issues between the teams that jointly delivered the same project and to instil the desired 'one team culture'.

> "*We have the collaboration meetings every week, so all the engineers and designers meet to discuss the work-package. You have the planners, normally someone from commercial, the designers and the engineers from construction, utilities and demolitions* […] *it is all the companies involved in the delivery. So, we each go through how our works are going, and then we look at how we can help each other. We also get updates for some commercial conflicts* […] *how they were solved and we can flag little problems we are having. So, the point is to make sure we keep good* [working] *relationships*" (Utilities Lead 2)

While the design of meeting was conducive to effective interactions in most relationships, the interactions between LG and UtiliCo within the practice was conflictual due to the behaviours of participants where:

> "*Like, when you are in meetings and someone obviously hasn't done their homework. We've sat in on a meeting where the work package manager, she's like this* [mimes being on a phone], *and halfway through the meeting she goes "yeah, but it is your fault". You know, where did you just come*

*from, you just sitting there using your phone. And this is from a senior manager.*

*So, again that communication, that attitude, I don't know whether it is a behaviour, it's a trait, I don't know what that is, they just seem to, it is almost a* [blows raspberry and shrugs] *type of attitude, I don't care*." (Lead Engineer, Subcontractor)

While LG attempted to remediate the situation, the conflictual interactions within the practice led to escalations in conflicts. The Commercial Manager noted:

"*It was always our fault, never their fault. That was always their approach to start with. And it continued like that* [during] *the job*. [I think it] *stems from getting their fingers burnt in the past. So, people are very defensive going forward* […]. *I think* [LG] *behaved very well you know. We didn't meet the aggression and anger we were receiving* […], *we were very calm, very collective and did our best to work around these issues. We did our best to make the contractor feel welcome to bring up these issues and that we are a team We kept on reinforcing that we are a team and that we are working together, but to no real avail*"

In addition, these behaviours were transferred to other practices, and negatively impacted other practices and therefore mechanisms. The progress meetings were deployed across the various relationships to facilitate joint problem solving. However, between LG and UtiliCo, the interactions of the participants led to conflicts and inertia rather than efficiency and problem solving. The Utilities Lead 1 noted that:

"*Overall, the progress meetings were always productive, you know we could push through the difficulties we were facing. But I have to admit, it was a bit difficult with* [UtiliCo], […] *it sometimes got a bit out of hand. They kept on bringing up all these commercial issues, and you know that was not the place for that. We are engineers, not lawyers or relationship managers. So eventually we had to tell them to either focus on the project or just stop coming. After a while, we just had to push on without them*"

UtiliCo's project manager noted that the difficulties stemmed from their organisation's strategy. "*before I was promoted to lead the project, we were having a few issues with LG* […]. *I think our head office wanted to maximise their profit on the project, so there was a bit of pressure to cut costs and get more work. So, I think it led to unproductive relationships*". Furthermore, UtiliCo's lead engineer noted that "*every subsequent meeting after that, we was never invited to. So, if you are part of the team, why side-line somebody?*". Therefore, the interactions between LG and UtiliCo, within the progress meetings was ineffective and thus did not permit the sustaining of coordinative outcomes.

As a consequence of these interactions and other operational issues, the subcontractor was excluded from the collaboration meetings, since they "*hijacked the conversation and made it all about them, and not the project*" and *"the other subcontractors were losing patience with the situation*". Furthermore, under LG's behest, UtiliCo changed its project leadership.

Therefore, the findings demonstrate that the design and implementation across different relationships in the project does not also yield the desired collaborative outcomes. Rather, it shows the effective deployment of practices requires the alignment between their design and the attitudes and behaviours of its participants. Indeed, the interactions of participants within practices dictate their successful implementation. Furthermore, the past experiences of individuals influence their current attitudes, and thus their interactions. This suggests that the agency of individuals is a determining factor of effective interactions.

Lastly, this research identified a set of practices that supported collaborative outcomes, despite not being deployed for that purpose. For example, the toolbox talks were deployed to "*discuss what is going on in the whole works area for that day. So, it would show an overview of what is happening in each area of sites* […] *These meetings are standard to every work site I have been to, so I don't think you can, well not have them. So, I am not sure if it was there to encourage collaboration*." (Lead Engineer). While these were deployed to discuss the ongoing works on the sites, their design was conducive for supporting relationship outcome. The daily meeting of site

teams *"allows people to speak up about their concerns in a free environment, without any fear of reprisal. And, I think historically a lot of supply chains had to keep their mouth shut, or were being shut down, or told to continue with things. Within these meetings, you are encouraged to speak up. So yeah, I think it does* [support collaborative behaviours], *I think very much so*." (Commercial Manager).

In addition to having a design that facilitated interactions, the behaviours and attitudes of its participants developed relational norms, such as reciprocity and recognition. For instance:

"They *really engaged with [LG]. We sometimes went there to present some of the environmental challenges for the day, and they'd start asking questions and suggesting lots of solutions. You know it was really interesting for us, because some of their ideas were very easy to implement, and they know how things are done on the sites better than us of course, so they'd know if it was feasible* […] *And when we did implement their ideas in other parts of the project, we would always give them credit, and they really appreciated that. So, it motivated others*" (lead engineer).

Therefore, the data show that the interactions and behaviours of practice participants can sustain relationship outcome despite these not being designed for collaboration. This suggests that collaboration can emerge through the performing of the practice.

## 4.5. The dynamic nature of collaborative practices

This section presents the findings related to the origins of collaborative practice. It demonstrates that practices were either transferred from previous projects and/or relationships to the current programme or emerged to sustain collaborative outcomes. Section 4.5.1 presents how partners transferred recursive practices in the ego-network, to facilitate collaboration at the onset of the project and to standardise collaborative working. Section 4.5.2 details how and why these recursive practices were adapted by the partners and their delivery teams, to sustain outcomes. Lastly, section 4.5.3 will describe how and why practices emerged in the different relationships.

Integrative mechanisms are composed of a set of practices in which exchange partners' personnel interacted. Therefore, this section will explain how outcomes were attained or not through the ostensive and performative aspects of their respective practices. Section 4.4.1 elicits these practices and addresses how and why these were deployed. It then examines how the interplay between the design of these practices and the interactions of individual supported relationship outcome or not. Conversely, Section 4.4.2 elicits the coordinative practices and addresses how and why these were deployed. It then examines how the interplay between the design of these practices and the interactions of individual supported coordinative outcomes or not. Section 4.4.3 describes the interplay between these practices.

### 4.5.1 Practice recursiveness

In addition to being the Government's preferred policy for delivering large-scale infrastructure programmes (Construction Playbook, 2019), collaboration was also Local and Global's key strategy for construction, infrastructure and supply chain management (Head of Collaborative Learning). To support their strategy, both Local and Global have attempted to standardise collaboration through the transfer of their practices and ways of working. "*We applied our lessons learnt from* [previous projects] *to* [the programme], *all our best practices*. […] *we want is to improve our collaborative competency and not repeat the mistakes we made in previous projects*" (Collaborative Working System Manager). The data suggests that the majority of

practices were transferred to this project and the ego network. The full list of recursive practices, their origin and supporting evidence can be found in Appendix C: Additional evidence. The data elicited three types of transferred practices. The first related to those transferred due to repeated interorganisational ties. The second to practices that are common across the infrastructure and construction industry. The last refers to the practices transferred by one of the partners to the relationship. The following paragraphs detail how and why these types of practices were deployed in the programme and in the ego-network.

First, a set of collaborative practices was deployed in the ego-network to support collaborative outcomes from the onset of the project. Since collaboration develops over time, LG attempted to standardise their approach to collaboration. Therefore, they transferred a set of formal and relational practices from their previous collaborations. For example, the Project Director argued that "*the governance has always been there; it hasn't changed for the past 10-12 years"*. Consequently, the practices adopted for governing LG, such as the 50-50 board, the quorum for decision making, and the blended teams, were transferred from their past projects. In addition to replicating their governance, LG replicated their previous operational practices to support the attaining of outcomes. For example, to instil relational norms and support collaborative behaviours, LG replicated the collaboration meetings, the behavioural workshops and the HR allocation process.

Furthermore, to support the delivery of the works, they replicated the collaboration meetings, the blended teams and their previously used decision-making process. "*Working in a JV is very different from other types of projects. But if you have worked in another LG or even in any previous collaborations with Local or Global, the ways of working are actually very similar* […] *actually for the most part identical*" (Utilities lead 1). The replication of previously used practices was conducive to standardising "*the system we used to collaborate. We cannot wait for a year or two to be productive.* […] *All builds on our experience to have the best practices right from the beginning, so we don't need to figure things out as we go. It shows the Client we have these competencies in place*" (Collaborative working systems manager). While the transfer of practice aimed to achieve economies of repetition, not all participants were familiar

with these. For example, the experience of personnel with working in these practices and with the systems dictated the fulfilment of collaborative outcomes.

> "*some people* [have] *never worked in a JV setting or for either* [Local or Global]. *You also have a lot of new staff too. So, they are not used to the systems, so they need to adapt and we have to guide them a lot.* […] *And not everyone can adapt you know, but they might be great at their job, so we just make them move to your more traditional projects*" (Utilities lead 1)

Moreover, practices were also replicated and transferred to control the production of the project and manage emerging technical and/or relational difficulties. For instance, the Operational Excellence & Transition Director noted that "*there is always uncertainty in bigger projects. So, if we transfer our ways of working, we can at least control our processes and we have at least a skeleton to deal with the issues. So, when issues surface, we don't have to redesign our entire way of working*"

In addition to practices transferred from previous interorganisational ties, others were institutionalised in the infrastructure and construction industry. These included the toolbox talks, colocation, the yearly client events, the supply chain events, the start of shift meetings, the site briefings and the newsletters. For example, the toolbox talks were so endemic to construction and infrastructure that interviewees suggested these might be required for compliance purposes. For instance, the Lead Engineer argued:

> "*These meetings are standard to every work site I have been to, so I don't think you can, well not have them.* […] *it helps with collaborating with site teams, what else people are up to and say what work is done, but it is nothing new to construction to have these meetings. They might be a legal requirement.*"

Furthermore, other institutionalised practices were inscribed in the ISO 44001 for Collaboration. These included the Relationship Management Plans, the Risk and Opportunity procedure, the risk logs, the open book accounting and the disengagement process. While LG "*didn't deploy the entire ISO systems, we did bring in the best*

*practices to maintain good relationship*" (Collaborative Working manager). Conversely to practices transferred from specific relationships or from a single partner, the practices inscribed in the ISO 44001 were known by the different partners of the project. For example, when deploying collaboration with its Tier 1 contractors, the Collaborative Principles and the Construction Playbook both referred to specific clauses from the standard. Similarly, "*everyone in infra and construction who works in public procurement had to deploy the ISO in at least one project. So, if we deploy the principles and some of the practices, it reassures them, it shows that we have a codified approach to collaboration"* (Head of Collaborative Learning). Thus, personnel from the different relationships in the ego-network were familiar with the deployed institutional practices. Therefore, these were conducive for the standardising collaboration and thus for achieving economies of repetition.

Lastly, some practices were transferred by a single organisation to a relationship or the project. These practices were either imposed to support the specific collaborative requirements or to facilitate the delivery of the works. Regarding the former, the Client imposed a set of relational and operational practices to align behaviours (for example the onboarding procedure and the behavioural assessments) and for ensuring business continuity (for example the disengagement procedure and the leadership transition procedure). Conversely, within LG, these largely related to the practices and procedures inscribed in the LWoW, which was transferred for facilitating the production of the works through the use of a unique system. While Local personnel had experience working with the LWoW, Global's personnel had to adapt to the new system. "*Having a common system makes production more efficient*. […] [Global's engineers] *would have preferred to use* [their] *own system, because they were familiar with it but they learned how to deal with the procedures quite quickly."* (Utilities lead 2). Since LWoW and Global's system were highly similar, where "*95% of the processes […] are pretty much identical*" (Lead Engineer), the adaptation of Global personnel was facilitated by their similarities. However, for particular production issues, these differences led to inefficiencies and delays. For example, the lead engineer noted that:

> "*There were some small differences that occasionally came up and that would take you by surprise*. […] *For example, within Global, you'd be able to reference the British standard* […] *but in Costain, you have to draw it first, get it signed off and then erect it* […] *there wasn't much love for that, like for a couple of rules like that, whenever it led to extra work that we weren't used to. Because obviously, this was extra time on their part, extra money spent and then extra people work on our side, which meant it took longer to sign off. There were a couple of instances like that where they felt that one set of processes was slowing down the projects.*"

Therefore, the differences in their respective systems and practices reduced the perceptions of efficiency and was argued to be a source of delays. Thus, the transfer of practices from one of the organisations to the project didn't support the desired economies of repetition.

In conclusion, this research identified three types of transferred practices, those from prior ties, from the institutional fields and the ISO and those transferred from individual partners to the project. Therefore, these practices are recurrent and repeated across organisational boundaries and projects, to facilitate collaboration from the onset of the relationship and support the delivery of the works. These are thus characterised as recursive practices, which are deployed to sustain economies of repetition. While the majority of practices adopted in the project were recursive, the data indicates that these were adapted to match the relational and technical needs of the project. The transfer of recursive practices from one project to another and from one relationship to another implies that Collaboration competencies are transferrable across projects. This suggests that the collaborative process is influenced by feedback loops between projects by deploying practices deployed in past relationships.

### 4.5.2 Practice adaptation

While LG transferred recursive practices to standardise collaboration and to sustain economies of repetition, the uniqueness of both the project and the relationships in the ego-network required their adaptation. Some practices were adapted from the onset of the project, in order to match the technical risks of the works. These include the on-

boarding procedure, the behavioural workshops, the monthly authorities programme, the planning meetings, the risk and opportunity management procedure and the sustainability KPI procedures. The data suggests that the process through which these practices were modified differed. First, some practices were designed to be adapted to the needs of the project. For example, the planning meetings were deployed to:

> "*update our plans as we go. Because this project is very complex, and extremely long, the planning will change a lot from the initial ones* […] *to the ones we'll actually produce. We have different* [planning meetings] *to look back at what we did and where we go from there.* […] *In the early days, it was just* [LG planners]*, now it is really work-package dependent, we have different people in there.* […] *Some of them are run with the subcontractors, others with the client, and some just us. So, we really try adapt the way we work to the way the project is going. If you look at how they*" (Area director 4).

While the planning meetings were repeatable solutions for conducting the planning activities, their performing varied over time to adapt to the needs of the project.

Similarly, the behavioural workshops were deployed to develop the collaborative behaviours of LG personnel. While the learning and development team designed "*generic workshops to get started on our learning platforms*" (Collaborative Working Systems Manager), they also designed adaptable workshops sessions. "*The different stages of the project require different behaviours, and on top of that you also have issues that arise which are quite unique, because of the stakeholder or the project itself. So, our workshops are very tailored to the situation,* […] *so we can develop our people's relevant competencies*" (Head of Collaborative Learning). While being a repeatable solution for shared learning, the workshops were adaptable to match the behavioural needs of the project.

Therefore, the data suggests that these practices were designed for flexibility and adaptiveness, to match the dynamic technical and relational needs of the project and/or the relationships.

Conversely, other practices were adapted through the deployment of an external process or practice. For example, due to the unique relational and technical risks of the project, LG adapted their risk management procedures to manage the project and organisational interdependencies of the project. Before starting the works, Local and Global combined their risks management procedures during their risk management meetings. They "*mapped* [the risk management procedures] *out*, […] *to see the similarities*" (Project Director 1) and "*combined* […] *procedures with Local's. So whenever we had a doubt, our risk managers would go with whichever was the safest and whichever fit the client's requirements the best*. […] *Our* [Risk and Opportunity Management Procedure] *is this hybrid Local and Global system which is pretty unique*" (Project Directors 2). Furthermore, to adapt to the dynamic risks of the project, LG "*require our project managers to update the risk logs as they go, so we can make risk management decision in our* [Risk Management meetings]. *It's all about adapting, adapting, adapting. Risk is not something you look at once and it's done"* (Area Manager 5). Therefore, the risk management meetings were deployed to continuously adapt the risk management procedures to the dynamic risks of project.

Similarly, the 'quality of scrutiny' was described as being inconducive to the attaining of coordinative outcomes (c.f. Section 4.4.2), and was a source of inefficiency, delays and commercial conflicts between partners. The rigid design and procedure of the practice for compliance purposes constrained the participants, who "*just couldn't go around it, we couldn't change it, we just had to get on*" (Senior Engineer). Due to the long lead times between the submission of the work packages, obtaining feedback and the reprocessing, LG adapted the practice, by creating a sign-off procedure for individual tasks rather than for the entire work package. Thus, all documentation was pre-approved before it was collated for submission to the quality of scrutiny (ibid). The modification was driven escalation process for problem solving. First, the issue was flagged during the progress meetings, where "*most of the issues we raised were for the sign-off process. It just didn't work*" (Lead engineer). Since project

managers were not empowered to change the process, the issue escalated to the internal management meeting. The area manager 4 noted:

> "*We barely started the project and we were already facing some operational challenges. […] our engineers were not happy with the sign-off process, not happy at all, and with good reason. So, we looked at how to change this in our management meetings, we had planners and risk coming in with different solutions"*

Since the practice was designed to ensure compliance, both to the construction code and the client's requirements, any chances "*had to be approved by the client. We can't tell them by the way we pulled the plug on your processes"* (Project Director 2). Therefore, the suggested changes were raised through the innovation diffusion procedure during the joint management meetings. Following their acceptance, the practice was adapted to the requirements of the field. Therefore, the data shows that the adaptation of the Quality of Scrutiny was driven by the problem-solving procedure (escalation points) and the innovation diffusion procedure.

Thus, the data suggests that some practices were designed specifically to change and adapt recursive practices to the idiosyncratic relational and/or technical needs of the field.

While the delivery teams were unable to modify the Quality of Scrutiny, other practices were adapted by their participants. These include the different LWoW procedures for producing the works (construction, demolitions, and utilities) and the reporting procedure. These practices were imposed upon their respective delivery teams. However, during their performing, these were identified as a source of inefficiency. For example, the construction procedures inscribed in LWoW were perceived as being ineffective, due to the added bureaucracy and prolonged lead time due to unnecessary activities. The Lead engineer noted that for "*very simple scaffolding, within Global, you'd be able to reference the British Standard, and they'd be able to erect it. But in* [LWoW], *you have to draw it first, get it signed off and then erect it. So obviously, it led to extra work* […] *it led to extra costs and it was much longer"*. While both the Global and Local procedures complied with the Construction

Code, the differences between their practices were rooted in their proprietary procedures and systems. For instance, the Senior Engineer/ Technical lead argued:

> "*there were differences between* […] *how* [Local and Global] *worked. So, when we had a difference in the process, we were taking a step back, and we had quick chats about it. We looked at which one was faster, which one was less risky and which one would help us on the long run with the other work packages we had to design. And then we'd make a choice between following the procedure or using some of Global's processes.* […] *So now, we have this mix of Local and Global processes. But it is interesting, I wasn't aware that some of our ways of working were maybe a bit too […] long winded. Global definitely helped with that"*

The adaptation of the LWoW procedures occurred in demolitions (Lead engineer, Senior engineer) and utilities (utilities lead 1). The adaptation was conducted by the participants to support the attaining of coordinative outcomes, such as efficiency, managing costs, mitigating delays and improving the delivery of tasks. The data showed that the adaptation of practices is conducted when these do not match the relational and/or technical requirements of the project. While some were designed to be adapted, others were adapted through the operationalisation of another practice. Lastly, this research found that some practices were adapted by their participants to support field based outcomes. Therefore, while the transfer of recursive practices is evidence of feedback loops across projects and relationships, their adaptation suggests that the collaborative process evolves during its performing through a set of feedback loops between practices and mechanisms.

### 4.5.3 Practice emergence

The recursive and adaptive aspects of practices deployed in the ego-network suggest that the partners' collaborative process changes by transferring and adapting their ways of working. In addition, the data showed that a last set of practice was identified in this research: emerging practices. The data uncovered 17 practices that

emerged in the ego-network. The following Table (Table 67) presents the emergent practices uncovered in the data.

While practices emerged across the different relationships in the ego-network, the coordinative ones only emerged between LG and Consents Authorities. Since LG and Consents authorities did not have prior ties, they consequently had no common ways of working. Therefore, to support the shared planning mechanism's desired coordinative outcomes, LG and Local authorities created and deployed two practices: the merging of planning on the Boroughs' systems and the Consents obtaining procedure. The Head of Consents noted:

> "*We didn't have a structured approach for consents, so of course it was a bit of a mess, and we had enormous difficulties to get the permissions on time*. […] *we created this approach from scratch, we understood their requirements* […] *and we started the regular meetings, and we uploaded the planning to their platforms*. *[…] We have the same approach for all of sectors now*."

Table 23: Emergent Practices

| Practice | LG | LG-Client | LG-Sub | LG-Consent |
|---|---|---|---|---|
| Collaborative training | ✓ | ✓ | | |
| Leadership change disengagement | ✓ | ✓ | | |
| Cultural development meeting | ✓ | ✓ | | |
| Behavioural assessment | ✓ | ✓ | | |
| Onboarding procedure | ✓ | | | |
| Sustainable innovation meetings | ✓ | | | |
| LWoW Workshop | ✓ | | | |
| Behavioural assessments | ✓ | ✓ | | |
| ECI (planning meetings) | | | ✓ | |
| Onboarding procedure | | ✓ | ✓ | |
| Business continuity procedure (transitions) | | ✓ | | |
| Monthly authorities meeting | ✓ | | | ✓ |
| Cost cutting meetings | | | ✓ | |
| Merging of work package on authorities platform | | | | ✓ |
| Merging of planning (systems) | | | | ✓ |
| Consents obtaining procedure | | | | ✓ |

While practices emerged across the different relationships in the ego-network, the coordinative ones only emerged between LG and Consents Authorities. Since LG and

While the effective delivery of the project required the timely obtaining of consents, LG and Consents Authorities did not have integrative mechanisms in place to support this aim. Consequently, these practices emerged to sustain the shared planning requirements of the relationship.

Similarly, the data suggest that the Leadership Transition Procedure was designed to support business continuity in the project. The Behavioural Consultant (Client) noted that:

> "*In a lot of long-term projects, main contractors deploy their best people at the beginning, but the closer you get to completion, the more you see that they were replaced by less experienced people. Consequently, these projects tend to drag on because of the loss of competence*"

Therefore, to sustain collaboration and business continuity for the end-to-end delivery of the works, LG designed and implemented the Leadership Transition procedure, to manage leadership turnovers. The data suggest that the practice was designed specifically for this programme as a response to the client's requirements. "*All the work packages and the larger contracts are interdependent, so the client needed us to have processes in place to manage transitions.* […] *It worked very well, we are* [actually] *including it in our ISO toolbox for future projects"* (Collaborative Working System Manager). While LG transferred both practices to instil collaboration from the onset, some practices emerged to match unique relational requirements of the project and its relationships. These practices were deployed to improve and manage relationships. These included leadership change and disengagement, behavioural procurement, cultural development meetings, behaviours steering group, special interest group and the LWoW workshops.

Lastly, since a set of recursive practices required the performing of others in order to be adapted (cf. Section 4.5.1), the data suggest that a set of practices emerged to facilitate the adaptation process. These include the Cultural Development meetings; Sustainable Innovation meetings; Onboarding procedure; ECI (planning meetings) and the Cost-cutting meetings. For example, initially, the onboarding of key subcontractors

was conducted through the "*target cost contract with our supply chain* […]. *Unfortunately, we did not see any of that collaboration and we struggled a lot with our supply chain partner for those works*." (Commercial Manager 1). The initial onboarding process relied upon "*a pretty standard tendering process. We really were looking at cost efficiency*" (Commercial manager 2). Therefore, in order to manage the effective integration of suppliers and to bring "*in people in a lot earlier and getting them involved from the beginning"* (Commercial manager 1), the onboarding procedure was deployed six months into the works to "*assess the behaviours and collaborative maturity of partners. It doesn't mean that they are all as collaborative as we would like them to be, but at least, we know where the risks are*" (Senior Procurement Manager). Therefore, the Onboarding procedure was deployed to modify and replace the procurement process transferred from previous relationships.

Similarly, due to the complexity of the works and the evolution of the planning over time, the Cultural Management meetings were deployed to adapt and complement the transferred governance practices deployed between Local and Global. While the recursive governance was a driver of effective collaboration in previous projects, the cultural dimension of past joint ventures "*had a huge impact on the relationship. We had a few bad experiences because the culture was really not right*" (Collaborative Working System Manger). Therefore, the governance practices related to the internal risk management were modified through the implementation of the Cultural meetings. The project Director 1 noted:

> "*we really wanted* [to look at] *the culture* […]. *We said you know what, that is what we are here to do, this is what the client wants. How do we meet* [their] *expectations, what do we want it to feel like if you're working with LG* […]. *And that really meant for me, locking ourselves in the room for some time, and have a very honest discussion on what each partner company wanted out of this particular contract. from past experience, working with alliances and joint ventures, unless you do that work you're setting yourself up to fail, because* […] *how can you communicate to a team, what you want, if you do not know what you want. If you haven't had these conversations, why bother having this. So how can you create a culture within organisation*, […] *if you don't even know the people there.*

*If you fail to do that, well the culture is going to develop itself and it might not be what you want*"

The Cultural Management Meetings enabled partners to define the culture they aspired to for the project, in terms of the organisational and individual behaviours and the relational norms. These were then included in the revised CRMP 2. In addition, the cultural meetings also steered change in the joint management meetings.

"*What was interesting* [is] *during our management meetings, we actually have a dedicated time for culture. That is quite atypical, because we normally only talk about costs, advancements and such. For* [this programme] *we really go deep in the relationship part.*"

The emergence of the cultural meeting thus not only modified the informal contractual arrangements deployed between Local and Global, but also the managerial practices deployed to manage the relational risks of the project.

In conclusion, the emergence of new practices in both recurring and novel relationships occurred when recursive practices did not match the idiosyncrasies of the relationships and the project. Thus, practices emerged either for adapting recursive practices or for complementing these to sustain aims. Furthermore, these also emerged to initiate the operationalising of integrative mechanisms in new relationships. Therefore, the emergence of practices, and their subsequent transfer to other project locations is evidence of feedbacks loops within projects. Therefore, the recursive, adaptive and emergent aspects of practices in this ego-network suggests that partners change how they collaborate over time. These feedback loops occur both across projects: through the transfer of practices from repeated ties; across relationships: through the transfer of proprietary practices to a relationship and; within projects: through the adaptation of recursive practices, the emergence of new ones and their subsequent transfer across project sectors and areas.

## 4.6 Summary of the Findings section

This chapter presented the findings related to the operationalisation of collaboration in the ego-network. To do so, section 4.2 presented the project background and the relationships that composed the ego-network. It showed that the strategic perceptions of these relationships varied, in terms of their aims, tasks, and governance arrangements. Section 4.3 demonstrated that project outcomes were attained through the deployment of integrative mechanisms. The findings showed that the more strategic the relationship was perceived, the higher the number and combination of mechanisms were deployed by the exchange partners. The most strategic relationship referred to Local and Global and LG and the Client. While all categories of integrative mechanisms were deployed across both relationships, the number, variety and combination of underlying mechanisms differed to match their specific aims and interdependencies. In addition, it showed that LG and subcontractors deployed fewer integrative mechanisms. Since these relationships were deployed to produce individual projects (work packages), they did not require the same number and/or variety of mechanisms. Lastly, it showed that the relationship between LG and Consents Authorities required the fewest integrative mechanisms, due to their comparatively low complexity in terms of tasks and interdependence.

In addition, section 4.4 demonstrated that integrative mechanisms were operationalised through the deployment of practices. This research found 116 practices. However, this research does not claim to have captured all the practices deployed to support collaboration. Rather, the findings demonstrate that the interactions of partners within combined practices enable the operationalisation of the mechanism. The findings show that the volume and variety of practices differed across the relationships in the ego-network. The data showed different dynamics regarding the operationalisation of collaborative mechanisms and the fulfilment of outcomes. Some practices were deployed across multiple relationships, others were unique to a relationship, and some were transversal and supported multiple mechanisms. Second, the data showed that the attainment of both collaborative and project outcomes was contingent on the interplay between the design and performing —the interactions of individuals— of practices.

Lastly, Section 4.5 demonstrated that practices were either transferred from previous projects and/or relationships to the current programme or emerged to sustain collaborative outcomes. It also demonstrated that collaborative practices were adapted to match the specific relational and/or technical requirements of the relationship and the project. By examining the recursive, adaptive and emergent aspects of practices in this ego-network, the findings demonstrate that the collaborative process involves various feedback mechanisms for its modification. This occurs both across projects, through the transfer of practices from repeated ties; across relationships, through the transfer of proprietary practices to a relationship and; within projects, through the adaptation of recursive practices, the emergence of new ones and their subsequent transfer across project sectors and areas.

The following section will discuss these findings in relation with the literature.

# 5 Discussion

## 5.1 Overview of the chapter:

This thesis furthers understanding on how collaboration is operationalised in an ego-network of a large-scale infrastructure project. More precisely, it examines how the process of collaboration is implemented by exchange partners to achieve both relational and technical outcomes. As such, this work contributes to the unpacking of the "black-box" of collaboration (Kadefors, 2004; Fawcett *et al.*, 2012; Diaz-Kope *et al.*, 2015).

This chapter explains how the observable phenomenon- the operationalisation of collaboration- is driven by the combining and configuration of practices and interactions to "*activate the mechanism as a whole* […] *to produce the outcome*" (Pajunen, 2008: 1452). The structure of the chapter reflects the different levels of collaboration that emerged in the findings, using the language of Critical Realism (cf. Keat & Urry, 1975).

Firstly, section 5.2 presents the findings and the literature associated with the collaborative process. In section 5.3, the operationalisation of integrative mechanisms through the deployment of practices is discussed in relation to the literature. Building upon this, section 5.4, discusses the inter-team dynamics in the context of practices in relations with the practice-based view of collaboration to explain how perceived effectiveness of collaboration occurs. Section 5.5 then shows how the findings modify the conceptual framework by incorporating the contributions of this study. This framework provides the foundations for capturing the intensity of collaboration through the examination of mechanisms and practices.

Lastly, section 5.6 provides a summary of the contributions to theory that were explicated in the discussion section.

## 5.2 The role of integrative mechanisms in the collaborative process

This section focuses on discussing the findings of research question 1 (How and why are collaborative outcomes attained through the operationalisation of integrative mechanisms in the ego network?). It critically examines the research findings to extend our understanding of the role of mechanisms for achieving relational and technical outcomes. This section builds upon Thomson and Perry's (2006) revised Antecedents-Process-Outcomes framework and Nikulina et al.'s (2022) collaborative process.

Consistently with the literature, with LG and its ego-network, relational and technical collaborative outcomes during the production stage of the project were achieved through the transfer and deployment of three overarching categories of mechanisms (see Sections 2.3 and 4.3) that are in turn composed of a subset of mechanisms. These overarching categories, defined by Nikulina et al (2022), are:

1. Governance and administration (see for e.g. Ireland *et al.,* 2002; Cao & Lumineau, 2015; DeFillippi & Sydow, 2016; Chakkol *et al.,* 2018; Tee *et al.,* 2019; Connaughton & Collinge, 2021; Nikulina *et al.,* 2022);
2. Support (Davies *et al.,* 2016; Hietajärvi *et al.,* 2017; Kokkonen & Vaagaasar, 2018 ; Bygballe & Swärd, 2019; Nikulina *et al.,* 2022)
3. Joint-work (Davies *et al.,* 2016; Hietajärvi *et al.,* 2017; Pargar *et al.,* 2019 ; Tee *et al.,* 2019; Nikulina *et al.,* 2022)

The following subsections describe how and why the collaborative process varied across the different relationships that compose LG's ego-network.

### 5.2.1: The antecedents of varying integrative mechanisms in the Ego-Network

This work found that configuration and the number of integrative mechanisms deployed within each relationship of LG's ego-network differed. This research found Local and Global deployed the highest number of integrative mechanisms in their relationship, followed by LG-Client, then LG-subcontractors and finally LG and Consents Authorities. The differences in both volume and configuration of integrative

mechanisms was driven by the perceived strategic and/or operationally interdependencies. The more strategic the relationship was perceived, the more partners wanted to adopt integrated delivery models to fulfil strategic aims, and therefore, the more integrative mechanisms they deployed. Three strategic aims were identified. The first was to mitigate relational risks, such as conflicts and skirting, by aligning the interests of partners. The second aim was to align the vision of executives and enable converging decisions in the partnership to sustain long term-commitment to the project. The third was to establish and manage an integrated joint-venture characterised by a "*one-team*" culture. For example, since the relationship between Local and Global as well as LG and the Client was perceived as being more strategic than with core subcontractors, a higher number of integrative mechanisms where deployed and combined in the collaborative process to achieve the aims. More precisely, this work found that relationships that were considered more strategic, such as Local and Global (within the JV) and LG and The Client deployed more extensive forms of Governance and administration mechanisms and support mechanisms. These mechanisms were largely transferred from prior collaborative projects and relationships. For example, LG adopted a fully integrated joint venture, where:

a) 8 mechanisms were deployed to *define the partnership* including 50-50 equity joint-venture with an even split for board seats, comprehensive contracts that detailed and formalised the roles and responsibilities for the collaboration life-cycle; clear targets and dissolution (exit) mechanisms;

b) 6 mechanisms were deployed to *manage the partnership* including fortnightly board meetings, sectorial joint-management meetings, full board support for engaging strategic shifts;

c) 7 mechanisms were deployed to *establish collaborative interactions and operations* including formalised communication mechanisms, issues escalation mechanisms and;

d) 5 mechanisms were deployed to *integrate teams* including team selection procedures and interviews and onboarding procedures fully integrated project teams

Conversely, despite adopting both collaborative contracts (NEC option C) and an integrated delivery model to avoid fragmentation, the relationships between LG and subcontractors were perceived as being less strategic. Consequently, fewer

Governance and administration mechanisms were deployed in the relationships, where:

a) a single type mechanism was deployed to *define the structure and boundaries partnership* including target costs and cost reimbursable contractual mechanisms and performance targets;

b) 2 mechanisms were deployed to *manage the partnership* including joint-planning mechanisms

c) 2 mechanisms were deployed to *establish collaborative interactions and operations* including issues escalation mechanisms to manage conflicts; and

d) 2 mechanisms were deployed to *integrate teams and suppliers* including behavioural procurement procedures, onboarding procedures and fully integrated project teams.

However, the relationship between LG and Consents Authorities was considered strategic, yet these also exhibited the fewest Governance and administration mechanisms. In fact, the only mechanisms were deployed to *establish collaborative interactions and operations* by creating liaison roles. This work argues that the low volume and less extensive combination of Governance and administration mechanisms stems from the volume of the tasks to be jointly delivered. This suggests that the strategic nature of the relationships and the production requirements both influence what mechanisms are deployed.

When examining the operational side of the relationship, this research found that the configuration and the number of integrative mechanisms deployed within each relationship of the ego-network was also influenced by the breadth of activities and outputs to be produced by partners and their operational aims. Five aims were identified in this research. The first was to provide visibility over the planned works, in terms of their composition, their goals and their required outputs. The second was to establish joint processes and procedures to systematically combine and align the production process of the works in the different project sectors and areas of work. The third was to combine the knowledge and capabilities of partners to produce project outputs and improve the efficiency of the delivery. The fourth was to manage and control the operational risks of the project. Lastly, mechanisms were deployed to

ensure business and production continuity during the disengagement process. The greater the variety of operational aims to be achieved and work packages to be produced, the more extensive the collaborative process, in terms of the number and combination of integrative mechanisms deployed by the exchange partners.

For example, due to their role as main contractor, LG had to manage and coordinate the production of all project outputs, in all geographical locations, for each sector's work-package. Therefore, to reinforce and sustain collaboration during the production, Local and Global deployed a higher volume and variety of *Support* (such as mechanisms to combine technical knowledge, to combine relationship management knowledge, to reinforce collective problem solving, to assess collaborative competencies) and *Joint-work* mechanisms (such as mechanisms to combine production systems, to control the quality of outputs, to leverage on specialisation and standardised procedures). Conversely, the aims of LG and the Client's deliverables were to produce the plans for the project to design work-packages and to control the quality of outputs produced by LG and its supply chain. Consequently, LG and the Client mostly deployed *Support* mechanisms to align incentives and goals and *Joint-work* mechanisms for planning, monitoring and control of the relationship and the project outputs. The production of the project per se was conducted my LG and its subcontractors. Therefore, the aims of LG and the Subcontractors deliverables were to plan and design the components of the work packages and produce these. Consequently, LG and the Subcontractors mostly deployed *Support* mechanisms to plan the sequencing of actions, to plan contingencies, to monitor the advancement of the works and *Joint-work* mechanisms to combine production efforts, to control the quality of outputs, to leverage on specialisation and standardised procedures.

Therefore, this research argues that the collaborative process, in terms of the volume and combination of integrative mechanisms is influenced by the interplay between two antecedents: strategic and operational perceptions. When relationships are perceived as being both highly strategic and having complex production outputs, partners deploy a higher volume and combination of integrative mechanisms to build relational norms and produce tasks. This, to the best of my knowledge, has never been observed in studies examining IOCs. Gulati *et al.,* (2013) suggested that "*interorganizational relations can range from highly cooperative to highly*

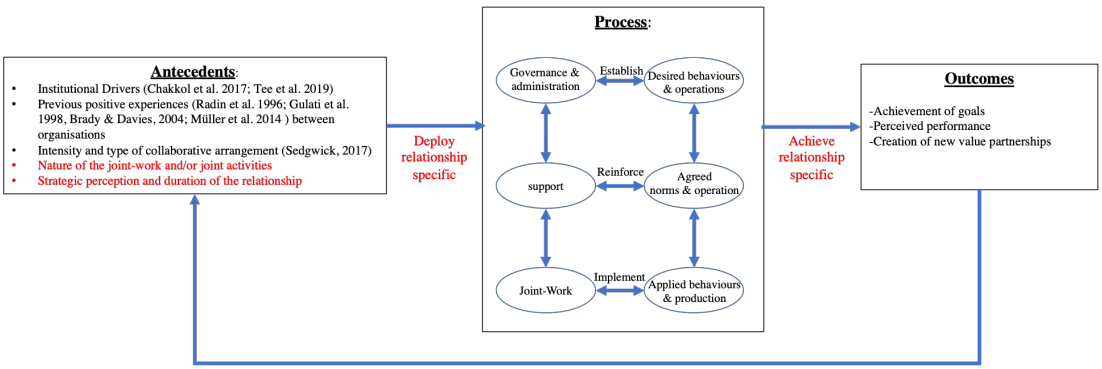
*uncooperative*", where "*the agreement that they forge on these inputs and outputs describes the intended "extent of cooperation," or the intended scope of the relationship*" (p.6), the role of antecedents and mechanisms in this process was largely unclear. Previous work largely examined dyadic and very formalised partnerships, such as JVs and alliances (cf. Hong *et al.,* 2009), and examine collaboration through formal —contractual (see for e.g., Caldwell & Howard, 2014; Kapsali *et al.,* 2018)— and informal (see for e.g., Poppo & Zenger, 2002; Cao & Lumineau, 2013) Governance and administration mechanisms. These studies conceptualise collaboration as the process through which organisations align their goals (see for e.g., Ring & Van de Ven, 1994; Spekman *et al.,* 1998; Gulati *et al.,* 2013; Tee *et al.,* 2019) and build relational norms (see for e.g., Poppo & Zenger, 2002; Cao & Lumineau, 2015; Aaltonen & Turkulainen, 2018; Prajogo, 2019). To date, the extant literature has largely adopted a prescriptive view of collaboration, by eliciting the governance mechanisms that lead to complex performance (see for e.g., Bendoly & Swink, 2007; Jap & Anderson, 2007; Caldwell & Howard, 2014; Kapsali *et al.,* 2018) in formalised partnerships. By examining an ego-network, this work shows that collaboration between exchange partners differs in accordance with the strategic perceptions and aims. This work also shows that the constituting parts of the collaborative process -the deployment of integrative mechanisms- to achieve the desired outcomes varies from one relationship to another. By going beyond the prevailing prescriptive view of collaboration, the findings provided insight into the way in which exchange partners deploy different mechanisms across their partnerships to achieve outcomes.

Furthermore, few studies have examined the production (as opposed to the pre-formation and formation) stage of IOCs. Indeed, previous work rooted in the resource-based view largely examined the role of formal mechanisms for resource allocation (see for e.g., Gulati & Singh, 1998; Das & Teng, 2000; Tedova & Knoke, 2005). The examination of contractual arrangements provides insight into how organisations design collaborative interorganisational relationships, for combining resources and producing project components (see for e.g., Kapsali *et al.,* 2018). However, these studies did not explain how mechanisms enable the attainment of differentiated operational goals across a network. By examining integrative mechanisms in relation to the nature of the activities conducted by exchange partners, rather than with

exchange governance only, this work provides empirical evidence to demonstrate how outcomes for producing tasks are achieved by partners.

Lastly, while complex projects are delivered by a multitude of interdependent stakeholders, most studies largely explore dyadic and very formalised collaborative relationships, such as joint ventures and alliances, rather than examine the role of integrative mechanisms between different partners in multi-stakeholder projects (Hong *et al.*, 2009). By examining the interplay between the deployed mechanisms and their outcomes with the activities of the project and/or the portfolio within LG's ego-network, this work demonstrates that collaboration takes different forms across different interorganisational relationships. The following figure depicts how the antecedents affect the collaborative process

Figure 16: Antecedents and collaborative process




## 5.2.2: The interplay between integrative mechanisms and outcomes

While this research showed that integrative mechanisms, and thus the collaborative process, varied across the different relationships, it also found that the perceived performance differed both across the various relationships and project locations, despite the deployment of similar mechanisms. For example, LG deployed the same Governance and administration mechanisms across the different relationships with strategic sub-contractors, such as DemoliCo, UtiliCo and DesignCo. These included contractual arrangements, the mechanisms to define the parameters of the partnership

(formalised roles and responsibilities, interest alignment, organisational structure), to manage the partnership (for e.g. joint groups for planning, integrated project teams), to deploy collaborative interactions (for e.g. communication procedures, information sharing procedures) and for selecting suppliers and integrating their teams. Similarly, these relationships also standardised the Support mechanisms to reinforce the exchange governance, such as mechanisms for collaborative knowledge sharing and incentivising collaborative engagement. Yet, the perceived performance of these relationships differed. For example, the relationship between LG and DesignCo was described as highly collaborative and productive. In terms of perceived performance outcomes, their joint tasks were largely delivered on time and delays were often due to upstream issues in the project's process. The financial and non-financial support mechanisms enabled cost saving and creative solutions for addressing emerging community issues. Conversely, the relationship between LG and UtiliCo was described as conflictual and yielding poor performance outcomes for production. Narratives of failure regarding the collaboration and perceived performance, in terms of costs and delays were a common theme in the data. Such issues occurred despite adopting the same mechanisms as LG and DesignCo.

This research identified two interrelated causes that explain the difference in perceived performance. First, the volume and complexity of tasks differed in these relationships. In the case of LG and DesignCo, both organisations were jointly creating engineering blueprints and designs for the works. These tasks required few resources, beyond IT systems, employees and information. Therefore, the deployed mechanisms were sufficient to manage these. Conversely, in the case of LG and UtiliCo, the tasks encompassed designs, engineering work, demolitions, excavation and re-routings of the grid. These required more expansive resources and additional suppliers for specialised tools and machinery. In addition, their work was subject to uncertainty, due to planning issues and incomplete/erroneous information. In such cases, the Governance and administration and Support mechanisms did not provide adequate procedures for managing all emerging risks. Financial disputes and conflicts led to the erosion of relational norms, were blaming and lack of accountability to avoiding bearing costs became common. These situations created negative feedback loops during the project, which worsened subsequent issues and in certain cases

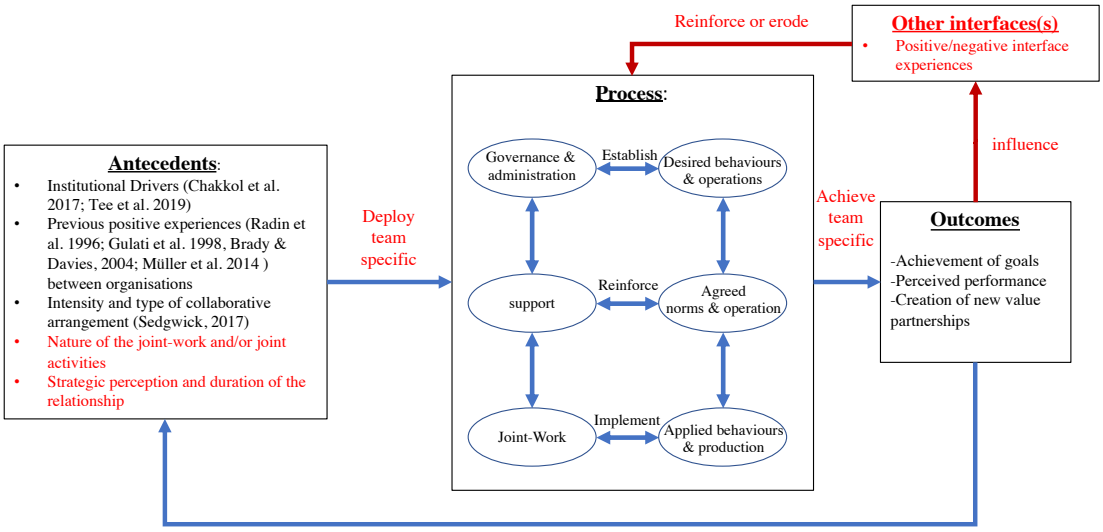
contaminated other project locations. Secondly, this research found that there were fewer interfaces between LG and DesignCo than between LG and Utilico. DesignCo's teams were deployed solely in sector Central 2, while UtiliCo deployed resources in all project locations, and were involved in all areas of the project. Over time, the issues and conflicts in a given project sector or area of work contaminated other teams and thus other project areas and/or sectors, thus reinforcing negative feedback loops and eroding collaboration.

While prior works showed the role of mechanisms for establishing, controlling, reinforcing and enacting relational norms, the literature does present significant limitations. Though the role of integrative mechanisms for driving project performance is well researched (see for e.g., Mello et al, 2015; Davies *et al.,* 2016; Benítez-Ávila, 2019; Tee *et al.,* 2019; Prajogo *et al.,* 2021), few studies unpacked how these mechanisms are deployed during the production stage of projects. The collaboration literature historically and predominantly examined how the governance of projects drive performance (e.g. Joskow, 1988; Zaheer & Venkatraman, 1995; Oxley, 1997; Joshi & Campbell, 2003; Ferguson *et al.,* 2005; Lee & Cavusgil, 2006; Blome *et al.,* 2013; Chakkol *et al.,* 2018; Benítez-Ávila *et al.,* 2019; Aben *et al.,* 2021; Belhadi *et al.,* 2021) and still examine inter-organisational dyads to explain collaboration (see for e.g. Um & Oh, 2020; Van der Kamp, 2022) rather than examining multi-stakeholder networks that are commonly adopted in projects (Tee *et al.,* 2019). Therefore, their findings are inherently difficult to generalise beyond their cases (Prentice *et al.,* 2019) and provide little understanding of *"the complexity of what actually happens in a partnering relationship (as opposed to prescribing what should happen*" (Bresnen, 2007, 367). Unlike the prevailing literature, this work demonstrates that standardised mechanisms deployed across a network do not reflect the varying complexity of relationships. It shows that different dyads require different processes, despite having similar aims. In addition, even within the same relationship, the number of team interface can influence the collaborative process over time. Collaboration can either be reinforced through positive interactions and feedback loops or eroded through conflicts and negative loops that contaminate other team interfaces. To the best of my knowledge, no study examined how performance differed within the same project, across relationships or within a relationship across various locations.

However, this supports the works that found that the interplay between integrative mechanisms and collaborative outcomes are an inherent feature of the collaborative process (Bresnen, 2009; Cao & Lumineau, 2015; Chakkol *et al.*, 2018; Nikulina *et al.*, 2022). These works showed that mechanisms are engineered to facilitate the integration of organisations, their teams and their operations (Okhuysen & Bechky, 2009; Gulati *et al.*, 2012; Eriksson, 2015; Tee *et al.*, 2019). This work showed that perceived performance varied between relationships adopting the same mechanisms. It also showed that the standardising of mechanisms across collaborations provides limited evidence of better perceived performance. Rather, it is the ability of partners to deploy the collaborative process in team-to-team interfaces that supports or hinders collaboration through positive or negative feedback loops during the production stage of a project. The following figure depicts these contributions.

Thus, by examining the underpinnings of collaboration, this work attempts to unpack the collaboration "black-box" (Tompson & Perry, 2006; Fawcett *et al.*, 2012; Nikulina *et al.*, 2022) by going beneath the surface of collaboration to the nature and essence of its underlying mechanisms. This research demonstrates how different collaborative outcomes are achieved through integrative mechanisms. The following section examines how the mechanisms themselves are operationalised through the interactions of the exchange partners in the context of practices.

Figure 17: Team approach to antecedents, processes and outcomes of collaboration



## 5.3. The operationalisation of mechanisms through practices

This section focuses on discussing the findings of research question 2 (*How and why do practices and interactions of entities operationalise collaborative mechanisms?*) and 3 (*How and why do practices influence the perceived performance of interorganisational collaborations*?). It will critically examine the research findings in relation with the literature, to extend our understanding of the lower level of integrative mechanisms, that is the interactions of practices and entities (Machamer *et al.,* 2000; Bechtel & Abrahamsen, 2005). This section will thus show how practices are combined and performed to '*activate*' integrative mechanisms by adopting Pajunen's conceptualisation of mechanisms (2008). It will demonstrate the collaborative process and therefore the achieving of collaborative outcomes occurs at the level of practice combining and its performing by individuals.

### 5.3.1 The component parts of integrative mechanisms

In IOC's, scholars generally examine the higher level –the outcome– of mechanisms for instilling relational norms, such as trust (Rujiter *et al.,* 2021), commitment (Prajogo *et al.,* 2021) and for managing task interdependencies (Tee *et al.,* 2019) in formalised partnerships. Several mechanisms were prescribed by the literature for combining the efforts of partners, and therefore for attaining project targets or for building relational norms, such as mutuality, trust and commitment (Nikluina *et al.,* 2022). However, few studies examined the lower level of integrative mechanisms to understand the interplay between their component parts and therefore how the collaborative process itself is operationalised in complex projects.

This research found that the integrative mechanisms deployed in the different relationships of the ego-network are composed of a set of practices, in which individuals from the different organisations interacted. This research identified 74 individual practices, where 29 operationalised the Governance and administration mechanisms, 47 the Support mechanisms and 29 the Joint work. 10 practices were component parts of multiple mechanisms. These are summarised in the Appendix C: Additional data. This work found that the collaborative process is driven by the

combination of practices in which teams interact. Four dynamics were observed regarding this interplay.

Firstly, some practices were deployed to directly support the collaborative aims of their overarching mechanism(s). For example, the Support mechanism for incentivising collaborative engagement between Local and Global (within LG) was composed of practices such as blended teams, collocation, collaboration meetings, behavioural assessments, workshops and team events. It was the combining of practices that enabled the incentivising of collaborative engagement between Local and Global. The teams were composed of an equal mix of Local and Global employees, who were collocated in shared offices. They participated in weekly collaborative meetings to improve the collaboration. Furthermore, their collaborative competencies were regularly assessed to deploy workshops and team events for reinforcing expected behaviours. The successful operationalisation of these practices was contingent on the participant's involvement where their interactions over time reduced negative perceptions of partners and reinforced the desired one team mentality. The design and scope of these practices and the interactions of participants were conducive to the fulfilment of collaborative outcomes. The findings suggest that the design of the practice and the interactions of participants drove the fulfilment of collaborative aims. Outcomes were driven by this interplay rather than through the deployment of mechanisms per se. While the role of mechanisms and, to some degree, practices for supporting collaborative outcomes has been explored in previous works (see for e.g., Zollo *et al.,* 2002; Chakkol *et al.,* 2018; Hall *et al.,* 2018, Tee *et al.,* 2019), few studies examined this interplay (see Nikulina *et al.,* 2022). For example, Zollo *et al.,* (2002) showed the role of inter-organizational routines for "*enhancing the effectiveness of collaborative agreements*" and the performance of alliance dyads (p701). In addition, institutionalised interorganisational practices are found to be instrumental in governing collaborations (Chakkol *et al.,* 2018) and in explaining the degree of performance of collaborations in complex projects (Levering *et al.,* 2013). However, these studies provide a prescriptive account of collaboration, by suggesting which practices provide structures for collaborations rather than examining how these are performed. By examining the design, combination and performing of practices

(Pajunen; Biesenthal *et al.,* 2019), this research shows that the operationalising of mechanisms is the collaborative process is driven by practices.

Secondly, while some practices were intended to fulfil outcomes collaboratively, their design was not conducive to effective interactions, and therefore to the realisation of collaborative aims. For example, the Joint-work mechanisms for joint quality controls between LG and Sub-contractors were operationalised through the interplay between the quality of scrutiny procedure, the planning meetings and the shared sign off. The 'quality of scrutiny' was deployed to determine whether client requirements for a component's design were met. To do so, designs were submitted by Subcontractors to LG and both organisations' lead engineers would then meet to assess the quality of the work. The designs were then integrated into the BIM and the planning of subsequent tasks was conducted to provide technical recommendations. The work products of these activities were combined and sent for sign-off. The work product was either accepted (signed-off) or rejected (modification required). Until a design was accepted, teams were often left in waiting, which rapidly led to bottlenecks, inertia, delays, and financial conflicts between both organisations. These results are in stark contrast with the literature. The concept of flawed designs has been explored in past works, these largely examine failings in project structures and layouts such as task decomposition and task allocation (Puranam, Raveendran, & Knudsen, 2012; Raveendran & Puranam, 2012) and the erroneous and/or failed designs of contractual mechanisms (Gurcaylilar-Yenidogan, 2017). These studies suggest that the consequences of erroneous designs impede the realisation of outcomes. Yet, they do not demonstrate how and why their design is not fit for purpose, beyond their structures. Conversely, other studies suggest that failures stem from the bounded rationality of agents that designed the mechanisms, which constrains their ability to fully recognise interdependences (Simon & March, 1993; Ocasio, 1997; Heath & Staudenmayer, 2000; Puranam *et al.,* 2012, Gulati *et al.,* 2013; Gurcaylilar-Yenidogan, 2017). By examining how the design of practices impede the interactions of participants, this work explains how and why desired outcomes were, or not, attained. Recent studies examined how exchange partners combine their efforts and build relational norms by deploying practices (see Nikulina *et al.,* 2022). For example, Bygballe and Swärd (2019) argued that partnering practices drive collaboration over

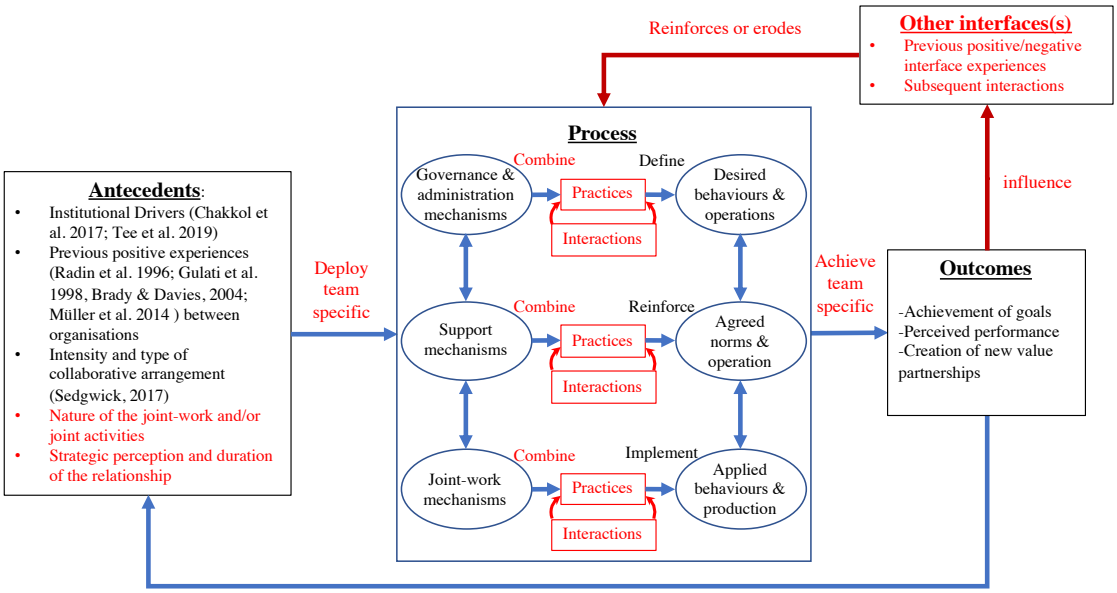
time, through a "*mutually constitutive relationship between top-down structural interventions and an emergent and social learning process"* (p.162). Nikulina et al. (2022) showed that practices deployed provide the environment in which actors establish relational norms and these in turn bring about collaboration. However, these works overlooked the interplay between the design of collaborative practices and the "*human actors and their actions*" (Jarzabkowski & Spee, 2009: 70). For collaborative practices to bring about collaboration, these require designs that fit their collaborative aims and enable the desired interactions and feedback loops.

Thirdly, while the design of other practices was conducive to fulfilling collaborative aims, the successful operationalising of the mechanism success was dictated by the interactions of participants, rather than by the design of the practice per se. For example, the Support mechanism for incentivising collaborative engagement (collocation, collaboration meetings, behavioural assessments, workshops and team events) was deployed in all strategic relationships and every sector but LG-Consent Authorities. The mechanism was successfully deployed between Local and Global, LG-The Client, LG-DesignCo and LG-DemoliCo. However, its operationalisation was perceived as a failure between LG-UtiliCo where the relationship was characterised as conflictual, unproductive and "uncollaborative". Despite being collocated, UtiliCo's managers felt isolated from LG's due to the office layout. This contributed to the emergence of an 'us versus them' culture and narratives of blaming when tasks failed. Over time, UtiliCo was excluded from the collaboration meetings due to uncollaborative behaviours and LG's perception that they refused to solve issues. In addition, the negative interactions contaminated in other practices, such a progress meeting, commercial meetings and planning meetings, where conflicts impeded productivity. Due to these interactions, UtiliCo was excluded from integrative mechanisms. These results extend our understanding of the collaborative process. Nikulina et al. (2022) argued that the three categories of mechanisms are connected in a '*hierarchical way'* (p.805) and enable a feedback loop where collaborative successes and failures enable changes and adaptations. Research argues that the collaborative process relies upon the creation of an environment where collaboration can be practiced (Eriksson, 2015; Hietajärvi *et al.,* 2017; Kokkonen & Vaagaasar, 2018; Bygballe & Swärd, 2019). However, these come short of explaining how the feedback

occurs. This study demonstrates that the negative feedback starts at the level of the interaction within practices, and then spreads across the different practices where the partners are involved. However, it is unclear whether this process is or not hierarchical.

Lastly, some practices were not deployed for sustaining collaboration. Yet, relational norms were perceived to be developed through the interactions of participants. For example, the start of shift, site briefings and toolbox talks were deployed to manage the daily risks of the project. However, the interactions of its participants during these practices supported the creation of a 'one team culture' on the work sites and a sense of ownership of the project by individuals. These results echo the findings from Nikulina et al. (2022), who argued that "*any project management activity may become an integrative mechanism if collaborative behaviours are present in it*" (p.807). However, this work shows that it is the combining of practices that support the emergence of integrative mechanisms, rather than a single activity. These dynamics are depicted in the following figure (Figure 3: The components of mechanisms in the collaborative process)

Figure 18: The components of mechanisms in the collaborative process



### 5.3.2 The dynamic nature of the collaborative process

#### *The transfer and adaptation of practices*

When exploring practices in the context of interorganisational relationships, scholars generally examine how repeated ties enable exchange partners to transfer practices from their previous alliances for the administrative control of the relationship (Defillippi & Sydow, 2016). This formalises behaviours and monitors the collaborative process (Zollo *et al.,* 2002) and supports innovation (Zheng & Yang, 2015). These studies largely explore how repeated ties between partners facilitate the transfer of organisational and interorganisational mechanisms and practices in the context of dyadic relationships (Gulati *et al.,* 1995a; Gulati *et al.,* 1995a; Zollo *et al.,* 2002; Tedova & Knoke, 2002; Bouncken, 2011; Manning & Sydow, 2011; Zheng & Yang, 2015; Defillippi & Sydow, 2016). By examining LG and its ego-network, this work investigated the replication of practices both in the context of a repeated collaboration (Local and Global), as well as between organisations that have no prior ties (LG-Client; LG-Subcontractors; LG-Consent Authorities). This work found different configurations of recursive practices.

First, LG replicated practices from their previous projects. As such, Local and Global transferred the practices that compose the Governance and administration and Support mechanisms from their previous JVs to this project. Both organisations were accustomed to working together and had systems in place to facilitate the systematic combining of their actions. Therefore, the transfer of recursive practices of collaboration aimed towards economies of repetition (cf. Davies and Brady 2016) and to facilitate the control of behaviours in the relationship(s) (Defillippi & Sydow, 2016). Furthermore, this research extends the work of Chakkol *et al.,* (2018) by showing that practices were replicated to collaborate from the onset of the relationship to address the challenge of establishing collaborative norms. These were defined as recursive practices. Additionally, the majority of practices that compose the Joint-work mechanisms between Local and Global were also recursive. Despite their prior relationships, the majority of individuals in the project had not collaborated before. Due to the magnitude of the project in terms of its resource needs and temporality, LG

recruited a significant number of new staff. Therefore, while practices are "*repeatable solutions by recycling experience from one project for another*" (Davies & Brady, 2000, p. 932) at an organisational level, the experience of individuals working within these practices differs from one project to another. This suggests that the role of agency in the context of collaboration dictates the degree to which these economies of repetition may or not be achieved.

Secondly, other practices were transferred from one interface of the ego-network to another. When practices led to successful outcomes in an interface, these were adapted and transferred to other interfaces in the project. For example, the business continuity procedure, the leadership change disengagement procedure and the behavioural assessments procedure were transferred by the Client to the LG-Client relationship. Due to the success of perceived outcomes, these were transferred in other interfaces, first internally to LG, then between LG and some Subcontractors. Another example was the Consents helpdesk, which was first deployed between LG and one of the Consents Authorities — a Borough in Central 1. The practice was perceived as being a driver of performance and collaboration both internally (within LG) and between LG and the Borough, where the obtention of consents were found to be faster. Therefore, the practice was replicated and transferred in other interfaces. Since practices imply "*repetitive performance to become 'practised'; that is, to attain recurrent, habitual, or routinized accomplishment of particular actions*" (Jarzabkowski, 2004: 531), only the individuals from the transferring organisation had experience with these practices. Conversely, actors within the ego-network had to adapt their ways of working to perform these practices. The adaptation process differed in accordance with the nature of the practice. Since the business continuity procedure, the leadership change disengagement procedure and the behavioural procurement were less recurrent in the project, a subcontracted consulting firm managed and lead the performing of the practices.

Lastly, this work found that a subset of recursive practices was institutionalised. Two varieties were identified in this research. First, a subset was common in the industry, such as the start of shift meetings, the toolbox talks, colocation and blended teams (Tee *et al.,* 2019; Davies *et al.,* 2016). These recursive practices are transferred

social institutions (cf. Jarzabkowski, 2004). The adoption of institutionalised collaborative practices within the infrastructure industry seems to be isomorphic (DiMaggio and Powell 1983; Levering *et al.,* 2013), where "*organizations, particularly those in the same sector or industry, come to resemble each other because of the common social structures upon which they draw*" (Jarzabkowski, 2004: 533). Secondly, a further subset of practices was deployed through institutional governance mechanisms such as the ISO 44001 and the Construction Playbook (2021). Local, Global and the Client replicated parts of the ISO 44001 from previous projects such as the CRMP and exit strategy procedure. Therefore, this research corroborates the work of Chakkol *et al.,* (2018), who show "*how the standard can formalise and codify informal collaborative practices and help transfer related learning across projects, thereby contributing towards the dual requirement for standardisation and flexibility in project settings*" (p.997).

While the deployed practices were recursive, these were nonetheless adapted to the project. This research identified two levels of adaptation. The first occurred at the institutional level, where partners deliberately modified and/or combined their practices to match the relational and technical requirements of the partnerships. These include the on-boarding procedure, the behavioural workshops, the monthly authorities programme, the planning meetings and the sustainability KPI procedures. Thus, a subset of practices was designed to be flexible to adapt to the idiosyncrasies of the project. The second occurred through the interactions of participants who adapted practices to their operational and relational needs. This work has shown that practices can be flexible and dynamic to match the aims of the relationship and the project, counter to the extant perspective of stability (cf. Zollo *et al.,* 2002; Schilke & Goerzen, 2010; Rerup *et al.,* 2019).

Furthermore, the risk and opportunity procedure is a combination of both Local's and Global's risk management practice. The modification of the practice occurred during the risk management meeting and the 'best for project' procedure (cf. Section 4.5.2). The risk management meetings were implemented to adapt the 'risk and opportunity' procedure for the duration of the project to match the changes in the

internal and external relational risks and the delivery risks. Therefore, while some practices were adaptive by design, others required exogenous interventions.

These results suggest that the deployment of collaborative practices in this infrastructure project relied on their repeated ties. It corroborates that this transfer occurs in recurring relationships (Gulati *et al.,* 1995a; Gulati *et al.,* 1995a; Zollo *et al.,* 2002; Tedova & Knoke, 2002; Bouncken, 2011; Manning & Sydow, 2011; Zheng & Yang, 2015; Defillippi & Sydow, 2016). However, it also shows that other practices are institutionalised in the industry (cf. Jarzabkowski, 2004; Levering *et al.,* 2013; Bromiley & Rau, 2016) and through institutional drivers such as government policy (e.g. Construction Playbook, 2021) and the ISO 44001 for collaboration (cf. Chakkol *et al.,* 2018). I show that the process of adaptation to the practices of partnering organisations occurs through changed designs, as well as through the performative aspect of the practice. Thus, the agency of practice participants and their interactions are instrumental in the development of collaborative capabilities. This, to the best of my knowledge is the first study to empirically demonstrate this phenomenon in the context of complex projects.

### *The emergence of practices*

The interorganisational collaboration literature largely examined how practices are adopted in alliances by their transfer in repeated ties (Zollo *et al.,* 2002; Schilke & Goerzen, 2010; Rerup *et al.,* 2019) and by the adoption of institutionalised practices through their respective fields (Levering *et al.,* 2013). Also, this can be done through institutional drivers such as government policy or standards (Chakkol *et al.,* 2018) to govern their relationships. However, the interorganisational literature examined practices as "*repeatable solutions by recycling experience from one project for others in the same line of business*" (Davies & Brady, 2000, p. 932). While Lawrence *et al.,* (2002), show how emergent practices diffuse beyond interorganisational boundaries to the field, there is little explanation as to how and why collaborative practices emerge in partnerships. This work found that a subset of practices adopted and performed in the different relationships were emergent.

This work found that the role of emergent practices varied. This work found two purposes of practices. First some practices emerged to improve and manage relationships based on past experiences. These included leadership change and disengagement, behavioural procurement, cultural development meetings, the behaviours steering group, the special interest group, and the LWoW workshops. These emerged to avoid the repeat of past failures. While Levering *et al.,* (2013) demonstrated that misfits between interorganisational project practices and project demands are rooted in past path dependencies, this work shows that previous experiences influence the emergence of practices in repeated and new IOCs.

Second, this work finds that a subset of practices emerged to match novel relational tensions between exchange partners that have no prior ties. These include the monthly community meetings, the quarterly uploads of planned works on Authorities platforms and the merging of project and authorities work packages. This work finds that practices emerged as a reaction to conflicting interests, through repeated interactions that were then formalised as a practice. Therefore, rather than being repeatable solutions his work demonstrated that practices also emerge as a response to novel or emerging relational issues between stakeholders.

## 5.4. Towards a Practice view of collaboration

This section builds upon the role of practices for attaining collaborative outcomes to propose a Practice-Based View (PBV) of the collaborative process. It critically examines the research findings in relation to the PBV literature to provide a theoretical frame to our understanding of how practices are deployed in the ego-network. "*The PBV stems from the logic that even small day-to-day activities of any firm or organization influence their performance* [...]. *Thus, the PBV is far more applicable as it focuses on common practices and performance*" (Dubey *et al.,* 2022:3). One of the assumptions of the practice-based view is that organisations do not use all their practices to support their performance but adopt specific institutionalised practices to achieve a set of desired outcomes (Bromiley & Rau, 2016). This research challenges this assumption in an attempt to provide more nuance to the practice-based view.

This research showed that the operationalisation of the collaborative process differed across the relationships of LG's ego-network. First this research showed that the strategic perceptions and nature of the joint tasks of the relationship influenced the volume and configuration of mechanisms. It then showed that the perceived performance differed both across the various relationships and the project locations, despite the deployment of similar mechanisms. Therefore it argued that the collaborative process was operationalised at the level of team interfaces, rather than at an inter-organisational level per se. In addition, it found that the successful and/or unsuccessful deployment of mechanisms in one location influenced other interfaces by either reinforcing or eroding the collaborative process's mechanisms. It then examined how the integrative mechanisms themselves, and therefore the collaborative process, are activated. This work uncovered 74 practices that when combined and performed 'activate' their respective mechanisms. It is the interplay between the design of collaborative practices and the interactions of participants within it that dictated perceived performance outcomes. In addition, this work found that negative interaction within practices not only impeded the operationalisation of their respective integrative mechanisms but also spread to other practices in the collaborative process, both within and across interfaces. Similarly, positive interactions and outcomes in practices reinforced collaboration within and across interfaces. Furthermore, it found that practices were replicated from prior projects and other interfaces to specific locations and were subsequently adapted to match the needs of the interface. Lastly, other collaborative practices emerged to either replace, modify of complement existing practices to fulfil the outcomes of the collaborative process.

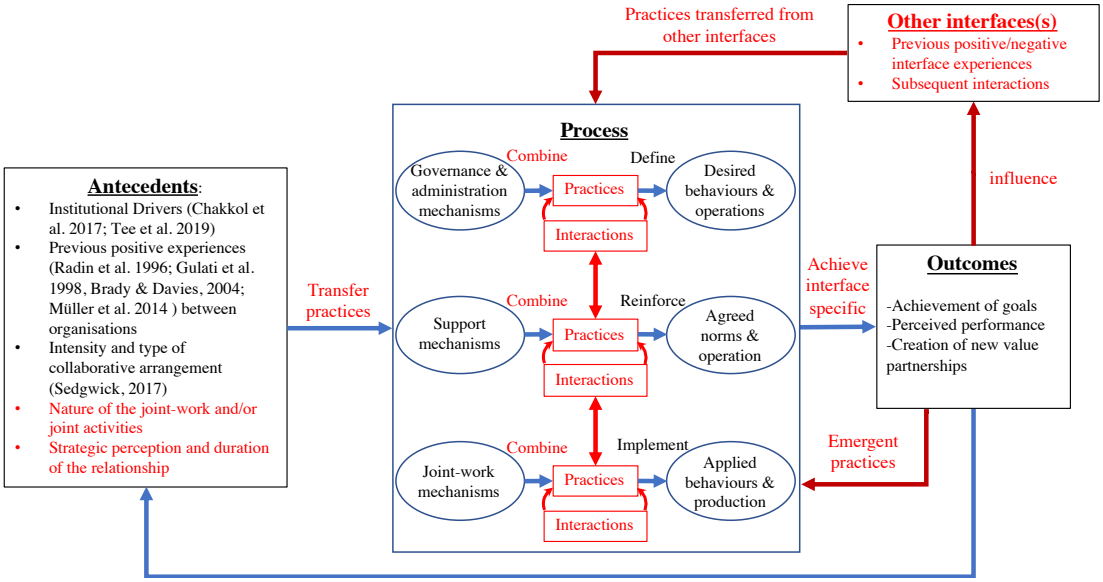
Based on these results, this research proposes a Practice Based View of collaboration. Consistently with Bromiley and Rau (2014), this work examined how practices were executed by exchange partners to achieve the desired performance outcomes. However, Bromiley and Rau (2014) also argue that organisations can attain better performance outcomes by implementing imitable practices. Li et al. (2022) reinforce this by arguing that the "*practice-based view which focuses on imitable* […] *practices may be a promising lens to explain performance variation*". Research in interorganisational relationships has paid significant attention to the role of mechanisms to explain the process of collaboration (see for e.g., Das, 2006; Vlaar, *et*

*al*., 2007; Holmberg & Cummings, 2009; Lewis & Roehrich, 2009; Das & Kumar, 2011; Dekker *et al*., 2013). Yet, much of the current knowledge regarding collaboration examines how particular project performance outcomes are achieved through the deployment of mechanisms (Zollo *et al*., 2002; Levering *et al*., 2013; Kapsali *et al*., 2018) and practices (Nikulina *et al*., 2022). However, the evidence of the role of practices for dictating performance was anecdotal and only examined organisational dyads. Furthermore, several studies argue that the deployment of institutionalised and standardised of practices across project accelerates collaboration (Davies *et al*., 2016; Chakkol *et al*., 2018; Tee *et al*., 2019). However, these works overlook the interactions of individuals in the practices. This work found that within the ego network, imitable practices do not explain performance variation per se. Rather, it is the effectiveness of their design to fulfill their purpose and the interactions of individuals that dictate perceived performance. It is the ability of partners to transfer, adapt, combine, complement and interact in practices that dictates perceive performance.

## 5.5. Conceptual Framework

The following conceptual framework was developed building on these contributions and the extant literature. More particularly, this framework integrates and modifies Thomson and Perry's (2008) Antecedents-Process-Outcome Framework Nikulina et al.'s (2022) collaboration. The conceptual framework has been modified to accommodate the contributions of this thesis. The emerging results are in red.

Figure 19: Revised conceptual framework




The revised framework provides four areas of modifications. First, it revised the antecedents of collaboration. This research demonstrated that the nature of the joint work and/or tasks and the strategic perceptions of the relationship influence the collaborative process. It does not claim that all collaborative structures are dictated by these elements, rather it contends that partners transfer and combine practices to match these antecedents.

The second modification to the framework related to the process of collaboration. This section integrates the emerging findings related to the role of practice for operationalising collaborations. This work thus opens the 'black-box' of collaboration (Fawcett *et al.*, 2011) by showing how the combining of practices and the interactions of individuals sustain collaborative outcomes across multiple types of collaborative

structures. It also demonstrates that the hierarchical feedback between the different mechanisms (c.f. Nikulina *et al.,* 2022) occurs at the level of practices.

Thirdly, it shows that the successful or unsuccessful attainment of perceived performance enables a feedback loop that influences both other project locations through and the emergence of new practices within the interface. Lastly, it demonstrates that practices can also be transferred from other project interfaces. In light of these points, I argue that collaboration is sustained by the interplay between the antecedents, the practices and interactions that constitute the collaborative process and the feedback loops within and across project interfaces and between projects.

## 5.6. Summary of the discussion chapter

This work examined how collaboration is operationalised in an ego-network, through a retroductive case study. By espousing the epistemology of Critical Realism (Bhaskar, 1978), this work found that the phenomenon of interest —the operationalisation of collaboration— manifests itself through three overlapping levels of reality: the *empirical,* the *actual* and the *real* domains (Bhaskar, 1978; Fletcher, 2017). Building upon institutional theory (Machamer *et al.,* 2000; Craver 2001; Glennan 2002; Bechtel and Abrahamsen 2005; Craver and Bechtel 2006), this work explored how exchange partners deploy integrative mechanisms to attain specific collaborative outcomes. Similarly to the extant literature, it shows that partners deploy integrative mechanisms to attain outcomes (see for e.g., Williamson, 1979; Choi, Dooley *et al.,* 2001; Sarkar *et al.,* 2001; Dekker, 2004; Dong & Glaister, 2006; Das, 2006; Vlaar, *et al.,* 2007; Holmberg & Cummings, 2009; Lewis & Roehrich, 2009; Roijakkers 2009; De Man and Solesvik & Westhead, 2010 Das & Kumar, 2011; Dekker *et al.,* 2013; Gulati *et al.,* 2013; Soda & Furlotti, 2017; Chakkol *et al.,* 2018; Furlotti & Soda, 2018). However, in contrast with the literature, it found that collaborative mechanisms vary in accordance with their strategic importance and the nature of the joint activities of collaborative partnerships. In the language of Critical Realism, the attainment of collaborative outcomes through these deployed mechanisms consists of the domain of the *empirical* (Outhwaite, 1987), which "*is the*

*transitive level of reality, where social ideas, meanings, decisions, and actions occur*" (Fletcher, 2017: 183) and is the measurable and/or observable phenomenon.

Furthermore, by adopting Pajunen's (2008) definition of mechanisms, this work empirically shows that these mechanisms consist of two levels: their outcome and their performing through their underlying practices and interactions. It showed that the attainment of outcomes, and therefore collaboration (Gulati *et al.,* 2013, Tee *et al.,* 2019) is driven by the lower level of mechanisms, that is the practices and interactions of entities (organisations and individuals). Building on the works of Jarzabkowski (2004), Bromiley and Rau (2014), Thomson and Perry (2009) and Nukilna et al. (2022) (2002) I demonstrated that the collaborative process is driven by interactions within practices. While partners transfer recursive practices to new and repeated relationships, these are modified and complemented by emergent practices during the collaboration's life cycle. I suggested that the interplay between practices, interaction and outcomes creates feedback loops within and across interfaces. These consist in the domain of the *actual* (Bhaskar, 1978), where events "*occur whether or not we experience or interpret them, and these true occurrences are often different from what is observed at the empirical level*" (Fletcher, 2017: 183).

Lastly, this work demonstrated that the attainment of the outcomes of integrative mechanisms and therefore collaboration itself (Nikulina *et al.,* 2022) is generated by the interplay between the design of the underlying combined practices and the interactions of individuals within these. It found that collaborative mechanisms and outcomes differ in interorganisational relationships through the combination and enactment of relationship specific collaborative practices. This interplay to activate integrative mechanisms consists of the domain of the *real* (Bhaskar, 1978), where practices "*are the inherent properties in an object or structure that act as causal forces to produce events*" (Fletcher, 2017: 183) and the phenomenon of interest (Bhaskar, 1978, Bhaskar, 1979; Outhwaite, 1987). Therefore, in contrast with the extant literature that examines IOCs through their formation (Ring & Van de Ven, 1994; Gulati, 1995a; Larson, 1997; Cravens *et al.,* 1998; Bresnen, 2007) and/or their governance mechanism (Poppo & Zenger, 2002; Cao & Lumineau, 2015; Chakkol *et al.,* 2018; Devarakonda *et al.,* 2018), this work proposed a Practice-Based View

(Bromiley & Rau, 2014) to explain how collaborations are operationalised in the context of complex projects.

# 6 Conclusion

## 6.1 Overview of the chapter

Chapter six summarises the conclusions of this thesis. Section 6.2 presents the research problem and the theoretical and practical rationales that motivated this work. Section 6.3 discusses how Critical Realism manifested throughout the research and its methods. Section 6.4 and 6.5 present the theoretical and managerial contributions of the study respectively. Subsequently, the limitations of the study are detailed in section 6.6, and finally, future research avenues are detailed for extending this work.

## 6.2 Summary of the Research Problem and Rationale

This research explored how collaboration is operationalised in an ego-network delivering an infrastructure complex project. The construction and infrastructure industry are notorious for delivering complex projects above their target costs and behind schedule. Policy makers have identified fragmented and adversarial relationships as one of the greatest risks to their success (Latham 1994; Egan 1998; National Audit Office, 2011). Therefore, collaboration is increasingly adopted as the preferred strategy for delivering large-scale complex projects to manage and match their complexity (Miller & Hobbs, 2000; Cooke-Davies, 2004; Chakkol *et al.,* 2018). While interorganisational collaboration is a well-researched phenomenon, collaboration itself is regularly used as a buzzword (Huxham & Vangen, 2001; Ploetner & Ehret, 2004; Bedwell *et al.,* 2012), and more often than not, it lacks conceptual clarity (for a review, see: Castañer & Olivera, 2020) and was ill-defined (Heide & Miller, 1992). Collaborative "*arrangements go by many names: strategic alliances, partnerships, collaborations, networks*" (Chen *et al.,* 2010: 381), and the term of collaboration is often used interchangeably with cooperation and coordination (Castañer & Oliviera, 2021).

Theoretically, research adopted the relational and structural perspectives (Madhok, 1995, Powell, 1998; Faems *et al.,* 2008) to explain the phenomenon of collaboration.

While these were largely addressed separately, recent research examined the interplay between the relational and structural dimensions of collaboration (for e.g. Poppo & Zenger, 2003; Cao & Lumineau, 2013). Using these theoretical perspectives, research has largely explored the pre-formation and formation (Klijn *et al.,* 2010), mostly in interorganisational dyads that adopted formalised collaborative structures such as joint ventures and alliances (Oliver, 1990; Caldwell & Howard, 2014; Davies *et al.,* 2016; Tee *et al.,* 2019). Furthermore, these focused "*on one of three aspects of collaborative relationships: predisposing conditions for collaboration, developmental processes, and perceived collaborative outcomes (Bryson, Crosby, and Stone 2006; Selsky and Parker 2005; Gray and Wood 1991)"* (Chen, 2010: 382). In an attempt to reconcile these streams of research, and to provide theoretical grounding for opening the 'black box' of collaboration, Nikulina *et al.,* (2016) introduced a framework detailing the collaborative process, to explain how it is operationalised. While the framework provides a useful approach for examining collaboration, it provided little conceptual clarity for explaining how the process of collaboration itself manifests.

To explain how collaboration is implemented, research examined the role of integrative mechanisms for the successful deployment of collaborative relationships (see for e.g. Palmer, 1983; Gulati, 1995; Dyer & Singh 1998; Das & Teng 2000; Kale, 2005; Argyres & Mayer, 2007; Varshney & Oppenheim, 2011; Gulati *et al.,* 2012; Chakkol *et al.,* 2018, Tee *et al.,* 2019). Rather than explaining how these are operationalised, these studies examined the role of such mechanisms for achieving collaborative outcomes. They therefore failed to explain "*the complexity of what actually happens in a partnering relationship (as opposed to prescribing what should happen)* " (Bresnen, 2007, 367). By examining the underlying practice and interaction that compose mechanisms (Pajunen, 2008), research could shift from providing prescriptive accounts of collaborative processes and outcomes to examining how cooperative and coordinative outcomes are practiced and attained (Gulati *et al.,* 2013; Davies *et al.,* 2016; Tee *et al.,* 2019). This would support a practice-based view of collaboration (Jarzabkowski, 2004 ; Rau & Bromiley, 2014)

In this thesis, I provide fresh empirical evidence regarding the operationalisation of integrative mechanisms to attain collaborative outcomes. In particular, three levels of

inquiry were investigated to further our understanding of collaboration. These are the identification of collaborative mechanisms and outcomes, their operationalisation through the interactions of partners in practices and the interplay between practices, interactions and interfaces. The research objective and questions are detailed below:

Research Objective: *to explore the operationalisation of collaboration through the deployment of integrative mechanisms in the context of an ego-network delivering a complex infrastructure project*.

RQ 1: How and why are projects outcomes attained through the deployment of collaborative mechanisms in the ego network?
RQ 2: How and why do practices and interactions of entities operationalise collaborative mechanisms?
RQ 3: How and why do practices influence the perceived performance of interorganisational collaborations?

## 6.3 Theoretical contributions

This study was designed to explore how collaboration is operationalised in an ego-network delivering a mega-project. To this end, three research questions were elicited following the review of the literature. Through its methodology and case setting, this research provides unique contributions to the IOC literature. First, collaboration was the contractually mandated strategy for the delivery of the studied infrastructure mega-project. This research could thus capture how the deployment of collaboration differed across the relationships in the same project. It found that both the process and outcomes of collaboration differed significantly across these relationships. This research thus contributes to the literature by providing a more nuanced understanding of what actually happens within an ego-network when partners deploy mechanisms to attain cooperative and coordinative outcomes, and thus collaboration. The rest of the chapter presents the contributions in relation to each research question.

Contributions related to the deployment of collaborative mechanisms (RQ1):

The case study revealed that the deployment of mechanisms differed across the relationships in the ego-network, in terms of their number and their variety. It found that these differences were driven by the roles, responsibilities, strategic requirements and joint activities of each exchange relationship. In the next two paragraphs, the contributions related to RQ1 are summarized.

Firstly, by examining interorganisational dyads, this research found that the collaborative process, in terms of the volume and combination of integrative mechanisms is influenced by the interplay between two antecedents: strategic and operational perceptions. When relationships are perceived as being both highly strategic and having complex production outputs, partners deploy a higher volume and combination of integrative mechanisms to build relational norms and produce tasks. This, to the best of my knowledge, has never been observed in studies examining IOCs. Research largely examines collaboration through formal —contractual (see for e.g., Caldwell & Howard, 2014; Kapsali *et al.,* 2018)— and informal (see for e.g., Poppo & Zenger, 2002; Cao & Lumineau, 2013) Governance and administration mechanisms. These studies conceptualise collaboration as the process through which organisations align their goals (see for e.g., Ring & Van de Ven, 1994; Spekman *et al.,* 1998; Gulati *et al.,* 2013; Tee *et al.,* 2019) and build relational norms (see for e.g., Poppo & Zenger, 2002; Cao & Lumineau, 2015; Aaltonen & Turkulainen, 2018; Prajogo, 2019). To date, the extant literature has largely adopted a prescriptive view of collaboration, by eliciting the governance mechanisms that lead to complex performance (see for e.g., Bendoly & Swink, 2007; Jap & Anderson, 2007; Caldwell & Howard, 2014; Kapsali *et al.,* 2018) in formalised partnerships.

Secondly, it also found that the perceived performance differed both across the various relationships and project locations, despite the deployment of similar mechanisms. Previous work largely examined dyadic and very formalised partnerships, such as JVs and alliances (cf. Hong *et al.,* 2009). Furthermore, prior studies have largely focused on the effect of mechanisms on relational outcomes (see for e.g. Nikulina *et al.,* 2022). Though the role of integrative mechanisms for driving project performance has been explored (see for e.g., Mello et al, 2015; Davies *et al.,*

2016; Benítez-Ávila, 2019; Tee *et al.,* 2019; Prajogo *et al.,* 2021), few studies unpacked how these mechanisms are deployed during the production stage of projects. The collaboration literature historically and predominantly examined how the governance of projects drive performance (e.g. Joskow, 1988; Zaheer & Venkatraman, 1995; Oxley, 1997; Joshi & Campbell, 2003; Ferguson *et al.,* 2005; Lee & Cavusgil, 2006; Blome *et al.,* 2013; Chakkol *et al.,* 2018; Benítez-Ávila *et al.,* 2019; Aben *et al.,* 2021; Belhadi *et al.,* 2021) and still examine inter-organisational dyads to explain collaboration (see for e.g. Um & Oh, 2020; Van der Kamp, 2022) rather than examining multi-stakeholder networks that are commonly adopted in projects (Tee *et al.,* 2019). Therefore, their findings are inherently difficult to generalise beyond their cases (Prentice *et al.,* 2019). this work demonstrates that standardised mechanisms deployed across a network do not reflect the varying complexity of relationships. It shows that different dyads require different processes, despite having similar aims. In addition, even within the same relationship, the number of team interface can influence the collaborative process over time. Collaboration can either be reinforced through positive interactions and feedback loops or eroded through conflicts and negative loops that contaminate other team interfaces. To the best of my knowledge, no study examined how performance differed within the same project, across relationships or within a relationship across various locations.

<u>Contributions related to the operationalisation of collaborative mechanisms through practices (RQ2) and the perceived performance of projects (RQ3):</u>

Few studies examined the lower level of collaborative mechanisms to understand how their outcomes are operationalised in complex settings. This research found that integrative mechanisms are composed of a set of combined practices in which individuals from different organisations interacted, that differed across the relationships in the ego-network. While the role of mechanisms and, to some degree, practices for supporting outcomes (see for e.g.Solesvik & Williamson, 1979; Choi *et al.,* 2001; Sarkar *et al.,* 2001; Dekker, 2004; Dong & Glaister, 2006; De Man and Roijakkers 2009; Westhead, 2010; Furlotti & Soda, 2018; Soda & Furlotti, 2017; Chakkol *et al.,* 2018; Hall *et al.,* 2018, Tee *et al.,* 2019; Nikulina et al., 2022) has been explored in previous works, these have not explored how practices sustain

collaborative outcomes. This work identified different dynamics that explain the interplay between practices and cooperative and coordinative outcomes. These dynamics then constitute the contributions pertaining to RQ2:

To the best of my knowledge, this thesis is the first to identify the interplay between the *design and scope* and *interactions of participants* in practices as the key determinant of collaborative outcomes. By examining both the design and interactions in the practices across the ego-network, this work found that the successful or unsuccessful attaining of collaborative aims was contingent on the interplay between their design and the agency of participants. These results contrast with the literature. It showed that ceteris paribus[7], the successful attainment of outcomes was dictated by the interactions of participants, rather than by the formal and informal mechanisms (*cf*. Gulati *et al*., 1995; Argyres & Mayer, 2007; Chakkol *et al*., 2018; Tee *et al*., 2019, Hall *et al*., 2018; Tee *et al*., 2019e.g., Poppo & Zenger, 2002; Aaltonen & Turkulainen, 2018).

By examining the design, combination and performing of practices (Pajunen; Biesenthal *et al*., 2019), this research shows that the operationalising of mechanisms is the collaborative process is driven by practices. Negative interaction within practices not only impeded the operationalisation of their respective integrative mechanisms but also spread to other practices in the collaborative process, both within and across interfaces. Similarly, positive interactions and outcomes in practices reinforced collaboration within and across interfaces. Furthermore, it found that practices were replicated from prior projects and other interfaces to specific locations and were subsequently adapted to match the needs of the interface. Lastly, other collaborative practices emerged to either replace, modify of complement existing practices to fulfil the outcomes of the collaborative process. By examining collaboration at the level of practices, this works provides a more granular understanding of what collaboration entails and how it is sustained.

[7] All things being equal

To conclude, by examining collaboration at the level of the practices, this work identified "*the complexity of what actually happens in a partnering relationship (as opposed to prescribing what should happen)* " (Bresnen, 2007, 367). The composition of collaborative mechanisms in terms of their configuration and quantity of practices differed across the ego-network. A varying set of standardized, replicated and unique mechanisms were used across partnerships, and these entailed differing types and quantities of practices. Lastly, some practices were transversal i.e., cross-sectional across projects and supported a multitude of collaborative mechanisms and outcomes. In addition, since these practices differed across both the relationships and the deployed mechanisms, I argue that prescriptive accounts of collaboration (see for e.g., Bendoly & Swink, 2007; Jap & Anderson, 2007; Caldwell & Howard, 2014; Kapsali *et al.,* 2018) constrain our theoretical understanding on how collaboration is sustained in complex projects.

<u>Contributions related to the PBV:</u>

This research showed that the operationalisation of the collaborative process differed across the relationships of LG's ego-network. It showed how the antecedent of collaboration dictate which practices are transferred and adapted in the different interfaces and how the collaborative process and its outcomes are driven by practices. It also demonstrated that there are multiple feedback loops in projects to modify practices and create new ones to achieve the desired performance. Not only do negative interactions within practices impede the operationalisation of their respective integrative mechanisms but these also spread to other practices in the collaborative process, both within and across interfaces. Similarly, positive interactions and outcomes in practices reinforced collaboration within and across interfaces. Furthermore, it found that practices were replicated from prior projects and other interfaces to specific locations and were subsequently adapted to match the needs of the interface. Lastly, other collaborative practices emerged to either replace, modify of complement existing practices to fulfil the outcomes of the collaborative process.

Based on these results, this research proposes a Practice Based View of collaboration. Consistently with Bromiley and Rau (2014), this work examined how practices were executed by exchange partners to achieve the desired performance outcomes. It refines the PBV by showing that within an ego network, practices and how there are practiced and adapted explain perceived performance variation. Currently, PBV research argues that imitable practices dictate performance (Bromiley & Rau; 2014; Li *et al*., 2022; Dubey *et al*., 2022; Bianco et al. 2023). This work shows that these do not explain performance variation, rather it is the effectiveness of their design and the interactions of individuals that dictate perceived performance. There is a temporal dimension to collaboration the transfer of standardized practice facilitate the deploying and implementing of collaborative mechanisms between partners, which are adapted over time to match the idiosyncratic needs of the relationship.

No other studies examining collaboration explored PBV in ego-network at production stage. By examining an ego-network, this research shows that the number, configuration and nature of practices varies in B2B collaborations despite the same focal company in the same megaproject.

## 6.4 Practical contributions

This research showed that IOCs in infrastructure projects are complex and entail varying types of structures, mechanisms, and practices. The results of the case study provide insights that could be relevant to managers delivering projects through collaborative relationships.

The principal contention of this research is that organisations should take more care in the design of integrative mechanisms and practices to enable collaboration. This case showed that the collaborative process, in terms of the operationalising of integrative mechanisms through practices should reflect the strategic and operational complexity of the relationship. To this end, managers first need to understand the strategic, operational, and relational requirements of each relationship in their ego-network and of the various projects these relationships deliver. Exchange partners should match the complexity of their projects and interfaces with integrative

mechanisms and practices. In doing so, managers could thus match the design of each relationship to these requirements and deploy appropriate mechanisms and practices to sustain collaborative outcomes. Nevertheless, this cannot be achieved solely through the efforts of the focal company. Rather, it requires interactions and agreement from all involved parties to address the individual strategic and operational needs of partners to sustain collaboration over time.

The focus of exchange partners should not be the standardisation of collaboration by replicating practice, but the careful design of team-to-team mechanisms to stimulate collaborative working from the onset. For example, while all strategic subcontractors were onboarded using the same combination of practices and where contractually bound using similar NEC contracts, the perceived performance between LG and the different partner varied significantly. A stronger focus on how to operationalise and support collaboration, rather than how to govern these should be beneficial for the perceived performance of projects. In addition, more attention should be drawn in the design and implementation of collaborative cultures and in identifying the behaviours that would support the attaining of collaborative outcomes in teams.

The Support mechanisms should also be adapted to the interface. For example, partners should stop deploying generic collaborative workshops: individuals who are well versed in collaborating and have experience already adhere to it. These also seem to have little effect on the collaborative outcomes since individuals from relationships perceived as failing attended these, yet they did not collaborate effectively. Thus, this work showed that standardised practices do not seem drive effective collaboration. Rather, the success or failure of the operationalisation of integrative mechanism, and thus the process collaboration is dictated by the interplay of practices and interactions. Therefore, organisations must focus on individual and team behaviours rather than solely structural elements.

In addition, this work showed that poor perceived performance was also the result of contamination of negative interactions within and across interfaces. Thus, how to maintain collaboration when conditions (endogenous/exogenous) change and collaborative risk management (i.e. what to do when collaboration fails, how to

improve it, how to limit contagion and exclusion) should be a priority. The feedback loops identified in this research —across projects, across interfaces, across practices— can help managers identify the risks of contagion in each partnership. I suggest that the early identification, operationalisation and proactive management of both practices and behaviours could potentially support the deployment of collaboration from the onset of projects. Furthermore, LG established a procedure (lesson learned) to identify performance drivers of the project and barriers to collaborating to improve subsequent relationships. However, this research argues that the feedback loops that occur during the project have a stronger influence on effective collaboration and project performance. Therefore, such mechanisms should be deployed in each interface to influence its future performance and help the transfer of practices in other locations and/or interfaces.

Lastly, this work identified the role of practice recursiveness, emergence and adaptation, to match the specific strategic, operational and relational considerations of interorganisational relationships. While managers replicate past structures, mechanisms and practices for standardising collaboration and achieving economies of repetition and thus control IOCs, this work argues that managers should pay particular attention to emergence and adaptation. Since both projects and interorganisational relationships are unique, by embracing emergence and adaptation, collaborative outcomes could be achieved more effectively. In addition, it is important to point out that while recursive practices can enable economies of repetition, this is contingent on the experience individuals have with these.

Overall, managers need to be aware that IOCs can have multiple configurations. This is evident from the varying types of collaborative structures, mechanisms and practices deployed in LG and its ego-network. Accordingly, these had implications on the ability of partners to attain collaborative outcomes. In conclusion, managers need to be conscious of the interplay between the antecedents, structures, processes and outcomes of collaboration and the role of individuals to sustain these in projects.

## 6.5 Limitations

This study is not without limitations. Firstly, it is based on a unique, in-depth case study within a single industry. While this offered an appropriate approach given the nature of this study, further empirical investigations in other contexts —cases and industries— are needed. Therefore, any claims for generalising the findings and contributions beyond this case must be made with caution. In addition, this study only looked at LG's ego-network, and thus its relationship with first tier suppliers and stakeholders and its client. The relationships with second tier suppliers and other managing contractors in other sections of the program were not addressed in this work. This was partly due to the indirect interactions LG had with these organisations. The examination of the complete network delivering the project during its entire life cycle would have required significant time and resources that were not feasible for a PhD thesis.

In single case settings, the selection criteria dictate the research process, since the data is bounded to the selected case. For this research, collaboration was mandated and the access to other members of the ego-network was necessary to investigate the structures and nature of collaborative relationships. In addition, the external events (Project review by the Government and the COVID 19 pandemic) provided an additional layer of challenges related to access. Therefore, while the case setting did match the adopted selection criteria, the process still relied upon 'planned opportunism' (Pettigrew, 1990).

Lastly, this work does present some methodological limitations. This research used a retroductive research strategy which was driven by a critical realist stance. As an iterative strategy, retroduction permits the explanation of previously postulated regularities through the identification of their underlying mechanisms. This strategy was deemed appropriate for this case study, its research objectives and questions that aimed to open the black box of collaboration. Nevertheless, retroduction in social sciences, and particularly in management and/or operations management research has a limited number of methodological guidance (Fletcher, 2017). Thus, there is an emerging need to develop and formalise methodologies for retroductive research.

## 6.6 Avenues for future research

This thesis resulted in a number of theoretical contributions centred on its areas of enquiry. An emergent conclusion is that the examination of the 'black box' of collaboration remains at an infant stage in the literature. Thus, while collaboration is a widely researched phenomenon, there are still several avenues for further studies. By examining collaboration at a more granular level, this work provides foundations upon which future research can be built.

First, collaboration has largely examined dyadic relationships (see Hong *et al.,* 2011), largely in formalised alliances (Gulati *et al.,* 2013). However, extant research also argued the need for examining collaboration across broader networks (Davies *et al.,* 2016; Chakkol *et al.,* 2018 Tee *et al.,* 2019). To this end, this research examined IOCs in an ego-network, where collaboration itself was mandated, to examine the role of mechanisms, their underlying practices and the interactions of individuals for sustaining collaborative outcomes. Despite advancing our understanding of collaboration by providing much needed granularity, future works should examine collaboration in complex projects by examining the entire network. The examination of the ramifications of collaboration on the Tier 2 and 3 suppliers would be of great interest. Furthermore, this case was bound to the infrastructure industry. By exploring other contexts, research could identify the institutional differences of collaboration across settings.

Secondly, the examination of the individual level of collaboration is mandated. While this work demonstrated the importance of interactions in the context of practices for sustaining collaborative outcomes, a deeper examination of agency and interactions would provide insight into the social nature of collaboration. Thus, further works should adopt ethnomethodology and longitudinal studies to understand the dynamics rooted in inter-personal interactions. Therefore, such works could provide additional insight on how collaboration unfolds.

Thirdly, this study examined the role of mechanisms and practices for sustaining collaborative outcomes (Gulati *et al*., 2013) and collaboration itself (Chakkol *et al*., 2018). However, whether collaboration leads to improved performance in comparison with other forms of inter-organisational relationships or linkages remains unclear (Kapsali *et al*., 2018). Fundamentally, research needs to examine if collaboration actually improves the performance of projects. In addition, this work did not address the life cycle of practices. Further examinations on collaborative practice survival could yield insightful, theoretical contributions related to practice dynamics.

Lastly, this work suggested that recursive, emergent and adaptive aspects of practices are indicative of a learning process. In addition, while Project Management research examined dynamic capabilities in complex projects (c.f. Davies *et al*., 2016), how organisations build their collaborative capabilities remains unclear. Future research could examine the role of practices for the building of collaborative capability.

## 6.7 Summary of the chapter

Chapter 6 served as the final concluding chapter of this thesis. It first reiterated the research problem and questions for this study. Section 6.3 outlined the manifestations of Critical Realism in the research process. Section 6.4 and 6.5 outlined the theoretical and practical implications of this thesis, respectively. Section 6.6 and 6.7 detailed the limitations and avenues for future research.

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# Appendices

## Appendix A: The interview Protocols

**FIRST INTERVIEW PROTOCOL**
Checklist:

-Interview participant GDPR sheet
-Questionnaire
-Acceptance of recording
-Introduction to the research
-Authorization to follow-up

Introduction:
Hi ___, first of all, I would like to thank you for taking the time to meet with me for this interview. I am very interested in the work [Name of organization] and yourself are doing for the project. The aim of this interview is for us to talk about the project you are delivering, your organization, your partners and yourself. I am trying to understand how you are all working together on the project.
If at any time you want to stop the interview, or want to talk of the record, please let me know. I want you to feel as comfortable as possible. When I will be looking at the data, I will delete all mentions of companies and names, including yourself to ensure your anonymity.

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**Part 1: Semi-Structured interview:**

1. **Context**: *[The aim of this section is to understand the background information about the interviewee, the organization, the relationship and the project]*

   1.1. Could you tell me about your background and how you came to work in your current role? Probe: How long have you been with the company?
   Probe: What are your responsibilities?
   Probe: For how long have you been working on the project?

   1.2. At what stage of the project are you currently on?
   Probe: What were the deadlines of the project?
   Probe: What were the milestones?
   Probe: How long is the overall project?

   1.3. Can you tell me a bit about the organizations you are working with?
   Probe: How many organizations are you directly working with?
   Probe: In what capacity do they work in?

   1.4. How closely do you work with these organizations?
   Probe: How do you work with your counterparts?
   Probe: how often do you meet and why?

1.5. Have you worked with these organizations before?
Probe: if yes: Can you tell me about similarities and differences in the way the past projects and current project are organised?
Probe: If no: How did you come to work with these organisations

2. **Designing the collaboration**: [The aim of the section is to explore how the collaboration is designed on an inter-organizational, organizational and project level]

2.1. Can you tell me about how the project is governed?
Probe: How do the contractual arrangements help to solve conflicts?
Probe: What type of relational mechanisms are in place to promote collaborative working?

2.2. What does collaboration mean in this project?
Probe: How do you collaborate with [Local/global]?
Probe: How do you collaborate with [organisations interviewees mentioned]?
Probe: What does collaboration do for your relationships?
Probe: What does collaboration do for the technical part of project?

2.3. How is the collaboration structured to deliver the project?
Probe: What routines have you put in place with your partners for delivering the project?
Probe: What processes do you have in place to avoid conflicts and support the performance of the project?

2.4. What do you think makes collaboration successful?
Probe: How do you [mechanism of coop, e.g. communicate] on this project?
Probe: How do you [mechanism of coop, e.g. jointly produce tasks] on this project?

3. **Enacting the collaboration**: [*The aim of this section is to identify how the skills and behaviours of managers can promote or hinder the performance of the project*]

3.1. How much flexibility do your managers have to solve conflicts?
Probe: Are these elicited in your governance mechanisms

3.2. During the delivery of the projects, what went well with collaboration
Probe: What made [successes provided by interviewee] successful?
Probe: How did managers promote this success?
Probe: What behaviours did you observe that led to this outcome?

3.3. During the delivery of the project, what did not go well with collaboration
Probe: Why did [types of issues provided by interviewee] arise?
Probe: How did the behaviours of managers lead to these issues?
Probe: How were these solved?
Probe: What behaviours did you observe that enabled a resolution of these issues?

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**SECOND INTERVIEW PROTOCOL: Implemented after the Pilot study**

Checklist:

-Interview participant GDPR sheet
-Questionnaire
-Acceptance of recording
-Introduction to the research
-Authorization to follow-up

Introduction:

Hi ___, first of all, I would like to thank you for taking the time to meet with me for this interview. I am very interested in the work [Name of organization] and yourself are doing for the project. The aim of this interview is for us to talk about the project you are delivering, your organization, your partners and yourself. I am trying to understand how you are all working together on the project.

If at any time you want to stop the interview, or want to talk of the record, please let me know. I want you to feel as comfortable as possible. When I will be looking at the data, I will delete all mentions of companies and names, including yourself to ensure your anonymity.

---

**Part 1: Semi-Structured interview:**

**1. Context**: *[The aim of this section is to understand the background information about the interviewee, the organization, the relationship and the project]*

1.1. Could you tell me about your background and how you came to work in your current role? Probe: How long have you been with the company?
Probe: What are your responsibilities?
Probe: For how long have you been working on the project?

1.2. What work packages are you delivering currently?
Probe: What were the milestones?

1.3. Can you tell me a bit about the organizations you are working with?
Probe: How many organizations are you directly working with?
Probe: In what capacity do they work in?

1.4. How closely do you work with these organizations?
Probe: How do you work with your counterparts?
Probe: how often do you meet and why?

1.5. Have you worked with these organizations before?
Probe: if yes: Can you tell me about similarities and differences in the way the past projects and current project are organised?
Probe: If no: How did you come to work with these organisations

2. **Designing the collaboration**: [The aim of the section is to explore how the collaboration is designed on an inter-organizational, organizational and project level]

   2.1. What does collaboration mean in this project?
   Probe: How do you collaborate with [Local/global]?
   Probe: How do you collaborate with [organisations interviewees mentioned]?
   Probe: What does collaboration do for your relationships?
   Probe: What does collaboration do for the technical part of project?

   2.2. How is the collaboration structured to deliver the project?
   Probe: What routines have you put in place with your partners for delivering the project?
   Probe: What processes do you have in place to avoid conflicts and support the performance of the project?

   2.3. What do you think makes collaboration successful?
   Probe: How do you [mechanism of coop, e.g. communicate] on this project?
   Probe: How do you [mechanism of coop, e.g. jointly produce tasks] on this project?

   2.4. What activities help with collaboration, in what way?
   Probe: Do you take part in [Practices identified]?
   Probe: How do [identified practices] help with [mechanism of coop]?
   Probe: How do [identified practices] help with [mechanism of coord]?

3. **Enacting the collaboration**: [*The aim of this section is to identify how the skills and behaviours of managers can promote or hinder the performance of the project*]

   3.1. How did you interact with partners during these activities?
   Probe: what behaviours made these collaborative?
   Probe: what behaviours made these uncollaborative?

   3.2. During the delivery of the projects, what went well with collaboration
   Probe: What made [successes provided by interviewee] successful?
   Probe: How did managers promote this success?
   Probe: What behaviours did you observe that led to this outcome?

3.3. During the delivery of the project, what did not go well with collaboration
Probe: Why did [types of issues provided by interviewee] arise?
Probe: How did the behaviours of managers lead to these issues?
Probe: How were these solved?
Probe: What behaviours did you observe that enabled a resolution of these issues?

3.4. Did any other activities help with collaboration?
Probe: How do common practices or processes help with collaboration?
Probe: How do common practices or processes hinder collaboration?

3.5. Is there anything that helped you collaborate that I did not ask about?
May I contact you again if I have any other questions?

---

**Third INTERVIEW PROTOCOL: Implemented after the Pilot study**

Checklist:
-Interview participant GDPR sheet
-Questionnaire
-Acceptance of recording
-Introduction to the research
-Authorization to follow-up

Introduction:
Hi ___, first of all, I would like to thank you for taking the time to meet with me for this interview. I am very interested in the work [Name of organization] and yourself are doing for the project. The aim of this interview is for us to talk about the project you are delivering, your organization, your partners and yourself. I am trying to understand how you are all working together on the project.
If at any time you want to stop the interview, or want to talk of the record, please let me know. I want you to feel as comfortable as possible. When I will be looking at the data, I will delete all mentions of companies and names, including yourself to ensure your anonymity.

---

**Part 1: Semi-Structured interview:**
**1. Context**: *[The aim of this section is to understand the background information about the interviewee, the organization, the relationship and the project]*

1.1. Could you tell me about your background and how you came to work in your current role? Probe: How long have you been with the company and in the project?
Probe: What area of work/ sector are you working in?
Probe: What are your responsibilities?

1.2. What type of work packages are you delivering currently?
Probe: What were the milestones?
Probe: What requires collaboration in this work package?
1.3. Can you tell me a bit about the organizations you are working with?
Probe: How many organizations are you directly working with?
Probe: In what capacity do they work in?

1.4. How closely do you work with these organizations?
Probe: How do you work with your counterparts?
Probe: how often do you meet and why?

1.5. Have you worked with these organizations before?
Probe: if yes: Can you tell me about similarities and differences in the way the past projects and current project are organised?

2. **Designing the collaboration**: [The aim of the section is to explore how the collaboration is designed on an inter-organizational, organizational and project level]

2.1. What does collaboration mean in this project?
Probe: How do you collaborate with [Local/global]?
Probe: How do you collaborate with [organisations interviewees mentioned]?

2.2. What do you think makes collaboration successful?
Probe: How do you [mechanism of coop, e.g. communicate] on this project?
Probe: How do you [mechanism of coop, e.g. jointly produce tasks] on this project?

2.3. What activities help with collaboration, in what way?
Probe: Do you take part in [Practices identified]?
Probe: How do [identified practices] help with [mechanism of coop]?
Probe: How do [identified practices] help with [mechanism of coord]?

2.4. Have you used these activities and practices in previous projects?
Probe: Which practices would you say are common practice in infrastructure
Probe: which of these practices do you think are unique to Global/Local or LG
Probe: Are there any practices or activities that are unique to this project?

3. **Enacting the collaboration**: [*The aim of this section is to identify how the skills and behaviours of managers can promote or hinder the performance of the project*]

3.1. Did these practices and activities change since you started them?
Probe: how are they different from the ones used in previous projects?
Probe: Why do you think these changed?
Probe: How did these change?

3.2. How did you interact with partners during these activities?
Probe: what behaviours made these collaborative?
Probe: what behaviours made these uncollaborative?

3.3. During the delivery of the projects, what went well with collaboration
Probe: What made [successes provided by interviewee] successful?
Probe: How did managers promote this success?
Probe: What behaviours did you observe that led to this outcome?

3.4. During the delivery of the project, what did not go well with collaboration
Probe: Why did [types of issues provided by interviewee] arise?
Probe: How did the behaviours of managers lead to these issues?
Probe: How were these solved?
Probe: What behaviours did you observe that enabled a resolution of these issues?

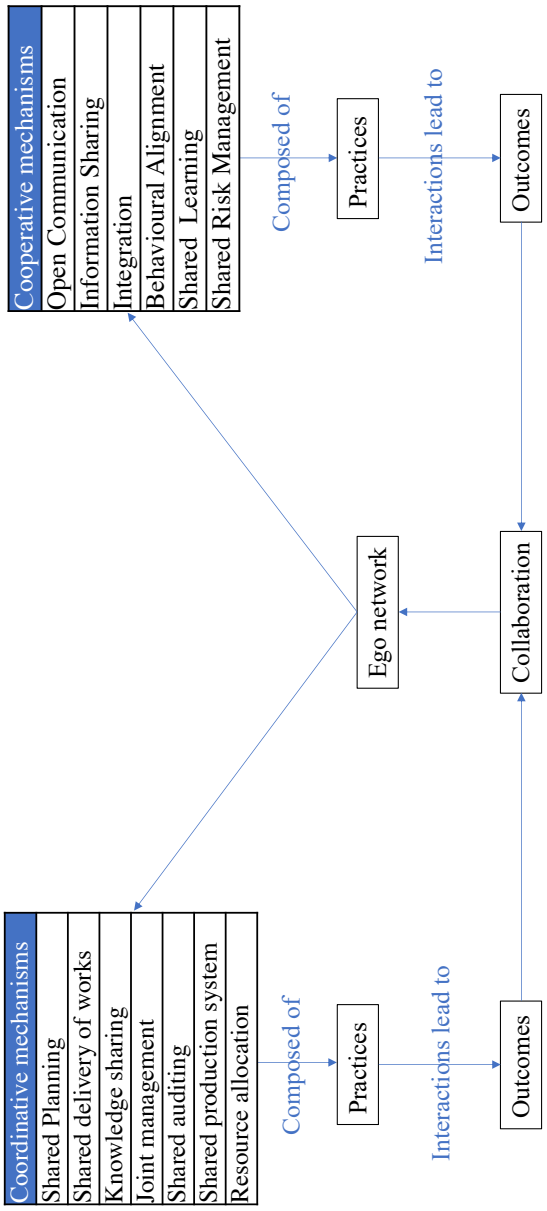
3.6. Did any other activities help with collaboration?
Probe: How do common practices or processes help with collaboration?
Probe: How do common practices or processes hinder collaboration?

3.7. Is there anything that helped you collaborate that I did not ask about?
May I contact you again if I have any other questions?

## The emergent coding template after interview 8 (Pilot Study):

Developed with publicly available data and the literature review

## Initial map:




**Context**

•National programme
•Rail infrastructure

**Collaborative Process:**

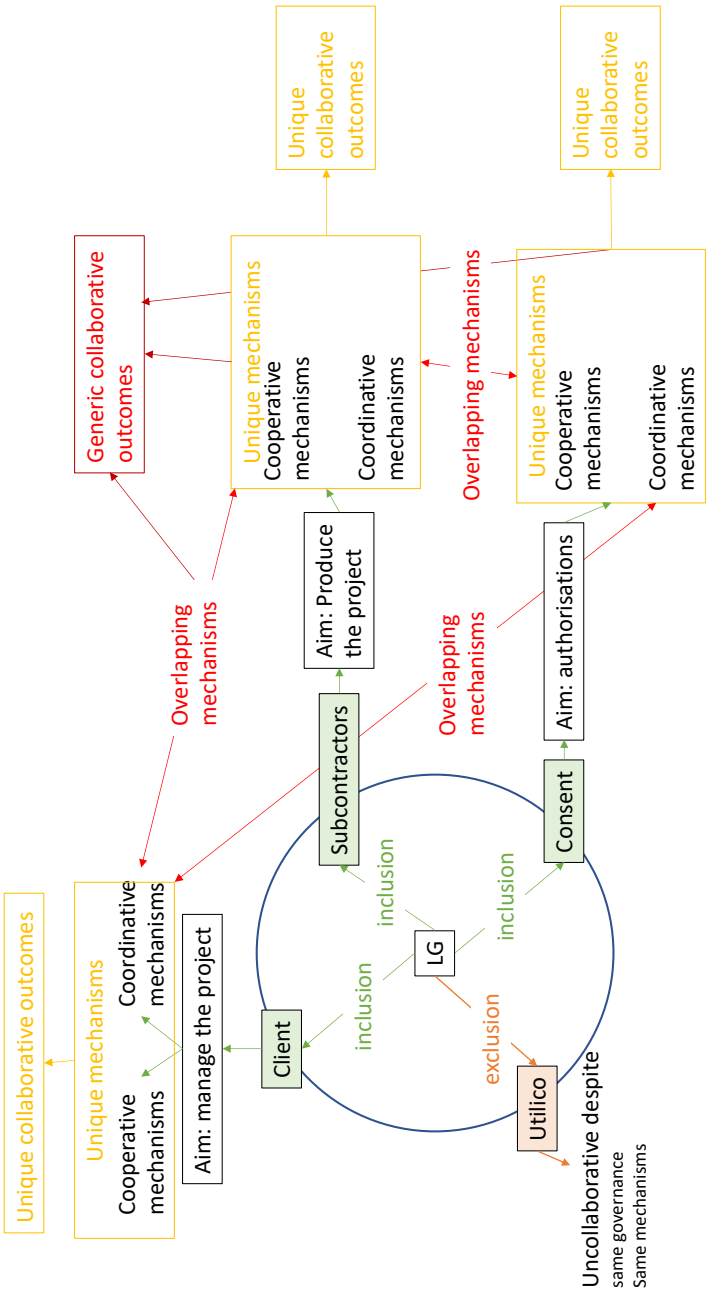
- •Cooperative mechanisms
  - -Open Communication
    - •Practices
    - •Interactions
  - -Information Sharing
    - •Practices
    - •Interactions
  - -Integration
    - •Practices
    - •Interactions
  - -Behavioural Alignment
    - •Practices
    - •Interactions
  - -Shared Learning
    - •Practices
    - •Interactions
  - -Shared Risk Management
    - •Practices
    - •Interactions
- •Coordinative mechanisms
  - -Shared Planning
    - •Practices
    - •Interactions
  - -Shared delivery of works
    - •Practices
    - •Interactions
  - -Knowledge sharing
    - •Practices
    - •Interactions
  - -Joint management
    - •Practices
    - •Interactions
  - -Shared auditing
    - •Practices
    - •Interactions
  - -Shared production system
    - •Practices
    - •Interactions
  - -Resource allocation
    - •Practices
    - •Interactions

**Collaborative Outcomes:**

- •Coordinative outcomes
- •Coordinative outcomes

## Emergent coding following Interview 8

First Map: Inductive coding




**Context**

- National programme:
  - -high volume of work packages
    - over 100 just for the EW

• beginning of MW (already 50 concurrent)

-high variety of work packages

•demolitions

-high rises: complex technically

-houses: complex relationally

- warehouses: “easiest task”

•utilities:

- majority of EW works

- widest geographical area

- large supply chain

- ECI with key subcontractors

-very hostile

• routes

-Creation of the large hub at (train station)

-high number of pedestrians, dangerous site

-lots of companies involved, but community only sees LG branding

•Ego Network:

-High number of tier 1 suppliers

•collaboration deployed with some

-ECI contracts and option C

-Strategic subcontractors

• collaboration not deployed with most

•differentiated contracts to match importance

-option A for task doers

-option C for creative

**<u>Collaborative Process:</u>**

**•Cooperative mechanisms**

-<u>Open Communication</u>

•operational communication

-practices:

• Informal communication;

•formal (mandatory?) collaboration meetings

•IT communication IT chat systems;

• Intra-sectorial communication vs inter-sectorial ?

• processual communication

-discussion around the project itself

-formal meetings for catch ups (technical)

-informal interactions to talk about deadlines

•Behavioural alignment

-quality of communication differed a lot across ego network
•· Clarity and visibility
•Commitment, reciprocity and mutual support

•Relational communication
- Informal communication
• break rooms and socialising to take "temperature" of the relationship
• informal makes it less imposing
-IT chat systems
•times consuming
•misunderstanding
•efficient to share outputs
-collaboration meetings
-differed across locations
-Differences in volume of interactions across locations
•West few interactions
-very conflictual
-negative discourses: Arrogant; "assholes"; berating
- they only care about the money"
•central 2 a lot
-· Conflict mitigation
- Trust, honesty and reliability
- Behavioural alignment

-<u>Information Sharing</u>
•Financial
- only in LG?
• Mitigation of conflicts, opportunism and hidden agendas
•Trust, honesty, reliability, good faith
- control the cost to make margin
- 3% margin only
- open book accounting
- financially supportive when cash flow issues
•Strategic
-differentiation between strategic level and operational level
•Competence-based trust & Relational trust
•honesty, reliability, transparency
-strategic information is not disseminated in supply chain
•feeling of exclusion
-client needs to know the big picture
•Behavioural

-collecting behavioural information to forecast conflicts
•unidirectional practices: LG imposes tests on contractors
-behavioural risk mitigation through collecting and disseminating of behavioural data

•Operational
- Client is unconcerned
- empowerment of managers to make decisions. Escalation of unresolved issues only
-information most widely shared with suppliers
•Identify complementary strengths
-Trust, reliability
-multidirectional sharing
-relevance of information for roles, responsibilities or tasks
•Supports design of the operations
-bargaining for obtaining info

-Integration
•Team integration
- colocation
- spatial barriers
•feeling of exclusion
•uncollaborative
•hostile discourses
- geographical proximity of offices
• campus
• people more interested
-Removes adversarial approach
-One team culture, improving, single operation, relational norms

•processual integration
- same process recruitment
- competition across LG projects
- same production process
-Mitigates competition
-Joint-recruitment
-smoother operation
-

- Alignment
•behavioural alignment
JV structure
Avoiding opportunism
Alliance Principles

Commitment, relational norms

•goal alignment

-Balancing power dynamics “we are partners, we don’t bully”

-Transparency?

- business continuity

- JV structure

-Strategic information sharing

-Joint decision making

-quorum

-force people to speak

-reconciling strategies, strategic adaptation

•processual alignment

-Conflict mitigation

-Breaking down siloes

-nonalignment leads to blaming and conflict

-Interdependence: we cannot do it without each other’s processes

-common system: easy to replace people

-mutual support, willingness to collaborate

-Shared Learning

•Practices

-Formal assessments

• Monitoring

- improvement of processes if they get in the way

- improving people

• promotion recognition

-Joint-training

• communal to develop trust during workshops

•Collaborative capability building

•Knowledge transfer

-interactions of people during workshops

-experts and novice in the same room

-Geographical proximity

•Relational learning

-Informal feedback

-Interactions through colocation

• Knowledge transfer, mentoring and guiding

•Competence based trust

-if unreliable, no one comes to you

-if you don’t know, ask around

•Behavioural alignment

-took the shame out

-asking is better than fixing

-<u>Shared Risk Management</u>

•Internal risk management

-Joint-risk management procedures

-Joint mechanism of monitoring and control

-Joint exit strategy

-Joint-decision making

•Fortnightly Board Meetings

•Board renegotiation meetings

•Colocation

•Blended teams

•Annual performance review

•Collaborative training

•Risk & Opportunity Management Procedure

•Risk Logs

•Reporting meetings

•Open book accounting

•Risk Management meeting

•Best for project procedure

•Leadership change disengagement

•Cultural development meeting

- Resource allocation alignment
- Processual alignment
- Amicable dissolution
- contingency planning
- Mitigation of shirking
- Conflict mitigation and relational alignment

•External Risk management

-Joint stakeholder engagement

-Behavioural procurement

-ECI

· Reliability, trustworthiness, conflict mitigation

· Relational alignment, relational control and improving relationships

· Mitigation of shirking

· Processual alignment and adaptation

•Delivery Risks and health and safety

-Health and safety procedures

-Contractual targets

-bonus for lack of accidents

•Coordinative mechanisms

-Shared Planning

- •Strategic Planning
  - -Shared project layout
  - -Shared planning procedures
  - -Planning feedback loops
- •Operational Planning:
  - -Sequencing of activities within projects
  - -Shared Planning Procedure
  - -Shared mechanisms of control"
- •Relational planning
  - -Joint planning of interfaces
  - -Joint-planning and onboarding of the supply chain"
- •Interactions

-Shared delivery of works

- •Strategic delivery:
  - -Shared Monitoring mechanisms
  - -Shared Quality Management
  - -Strategic KPIs
    - · Monitoring of programme advancements
    - · Joint-decisions
    - · Adaptation
    - · efficiency and improvements
- •Operational delivery
  - -Control mechanisms
  - -Quality Scrutiny
  - -Operational KPIs

-Knowledge sharing

- •Practices
- •Interactions

-Joint management

- •Strategic management
  - -Managerial hierarchy tension centralised decentralised?
  - -Decision making procedure: decentralised and escalation
- •Operational management:
  - -Empowerment of operational managers
  - -Decentralised problem solving
    - · Matching the project
    - · Efficiency, joint decisions
    - · business continuity continuation of the processes
    - · field-based problem solving
    - · efficiency
    - · flexibility
    - · consistency, monitoring and control

-Shared control

•Shared programme controls:

-Joint-defining of KPIs

-Hierarchical process

-Shared templates

-Adaptation of the reporting

· Useable data

· Monitoring inputs and outputs (productivity?)

· Improved delivery, improved decision making

• controllers adapt

-joint decision

-meeting to do things together

-cohesive group

-Shared production system

•Expertise sharing

Knowledge sharing contractual clauses

Knowledge combining

Competency analysis & personnel allocation

Integrated delivery

· Matching of the project requirement

Joint-learning, tacit knowledge diffusion, efficiency

Capability building

Innovation diffusion

Shared intellectual property rights

Innovation deployment procedure"· Knowledge diffusion

· Innovation implementation

· Efficiency, process improvement, faster turnover

-Resource allocation

•Joint personnel allocation:

-Contractual mechanisms for resource sharing and allocation

-Joint-recruitment process

-Formal HR allocation process

Behavioural assessments

Informal allocation (recommendations)

- Best person for the job

•Joint resource management system

- Joint procurement process

- Joint resource allocation

- Joint inventory management

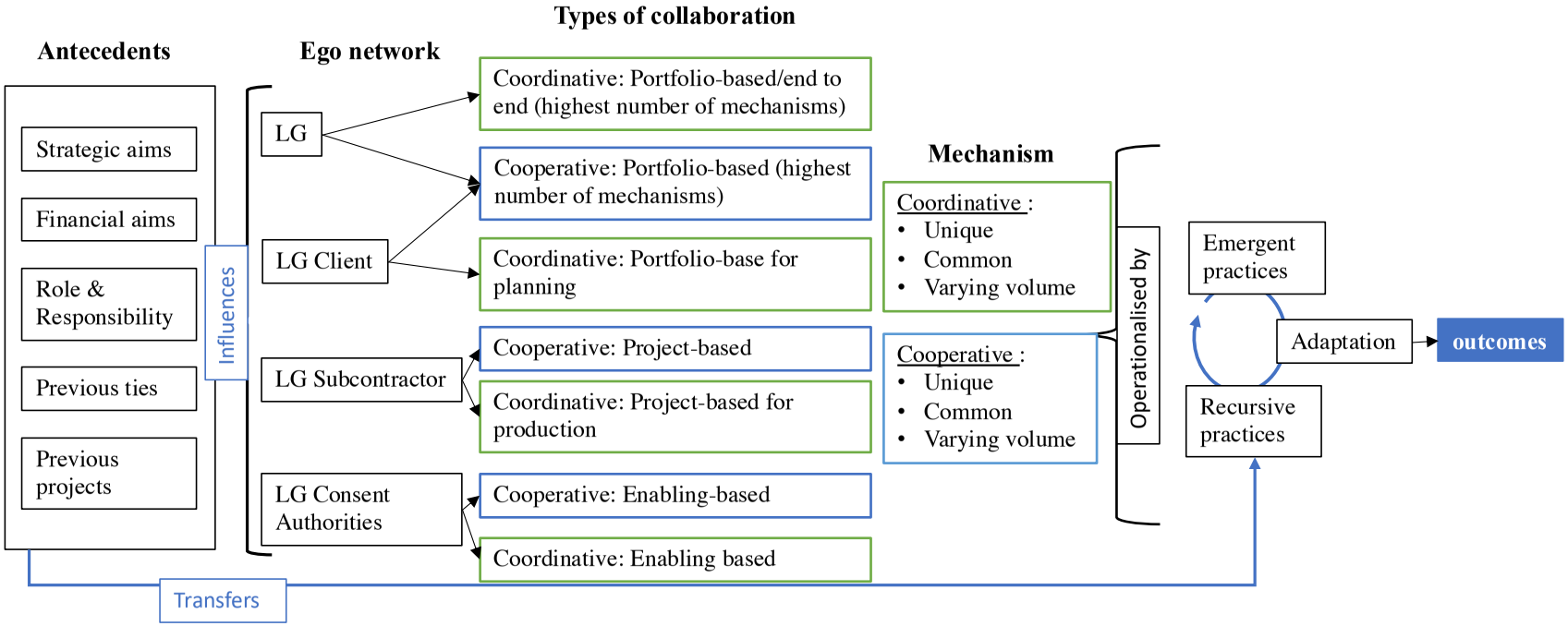
mitigates the risk of competing for resources

Optimisation of resource allocation, efficiency, cost saving

Mitigation of disruption, removal of duplicates

We avoid stupid expenses

**Second map: following retroductive analysis**


Types of collaboration
Antecedents
Ego network
Strategic aims
Financial aims
Role & Responsibility
Previous ties
Previous projects
Influences
LG
LG Client
LG Subcontractor
LG Consent Authorities
Coordinative: Portfolio-based/end to end (highest number of mechanisms)
Cooperative: Portfolio-based (highest number of mechanisms)
Coordinative: Portfolio-base for planning
Cooperative: Project-based
Coordinative: Project-based for production
Cooperative: Enabling-based
Coordinative: Enabling based
Mechanism
Coordinative :
• Unique
• Common
• Varying volume
Cooperative :
• Unique
• Common
• Varying volume
Operationalised by
Emergent practices
Adaptation
outcomes
Recursive practices
Transfers

## Appendix C: Additional evidence

Table C1: LG's Identified Risks

| | Internal Risks | Source |
|---|---|---|
| Strategic level risks | Lack of a cohesive collaborative objectives | CRMP 1, Area Director 2 |
| | Bidding risks | CRMP 3 |
| | Premature dissolution of the partnership | CRMP 3; ISO 44001 |
| | Insufficient allocation of resources | Project Director 1, R&OMP |
| | Bankruptcy risk | CRMP |
| Operational level risks | Mis-deployment of a cohesive collaborative environment | Collaborative Working System Manager; Project director 2, CRMP |
| | Operational conflicts due to culture and processes | Project Director 1, Commercial Manager 1, RMP |
| Team level risks | Team behaviour and team composition | Utilities lead 1; Lead engineer 1; Area Director 2, CRMP 3 |
| | **External Risks** | **Source** |
| Supply chain behavioural risks | Misalignment of behaviours between LG and Sub-contractors | Commercial manager, Project director 2; Utilities Lead 2, CRMP 3, R&OMP |
| | Commercial disputes and lack of flexibility | Commercial director, Commercial Manager, Senior Procurement manager |
| Supply chain processual risks | Quality management and reprocessing | CRMP 3; Lead Engineer, Area Director 3 |
| | Processual rigidity | Delivery Director 2, Lead Engineer |
| Consent Authorities risks | Conflicts due to the political environment<br>Delays in obtaining consents and/or interventions | Head of consents, Consents manager |
| | **Delivery Risks** | **Source** |
| Health & Safety risks | Accidents and injuries | Head of compliance, Head of Social Sustainability |
| | Construction code compliance violations | |
| Sustainability risks | Failures to achieve sustainable targets<br>Conflicts related to the implementation of sustainable innovations | Environmental manager 1 & 2 |

Table C2: practices in the ego-network

| Practice | LG | LG-Client | LG-SubC | LG-Cons |
|---|---|---|---|---|
| 50-50 board split | ✓ | | | |
| Annual performance review | ✓ | | | |
| Area advancement meetings | ✓ | ✓ | | |
| Behavioural assessment | ✓ | ✓ | | |
| Behavioural interviews | ✓ | | | |
| Behavioural procurement exec testing | | ✓ | ✓ | |
| Behavioural workshops | ✓ | | | |
| Behaviours steering group and SIG | ✓ | | | |
| Best for project HR allocation | ✓ | | | |
| Best for project procedure | ✓ | | | |
| Blended teams | ✓ | | ✓ | |
| Blind interviewing | ✓ | | | |
| Board meetings | ✓ | | | |
| Board renegotiation meetings | ✓ | | | |
| Business continuity procedure (transitions) | | ✓ | | |
| Capability assessments: operational DD | ✓ | | ✓ | |
| Collaboration meeting | ✓ | ✓ | ✓ | |
| Collaborative training | ✓ | ✓ | ✓ | |
| Collation of controls reports | ✓ | ✓ | | |
| Colocation | ✓ | ✓ | ✓ | |
| Commercial meetings | ✓ | ✓ | ✓ | |
| Community risk and opportunity workshops | ✓ | | | ✓ |
| Community steering groups | | | | ✓ |
| Conflict management procedure | ✓ | ✓ | ✓ | |
| Consents obtention procedure | | | | ✓ |
| Controls meeting | ✓ | | | |
| Cost cutting meetings | | | ✓ | |
| Cultural development meeting | ✓ | ✓ | | |
| Customer satisfaction returns (behavioural assessment section) | ✓ | | | |
| Decision making process | ✓ | | | |
| Early careers training scheme | | | ✓ | |
| ECI (planning meetings) | | | ✓ | |
| ECI reward sharing negotiation | | | ✓ | |
| Escalation process | ✓ | ✓ | | |
| Executive behavioural workshops Relationship staff surveys | ✓ | ✓ | ✓ | |
| External disengagement procedures | ✓ | | | |
| External relationship assessment | ✓ | ✓ | | |
| Feedback | ✓ | | | |
| Feedback | ✓ | ✓ | ✓ | ✓ |
| Financial target procedure | ✓ | ✓ | | |
| Fortnightly Board Meetings | ✓ | | | |
| Innovation diffusion procedure | ✓ | ✓ | ✓ | |
| Innovation Trial | ✓ | ✓ | ✓ | |
| integrated work package teams with subcontractors (some sectors) | | | ✓ | |

| | | | | |
|---|---|---|---|---|
| Internal disengagement procedures | ✓ | | | |
| Internal relationship assessment form | ✓ | | | |
| ISO 44001 disengagement process | ✓ | ✓ | | |
| IT chat platform | ✓ | | ✓ | |
| Joint due diligence meetings | ✓ | | | |
| Joint innovation sheets | ✓ | ✓ | | |
| Joint learning and development trainings | ✓ | | | |
| Joint management meetings | ✓ | ✓ | | |
| KPI (operational/sustainability) meetings | ✓ | | ✓ | |
| KPI management meetings | ✓ | ✓ | | |
| KPI meetings | ✓ | ✓ | | |
| Leadership change disengagement | ✓ | ✓ | | |
| Leadership transitions | ✓ | ✓ | | |
| Lessons learnt and review | ✓ | ✓ | | |
| Lunch & Learn | ✓ | | | |
| LWoW construction procedures | ✓ | | | |
| LWoW demolitions procedures | ✓ | | | |
| LWoW inventory management | ✓ | | | |
| LWoW meetings | ✓ | | | |
| LWoW planning procedure | ✓ | | | |
| LWoW procedures | ✓ | | | |
| LWoW procurement procedure | ✓ | | | |
| LWoW resource allocation | ✓ | | | |
| LWoW templates | ✓ | | | |
| LWoW utilities procedures | ✓ | | | |
| LWoW Workshop | ✓ | | | |
| Management Reviews | ✓ | ✓ | | |
| Merging of planning (systems) | | | | ✓ |
| Merging of work package on authorities platform | | | | ✓ |
| Monthly authorities meeting | ✓ | | | ✓ |
| Monthly management meetings | ✓ | ✓ | | |
| Newsletters | ✓ | ✓ | ✓ | |
| Onboarding procedure | ✓ | ✓ | ✓ | |
| Open book accounting | ✓ | ✓ | ✓ | |
| Planning meetings | ✓ | | ✓ | |
| Procedure mapping meeting | ✓ | | | |
| Procurement reports | ✓ | | | |
| Programme advancement meetings | ✓ | ✓ | | |
| Programme meeting | ✓ | ✓ | ✓ | |
| Programme presentation meetings | | | | ✓ |
| Progress meetings | ✓ | ✓ | ✓ | |
| Project advancement report meetings | ✓ | ✓ | | |
| Project Layout meetings (structure) | ✓ | ✓ | | |
| Project notice boards | ✓ | ✓ | ✓ | |
| Quality of Scrutiny | ✓ | ✓ | ✓ | |
| Quality of Scrutiny (sector and area) | ✓ | ✓ | | |
| Quality of Scrutiny (work package and tasks) | ✓ | | ✓ | |
| Quarterly relationship assessment procedure | ✓ | ✓ | | |

| | | | | |
|---|---|---|---|---|
| Quarterly uploads of planned works | | | | ✓ |
| Quorum for decision making | ✓ | | | |
| Recommendations | ✓ | | | |
| Relationship management plans | ✓ | ✓ | ✓ | |
| Relationship register | ✓ | ✓ | | |
| Renegotiation meetings | ✓ | ✓ | ✓ | |
| Reporting meetings | ✓ | ✓ | | |
| Reporting procedure | ✓ | | | |
| Risk & Opportunity Management Procedure | ✓ | | | |
| Risk Logs | ✓ | ✓ | | |
| Risk Management meeting | ✓ | ✓ | | |
| Risk report | ✓ | | | |
| Shared bid strategy | ✓ | | | |
| Shared job listing | ✓ | | | |
| Shared LWoW system (personnel onboarding) | ✓ | | | |
| Shared organograms | ✓ | ✓ | ✓ | |
| Shared planning procedures | ✓ | | | |
| Shared sign off | ✓ | | ✓ | |
| Shared system (LWoW) | ✓ | | | |
| Site briefing | ✓ | ✓ | ✓ | |
| Standardised ECI | ✓ | ✓ | | |
| Start of shift meeting | ✓ | | ✓ | |
| Success boards | ✓ | ✓ | ✓ | |
| Supplier behavioural assessments | ✓ | | | |
| Supply Chain Events | ✓ | ✓ | ✓ | |
| Sustainable innovation meetings | ✓ | | | |
| Team building events | ✓ | ✓ | ✓ | |
| Toolbox talks | ✓ | | ✓ | |
| Trainings records | ✓ | | | |
| Transitions assessments | ✓ | ✓ | | |
| Trial and testing procedure | ✓ | | ✓ | |
| Workshops | ✓ | ✓ | ✓ | |
| Yearly Client event | ✓ | ✓ | ✓ | |
| Your voice our success surveys | ✓ | ✓ | ✓ | |

| Practice | Origin of the practice |
|---|---|
| Fortnightly Board Meetings | Replicated governance (PD1) |
| Board renegotiation meetings | Replicated governance (PD1) |
| Colocation | Institutionalised |
| Blended teams | Replicated governance (PD1) |
| Annual performance review | Replicated from past LGs (CWSM) |
| Risk & Opportunity Management Procedure | Replicated governance (PD1) |
| Risk Logs | Institutionalised (ISO 44001) |
| Reporting meetings | Replicated governance (PD1) |
| Open book accounting | Institutionalised (ISO 44001) |
| Risk Management meeting | Replicated from past project (CM1) |
| Best for project procedure | Replicated from past Global project (CWSM) |
| Joint due diligence meetings | Replicated from past project (CWSM) |
| Supply Chain Events | Replicated from past project (PD1) |
| Risk Logs | Institutionalised (ISO 44001) |
| Procedure mapping meeting | Replicated from past LG (PD2) |
| Toolbox talks | Institutionalised (LE1) |
| Risk management meetings | Replicated from past LG (CM1) |
| Risk report | Institutionalised (ISO 44001) |
| Colocation | Institutionalised |
| Lessons learnt and review | Institutionalised (Construction Playbook) |
| Lessons learnt and review | Institutionalised (Construction Playbook) |
| Quarterly relationship assessment procedure | Replicated from past project (RMP) |
| Lunch & Learn | Replicated from past project (HC) / Institutionalised? |
| Behavioural workshops | Replicated from past project (HCL) |
| Joint learning and development trainings | Replicated from past project (HCL) |
| Feedback | Replicated from past project (OM; RMP) |
| Shared LWoW system (personnel onboarding) | Transferred from Local (multiple) |
| Colocation | Institutionalised |
| Blended teams | Replicated governance (PD1) |
| Team building events | Institutionalised |
| Early careers training scheme | Institutionalised |
| Collaboration meetings | Replicated from past project (CWSM) |
| integrated work package teams with subcontractors (some sectors) | Replicated governance (PD1) |
| Executive behavioural workshops Relationship staff surveys | Replicated from past project (HCL) |
| Your voice our success surveys | Replicated from past project (RMP) |
| Onboarding procedure | Transferred from the Client |
| Business continuity procedure (transitions) | Transferred from the Client/Institutionalised (ISO 44001) |
| Behaviours steering group and SIG | Institutionalised (ISO 44001) |
| Behavioural procurement | Replicated from past project (CWSM) |
| Relationship management plans | Institutionalised (ISO 44001) |
| ECI reward sharing negotiation | Replicated from past project (HC) |
| Renegotiation meetings | Replicated from past project (SPM; RMP) |
| LWoW procedures | Transferred from LOCAL |
| Joint management meetings | Replicated from past project (PD2) |
| Toolbox talks | Institutionalised |
| Success boards | Replicated from past project (UL2) |
| IT chat platform | Replicated from past project (LE) |
| Start of shift meeting | Replicated from past project (LE) |
| Feedback | Replicated from past project (CWSM) |

| | |
|---|---|
| Programme meeting | Replicated from past project (OM) |
| Project notice boards | Replicated from past project (UL2) |
| Newsletters | Replicated from past project (OM; RMP) |
| Quarterly reports | Replicated from past project (OM; RMP) |
| Toolbox talks | Institutionalised |
| Site briefing | Institutionalised |
| Yearly Client event | Institutionalised (Construction Playbook) |
| Supply chain events | Replicated from past project (PD2) |
| Programme presentation meetings | Replicated from past project & LG (HCL/OM/CM2) |
| Community steering groups | Replicated from past project (HC/CM/CWSM) |
| Open book accounting | Institutionalised (ISO 44001) |
| Collation of controls reports | Replicated from past project (CM) |
| Financial target procedure | Replicated from past project (CM) |
| Procurement reports | Replicated from past project (CM & PC) |
| Programme advancement reports controls reports (quality) | Replicated from past project (PD2) |
| Trainings records | Replicated from past project (RMP) |
| Customer satisfaction returns (behavioural assessment section) | Replicated from past project/LGs (RMP) |
| Supplier behavioural assessments | Replicated from past project/LG (RMP) |
| Programme meetings | Replicated from past project/LG (OM; LE;PD2;UL) |
| Joint innovation sheets | Replicated from past project (PD2) |
| Shared organograms | Institutionalised (ISO 44001) |
| Shared bid strategy | Replicated from past LG (CWSM & ROMP) |
| Collaboration meetings | Replicated from past project (CWSM) |
| Project advancement report meetings | Replicated from past project (PD2) |
| Project Layout meetings (structure) | Replicated from past LGs |
| KPI elicitation and adaptation procedure | Replicated from past projects |
| Shared planning procedures | Replicated from past LGs |
| LWoW planning procedure | Transferred from Local |
| Quality of Scrutiny | Transferred from Client |
| KPI (operational/sustainability) meetings | Replicated from past projects |
| Planning meetings | Replicated from past LGs |
| Onboarding procedure | Transferred from Client |
| Commercial meetings | Replicated from past projects |
| Conflict management procedure | Replicated from past projects |
| Management Reviews | Replicated from past LGs |
| Quality of Scrutiny (sector and area) | Transferred from Client |
| KPI management meetings | Replicated from past projects |
| Quality of Scrutiny (work package and tasks) | Transferred from Client |
| Collaboration meeting | Replicated from past projects |
| Blended Teams | Replicated from past LGs |
| Template diffusion | Transferred from Client |
| Shared sign off | Transferred from Client |
| Progress meetings | Replicated from past LGs |
| 50-50 board split | Replicated governance |

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| Quorum for decision making | Replicated governance |
| Internal relationship assessment form | Replicated from past LGs |
| Board meetings | Replicated governance |
| Monthly management meetings | Replicated governance |
| KPI meetings | Replicated from past LGs |
| Collaboration meeting | Replicated from past projects |
| External relationship assessment | Replicated governance |
| Relationship register | Institutional (ISO 44001) |
| Onboarding procedure | Transferred from Client |
| Standardised ECI | Replicated from past projects |
| Colocation | Institutional |
| Progress meetings | Replicated from past projects |
| Decision making process | Replicated from past LGs |
| Escalation process | Replicated governance |
| Shared system (LWoW) | Transferred from Local |
| LWoW construction procedures | Transferred from Local |
| LWoW utilities procedures | Transferred from Local |
| LWoW demolitions procedures | Transferred from Local |
| LWoW templates | Transferred from Local |
| Programme advancement meetings | Replicated from past projects |
| Area advancement meetings | Replicated from past LGs |
| Progress meetings | Replicated from past LGs |
| Colocation | Institutional |
| Workshops | Institutional |
| Progress meetings | Replicated from past LGs |
| Toolbox talks | Institutional |
| Capability assessments | Replicated from past LGs |
| Best for Project procedure | Replicated from past LGs |
| Trial and testing procedure | Replicated from past LGs |
| Blended teams | Replicated from past LGs |
| Innovation diffusion procedure | Transferred from Client |
| Supply chain events | Replicated from past LGs |
| Innovation Trial | Transferred from Client |
| Behavioural interviews | Replicated from past projects |
| Shared job listing | Replicated from past LGs |
| Blind interviewing | Replicated from past LGs |
| Best for project HR allocation | Replicated from past LGs |
| Recommendations | Replicated from past LGs |
| LWoW procurement procedure | Transferred from Local |
| LWoW resource allocation | Transferred from Local |
| Quantity surveyor verification | Replicated from past LGs |
| LWoW inventory management | Transferred from Local |
| Reporting meetings (KPI elicitation) | Replicated from past projects |
| Reporting meetings (advancement of the works) | Replicated from past projects |

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| Reporting templates | Institutional |
| Reporting procedure | Transferred from Client |
| Controls meeting | Replicated from past projects |