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How Design Thinking Can Improve Cross-subsidiary Collaboration

Insights from a project with a Swedish technical
installation service provider

Master's thesis in Quality and Operation Management

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Abstract

Collaboration is widely recognized as an important but challenging factor for companies in the construction industry, especially as the market increasingly expects more integrated solutions. To meet this demand while maintaining strong local customer relationships, it is common for multiple specialized technical installation companies to consolidate under one parent group. This setup requires cross-subsidiary collaboration, but such collaboration does not always happen in a clear or consistent way. Collaboration is often assumed to occur naturally among affiliated companies, overlooking the need for more formalised and standardized procedures. To address this issue, this thesis examines cross-subsidiary collaboration in a Swedish technical installation and service group, focusing specifically on one focal subsidiary and its collaboration with selected sister companies. Through a qualitative and experienced-based case study design the thesis aims to identify the main challenges that hamper cross-subsidiary collaboration and to explore how the use of Design Thinking methods can influence these challenges. Design Thinking is a structured, human-centred problem-solving methodology that has been widely applied to improve customer satisfaction and support multidisciplinary collaboration across various sectors.

The findings show that, while cross-subsidiary collaboration was expected at group level, it depended heavily on personal contacts, local priorities, and individual initiative. Personal relationships helped employees to start collaboration, especially when they knew each other or worked close to each other. However, this also made collaboration uneven, since opportunities could be missed when employees did not know who to contact. Collaboration also became more difficult in larger projects, where clearer roles, pricing, planning and follow-up were needed. Local financial responsibilities further limited collaboration as the extra coordination work did not create a clear benefit for the subsidiary taking on the work.

Furthermore, the results show that the use of Design Thinking method helped participants from different subsidiaries discuss shared problems in a more focused way. The methodology facilitated tasks based on the established common value, achieved a more structured discussion, clear role and responsibility sharing and a better view of potential next steps. Nevertheless, Design Thinking did not assist in addressing issues such as financial models, parent company decisions or long-term follow-up. As such, the thesis concludes that Design Thinking could enhance collaboration between subsidiaries when the possible solutions to the challenge could be executed within their authority.

Keywords: Cross-subsidiary Collaboration, Design Thinking, Collaboration Challenge, Technical Installation Collaboration, Multidisciplinary Collaboration, Design Thinking Application.

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1.0 Introduction

Collaboration is widely recognized as a critical factor for firms' long-term success in the construction industry, where projects typically require multidisciplinary cooperation among contractors and professional stakeholders (Redzuan et al., 2025). The industry is inherently project-based with contractors collaborating in temporary, loosely structured networks to address specific site requirements, often without shared goals for long-term integrated cooperation (Gunduz & Abdi, 2020). Due to the project-based nature of the industry, teams are frequently reconfigured for each project, increasing the risk of misaligned objectives, communication breakdowns, and conflicts over issues such as risk and responsibility sharing (Hosseini et al., 2018). These risks constrain firms' capacity to enhance customer satisfaction, as conflicts among contractors generate project inefficiencies, resulting in increased costs, inconsistent quality outcomes and deterred responsiveness (Gadde & Dubois, 2010; Gunduz & Abdi, 2020).

Strong collaborative relationships with formal contracts and routines among contractors can mitigate these challenges, improve productivity, and enhance firms' innovation capabilities and operational performance in responding to evolving customer demands (Redzuan et al., 2025; Gadde & Dubois, 2010). In the construction industry, increased customer satisfaction drives repeat business and referrals which often lead to increased market share and profits as repeated actions often enhance quality and cost efficiency (Uzaslan, 2009).

Technical installation and service constitutes a distinct sub-sector within the construction industry (Bygghöretagen, 2023) and plays a pivotal role in shaping overall customer satisfaction. Unlike many other contractors whose direct engagement with clients typically ends at project completion, technical installation firms often maintain long-term relationships with customers throughout the operational life cycle of a building (Perrier et al., 2020). Consequently, these firms must ensure the continuous provision of high-quality services throughout the building's operational life cycle. This requirement implies that professionals from diverse disciplines must collaborate closely within a long-term framework. Additionally, demand for comprehensive solutions within the technical installation sector has increased significantly. Customers increasingly expect integrated systems, such as surveillance cameras, alarm systems, lighting, and HVAC to be centrally controlled through unified platforms (Installatörsföretagen, 2022, p. 16).

In many countries, including Sweden, the market for technical installation and related services is characterized by specialized firms delivering both project-based assignments (e.g., installations in new-build and renovation projects) and maintenance in existing facilities (Eurostat, 2025). Most firms in this sector are structured as small and medium-sized enterprises (SMEs) (Bygghöretagen, 2022), often acting as subcontractors to major construction companies or as service providers to building owners. It is common for corporate group structures that

bring together multiple specialist firms, enabling broader and integrated solutions while maintaining strong local customer relationships (Tillväxtverket, 2023).

Maintaining a portfolio of specialized subsidiaries allows such groups to address the growing demand for integrated solutions (Karlsson, 2022). Delivering these solutions, however, requires effective collaboration among subsidiaries within the corporate group. In practice, achieving such cross-subsidiary collaboration remains challenging among the multidisciplinary subsidiaries. Studies have identified several barriers that hinder collaboration among multidisciplinary subsidiaries, including cultural differences, limited trust, ineffective communication and management practices, and different organizational structures (Brinkman et al., 2015). These challenges are further complicated by the so-called “sibling syndrome,” whereby employees and corporate management assume that collaboration will occur naturally among affiliated firms and therefore overlook the need for formalized contractual frameworks and standardized processes (Brinkman et al., 2015; Chambers, 2015). Among subsidiary employees, the use of formal contracts is often perceived as a signal of distrust, which is considered inappropriate within relationships framed as “siblings” within the same corporate group (Brinkman et al., 2015). As a result, collaboration between subsidiaries tends to rely heavily on informal and spontaneous interactions. While such practices may facilitate flexibility, they can also contribute to operational inconsistencies (Sandström & Ållenberg, 2016). Consequently, the question of how to effectively improve cross-subsidiary collaboration remains a clear need to be investigated.

A potential alternative approach for facilitating collaboration among multidisciplinary subsidiaries is Design Thinking (DT). DT is a structured, human-centred problem-solving methodology that integrates diverse perspectives to facilitate a qualitative understanding of complex problems (Brown, 2008). The methodology has been widely applied to improve customer satisfaction and support multidisciplinary collaboration across various sectors. Prior research showed that DT has been widely adopted as a methodology for strengthening collaboration in project-based environments by supporting communication, relational skills, and shared problem framing among multidisciplinary teams (Abich et al., 2024; Bene & McNeilly, 2020; Gao & Yu, 2023). Through structured practices and visual tools, DT provides teams with a systematic approach to collaboration that facilitates dialogue, knowledge exchange, and alignment across diverse professional backgrounds (Carlgren & BenMahmoud-Jouini, 2022; Madhuri, 2025). As a result, the seamless collaboration ensures problem-solving outcomes and improves customer satisfaction.

These qualities suggest that DT could be useful for addressing cross-subsidiary collaboration challenges, such as ineffective communication and inconsistent coordination. However, it remains unclear whether, and in what ways, DT can support such collaboration in practice. This issue is significant because weak coordination across subsidiaries may reduce the consistency of service delivery and constrain the organization’s capacity to provide integrated solutions, and eventually lead to negative impact on customer satisfaction. Moreover, the issue is especially critical among technical installation and service firms since they must ensure the

continuous provision of high-quality services throughout the building's operational life cycle, which can be hampered by poor cross-subsidiary collaboration.

1.1 Study aim & research questions

This study aims to investigate how Design Thinking methods can be used to address collaboration challenges between multidisciplinary subsidiaries, focusing specifically on SME subsidiaries of a technical installation and service firm in Sweden.

To fulfil the purpose of this study, the following questions will be answered:

1. What challenges are hampering cross-subsidiary collaboration among SME subsidiaries in a technical installation and service firm?
2. How can the use of Design Thinking methods influence how these cross-subsidiary challenges are addressed?

1.2 Scope

This study focuses on how subsidiaries collaborate within N Group, a Swedish technical installation and service firm. It is a single-case study in the Gothenburg region, examined mainly from the perspective of S company and its collaboration with selected sister companies. The organisational setting is SME subsidiaries, which is common in the Swedish building services sector (Byggföretagen, 2022).

Analytically, the study focuses on identifying current cross-subsidiary collaboration challenges and analysing the usefulness of DT methods in contributing to addressing these challenges in a workshop setting. It does not cover long-term implementation, physical prototyping, or follow-up evaluation of organisational change over time.

2.0 Theoretical Framework

This chapter presents the theoretical framework that forms the basis for the analysis, discussion and conclusion of the study. The framework is built upon literature on cross-subsidiary collaboration, organizational barriers and DT's application in collaboration. Together, these areas provide the theoretical foundation for understanding why collaboration across subsidiaries can be difficult, how such challenges may be explored through DT methods and how the study analyses both existing collaboration challenges and the potential of applying DT as a support for cross-subsidiary collaboration. The chapter is structured into three sections: cross-subsidiary collaboration, the use of DT to address these challenges, and the conceptual framework used to analyse challenges and the potential of DT in this study.

2.1 Cross-subsidiary Collaboration

Collaboration involving organisational units can take different forms. Williamson (1975) distinguishes between market-based exchange among independent actors and hierarchical coordination within formal organisations. Powell (1990) argues that some relationships cannot be understood only through this distinction, since network forms also depend on relational ties and repeated exchange. Intra-organisational collaboration is here understood as a coordination between units within the same formal organisation, where authority and mechanisms for integration can support the management of interdependent work (Lawrence & Lorsch, 1967; Williamson, 1975). Inter-organisational collaboration concerns legally autonomous organisations that coordinate around shared interdependencies, goals or problem domains (Schruijer, 2020). Gulati (1998) further shows that collaboration across organisational boundaries is shaped by the relational networks in which organisations are embedded.

Cross-subsidiary collaboration differs from both intra-organisational collaboration within a single organisation and inter-organisational collaboration between independent firms. Subsidiaries are formally connected through common ownership, but this does not mean that they share the same roles, knowledge bases or ways of working. Lawrence and Lorsch (1967) show that organisational units may become differentiated in their goals, time orientations, and practices, while integration is required to coordinate these differences. Ghoshal and Bartlett (1990) similarly describe large firms as networks of differentiated organisational units rather than as uniform hierarchies. Gupta and Govindarajan (1991) further show that subsidiaries may differ in their strategic roles and in the knowledge flows that connect them to the wider organisation.

Differences between subsidiaries may also concern how collaboration is understood. Kaplan (2008) shows that cognitive frames influence how managers interpret ambiguous organisational situations, which is relevant when subsidiaries hold different understandings of priorities, responsibilities, or opportunities for joint work. Based on this literature, cross-subsidiary collaboration is defined in this study as the process of coordination and knowledge sharing between subsidiaries that are formally connected through common ownership but may

remain differentiated in their operations, knowledge bases, and understanding of joint work. The following subsection develops the theoretical elements used to analyse the conditions and challenges shaping such collaboration.

2.1.1 Theoretical Elements for Analysing Cross-Subsidiary Collaboration

Building on the definition above, three main theoretical elements for analysing cross-subsidiary collaboration can be distinguished: coordination mechanisms and operational governance; incentives, local autonomy, and agency; and relational and cognitive conditions. These elements are not taken from one established model. Instead, each element is built from related bodies of literature that explain collaboration from a different angle. The first focuses on how interdependent work is coordinated and carried forward across organizational units. The second is the impact of local goals and autonomy on collaboration between formally connected subsidiaries. The third is the impact of relationships, trust and understanding on knowledge exchange between subsidiaries.

The first theoretical element, **coordination mechanisms and operational governance**, is built on literature that conceptualises collaboration as the organisation of interdependent work. Coordination can be conceptualised as the management of dependencies between activities, which provides a basis for exploring how work is connected and organised between subsidiaries (Malone & Crowston, 1994). Martinez and Jarillo (1989) show that coordination mechanisms in multinational organisations consist of structural arrangements and more informal mechanisms across organisational units. Similarly, Tsai (2002) explains that knowledge exchange in multiunit organisations is supported through both hierarchical structures and lateral relationships. Huxham and Vangen (2005) add a collaboration-process perspective by arguing that aims, membership, and working processes require active management. Drawing on these contributions, operational governance refers in this study to the arrangements through which cross-subsidiary work is carried forward in practice, including responsibilities, coordination routines, ownership, and follow-up. This element is therefore used to analyse whether collaboration is supported by stable arrangements or remains dependent on informal coordination.

The second theoretical element, **incentives, local autonomy, and agency**, is built from literature that understands collaboration in relation to goals, interests, and evaluation structures. Agency problems may emerge when actors have different objectives, access to information or evaluation systems (Eisenhardt, 1989), which is relevant for subsidiary collaboration as formal group membership does not automatically eliminate local priorities or profit responsibility. Subsidiary autonomy may also have different effects depending on the conditions in which subsidiaries operate (Geleilate et al., 2020). Tippmann et al. (2018) further show that subsidiaries may both cooperate and compete within the same corporation. This element is therefore used to analyse how local autonomy, financial incentives and subsidiary-level priorities may affect collaboration even within a shared corporate group.

The third theoretical element, **relational and cognitive conditions**, is drawn from social capital and knowledge-transfer literature, which conceptualizes collaboration as being contingent on relationships and shared meaning. Nahapiet and Ghoshal (1998) describe social capital by structural, relational and cognitive dimensions, such as ties between actors, trust, shared language and shared understanding. Using this perspective, Inkpen and Tsang (2005) examine how these dimensions influence knowledge transfer in networks, including intracorporate networks. Trust and shared vision have also been shown to influence knowledge transfer in subsidiaries' intra- and inter-organisational relationships (Li, 2005). This element is therefore used to analyse how personal relationships, trust, shared professional understanding, and awareness of other subsidiaries' capabilities may shape collaboration across subsidiary boundaries.

Together, these theoretical elements provide a basis for examining collaboration challenges in this study. The following section identifies the specific cross-subsidiary collaboration challenges discussed in previous research.

2.1.2 Collaboration Challenges Across Subsidiaries

Previous research has identified several difficulties in coordinating interdependent work across organisational units (Lawrence & Lorsch, 1967; Malone & Crowston, 1994). Building on the definition above, cross-subsidiary collaboration involves particular challenges because formally connected subsidiaries may still differ in roles, knowledge bases, local operations, and priorities (Ghoshal & Bartlett, 1990). The challenges reviewed in this section are therefore linked to the three theoretical elements described above: coordination mechanisms and operational governance; incentives, local autonomy, and agency; and relational and cognitive conditions. In this study, these challenges are understood as difficulties experienced by subsidiary actors when joint work requires coordination across unit and disciplinary boundaries. They also matter at group level because difficulties in cross-subsidiary collaboration may limit knowledge sharing and the coordination of specialised capabilities across the organisation (Tsai, 2002). Four overlapping challenge areas are reviewed below and their relationship to the literature strands is summarised in Figure 1.

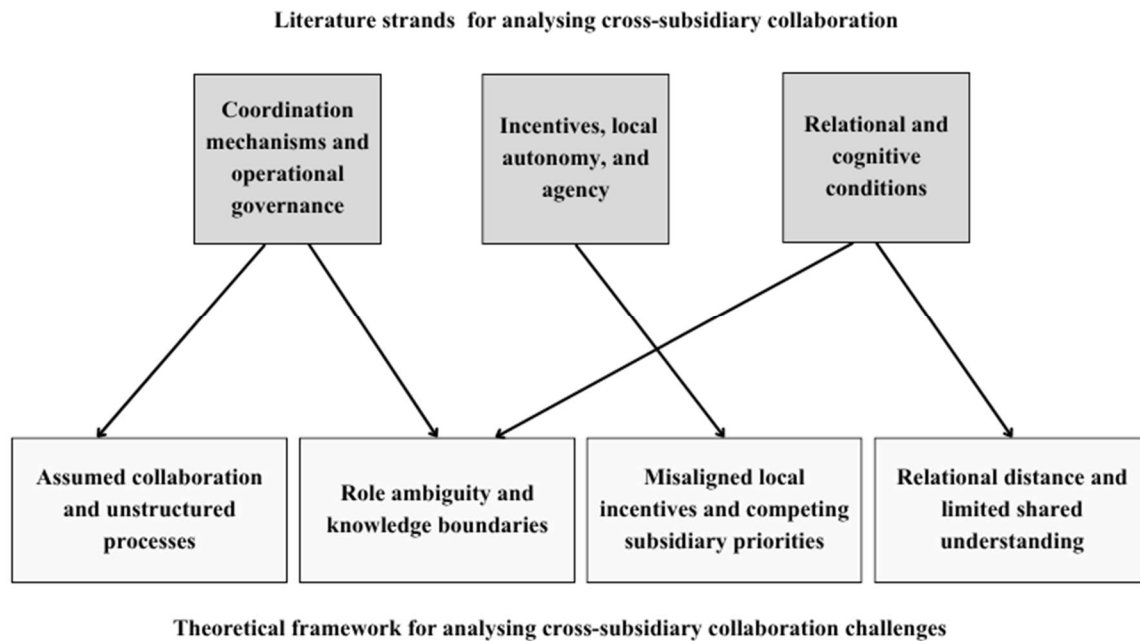


Figure 1 - Theoretical underpinnings for analysing cross-subsidiary collaboration challenges.¹

A first challenge concerns **assumed collaboration and unstructured processes**. Brinkman et al. (2015), studying collaboration between subsidiaries from different disciplines in the construction industry, show that trust, agreements, and clarity of organisational goals are important for collaboration. Their study is relevant here because it concerns subsidiaries that are connected through the same corporate group while operating within different disciplines. Common ownership may create an expectation that collaboration should occur, but it does not in itself specify how joint work should be organised. Huxham and Vangen (2005) similarly argue that collaboration requires aims, membership, identity, and working processes to be actively managed. For cross-subsidiary collaboration, the challenge therefore arises when subsidiaries are expected to work together, while agreements, responsibilities, and working processes for joint work remain unclear.

A second challenge concerns **role ambiguity and knowledge boundaries**. According to Birkinshaw et al. (2000), headquarters and subsidiaries may hold different perceptions of a subsidiary's role, and such perception gaps can affect cooperation. These difficulties may become stronger when organisational units work from different professional domains or attach different meanings and interests to the same issue. In such situations, communication requires not only information exchange, but also translation and, in some cases, transformation of knowledge (Carlile, 2004). For cross-subsidiary collaboration, this challenge concerns unclear expectations of roles and responsibilities, as well as difficulties in transferring knowledge across different technical areas.

¹ The arrows indicate which theoretical elements inform each challenge area. The challenge areas overlap and are not intended as a one-to-one classification.

A third challenge concerns **misaligned local incentives and competing subsidiary priorities**. Formally connected units may still act according to different goals, evaluation systems, and local priorities. Agency problems may arise if there are differences in goals, information access or evaluation systems (Eisenhardt, 1989). Subsidiary autonomy may also have different effects depending on the organisational conditions in which the subsidiary is embedded (Geleilate et al., 2020). In addition, subsidiaries may simultaneously cooperate and compete within the same corporation (Tippmann et al., 2018). In cross-subsidiary collaboration, this challenge arises when joint work is expected at group level but is not aligned with the priorities or perceived interests of the subsidiaries involved.

A fourth challenge concerns **relational distance and limited shared understanding**. Li (2005) shows that trust and shared vision influence knowledge transfer in subsidiaries' intra- and inter-organisational relationships. Knowledge transfer across organisational units is also connected to social capital conditions such as network ties, trust, shared language, and shared understanding (Nahapiet & Ghoshal, 1998). Vangen and Huxham (2003) further describe trust building as an important but difficult part of collaboration across organisational boundaries. In cross-subsidiary collaboration, this challenge concerns situations where weak relationships, limited shared understanding, or differences in professional language make it difficult for subsidiaries to recognise opportunities for collaboration or coordinate effectively.

Together, these four challenge areas provide a literature-based basis for interpreting collaboration challenges in the empirical material. The three theoretical elements developed above are used as complementary lenses for examining how these challenges interact in cross-subsidiary collaboration.

2.2 Design Thinking and Collaboration

DT has been applied across various industries to support collaboration in both inter- and intra-organizational settings. As earlier mentioned, cross-subsidiary collaboration is a hybrid form of both inter- and intra-organizational collaboration (Ouchi, 1980; Schruijer, 2020; Gulati, 1998; Tsai, 2002; Birkinshaw et al., 2000; Geleilate et al., 2020), and in the technical installation sector, subsidiaries often have distinct professions (Installatörsföretagen, 2022). Hence, prior research on the use of DT in multidisciplinary collaboration in various industries provides a useful basis for analysis.

2.2.1 Design Thinking's Origin and Development

Design Thinking is a problem-solving methodology for process development with focus on user needs, it could be used for product, process, service and strategy development (Brown, 2008). Its origin can be traced back to the mid-1950s, when design schools developed a specific approach for having a systematic working plan (Bowman, 1955; Matousek, 1957). From the mid- 1960's, the Human Potential Movement emerged, with the emphasis on responding to

users' physical, intellectual and emotional needs, which eventually developed to today's human-centred iterative problem-solving process (Auernhammer, 2025).

Over the last two decades, organisations and academy institutions adopted DT methodologies to solve wicked and complex problems, one of them is the challenge of multidisciplinary collaboration. Deng et al. (2026) demonstrate that it is getting more and more popular to integrate DT in the higher education sector to boost students' collective problem-solving capability. Schlott (2024) examined the application of DT methodology in six different industries globally in the past half century. The author argues that DT can significantly provide a positive impact on core teamwork dimensions, for example team interactions, team skills and values and emotions, and they are the keys to better and consistent team performance.

2.2.2 Design Thinking and Multidisciplinary Collaboration

DT has several mechanisms that can contribute to enhancing multidisciplinary teamwork in various industries in both inter- and intra-organizational context.

First, DT makes an undeniable contribution to **reinforce communication consistency** in multidisciplinary collaborations by fostering interactive communication, using non-verbal communication tools and reducing breakdown. In higher education, Abich et al. (2024) examined an 18-month DT project involving participants within software development backgrounds with varied academy- and professional levels. Their findings indicate that DT increases all participants' social skills and supports sustained communication. Half of the groups have achieved the highest communication score, meaning team members can maintain constant communication through stand-up meetings, create regularly and actively share progress and proposals. Even for the rest half of the teams that have not achieved the ultimate communication performance, they can at least regularly hold periodic meetings and ensure the necessary information exchange.

This is further supported by Gumienny et al. (2013) who has examined the implementation of DT as a new, creative way of working for project teamwork in globally distributed subsidiaries in the software industry. The study found that the use of visual tools like sticky notes can effectively encourage those quieter persons to express their thoughts by writing them down. Moreover, when facilitating an idea board, members can get feedback at once, making the conversation more interactive.

Second, DT has great ability to **build trust and deepen stakeholders' understanding** of one another, particularly in multidisciplinary settings. This is largely achieved by emphasising on being empathy, respecting differences and establishing shared decision-making. In the higher education industry, Guaman-Quintanilla et al. (2020) found that DT actively encourages participants to openly express opinions and share individual professional experiences, which is the fundamental element to trust-building and to increase understanding of different stakeholders. This can significantly mitigate misalignment among individuals from distinct

disciplines. By creating a safe environment for different voices, one way information becomes discussion, participants become more receptive to diverse viewpoints and as a result they are more willing to cooperate. Similarly, Santos Ordóñez et al. (2017) indicated that DT helps individuals recognize and respect the value of diverse perspectives, which can help them understand their own roles within a team. This deep understanding of each other builds up a solid trust and promotes a strong sense of shared responsibility.

Similarly, findings could be found in inter-organizational collaboration studies as well. In the healthcare sector, Jarrett et al. (2022) and Voorheis et al. (2020) both highlight that the co-creation phase of the DT process particularly helps to bridge responsibility gaps between disciplines. Here, transparency is the key, the authors mean that when generating and testing the solutions, the prioritization and decision making are made together by different stakeholders, everyone shares the ownership and commitment to the selected solution, which helps to build a strong relationship among them.

Third, existing studies have been clearly proven that DT can successfully **resolve conflict and reduce misalignment** across diverse disciplines by surfacing differences and focusing on committed shared tasks. In the consulting sector, Magistretti et al., (2021) demonstrate that DT can effectively reduce conflicts that often arise due to the uncertainty in technology and divergent perspectives between different stakeholders. Because DT welcomes diverse perspectives, it encourages participants to bring contrasting proposals to the surface instead of ignoring them. The shared decision-making principle of DT can help stakeholders to create a neutral filter from the focus group's perspective, namely the users', to select the "right" ideas without creating tensions among stakeholders who may have proposed opposite ones.

This is further strengthened by Langen et al. (2023) who examine DT's capability to support sustainable collaboration between organizations in the logistics sector. Their findings show that DT can make different actors more willing to share risks and align their daily activities more effectively. The authors explain that when different actors agree on a co-defined shared business value, they create a common goal, which helps them reach reconciliation. Moreover, the DT process is not linear but iterative, meaning that ambiguity is not taboo, but rather an acceptable topic to bring to the discussion table, which helps to reach a mutual agreement where the risk is acceptable for all actors.

Similar outcomes are observed in the health care sector where collaboration needs to cross organization borders. Jarrett et al. (2022) demonstrate that DT's pre phase, namely "groundwork", which is before the diagnosis, focuses on ensuring high level engagement in the beginning of the project from different actors. The purpose is to establish shared vision, secure strong commitments and establish common ground for respectful information exchange. With respect as the bottom-line, stakeholders can discuss issues openly, which results in reducing misunderstanding and helping to achieve mutual goals.

Fourth, DT can significantly **increase both the awareness of and the desire for collaboration** among individuals and cross organization. Alexandrakis (2021) and Abich et al. (2024) pointed

out that at the individual level, participating in DT activities actively increases a person's desire to seek working with others. The study shows that nearly half of the participants in the DT project reported wanting to collaborate more frequently with other stakeholders to solve problems. Because being involved in a project from the beginning generates high motivation to follow it to the end. The high motivation for collaboration largely contributes to foster alignment of interests among different team members. At the organizational level, Liedtka and Locatelli (2023) explain that DT principles forces construction project leaders to recognize the critical need to collaborate with external stakeholders so that they could understand their concerns and needs, which is vital to execute the project smoothly and successfully.

2.2.3 Design Thinking's Ability to Support Structured Collaboration

DT provides a structured framework by dividing the problem-solving process into several phases, where each phase has its own goals and actions (Brown, 2008).

First of all, DT's foundation is built upon diverse minds, meaning the first step of conducting a DT project or framework is to bring together individuals from diverse professional backgrounds. This action itself already **signals a formalized cross-functional approach**, announcing the expectation of an alliance. This not only strengthens trust and commitment but also ensures that all participants operate with a common understanding of goals, challenges, and progress (De Paula et al., 2018).

Second, DT **transforms the abstract concept of collaboration into a structured, actionable process**, by breaking down the collaboration process into a structured, step - by-step framework that is easy to follow by everyone. In the academy sector, many studies confirmed that by following clearly defined phases, teams can easily track progress, set deadlines, and conduct regular check-ins to ensure everyone is on track regardless of their prior experience of project management. The clear structure leading to more consistent and organized collaboration (Santos Ordóñez et al., 2017; Guaman-Quintanilla et al., 2023; Abich et al., 2024).

When it comes to inter-organizational collaboration, DT's structured framework is often considered very helpful. In the urban design sector, Alexandrakis (2021) indicates that the clear DT structure facilitated faster communication among diverse stakeholders thanks to the strictly defined goals in each phase. Similarly outcomes are found in the logistic industry as well. Langen et al. (2023) show that by breaking down the problem-solving process into several specific steps, stakeholders were able to systematically manage the information exchange and learn how to self - organize their actions in order to meet the greed - upon goals. The clear structure makes participants feel more confident about how to initiate and engage in collaboration with other companies.

Third, DT helps diverse stakeholders **clearly define roles and responsibilities** in complex project teamwork. In the healthcare and manufacturing industries, Lund (2014) explains that by having a clear goal for each phase, different stakeholders can better understand their roles and responsibilities within that phase, reducing cultural and goal misalignments that often occur in cross-organizational collaborations. In the logistics industry, at the beginning of the

DT workshop, participants focused on co-creating an agreement regarding who does what, when, and how. Later, during the transition phases in which ideas are transformed into possible solutions, participants were all involved in creating action plans, where specific resources, manpower, timelines, and actions were outlined. This allowed stakeholders to quickly align responsibility sharing by identifying the specific person or organization responsible for each task (Langen et al., 2023).

In summary, DT provides a structured framework for collaborative problem-solving. By following the clearly defined phases of DT, participants are able to transform abstract and complex problems into concrete and actionable activities by concentrating on one specific objective at a time. This approach not only helps teams avoid overlooking important checkpoints, but also ensures that all participants remain aligned and aware of their respective roles throughout the problem-solving process. The overall DT mechanisms that contribute to more structured collaboration within and across organizational boundaries are presented in Table 1.

While DT has been shown to enhance multidisciplinary collaboration in both inter- and intra-organizational environments, it is usually used in contexts with flat organizational structures and relies on dedicated involvement from top managers (Lund, 2014; Langen et al., 2023). This context is not always possible in collaborations among or between subsidiaries, where parent groups may not have the authority or resources to organize local operations and collaborations. The only article found examining the effect of applying DT to subsidiary collaboration focused on collaboration between a parent company and its subsidiaries, rather than between the subsidiaries themselves (Gumienny et al., 2013). Whether the application of DT can achieve the same outcome in enhancing collaboration between subsidiaries remains unclear.

Table 1 shows an overview of literature study of the application of DT methodology in practice in both inter- and intra-organizational contexts in various industries.

Table 1 - Overview of DT collaboration mechanisms in previous research.

Author & year	Industry	Collaboration Type	DT Mechanism for enhancing multidisciplinary collaboration	DT Mechanism for supporting structured collaboration
Abich et al. (2024)	Higher education	Intra-organizational	-support communication sustainability. -Increase the awareness of and the desire for collaboration.	-Make collaboration be more structured due to clear defined DT framework.
Alexandrakis (2021)	Logistic	Inter- organizational	-Increase the awareness of and the desire for collaboration.	-Different goals setting in each phase make collaboration more actionable.
Guaman-Quintanilla et al. (2020)	Higher education	Intra-organizational	-Build trust and increase understanding among stakeholders.	-Make collaboration be more structured due to clear defined DT framework.
Gumienny et al. (2013)	Information Technology	HQ & subsidiaries	-Support communication in various ways including using non-verbal DT tools. -support communication sustainability.	
Jarrett et al. (2022)	Healthcare	Inter- organizational	-Build strong relationships. -Reduce conflicts and misalignment.	
Langen et al. (2023)	Logistic	Inter- organizational	-Reduce conflicts and misalignment.	-Different goals setting in each phase make collaboration more actionable. -Quickly align responsibility sharing.
Liedtka and Locatelli (2023)	Construction	Inter- organizational	-Increase the awareness of and the desire for collaboration.	

Table 1 - continued from previous page

Author & year	Industry	Collaboration Type	DT Mechanism for enhancing multidisciplinary collaboration	DT Mechanism for supporting structured collaboration
Lund (2014)	Manufacturing, IT & Healthcare	Intra-organizational		-Clarify role and responsibility sharing.J20
Magistretti et al. (2021)	Consulting	Inter- organizational	-Reduce conflicts and misalignment.	
Paular et al. (2018)	NPD in General	Intra-organizational	-Reduce handover misunderstandings.	-Enhance the acknowledge of a formalized collaboration
Santos Ordóñez et al. (2017)	Higher education & NGOs	Inter- organizational	-Respect diversity and build trust. -Reduce misunderstanding.	-Make collaboration be more structured due to clear defined DT framwork.
Voorheis et al. (2020)	Healthcare	Both inter- & intra-	-Build strong relationships.	

2.3 Conceptual Framework

Collaboration challenges in multi-subsidary groups have a unique condition, where shared ownership does not automatically create alignment across units. Here, the literature points to assumed closeness, subsidiary autonomy, weak governance, and differences in local routines and expectations as additional barriers to collaboration (Ghoshal & Bartlett, 1990; Brinkman et al., 2015; Geleilate et al., 2020). At the same time recent literature examining the application of Design Thinking within multidisciplinary environments demonstrates that this methodology reinforces sustainable communication, increases trust and understanding, clarify roles and responsibilities, resolve conflict and significantly increase collaboration formalization and structure (Abich et al., 2024; Gumieny et al., 2013; Guaman-Quintanilla et al., 2020; Santos Ordóñez et al., 2017; Jarrett et al., 2022; Voorheis et al., 2022; Liedtka & Locatelli, 2023; Magistretti et al., 2021; Van Langen et al., 2023). Consequently, these mechanisms likely have great potential to mitigate the aforementioned cross-subsidiary collaboration challenges.

Based on the above-mentioned theory, a conceptual framework of potential ways in which DT methodology could mitigate cross-subsidiary collaboration is created as shown in Figure 2. The left side of the figure illustrates the collaboration challenges identified according to the literature within the research industry, categorized according to the three theoretical elements introduced in Section 2.1.2, where the blue blockers are linked to the coordination and operational governance element, the purple one is the incentives, local autonomy, and agency element and the yellow block is linked to the relational and cognitive conditions element. The right side of the figure presents the DT mechanisms identified in prior research, where the green elements are associated with multidisciplinary collaboration and the red elements are related to structured collaboration. The blue dotted arrows indicate the potential relationships between the identified collaboration challenges and the corresponding DT mechanisms.

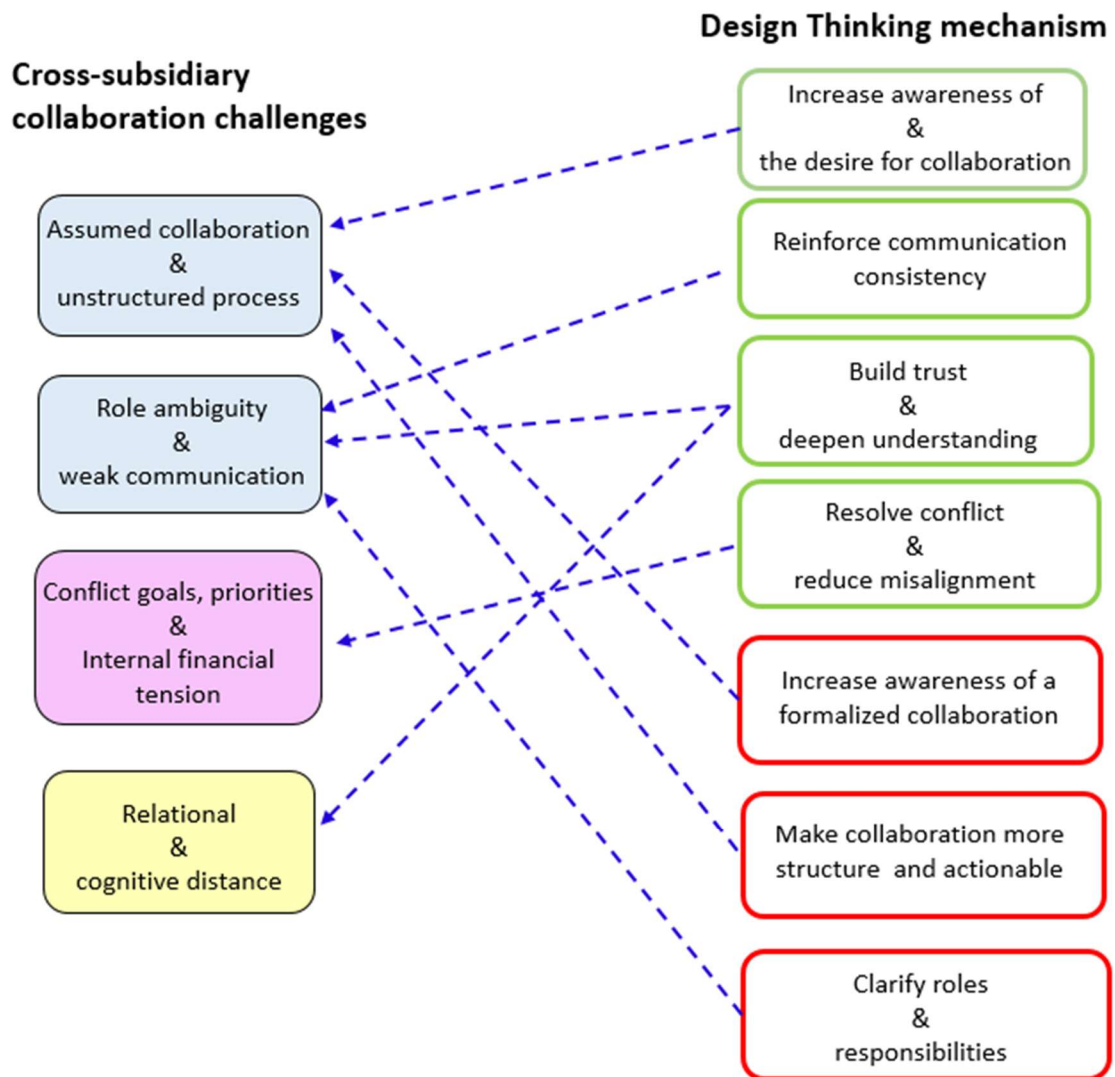


Figure 2 - Conceptual framework of how DT mechanism could potentially mitigate cross-subsidiary collaboration challenges.

However, the fit between DT and cross-subsidiary collaboration should not be treated as automatic. According to Brown (2008), DT builds on human-centred and participatory work, and much of the literature discussed above focuses on settings where participants can work directly around a shared problem. In cross-subsidiary collaboration, the situation may be more complex because collaboration is also shaped by local routines, subsidiary autonomy, decision-making power, and follow-up across units. These conditions may affect how far DT mechanisms can influence the identified collaboration challenges and its connection to the type of challenges.

3.0 Methodology

This chapter presents the methodology used in the thesis. First, the research strategy is explained, followed by the case selection and research context. Second, the sampling, data collection, and data analysis are described, including the interviews, DT workshop, and secondary data. Finally, the chapter reflects on the strengths and limitations of the chosen methods, research quality, ethical considerations, and the transparent use of LLM tools.

3.1 Research Strategy

The research was conducted as an exploratory qualitative single-case study in order to explore collaboration between subsidiaries. The study was exploratory in nature, since the aim was to learn how collaboration works in practice, what causes challenges and how challenges are experienced by people engaged in cross-subsidiary work. As Saunders et al. (2023) state, exploratory studies are appropriate when the aim is to gain insight into a problem and to find patterns that can lead to further understanding.

A qualitative approach was suitable because the study focused on participants' experiences, interpretations, and descriptions of cross-subsidiary collaboration. This is useful for understanding how people interpret their social world, which fits the purpose of this study (Bell et al., 2019).

The study was also designed as a single-case study since the collaboration challenges were examined within one organizational setting. Yin (2018) argues that case studies are suitable when a phenomenon is studied in its real-life context, especially when the boundaries between the phenomenon and the context are not clearly separated. This is relevant here because collaboration between subsidiaries cannot be understood apart from the group structure, local autonomy, daily routines, and project- and service-oriented work.

The study included an experience-based DT workshop with case participants. The workshop was used as an interactive data-generation activity to refine the conceptual framework, not as an implementation project or action research cycle. As a human-centred and iterative approach to framing and solving problems (Brown, 2008), DT offers a useful lens for the study since the research aims to investigate how such methods can contribute to addressing cross-subsidiary collaboration challenges. The workshop was evaluated through three lenses: whether it helped surface or clarify collaboration challenges, whether it supported shared understanding among participants, and how participants reflected on the usefulness of the DT activities as the closure of the workshop.

3.1 Case Selection and Context

This study was carried out within Company N, a Swedish technical service group with several specialised subsidiaries based around the city of Gothenburg. Company S was chosen as the focal subsidiary within the case. Company S operates within electrical installation and automation and combines project-based delivery with service-oriented activities. The case was relevant because cross-subsidiary collaboration was connected to Company S's ability to work with broader customer needs, while collaboration with sister subsidiaries appeared to remain mostly informal and inconsistent.

Company N is organised around specialised technical disciplines rather than only by geographical location. Its subsidiaries cover areas such as electrical services, technical services, heating, ventilation, and sanitation. Economic responsibility is divided by discipline and organizational area. This means that subsidiaries operating in the same city, or even in close physical proximity, may still belong to different economic structures.

In line with the exploratory nature of the study, the case focus emerged during the early project work. The initial focus was more business-oriented, but it became clear that several constraints were internal rather than only market-related. In particular, limited and mostly informal collaboration between Company S and other subsidiaries appeared to affect the ability to coordinate broader service offerings. This shifted the study toward understanding why cross-subsidiary collaboration remains inconsistent and what could support it in practice.

The construction and building-services industry also provides an important context for this case. Work is often organised around temporary projects and short delivery cycles, where several specialist firms need to coordinate around the same customer or site. Collaboration is therefore important, but consistent collaboration processes can be difficult to sustain in daily operations (Bresnen & Marshall, 2000; Rahman et al., 2014). Hobday (2000) describes project-based organizations as suitable for complex and customer-specific work but also points to weaknesses in routine coordination and organization-wide learning. In construction, Dainty et al. (2006) argue that project work is often characterized by the temporary coming together of unfamiliar groups. This may serve to make communication and coordination more difficult.

Project-based work also creates challenges for learning and continuity. According to Bakker et al. (2011), knowledge can be created within temporary projects but remains difficult to transfer to future projects or the wider organization. This is relevant because cross-subsidiary collaboration does not only depend on solving one project. It also depends on whether knowledge, routines, and relationships can be carried forward into future work. Service-oriented work adds another time horizon. Wikström et al. (2009) show that project-based firms may include services in their business models, but that

this creates different business logics depending on project complexity and service maturity. Operation and maintenance are also described as a long phase in the construction project life cycle (Perrier et al., 2020).

In Sweden, this context is shaped by additional conditions. The industry is dominated by small and medium-sized enterprises and cooperation often takes place through personal networks and local modes of work (Byggföretagen, 2023). Public procurement is another condition in that framework agreements are often used to determine the conditions for later call-offs. This can affect the way in which services are packaged and coordinated over time (Upphandlingsmyndigheten, n.d.).

These sector conditions provide the background for the case, but the study itself is limited to one corporate group and one focal subsidiary. The findings are therefore not intended to represent the full construction or building-services sector. Instead, they are most applicable to similar multi-subsiary technical service groups where specialised subsidiaries are expected to collaborate while still working with separate routines, responsibilities, and priorities. The focus on the Gothenburg context also reduces geographic variation, but makes it possible to focus more closely on organizational and human barriers rather than distance-related constraints.

3.3 Sampling Strategy

Participants were selected by purposive sampling as they had relevant experience for the study. Saunders et al. (2023) explain that this type of sampling is appropriate when participants are selected because they can offer insight into the phenomenon being studied. In this study, the focus was on participants who had experience of Company S's collaboration with sister subsidiaries, either through successful collaboration, difficult collaboration, or roles connected to coordination between subsidiaries.

3.3.1 Interview Sampling

Eight semi-structured interviews were conducted. The interviewees represented different organizational levels, ranging from top managers to front-line workers, including one apprentice. This variation was used to capture different perspectives on how collaboration works in practice, how decisions are made, and where challenges appear in daily work.

Participants were selected based on their connection to cross-subsidiary collaboration. This included people with experience of working across subsidiary boundaries, handling customer requests involving several technical areas, or managing work that required coordination with other subsidiaries. Both successful and difficult collaboration experiences were considered relevant, since the study aimed to understand not only challenges, but also what enables collaboration in practice.

No corporate-level representatives were interviewed. This limits the study's ability to capture the parent company's perspective directly. However, the selected interviewees provided insight into how collaboration was experienced and handled at operational and managerial levels within and around the focal subsidiary.

3.3.2 Workshop Participant Selection

The DT workshop included four participants from two different subsidiaries of N group located in the same office. The participants held roles connected to customer contact, project coordination, and cross-subsidiary collaboration. These participants were selected because they had relevant experience of cross-subsidiary collaboration and were connected to the collaboration challenges identified in the interviews. The purpose was not to create a statistically representative sample, but to bring together participants who could discuss the identified challenges and work with them through DT methods.

The workshop sample was smaller than the interview sample because the aim was to support interaction, discussion, and joint idea development. According to Ørngreen and Levinsen (2017), workshop groups are kept small to give participants the opportunity to be heard and to take an active role in the activities. In this study, the smaller group allowed participants to share experiences, discuss the identified collaboration challenges, and develop possible solution concepts together.

3.4 Data Collection

Data was collected through semi-structured interviews, one DT workshop, and secondary data. The interviews were used to understand how participants experienced cross-subsidiary collaboration in daily work. The DT workshop was used to examine the applicability of DT methods in relation to the identified cross-subsidiary collaboration challenges. Secondary data was used to understand the formal organizational context.

3.4.1 Semi-Structured Interviews

Among the eight semi-structured interviews that were conducted, five interviews were held online and three were held on-site. Each interview lasted approximately one hour. All interviews were recorded with participant consent and fully transcribed before analysis.

The interviews followed an interview guide, but flexible follow-up questions were used when participants raised relevant examples or new issues. This made it possible to ask comparable questions across interviews while still allowing participants to explain their own experiences in more detail. Kvale and Brinkmann (2015) describe semi-structured interviews as suitable when the researcher wants to explore participants' experiences while keeping the interview focused on the research topic.

The interview guide was designed to capture how cross-subsidiary collaboration works in practice. The questions were therefore structured around four main areas. First, participants were asked about their role and daily work to understand their position in relation to cross-subsidiary collaboration. Second, they were asked about examples of successful and unsuccessful collaboration to identify both challenges and enabling conditions. Third, the questions were related to practical aspects of collaboration, such as contact persons, handovers, responsibilities, communication and follow-up. Finally, participants were asked about possible improvements and what would need to change for collaboration to happen earlier or more often.

The questions were selected to connect directly to the research questions while still allowing participants to describe concrete situations in their own words. The full interview guide is included in Appendix 1.

3.4.2 Design Thinking Workshop as Interactive Data Generation

The DT workshop was facilitated by the researchers and was based on the main collaboration challenges identified in the interview phase. It followed an adapted DT process with a Double Diamond logic, where the first part focused on exploring and narrowing the problem, and the second part focused on developing and narrowing possible solutions. The purpose of the workshop was to let participants experience DT methods by working with the identified challenges through structured DT activities, rather than to test a finished solution or implement changes in practice.

Before the workshop, participants received a one-page introduction explaining DT and the structure of the session. The workshop started with a short warm-up and introduction. The main collaboration challenges from the interviews were then presented on the whiteboard as separate stickers and used as the starting point for the workshop activities.

The first phase was problem framing. Participants first categorized the challenges by moving the stickers on the whiteboard without verbal discussion. They then rated the challenges individually based on criticality. They then discussed the ratings and selected one challenge to work on further. The objective of this phase was to achieve a common understanding of the problem and to narrow the focus from a number of broad challenges to one central challenge.

The second phase was brainstorming. After the individual brainstorm, participants were asked to share their ideas with the group. They were asked to describe how the ideas could work in practice and what resources might be needed. The purpose was to bring in different perspectives and generate possible ways to address the selected challenge.

The third phase was solution selection. Participants discussed the proposed ideas and assessed them against practical criteria such as feasibility, available resources,

implementation time, and potential value for more than one subsidiary. Ideas that were difficult to test on a small scale or did not offer wider value were deprioritized. This phase led to the selection of one solution concept to develop further.

The fourth phase was prototyping. Participants developed an initial prototype for the selected solution. The prototype was not finished or tested during the workshop. However, participants agreed on what information it should include, who could be involved, and what would be needed to continue developing it after the session.

The final phase was reflection. Since the study did not include implementation or testing over time, the testing phase was replaced by a reflection activity and a short post-workshop reflection survey. The survey used a five-point Likert scale and asked participants to reflect on the workshop process, the usefulness of the DT activities, and their willingness to use similar methods again. The survey is included in Appendix 2.

The workshop generated interaction data, workshop artefacts, solution concepts, and participant reflections. Data was collected through researcher notes, workshop observations, post-it groupings, prioritization outputs, prototype material, and the post-workshop reflection survey. The workshop outputs were photographed and archived after the session.

3.4.3 Secondary Data

Secondary data was collected to understand the formal context around Company N and Company S. This included website material, service brochures, organizational charts, public company information, and annual report material. The sources were used to understand the group structure, service offering, and economic structure of the case. The secondary data was not used as the main source of findings. Instead, it provided contextual material for understanding how the organization and its services were formally presented. It also helped compare the formal organizational setup with how collaboration was described by participants in the interviews and workshop.

3.5 Data Analysis

The main material used in the analysis consisted of interview transcripts, workshop notes, workshop artefacts, and the post-workshop reflection survey. The analysis was conducted in two parts: thematic analysis of the interview data and workshop material that was analysed through the activities, artefacts, and reflection survey produced during the session. Secondary data was reviewed separately to understand the formal case context and was used as contextual support in the findings.

3.5.1 Thematic Analysis of Interview Data

The interview analysis was based on the full interview transcripts. Since qualitative coding involves interpretation, both authors coded the material and discussed the coding to reach a shared understanding of the main patterns in the data. The coding process was iterative, meaning that the codes were refined as the authors moved between the transcripts, the coding structure, and the emerging themes.

The coding process was inspired by Gioia et al. (2013), as the analysis moved from first-order codes close to participants' wording toward broader interview themes. First-order codes captured concrete statements and recurring issues in the interviews, such as informal contact, unclear ownership, separate financial logic, and limited knowledge of other subsidiaries' capabilities. These codes were then grouped into three main themes as presented in section 4.1.

The interview findings were mainly structured around RQ1 and therefore organised around collaboration challenges identified in the interview data. At the same time, the analysis compared examples where collaboration worked well with examples where collaboration was described as difficult or inconsistent. These contrasting examples were used to clarify when collaboration challenges appeared more strongly and when they were less visible.

Coding frequencies were used as descriptive support to show how often certain themes appeared in the material. They were not used as statistical measures of importance.

3.5.2 Analysis of Workshop Outcomes and Artefacts

The content of the DT workshop was analysed in relation to RQ2. The analysis used researcher notes, workshop observations, post-it material, prioritization results, prototype material, and responses from the post-workshop reflection survey.

The collaboration challenges identified from the interviews were used as input for the workshop. They served two purposes. First, they guided participants through the DT activities and allowed them to work with real collaboration challenges identified in the case. Second, they provided a basis for examining how DT mechanisms influenced the way participants discussed, clarified, and worked with different types of collaboration challenges during the workshop.

The analysis focused on the relationship between three elements: the collaboration challenges identified in the interviews, the DT mechanisms observed during the workshop, and the outcomes produced in the workshop material. For each challenge, the authors examined whether the DT activities helped participants surface, clarify, mitigate, or work further with the challenge. This structure follows the purpose of the second research question and is presented in the findings through the categories of collaboration challenge, DT mechanism, and workshop outcome.

The workshop outcomes were classified into three levels: substantially influenced, moderately influenced, and marginally influenced. A challenge was classified as substantially influenced when it clearly emerged during the workshop and DT mechanisms made a strong contribution to clarifying or mitigating it within the workshop setting. A challenge was classified as moderately influenced when DT mechanisms helped participants surface and discuss the challenge, but the challenge remained partly dependent on existing relationships, practical implementation decisions, or future action outside the workshop. A challenge was classified as marginally influenced when it was only briefly surfaced or acknowledged, and when DT mechanisms made limited contribution to mitigating it during the workshop.

The post-workshop reflection survey was used as complementary material to understand participants' perceptions of the DT process and its usefulness for discussing collaboration challenges. It was not used as evidence that any challenge had been resolved in organisational practice, but rather focused on how participants experienced and worked with these challenges during the workshop.

In this analysis, the terms substantially influenced, moderately influenced, and marginally influenced refer only to patterns that surfaced during the workshop. The analysis therefore examines how DT influenced participants' handling of identified collaboration challenges within the workshop setting, not whether collaboration improved after the session. As such, it serves as an initial indicator of the usefulness of DT methods to address cross-subsidiary collaboration challenges.

3.6 Method Discussion

The methodological choices made in the study involve both strengths and limitations in relation to the research design, research quality, ethical considerations, and the use of LLM tools, which need to be discussed.

3.6.1 Methodological Strengths and Limitations

A strength of the chosen methodology is that it fits the type of problem studied. Cross-subsidiary collaboration is informal, context-dependent, and shaped by daily routines, relationships, and local priorities. A qualitative single-case study was therefore suitable because it allowed the study to examine collaboration in its real organizational setting.

The study also benefited from using several data sources. Interviews gave the in-depth view of how collaboration was experienced in practice, while the DT workshop demonstrated how collaboration challenges were discussed and worked through by participants. Secondary data helped describe the formal case context. This supported triangulation across interviews, workshop material, and formal organizational information. Another strength was the access to participants at different organizational levels, from top managers to front-line workers. All interviews were fully transcribed,

and both authors were involved in coding the material. This reduced the risk that the findings were shaped by only one researcher's interpretation.

At the same time, the study has limitations. It is based on one corporate group and one focal subsidiary, which limits transferability. The findings are therefore not intended to represent all technical installation and service firms, but are mainly applicable to similar multi-subsidiary service groups. No corporate-level representatives were interviewed, which limits the study's ability to capture the parent company's perspective directly. The sampling also has limitations. Purposive sampling means that participant selection depended on the researchers' judgement of who had relevant experience, which may have limited the range of perspectives included. The DT workshop also included only four participants. This was suitable for interaction and joint idea development but limited the number of perspectives included in the workshop.

The DT workshop created useful empirical material, but it did not include implementation or testing over time. This means that the study can analyse how DT methods influence the identified collaboration challenges among subsidiaries, not whether any concept produced in the session would work in practice. Since the workshop was facilitated by the researchers, the facilitation may also have influenced how participants framed problems, discussed ideas, or prioritized solutions.

Finally, qualitative analysis depends on how participants describe their experiences and how researchers interpret these descriptions. The researchers' own understanding of the case and the research topic may have influenced how patterns were interpreted. Member checking was not conducted, meaning that the final interpretations were not formally validated by participants. Anonymisation also reduced the level of contextual detail that could be presented.

3.6.2 Research Quality and Ethical Considerations

Research quality was considered through credibility, transferability, dependability, and confirmability, which are commonly used in qualitative research (Bell et al., 2019). Credibility was supported by using several data sources, full interview transcripts, participant quotes in the findings, and both authors' involvement in the coding process.

Transferability is limited by the single-case design. The study focuses on one corporate group and one focal subsidiary, and the findings are not intended to be statistically generalised. Instead, the aim is analytical transferability to similar multi-subsidiary technical service groups. Dependability was supported by documenting the research process through the interview guide, recordings, full transcripts, coding files, archived workshop outputs, and the post-workshop reflection survey. Confirmability was supported by both authors discussing the coding and comparing examples where collaboration worked well with examples where collaboration was difficult or inconsistent.

Ethical considerations were addressed throughout the study. Participants were informed of the purpose of the study, how the data would be used, and that participation was voluntary. Consent was collected before interviews were recorded, and participants had the right to withdraw. Companies and participants were anonymised, and the collected material was stored securely and used only for the purpose of the thesis, in line with relevant data protection requirements.

3.6.3 Use of LLM Tools

LLM tools, including ChatGPT and Google Gemini, were used to support language editing, text structure, and clarity. All interpretations, findings, and final academic decisions were made and reviewed by the authors.

4.0 Findings

This chapter presents the empirical findings of the study in relation to the two research questions. The focus is on collaboration involving Company S and selected sister subsidiaries within Company N. The first part addresses the challenges hampering this collaboration, while the second part addresses how DT was found to influence the identified challenges during the workshop.

4.1 Challenges Hampering Cross-Subsidiary Collaboration

The challenges that were found to hamper cross-subsidiary collaboration relate to three main themes: 1) informal and relationship-based collaboration, 2) coordination gaps and lack of shared ownership, and 3) local autonomy and commercial tensions. Each theme includes several connected patterns, which are summarised in Table 2 before being discussed in detail.

Table 2 - Main collaboration challenge themes and identified patterns.

Challenge theme	Patterns identified in the material
Informal and relationship-based collaboration	Collaboration depended on physical proximity; opportunities depended on personal contacts and group identity; employees had limited awareness of sister subsidiaries' capabilities.
Coordination gaps and lack of shared ownership	No clear routines for shared ownership, handovers, and follow-up were not visible; previous coordination efforts were not sustained; informal coordination became difficult in larger or more complex projects.
Local autonomy and commercial tensions	Discipline-based financial structures weakened cross-disciplinary collaboration; additional coordination work was not clearly rewarded; customer purchasing requirements limited integrated offers. Differences in subsidiary size and local market position reduced the perceived value of collaboration.

4.1.1 Informal and Relationship-Based Collaboration

The interviews show that collaboration between subsidiaries often depends on informal relationships rather than formal routines. Participants described that collaboration was easier when people already knew each other, shared the same office, or met at project sites. However, this also meant that collaboration became more difficult when these relationships or forms of proximity were absent. In the interview coding, dependence

on informal relationships and physical proximity appeared as one of the recurring collaboration challenges.

A first difficulty concerned the lack of physical proximity between subsidiaries. Several participants explained that collaboration happened more often with subsidiaries located close to them. One middle manager described that the most frequent collaboration was with the ventilation company, partly because they were located in the same office area, while another subsidiary was placed in a different building. A top manager explained the difference that physical distance could make:

“Yes, it is a very big advantage to be in the same building. It is much easier to have a dialogue when it happens in person. If you are on Teams and you disagree about something, it can become a bit impersonal. It is much easier to sit down together and say, ‘This is how we see it, and this is how you see it. How do we solve it?’”

This indicates that collaboration became harder when contact occurred remotely or indirectly. Participants described that it was more difficult to solve disagreements or create a personal dialogue when contact only happened by phone, email, or through another person. One front-line worker described communication as difficult because they had never met the person they were completing work for and only communicated by phone through someone else.

The findings also show that collaboration depended on a feeling of belonging to the same group. Several participants described that it was easier to contact sister subsidiaries when they felt part of the same “family” or shared a company identity. This could create initial trust and make contact easier. However, it also meant that collaboration relied partly on personal connection and informal closeness rather than on an established way of working across subsidiaries. This dependence was especially clear when participants described how opportunities were shared. Collaboration often required knowing the right person rather than using a shared process or system. One top manager explained that collaboration could begin through informal conversations:

“No, not formal meetings. It is more informal. You sit at the coffee table and say, ‘I am calculating this project now. Is this something you are interested in?’ [...] It is very much about people. Relationships are extremely important in our industry.”

A middle manager similarly explained that projects and offers were forwarded between subsidiaries mainly because people were in the same building and already knew each other. A front-line worker described the limitation more directly:

“If I don’t have a personal contact person at other subsidiaries, I will not talk to Company S about the opportunity.”

This indicates that collaboration opportunities could be missed when the right personal contact was missing. The same informal logic that made collaboration fast and flexible could therefore also make it uneven. Collaboration worked where relationships already existed, but became weaker when employees did not know who to contact.

The findings also show that collaboration depended on awareness of what sister subsidiaries could offer. Participants did not always have a clear overview of the capabilities, capacity, or preferred type of work of other subsidiaries. One top manager explained that collaboration was easier within the same discipline because people shared a professional language, but that this did not automatically create broader joint business:

“People within the same discipline have someone responsible for that area, and they speak the same professional language. Electrical companies understand other electrical companies, and so on. That is also an advantage. But I do not think this structure creates as much joint business as it could.”

This suggests that collaboration across different disciplines became more difficult when employees lacked knowledge of other subsidiaries’ capabilities or did not clearly understand how different technical services could be combined.

Participants also described feedback after transferred opportunities as important for learning across subsidiaries. When no feedback was received, employees gained little knowledge of how the sister subsidiary had handled the opportunity or what it could contribute to future work. This limited the development of shared understanding and kept collaboration dependent on individual contacts.

Overall, the findings show that cross-subsidiary collaboration became vulnerable when it depended on personal contacts, physical proximity, and individual knowledge of what other subsidiaries could offer. Where these conditions were missing, collaboration was more difficult to initiate and opportunities could be overlooked due to the relational based motivation, information sharing and understanding. The next section focuses on what happened when initial contact was made but was not supported by clear coordination, ownership, and follow-up.

4.1.2 Coordination Gaps and Lack of Shared Ownership

A second finding is that collaboration becomes difficult when informal contact is not supported by clear coordination. While Section 4.1.1 showed that initial collaboration often depended on personal relationships, this section focuses on what happened after contact had been made. Participants described that requests, opportunities, and project ideas could be passed between subsidiaries without a stable routine for ownership, follow-up, or continued coordination. Within this theme, process formalisation and scalability was the most frequent coded pattern, appearing in 12 coded references.

The secondary data provided a formal counterpart to this finding. Although the reviewed material presented a broad technical offering across Company N, it did not show clear routines for shared ownership, handovers, regular meetings and follow-up in work involving more than one subsidiary. The interviews provided further detail on how this lack of visible coordination structure affected collaboration in practice.

Several participants described that attempts to create more structured collaboration had existed but were not sustained over time. One middle manager explained that the subsidiaries had previously worked more actively with joint offers, but that organizational changes weakened the cooperation. The same participant described how a shared coordination tool disappeared when companies stopped using it:

“The first year we actually had a joint Excel file where everyone put in the projects that they were calculating on and were planning to make offers for. But then half of the companies stopped using it, and then everyone else stepped off, and it just vanished.”

This indicates that the problem was not only a lack of willingness to collaborate. There had been attempts to create shared routines, but they were not maintained. Participants also described that follow-up often happened informally, for example through conversations over coffee or lunch, rather than through official meetings or shared routines.

The interviews also show a lack of shared ownership for cross-subsidiary collaboration. Participants described that each company mainly planned and managed its own work, while no role clearly held responsibility for keeping collaboration together across the group. One middle manager stated:

“Everyone is doing their own planning, and we don’t have anyone that has the responsibility to work for the better of the group.”

Other participants described a similar pattern. Earlier coordination had depended on specific managers or temporary initiatives, and when these disappeared, collaboration became weaker. This suggests that collaboration was not anchored in a stable process. Instead, coordination often depended on individual managers, informal contact, or tools that were not consistently used. The findings also show that informal coordination worked better in smaller tasks than in larger projects. For smaller jobs, participants described that it could be enough to make a call, forward a contact, or connect two people directly. When the work became larger and required pricing, planning, or more detailed coordination, the process became harder to manage. One top manager explained:

“If it’s a small job, maybe I just say, okay, I can fix it, he will come and change this next week. But if it is a bit larger, then maybe they want information about pricing and hours and stuff like that, and I would just

recommend them and put them together so they can have contact directly with each other. So it becomes a bit complicated.”

This was also visible in larger projects where subsidiaries worked next to each other but not necessarily together. One top manager described a project where each company mainly handled its own part and explained that being sister companies could reduce the level of formality:

“We had a big project [...] We all made our separate parts. [...] We had a negative effect since we were sister companies because we didn’t do maybe all the formal way, and we didn’t have as high demands on each other because we were like family instead.”

Several participants therefore pointed to the need for clearer structure in larger projects. They described that roles, expectations, and practical arrangements need to be clarified before work begins, rather than handled informally during the project avoiding assumed collaboration due to being sister companies.

Overall, the findings show that coordination gaps appear when collaboration moves beyond quick informal contact. Participants described missing routines for follow-up, unclear ownership of cross-subsidiary work, and weak continuity in shared coordination tools. Informal contact can set collaboration in motion, but bigger projects require clearer roles, routines and responsibility for maintaining the collaboration. The next section focuses on financial and commercial conditions that further limited collaboration between subsidiaries.

4.1.3 Local Autonomy and Commercial Tensions

One of the main challenges identified in the empirical material concerned the internal financial model and local profit-centre logic within Company N. The secondary data showed that Company N is structured into three financial divisions based on technical discipline. For example, ventilation companies within Company N are assigned to one division, while electrical companies are grouped within another. Each division is overseen by a division manager responsible for its financial performance. Participants described that collaboration within the same division followed clearer financial and responsibility arrangements, even when subsidiaries were located in different countries or regions. In contrast, subsidiaries located in the same geographical area could face less clear arrangements when they belonged to different financial divisions.

Participants described that collaboration between subsidiaries in different divisions did not create visible economic benefits at the divisional level. Each division had its own targeted margin, and participants explained that subsidiaries across divisions could not reduce their margins in order to win a joint project. Without coordinated group-level support, cross-divisional collaboration was described as less structured, with financial and responsibility sharing varying between projects. As a result, cross-divisional

collaboration could be deprioritised, while local subcontractors offering lower prices could be preferred. This was described as particularly limiting in situations where customers needed services from more than one technical discipline, such as pump and electrical services in combination.

The findings showed how this formal structure shaped collaboration in practice. Participants described that the discipline-based financial structure reduced the incentive to collaborate with sister subsidiaries in the same geographical region, despite the willingness to support sister subsidiaries described in Section 4.1.1. Additional coordination work could be required without contributing clearly to the financial results of the unit initiating the collaboration. One project manager stated:

“Basically if you take EL with you, it doesn't really show in numbers in your division. Plus I need to do extra work to arrange the work and don't get paid for that. So, I do not really want to work together with other sister companies too much.”

Another challenge concerned customer purchasing requirements. Participants described that large construction customers often requested separate bids from installation companies rather than one consolidated offer covering several technical services. This made it difficult to develop integrated offers across subsidiaries, since customers wanted to compare costs for each technical function separately. One middle manager explained:

“The big construction companies do not want us to provide a package price, they want us to break down the cost as detailed as possible. They want to see each function cost so they can compare to other service providers. I really don't know what we can do.”

Finally, participants described differences in company size and professional expertise as an additional challenge to collaboration. According to the findings, some subsidiaries had been established in their local markets for more than 15 years, while others had been founded within the previous two years. This could create an imbalance between more established and newer subsidiaries. Participants described that larger or more established subsidiaries could have limited incentive to initiate collaboration with smaller or newer sister subsidiaries, particularly when the financial benefit was unclear. Such uncertainty could be further increased in this collaboration, where there is limited information sharing and reliance on individual initiative as discussed in Section 4.1.1.

These findings collectively suggest that in practice, the potential for cross-subsidiary collaboration may be limited by local financial responsibility, customer buying needs, and differences between subsidiaries. These challenges were interconnected in that financial incentives affected the extent to which subsidiaries recognized the value of initiating, coordinating, and maintaining joint work. All challenges identified through the interviews are summarized in Table 3 and categorized into five overarching themes.

Table 3 - Data structure of identified collaboration challenges.

First - order coding	Second - order theme	Aggregate dimension
- Customers want separate costs so they can compare suppliers.	Financial	Local autonomy and commercial tensions
- Own-company incentives undermine collaboration.		
- Different business focus reduces fit between subsidiaries.		
- Unpaid coordination effort limits whole-package offers.		
- No one owns collaboration at group level.	Parent group support	Coordination gaps and lack of shared ownership
- Decentralized governance creates silos that hinder group-wide cooperation.		
- Networking is limited to personal effort.		
- The shared coordination tool was not sustained.		
- Informal family-like interaction does not scale well to larger projects.	Operation handling	
- Collaboration relies on personal relationships rather than structured interaction.		
- Front line employees usually perceive the subsidiaries as separate companies rather than as one group.	Trust and understanding	Informal and relationship-based collaboration
- Family identity causes a high risk of inconsistent outcome.		
- Unclear contact points create confusion in cross-subsidiary cases.	Communication	
- Collaboration strategy does not reach operational level.		
- Capability awareness depends on informal contact rather than routine sharing.		

4.2 The Use of Design Thinking in Practice

Insights from the DT workshop suggest that cross-subsidiary collaboration challenges may be differentially mitigated by the use of DT methods, with influence assessed as marginal, moderate, or more substantial as described in section 3.5.2. Table 4 provides a summary of the criteria used to assess and classify how the identified challenges were influenced by DT mechanisms in the workshop setting.

Table 4 - Assessment matrix of how cross-subsidiary challenges were influenced by DT mechanisms.

Marginally influenced	Moderately Influenced	Substantially Influenced
Only briefly surfaced or acknowledged, and when DT mechanisms made limited contribution to mitigating it during the workshop.	DT mechanisms helped participants surface and discuss the challenge, but the challenge remained partly dependent on existing relationships, practical implementation decisions, or future action outside the workshop.	Clearly emerged during the workshop and DT mechanisms made a strong contribution to clarifying or mitigating it within the workshop setting.

4.2.1 Substantially Influenced Collaboration Challenges

The challenge regarding **coordination gaps and lack of shared ownership** has been recognized and considered substantially mitigated by the use of DT methods among all participants during the workshop. Several DT mechanisms that contributed to mitigating these challenges were identified.

First, the workshop fostered a sense of formalized collaboration among participants. By bringing all relevant stakeholders together in a dedicated workshop setting, participants were made aware that they were engaging in a structured and purposeful collaborative activity. This setting helped establish a shared understanding of the importance of coordinated participation and contributed to increasing awareness of the need for a more systematic approach to collaboration. As a result, participants became more conscious of their collective involvement in the problem-solving process and the value of working toward shared objectives. One participant gave a comment when reflecting the use of the DT methodology:

“By just gathering everyone here it already gave me a feeling that the things we are talking about here are more serious than those that are chatting by the coffee machine. It feels like this workshop will lead to something, not like a casual talk that you probably will forget tomorrow.”

Second, the problem-solving process involving multiple stakeholders became more structured and actionable through the application of the DT methodology. Participants consistently reported that the well-defined DT process was easy to follow, despite having little or no prior experience with the method. As the workshop progressed through its different phases, participants were able to quickly understand the objectives and purpose of each stage. Several participants noted that the structured nature of the process enabled them to systematically transform an initially abstract and complex challenge into a clear and actionable task. Several participants state that the structured DT process facilitated a more controlled approach to collective problem-solving. Given the multiplicity of challenges and the diversity of stakeholder perspectives involved, participants often found it difficult to determine priorities. The structured DT process provided a systematic mechanism for navigating these complexities and establishing shared priorities. One top manager expressed:

“You always know there is so much to do but don’t know how to start. This method can help us to find out where to start, and who may do what, it makes the ideas become more feasible.”

Third, communication consistency among stakeholders was significantly enhanced throughout the DT process. During the selection of both the focal challenge and the solution for further development, participants demonstrated a high level of engagement in expressing, discussing, and evaluating their perspectives. Rather than following a linear decision-making process, discussions were highly iterative, with participants repeatedly revisiting and debating alternative challenges and solution options.

All participants actively contributed their views regarding which challenge should be prioritized and which solution would be most effective. Importantly, they justified their positions by drawing upon their individual experiences, expertise, and professional perspectives. This pattern of interaction reflects a high degree of communication consistency, as each contribution received immediate feedback and consideration from other participants, and no suggestions were overlooked or disregarded. This information sharing is non - relational based, instead they are goal - oriented, reducing relational biases and the information reaching all stakeholders at the same time. Several participants state that the communication has been effectively improved as they usually do not give formal feedback to each other as long as there is no major mistake found in the joint project. The different goals set in each phase “forces” participants to complete one communication loop before starting another.

Through this sustained and reciprocal communication process, participants developed a deeper understanding of both the challenges under discussion and the capabilities and perspectives of their “sisters”. Consequently, the workshop facilitated greater alignment among stakeholders and promoted an effective information sharing as all

participants are actively shared their knowledge to all stakeholders, one participant expressed:

“I gained quite a lot of new information about others during the workshop. For instance, I didn't know that Company T had used this kind of document before. We do talk about a lot of things daily, but they often do not go deep.”

Fourth, the issue of role ambiguity was explicitly identified and clarified throughout the workshop process. Across multiple phases, questions concerning the distribution of roles and responsibilities were repeatedly raised and discussed. During both the idea generation and selecting solution stages, participants frequently questioned who would be responsible for driving the proposed solutions forward. This issue became particularly salient during the prototyping phases, where extensive discussions focused on who should continue developing the prototype, which stakeholders needed to be involved in its construction, and who would be responsible for testing and further developing the solution. Ultimately, a shared understanding of responsibilities related to the actuarial challenge under consideration was established and agreed upon by all participants. Reflecting on this aspect, most participants reported having a clear understanding of their respective roles throughout the process. Furthermore, the prototyping phase enabled them to develop a more concrete understanding of the proposed solutions, which in turn facilitated a clearer delineation of roles and responsibilities.

These DT mechanisms identified during the workshop did not operate independently but rather interacted and reinforced one another. Increased awareness of the need for formalized collaboration encouraged participants to focus on developing a more structured approach to working together. By following a well-defined DT process, participants were able to follow the progress status and remain actively engaged with intense and systematic information exchange. This fostered a deeper understanding of both the challenge and the perspectives of their stakeholders, resulting in mitigating the constraints associated with relationship-based information-sharing channels. Moreover, the prototyping phase brought often-overlooked questions concerning role and responsibility sharing to the forefront. Through the development of tangible prototypes, participants gained a more comprehensive understanding of potential solutions, which facilitated the clarification of individual and collective responsibilities. Hence the unstructured collaboration process and role ambiguity challenge is considered as being substantially influenced by applying DT methodologies.

4.2.2 Moderately Influenced Collaboration Challenges

The challenge of **relationship-based collaboration** was evident throughout the workshop. When generating and selecting ideas, participants frequently proposed ideas influenced by their personal relationships with particular subsidiaries. This often

resulted in disagreements regarding prioritization and the selection of subsidiaries to be involved in subsequent solution development.

However, through intensive information exchange and discussions incorporating diverse perspectives during the DT process, participants were able to resolve these conflicts by establishing shared values and common evaluation criteria. For example, during the solution-selection phase, participants first discussed the purpose and potential impact of each proposed solution. They subsequently agreed upon the use of a common filter to assess and select solutions objectively. Ultimately, solutions that could not be tested on a small scale or implemented using existing resources, tools, and knowledge were excluded from further consideration. Participants also agreed to eliminate solutions that failed to generate benefits for all participating subsidiaries.

Importantly, this process was characterized by goal-oriented rather than relationship-based information sharing. Information was communicated openly and simultaneously to all stakeholders, reducing the influence of relational biases on decision-making. These findings suggest that the DT mechanisms of reinforced communication consistency and increased mutual understanding enable participants to evaluate organizational goals more objectively through the co-creation of shared values and assessment criteria. Consequently, these mechanisms contribute to mitigating misalignment arising from relationship-based motivations and preferences.

Additionally, an increased awareness of and desire for collaboration were observed among participants throughout the workshop. During the individual idea-generation activities, participants frequently involved other subsidiaries in their proposed solutions and demonstrated a strong capacity for collective idea development. For example, one participant proposed the creation of a shared document where all bidding projects in each subsidiary are visible to everyone, constant information about project type, possible other disciplinary may be needed etc. Building upon this idea, another participant suggested the implementation of monthly “lessons learned” meetings, during which previous collaborative projects could be reviewed and opportunities for improvement identified. This indicated a shift in participants’ perceptions of collaboration, from viewing joint projects as just one type of separated individual tasks toward understanding collaboration as a process of collective creation. This reflects a transition in mind-set from an individualistic “me” orientation to a more collective “we”, which can be interpreted as a desire for collaboration. These findings suggest that the participants' motivation was not relational based, instead it was based on the shared common goal.

However, when it comes to implementation of solutions, participants still tend to seek collaboration with those that they are familiar with and have good relationships. When reflecting the application of DT in practice one participants explain that:

“The prototype looks promising, however it still feels risky to start it with someone you do not know that well. Because you know the solution is not perfect yet, if it doesn’t work that well it feels easier to talk to people that you know you can handle.”

This finding indicates that increased mutual understanding of both the challenges and the perspectives of other stakeholders can help bridge information-sharing gaps arising from limited, relationship-based communication channels. By facilitating open and collective discussions, participants were able to shift their focus toward shared objectives and common value creation rather than relying solely on personal relationships. However, while these mechanisms were effective in reducing relational biases in theoretical debating phases, they were less effective when translating conceptual solutions into practical implementation. Consequently, the challenge of relationship-based collaboration is considered only been moderately influenced. Although the workshop successfully surfaced personal biases and encouraged participants to adopt a more objective, value-oriented perspective, the influence of established relationships remained significant when implementation decisions required concrete actions and resource commitments.

4.2.3 Marginally Influenced Collaboration Challenges

The challenge regarding **local autonomy and internal financial tension** was barely discussed in relation to the DT methodology during the workshop.

During the workshop, participants were asked when they expected the prototype to be completed and implemented. All participants indicated that further development would only be pursued after local priorities had been addressed. This response suggests that collaborative objectives were consistently subordinated to local organizational priorities. As one participant explained:

“After all, we are still an independent unit. The organization's survival depends on local profit, while collaboration with other subsidiaries is more of an additional benefit than a primary focus.”

Despite the increased understanding and the recognition of a shared, co-created value proposition, participants continued to face difficulties in overcoming challenges related to local autonomy. As a result, collaborative initiatives are treated as a “plus” benefit for each subsidiary, not as the main goals. Hence, they remained highly dependent on the availability of local resources. Several participants pointed out that addressing this challenge would require changes beyond the scope of the workshop, potentially involving a broader transformation of the group's business model and incentive structures. Specifically, they argued that the cross-subsidiary collaboration would remain difficult to prioritize unless the parent group actively promoted such initiatives through financial incentives. Without such support, it is hard to not put local priorities over the collective goals, as it determines the local unit’s survival. Moreover,

participants showed very high motivation of collaboration on the individual level, however it is not enough to overcome the local baseline that is determined by the parent group.

These findings indicate that the DT mechanism of conflict resolution had limited influence on addressing internal financial tensions. Given that the underlying challenge is heavily dependent on higher level parent group governance, its resolution extends beyond the scope of the DT methods applied during the workshop intervention. Furthermore, because representatives from the parent group were not involved in the workshop, it remains difficult to assess whether DT mechanisms could make a notable contribution to addressing this challenge under different organizational conditions. Consequently, the challenge of local autonomy and competing local goals is classified as marginally influenced by the use of DT methods.

In summary, DT mechanisms that could potentially help to mitigate collaboration issues shown in the framework were identified throughout the workshop across different phases. However the DT mechanisms influence different types of challenges in different levels, some challenges were substantially influenced, while some were only marginally influenced during the workshop (see Table 5). Moreover, one DT mechanism often could influence several collaboration issues. This finding suggests that DT mechanisms may promote collaboration from a broader and more holistic perspective, rather than being limited to encountering a single specific problem.

Table 5 - Influence of DT mechanisms on cross-subsidiary collaboration challenges.

Collaboration challenges	DT mechanism contributions	Detection of DT mechanism	Outcome
4.1.2 Unstructured process & Role ambiguity	Develop a broader understanding of the problem.	In problem framing- and selecting solution phase	Substantially Influenced
	Increase awareness of a formalized collaboration.	In all phases	
	Make collaboration more structured and actionable.	In all phases	
	Clarify roles and responsibilities.	In selecting solution- and prototyping phase	
	Reinforce communication consistency.	In all phases	
	Deepen understanding.	In all phases	
4.1.1 Relational based motivation, information sharing and understanding	Resolve conflict and reduce misalignment.	In selecting solution phase	Moderately Influenced
	Increase awareness of and the desire for collaboration.	In brainstorming- , selecting solution - and prototyping phase	
	Reinforce communication consistency.	In all phases	
4.1.3 Conflict goals, priorities & Internal and external financial tension	Deepen understanding.	In problem framing- and selecting solution phase	Marginally influenced

5.0 Analysis

This chapter analyses the empirical findings in relation to the literature reviewed in Chapter 2. The analysis first examines why cross-subsidiary collaboration in the studied case remains largely informal and inconsistent despite shared organizational ownership. It then analyses how the use of DT methods during the workshop contributed to making these challenges visible and developing possible responses.

5.1 Interacting Conditions behind Informal Cross-Subsidiary Collaboration

Regarding challenges hampering cross-subsidiary collaboration among the studied subsidiaries, the findings indicate that collaboration was not limited by one isolated barrier, but by several interacting conditions. For this reason, the analysis deviates from the conceptual framework to examine how the challenges interact in practice. This allows the analysis to explain why collaboration remains uneven and difficult to develop into sustained joint delivery.

5.1.1 Shared Ownership and Relational Closeness without Stable Operational Governance

Cross-subsidiary collaboration in this case begins from an apparent advantage: the subsidiaries are connected through common ownership within Company N and were described by participants as sister companies within the same “family.” This connection appeared to make informal contact easier and to create an initial basis for cooperation. However, subsidiaries within the same group may still remain differentiated in their operations and priorities, meaning that common ownership does not remove the need for coordination between units (Ghoshal & Bartlett, 1990; Lawrence & Lorsch, 1967). The findings show this tension in practice. Being part of the same group created closeness between subsidiaries, but did not establish clear responsibility, routines or follow-up for joint work.

This relational closeness was not only an enabling condition. In one larger project, a participant explained that being sister companies had a negative effect because the companies “didn’t do maybe all the formal way” and did not place the same demands on each other because they were “like family.” This does not show that the subsidiaries simply assumed collaboration would happen. Rather, it suggests that group connection and familiarity created expectations that cooperation could be handled informally, even in situations where clearer arrangements were needed. Brinkman et al. (2015) similarly identify trust, agreements and clarity of organizational goals as important conditions for collaboration between subsidiaries from different disciplines. In this case, shared ownership appears to reduce relational distance between subsidiaries without removing the need for operational governance. Participants could approach sister companies through familiarity and trust, but joint work still lacked stable ownership and routines.

Relational closeness therefore enabled informal cooperation, while also creating a risk that clearer coordination arrangements were treated as less necessary than they became in practice.

The lack of stable operational governance was also visible in earlier attempts to organise collaboration over time. Participants described a shared Excel file in which subsidiaries had entered planned projects and intended offers, but the routine disappeared when several companies stopped using it. This indicates that the problem was not a complete absence of ideas for coordination. Instead, shared routines were difficult to sustain when responsibility for maintaining them was unclear. The same issue appears in the statement that each company mainly managed its own planning and that no one had responsibility for working “for the better of the group.” In the theoretical framework, operational governance refers to the arrangements through which cross-subsidiary work is carried forward in practice, including responsibility, ownership, routines and follow-up. The findings indicate that these arrangements remained weak, despite the existing basis for informal cooperation. This supports Huxham and Vangen’s (2005) argument that collaboration requires working processes to be actively managed rather than relying only on a general intention to cooperate.

The first challenge is therefore not a lack of connection between the subsidiaries, but the limited translation of that connection into stable support for joint work. Shared ownership and familiarity enabled informal contact, while responsibility for maintaining collaboration remained unclear. This helps explain why personal relationships and individual knowledge became important routes for identifying and initiating collaboration opportunities, which is analysed in the following section.

5.1.2 Personal Relationships Link to Unstructured Operation

A second challenge concerned access to collaboration when employees did not know people in another subsidiary or did not interact with them regularly. Previous research identifies network ties, trust, shared language and shared understanding as conditions that support knowledge exchange across organizational units (Nahapiet & Ghoshal, 1998; Inkpen & Tsang, 2005). The findings support the importance of these conditions by showing what happened when they were weak: employees found it more difficult to approach another subsidiary, identify relevant contacts or recognise possible collaboration opportunities. The findings also add a case-specific nuance. Relationships did not only support collaboration once contact had been established; where shared contact routes and capability information were limited, they became part of how employees gained access to collaboration in the first place.

The problem was especially visible when subsidiaries lacked physical proximity. Participants described communication as more difficult when contact happened remotely, indirectly or without earlier personal interaction. This is consistent with Vangen and Huxham’s (2003) argument that trust building is an important but difficult part of collaboration across organizational boundaries. In this case, limited proximity

reduced the opportunities for employees to become familiar with other subsidiaries through everyday interaction. As a result, another subsidiary could remain less visible when a project opportunity appeared. Where repeated interaction existed, it partly compensated for this limitation by making contact more natural and increasing familiarity with the other subsidiary's work.

The dependence on existing contacts created unequal access to collaboration. One front-line worker stated: "If I don't have a personal contact person at other subsidiaries, I will not talk to Company S about the opportunity." Li (2005) shows that trust and shared vision affect knowledge exchange in subsidiary relationships. The findings confirm that relational conditions matter, but they also show that the difficulty may arise before knowledge is exchanged at all. When employees did not know whom to contact, an opportunity could remain within one subsidiary rather than being brought into possible joint work. Personal relationships therefore helped overcome uncertainty where they existed, but their absence made collaboration less accessible to employees outside established networks.

This challenge was also connected to limited knowledge of other subsidiaries' capabilities. Participants did not always know what sister subsidiaries could offer, what kind of work they preferred or whether their expertise could fit a particular project. Collaboration across technical disciplines was described as more difficult when employees lacked shared professional understanding. Carlile (2004) argues that work across different knowledge domains requires actors to understand how different expertise can be connected, rather than only exchanging information. The findings support this argument but suggest that the challenge began even earlier in this case: when employees lacked knowledge of another subsidiary's capabilities, they might not recognise the opportunity for collaboration at all. Capability awareness therefore appeared to depend largely on individual familiarity and previous interaction rather than on shared knowledge available across subsidiaries.

Limited feedback reinforced this dependence on personal knowledge. When employees received no feedback after transferring an opportunity, they learned little about how the sister subsidiary handled the work or what it could contribute in future projects. Knowledge of capabilities therefore remained tied to individual experience rather than developing into shared understanding across subsidiaries. This supports the relevance of shared understanding for knowledge exchange identified by Nahapiet and Ghoshal (1998), while showing that feedback after collaboration was also important for building that understanding in this case.

This creates an important link to the limited operational governance analysed in the previous section. Tsai (2002) shows that knowledge exchange in multiunit organizations can be supported through both formal structures and lateral relationships. In the studied case, lateral relationships appeared to carry functions that were not consistently provided through shared routines: knowing whom to contact, understanding what another subsidiary could contribute and deciding whether to raise

an opportunity. This does not make personal relationships a problem in themselves. They enabled collaboration where formal routes and shared knowledge were limited or non-existent. The challenge was that access to collaboration became dependent on them. Employees with established contacts were better positioned to recognise and raise cross-subsidiary opportunities, while others relied more on chance contact or individual knowledge. Collaboration was therefore not only informal, but uneven in who could initiate it and which opportunities became visible. The next section analyses why even identified opportunities could be difficult to carry forward when coordination work lacked clear ownership and local benefit.

5.1.3 Coordination Work without Clear Ownership or Local Benefit

Collaboration opportunities could be overlooked when employees lacked contacts or knowledge of other subsidiaries' capabilities. However, recognising an opportunity did not mean that collaboration would be carried forward. Once a possible opportunity had been identified, someone still needed to connect the subsidiaries, share information, coordinate practical arrangements and follow up the work. According to Malone and Crowston (1994), coordination concerns the management of activities that depend on each other. The findings support this view, since participants described that each company mainly planned its own work and that no role clearly held responsibility for keeping collaboration together across subsidiaries. The challenge was therefore not only that routines were unclear, but that ownership of the coordination work itself was unclear.

This adds an important dimension to the relationship-dependent collaboration discussed in the previous section. Personal contacts could help employees identify an opportunity and approach another subsidiary, but they did not provide a stable process for what happened after the contact was made. Coordination across organizational units can rely on both formal arrangements and informal mechanisms (Martinez & Jarillo, 1989). In this case, informal relationships clearly helped collaboration begin. However, where no shared responsibility existed, the person initiating contact could also become responsible for arranging the cooperation. Relationships therefore helped overcome limited access and visibility, but they could not replace ownership of the process.

The findings further show that taking on this coordination work was not always supported by the internal financial structure. One project manager explained that involving an electrical sister company meant additional work, while the benefit did not appear in the initiating division's results: "Basically if you take EL with you, it doesn't really show in numbers in your division. Plus, I need to do extra work to arrange the work and don't get paid for that." This statement is important because it shows that the barrier was not simply an unwillingness to cooperate. Employees could recognise a possible joint opportunity but still have limited reason to invest time in arranging it when the additional effort created no clear local benefit.

This pattern is consistent with previous research on local autonomy and competing subsidiary priorities. Eisenhardt (1989) argues that tensions can arise where actors are guided by different goals or evaluation systems. Similarly, subsidiaries within the same corporate group may both cooperate and compete, depending on how their interests are organised (Tippmann et al., 2018). The findings confirm that local financial conditions can limit collaboration, but they also add a more specific point in this case: the tension appeared before a joint project was secured. It affected whether someone was willing and able to spend time creating the collaboration opportunity in the first place.

The financial division structure made this issue more visible. Participants described collaboration within the same division as having clearer financial and responsibility arrangements, while cooperation across divisions did not create the same visible benefit. This indicates that common ownership did not remove local financial considerations. Geleilate et al. (2020) show that the effect of subsidiary autonomy depends on the organizational conditions in which subsidiaries operate. In the present case, local responsibility allowed subsidiaries to manage their own work, but also made cross-subsidiary coordination harder to justify when the effort and the visible benefit were located at different levels of the organization.

From this perspective, informal collaboration may be understood as an understandable response at subsidiary level. More structured joint work would require additional time, coordination and responsibility, while the findings show that the local benefit of taking on this work was not always clear. This does not mean that subsidiaries rejected collaboration. Rather, the conditions made sustained cross-subsidiary coordination difficult to prioritise.

The analysis therefore points to a deeper challenge than missing relationships or unclear routines alone. Cross-subsidiary collaboration depended on employees taking on coordination work across subsidiary boundaries, while both responsibility for this work and the local benefit of doing it remained unclear. From a group perspective, this limited the development of more consistent collaboration. From the perspective of an individual subsidiary, however, relying on informal and selective cooperation may be understandable when more structured joint work creates additional effort and responsibility without a clear local return. Personal relationships could open access to an opportunity, but they could not remove the organizational and financial conditions involved in developing it further. Collaboration therefore remained vulnerable because it relied on initiative that was neither clearly owned nor consistently supported by the way performance was evaluated.

5.1.4 A Reinforcing Pattern Limiting Consistent Joint Delivery

The limitation of informal collaboration became most visible when cooperation moved beyond a direct referral or a small task. Participants described that smaller assignments could often be handled through personal contact, while larger work required pricing,

planning, agreed roles and continued follow-up. This indicates that informality was not equally problematic in all situations. It became a stronger barrier when several subsidiaries needed to coordinate their contributions over time. This supports Brinkman et al.'s (2015) argument that trust must be combined with clarity and agreements in collaboration between subsidiaries from different technical disciplines. In the studied case, the main difficulty was therefore not only recognising a collaboration opportunity but turning it into a repeatable form of joint delivery.

The transition from opportunity to delivery was also affected by how collaboration opportunities emerged in relation to the financial structure. Participants described that collaboration occurred more easily where subsidiaries were geographically close and employees had existing contact. At the same time, subsidiaries located close to each other could belong to different financial divisions, where the local benefit of joint work was less clear. Previous research shows that subsidiaries within the same corporate group may remain shaped by local goals and conditions, even while opportunities for cooperation exist (Geleilate et al., 2020; Tippmann et al., 2018). The findings support this argument but add a specific nuance: collaboration that was practical to initiate through proximity and relationships was not always equally supported by the structure through which financial benefit was evaluated. The findings do not show that the division model caused the lack of formal coordination. However, they suggest that it could make locally emerging collaboration more difficult to sustain when the additional coordination effort did not create a clear local return.

These conditions affected not only whether a single opportunity became joint delivery, but also whether experience from collaboration strengthened the basis for future cooperation. The limited feedback described by participants further reinforced this pattern. When employees received little information about how transferred opportunities were handled or what another subsidiary could contribute in future work, knowledge from collaboration remained tied to the individuals involved rather than developing into shared understanding across subsidiaries. Future opportunities therefore continued to depend on personal contacts and individual awareness of capabilities.

A separate but related limitation concerned customer purchasing requirements. Participants described that customers often requested separate and comparable prices for different technical services rather than one integrated offer. This means that stronger internal collaboration would not automatically make every joint delivery commercially suitable. Even where subsidiaries identified a relevant opportunity and were able to coordinate internally, external purchasing logic could still restrict whether an integrated solution was feasible or attractive to present. Unlike the internally reinforcing conditions above, this limitation arose from the purchasing logic of external customers rather than from how collaboration was organised within Company N.

The analysis therefore suggests a reinforcing internal pattern behind the collaboration challenges. Because shared ownership was not translated into sufficiently stable

coordination routines, clear ownership or shared visibility of capabilities, collaboration often depended on personal relationships and individual initiative. This made cooperation possible where employees already knew whom to contact and what another subsidiary could contribute, but made opportunities less visible outside these existing relationships. At the same time, because collaboration remained selective and feedback after transferred opportunities was limited, knowledge gained through joint work did not consistently become shared across subsidiaries. Employees could therefore continue to lack awareness of other subsidiaries' capabilities, leaving future collaboration dependent on the same personal contacts that had enabled earlier cooperation.

This pattern was further reinforced where cross-subsidiary coordination required additional effort without a clear local return, particularly across financial divisions. In addition, customer requirements for separately priced offers formed an external constraint on integrated delivery. Cross-subsidiary collaboration was therefore hampered not primarily by a lack of potential or willingness to cooperate, but by a pattern in which limited organizational support increased dependence on informal collaboration, while the absent follow-ups and communication limited the development of the shared knowledge and support needed to reduce that dependence.

Figure 3 illustrates how the main collaboration challenges reinforce each other and make cross-subsidiary collaboration difficult to repeat. The figure shows that limited coordination, ownership and visibility lead subsidiaries to rely on informal collaboration through existing personal contacts. This makes opportunity recognition selective, since collaboration is more likely when employees already know whom to contact. Limited feedback then means that knowledge from previous collaboration remains with individuals rather than becoming shared across subsidiaries. As a result, capability awareness stays uneven, and future collaboration continues to depend on personal networks. The figure also shows that internal commercial conditions and customer pricing requirements make it harder to turn identified opportunities into repeatable joint delivery.

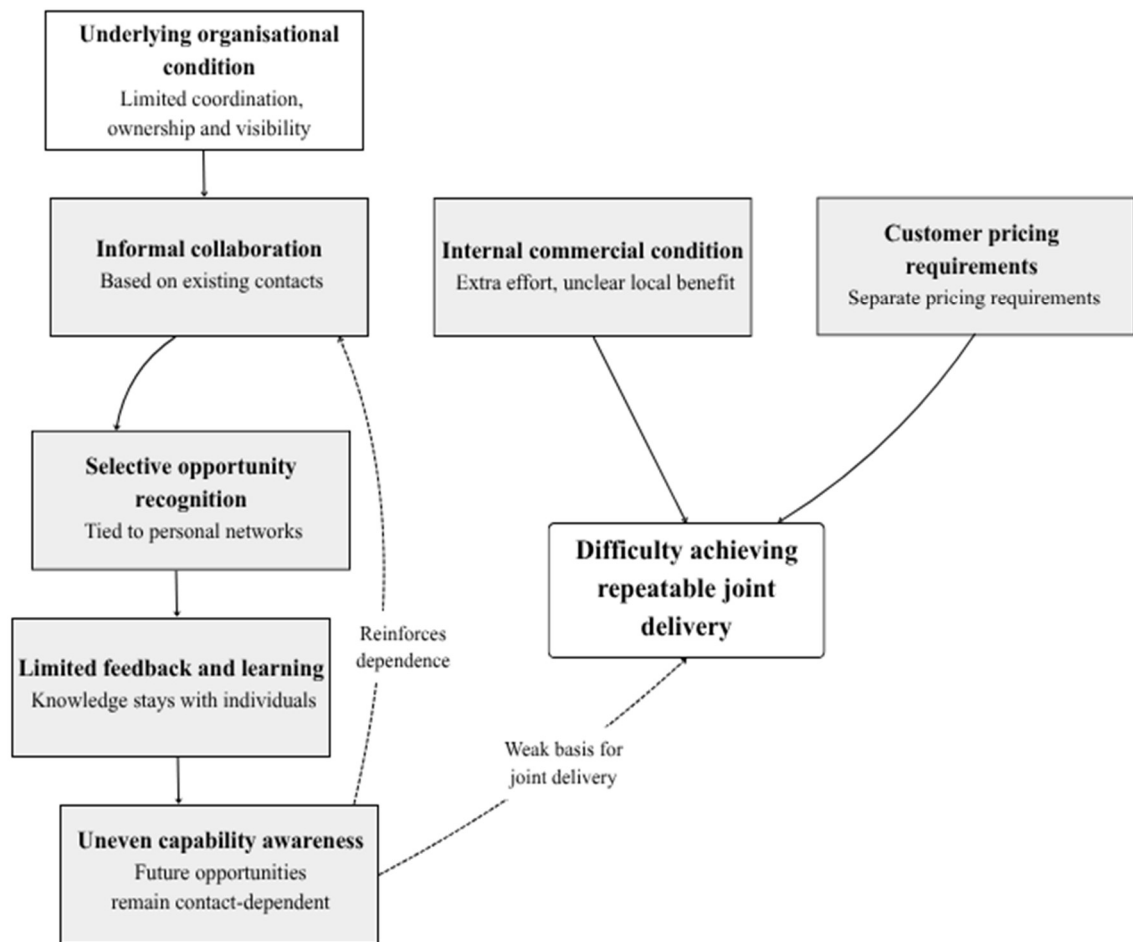


Figure 3 - Reinforcing Pattern Hampering Cross-Subsidiary Collaboration.

5.2 Assessment of Using Design Thinking in Practice

When comparing the conceptual framework with the findings, differences emerge in the extent to which DT mechanisms may influence the identified cross-subsubsidiary collaboration challenges.

5.2.1 DT Mechanisms' Contribution for Enhancing Cross-Subsidiary Collaboration

During the Design thinking workshop, all DT mechanisms that theoretically could contribute to enhance cross subsidiary collaboration mentioned in section 2.2 were found in the practice, including examples like reinforced communication consistency, deepen participants' understanding of each other and make collaboration structured and actionable. This empirical data indicates the use of DT methodology is applicable across diverse organizational contexts. Importantly, they do not solely exist, instead clear interdependencies are identified among them.

There are several DT mechanisms showing a clear positive connection linked to the collaboration challenges in the cross-subsidiary settings as expected according to the conceptual framework.

First, participants express that the gathering of diverse stakeholders to the DT workshop has already made them feel like this is a formal activity that aims to solve more serious problems than those discussed by the coffee machine. This supports earlier findings that demonstrated by conducting the DT workshop itself, enables participants' expectation of a mutual commitment to a formal alliance (Paula et al., 2018). This mechanism is very constructive to the study case, because the collaborations between case companies were primarily done informally. Increasing the awareness of formal collaboration could make the participants be more committed to the issue, meaning they may release more resources to handle the issue.

Second, by following the step-by-step DT phases, participants could easily follow the process and maintain high engagement all the way. These findings are consistent with prior research. Alexandrakis (2021) and Guaman-Quintanilla et al. (2020) state that the clearly defined phase makes participants easily track the progress and be able to contribute to the common goals by effective information exchange. As a result, the easy-followed framework makes collaboration more structured. In the study case company, the clearly defined problem-solving process is particularly helpful as it was handled in different ways depending on individual preference and experience, causing inconsistent outcomes and making collective problem solving difficult as it changes from time to time. The structured DT framework allows different subsidiaries to easily follow the discussion as the abstract goal has been divided into different small targets in each phase. By only focusing on one task at a time, participants from different disciplines can exchange information systematically according to the sub - goal. This structure provides enough space for participants to absorb and process the information received from complete different disciplines and therefore be able to reach co-creation. Additionally, by having a structured process, participants can develop their cooperative skills as they could predict the expected outcome from them and be prepared, leading to faster communication.

Third, participants through the workshop were able to clarify roles and responsibilities, increase their awareness of a formalized collaboration, which directly contributes to structure the collaboration process. This is mainly due to the prototyping phase, where participants can understand the solution more comprehensively and could therefore assess the proper responsibility sharing to ensure the best possible outcome. The findings are consistent with earlier literature, where Lund (2014) demonstrates that the challenge is mitigated when participants could see a clear goal in each phase, which provides a concrete basis to discuss responsibility sharing, guiding participants to perform accordingly to each sub-goal, and making collaboration actionable. However, the responsibility sharing in the study case is primarily based on voluntary actions, for instance, the prototype developing task was taken by an experienced project leader

voluntarily rather than determined by comprehensive discussions. This may be largely influenced by the mutual increased desire for collaboration during the workshop, which on the other hand also indicates the DT mechanism of clarifying roles and responsibilities may not be able to provide substantially positive influence in the long run, especially when the mutual desire for collaboration is on its downhill.

Meanwhile, several DT mechanisms are identified during the workshop, however, their relationship to the correspondent challenges or existence is not completely consistent with the conceptual framework.

While Abich et al. (2024) and Gumienny et al. (2013) demonstrate that the communication is significantly improved by the participants along with developed social skills and the use of visualised tools, this study found that the communication consistency heavily depends on the structured and actionable DT process. The differences may be caused by the limited experiences of the DT methodology. The participants in this study only have attended one workshop, it is hard to confirm the individual development in social skills and the use of visualise tools. However, this DT mechanism ultimately contributes to reduce the coordination gap that is caused by unstructured collaboration processes.

In earlier research, DT's mechanism for building trust and increasing understanding among stakeholders was primarily to provide a safe environment for open dialogue (Guaman-Quintanilla et al., 2020). Conversely, in this study, the increased understanding is largely driven by the reinforced communication consistency. By continuously providing insights into each other's ideas, participants leverage a structured process in which one goal must be completed before moving on to the next, thereby ensuring an effective feedback mechanism, resulting in enhancing a more structured collaboration. This shift of conversations from focused on general information exchange to goal-oriented contributions facilitated the emergence of deeper, previously hidden information and knowledge that might not have surfaced otherwise.

The physical proximity between the participant subsidiaries in this study may be the reason for these discrepancies. Because the two attendant subsidiaries are located in the same office, which very likely influences their relationships in a positive way. Consequently, they may already establish a good understanding of each other, which on the other hand also encourages an informal feedback process between them, as they may assume the other one could understand them automatically. Under these conditions, reinforced communication consistency influence the relational based collaboration challenge more directly than the increased understanding. Because the information is distributed based on the focal goals that are established by all participants, rather than being mediated by interpersonal relationships.

However, this connection may not be applicable in general conditions. When subsidiaries do not have the physical proximity, the lack of trust and understanding may likely hamper the sensitive information exchange. Therefore, they in all likelihood may need to build trust first through general information exchange and participating in common activities. In this way the increased trust and understanding have the highest potential to reduce relational biases the subsidiaries have before the application of DT methods. Nevertheless, this was not indicated in this study, hence the conclusion can only be drawn according to the circumstances this case has, that the reinforced communication consistency helped more directly to mitigate relational biases than the increased trust and understanding does.

The DT mechanism of increased awareness of and desire for collaboration is observed in this study, which is identified in early study as well. Alexandrakis (2021) demonstrated that by involving participants from the beginning of a project can significantly increase their desire for collaboration all the way to the end of the project and the increased motivation will largely benefit the conflict resolution. In the study case, participants increase their desire for collaboration through active information and knowledge sharing based on the aims of a collective benefit. This increased motivation primarily contributes to reducing the individual relational biases, making subsidiaries choosing collaborative partners based on the objective goals instead of personal relationships.

5.2.2 DT mechanisms' Limitations for Enhancing Cross-Subsidiary Collaboration

The literature pointed out that DT's ability to resolve conflict is largely based on its principle of respecting diversity (Jarrett et al. 2022) and co-decision making process (Langen et al., 2023; Magistretti et al., 2021). The findings in this study provide strong support for these arguments as the use of co - created filters effectively reduces conflicts created by personal relational biases. However, this conflict-resolution mechanism appears to be applicable only to conflicts that are not directly linked to financial considerations. Hence the DT's contribution to mitigate the local autonomy and internal financial tension challenge can only be considered as being marginally influenced.

In the case examined, the decision-making power regarding the financial model applied in each subsidiary is highly concentrated in the parent group. When the financial conflicts arise in a joint project, the subsidiaries cannot assess the prioritization level from a collaborative perspective. Because the local financial requirement that is determined from the parent group always has a higher level of prioritization than the collective ones that are based on share value among subsidiaries. This kind of financial setting for subsidiaries under one parent group can be quite common, and the financial base line and advantage is usually the first thing to prioritize for all subsidiaries. Consequently, the DT's contribution to the conflicting financial goals in subsidiary-to-subsidiary setting is constrained by the organization hierarchy, and has limited influence to mitigate it.

The importance of obtaining top management support when applying DT methodology in this case appears to be consistent with prior studies, which underscores that in practice, the successful adoption of such a method is heavily relying on the support of top management (Lund, 2014; Langen et al., 2023). However, empirical insignnia from the conducted cross- subsidiary workshop indicates that by applying DT the participants showed strong capability for interest alignment by focusing on common goals and deepening understanding. Therefore, from a theoretical perspective, integrating the parent group into the DT problem solving process, a positive influence is expected.

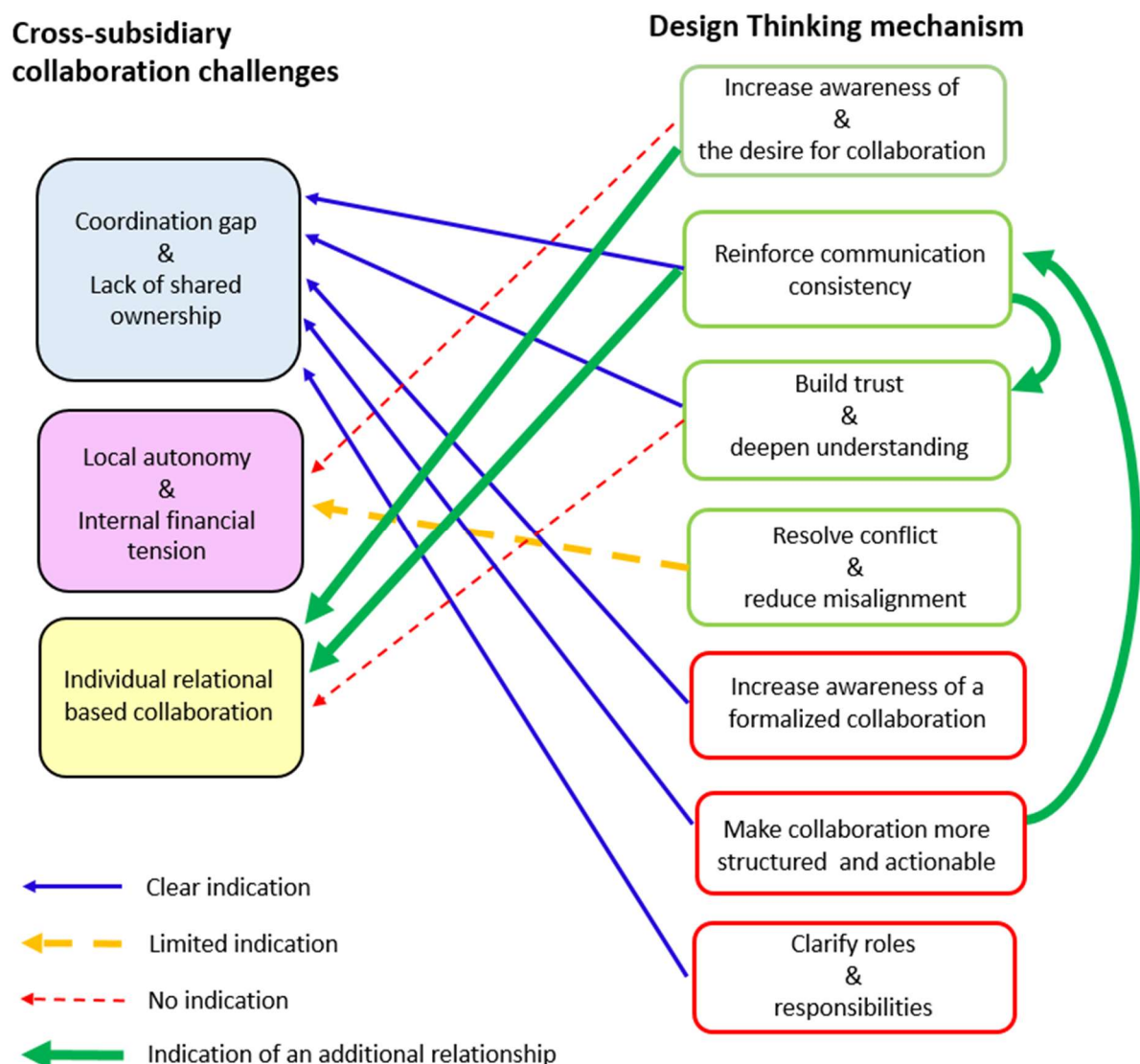


Figure 4 - Revised Conceptual Framework.

In summary, this study highlights that the DT methodology shows potential in mitigating several cross-subsidiary collaboration challenges. The analysis suggests that DT mechanisms may enhance cross subsidiary collaborations by making collaboration more structured and actionable, mitigating individual relational-based biases and supporting conflict resolution. At the same time, not all mechanisms identified in previous research were observed in this case. Moreover, the findings point to additional patterns that have not been strongly emphasized in earlier studies.

Based on these insights, Figure 4 presents a revised conceptual framework that reflects the patterns identified in the studied case. On the right side, the green blocks represent the DT mechanisms that emerged from the findings, they are supposed to enhance collaboration operationally. The red blocks refer to the DT mechanisms that emerged and are supposed to help organisations to structure the collaboration process. The blue arrows represent connections indicated in this study that are consistent with previous research, indicating that the DT mechanisms were observed and positively influenced the corresponding types of collaboration challenges. The red dotted arrows represent relationships that could not be identified in this study. These discrepancies likely happened due to two main reasons: the absence of the parent group in DT workshop and the relationships already established between the participants in this case. The yellow dotted arrows represent a relationship that is only partly indicated in this study.

Finally, the thick green arrows illustrate newly identified relationships emerging from this study. These show between the two block groups demonstrating that the DT mechanisms contributed to mitigating types of collaboration challenges that have not been highlighted in earlier studies. A new connection is the increased desire of collaboration's positive influence on reducing relational based collaboration motivation. This study indicated that participants actively involve other subsidiaries into their proposed ideas and solutions for the best possible outcome for all stakeholders rather than for their own interests.

Another new connection is the reinforced communication consistency's positive influence on reducing relational biases. This is because the increased participants' understanding of each other is heavily dependent on the reinforced communication consistency. Without the structured way of information exchange, participants' conversation would have difficulty to reach a deep level. By equally distributing and receiving the same information to all participants, they were able to make choices more objectively. The ones that appear on the right side of the DT mechanisms blocks represent influences among the DT mechanisms, meaning there is interaction between them, without one mechanism emerging first, the other one may not appear or have difficulty to stand along to address the challenge.

6.0 Discussion

This section discusses the findings and analysis of the study in relation to its overall research problem: technical service groups are expected to offer broader and more integrated solutions, but collaboration between specialised subsidiaries often remains informal and inconsistent. The findings provide some insights into how this problem can be addressed. It suggests that the main issue is not that employees do not want to collaborate, but rather that collaboration was expected at group level, while the daily conditions for making it work were weak. Routines, ownership, incentives, and follow-up were not clear enough to support collaboration beyond individual contacts and local initiatives.

6.1 Collaboration Require Both Relationships and Structure

The study indicates that common ownership gave the subsidiaries a starting point for collaboration, but it did not create collaboration by itself. The companies were described as sister companies, and this made informal contact easier. However, the results also showed that being in the same group did not necessarily create clear roles, shared routines or stable follow-up. This supports previous research showing that units within the same organisation can still differ in goals, routines, knowledge, and priorities (Lawrence & Lorsch, 1967; Ghoshal & Bartlett, 1990). The contribution of this study is that it shows how these differences played out together in a multi-subsidiary technical service setting. Informal relationships, weak routines, unclear ownership, and local business priorities did not appear as separate problems. They reinforced each other and made collaboration difficult to sustain.

Personal relationships were one of the clearest examples. They helped collaboration, when people already knew each other, had the same office, or worked together before. This confirms the importance of trust, network ties and shared understanding for knowledge sharing (Nahapiet & Ghoshal, 1998; Inkpen & Tsang, 2005). However, the same dependence on relationships also made collaboration uneven. When employees did not know the right person, opportunities could be missed. Personal relationships therefore had a double role. They supported collaboration where they existed, but they also became a replacement for missing routines, shared contact points, and organisational support.

The findings also show why informal collaboration became weaker when work became more complex. Smaller tasks could often be handled through a direct call or referral. Bigger projects required more delineation of roles, pricing, planning, handovers and follow up. This supports the view that collaboration needs active management and working processes, not only trust or goodwill (Huxham & Vangen, 2005). In the studied case, no clear role or function owned collaboration across subsidiaries. As a result, coordination often depended on individual initiative. This enabled collaboration in some cases, but was hard to repeat and scale.

Part of the problem was also the tension between group-level collaboration and local business priorities. Although the subsidiaries were part of the same corporate group, they had different financial responsibilities and local priorities. Collaboration was harder to justify when the extra coordination work did not create a clear benefit for the unit doing the work. This supports previous research showing that subsidiaries may both cooperate and compete within the same corporation (Tippmann et al., 2018). It also shows that collaboration cannot be treated only as a communication issue. Financial structures and local priorities also shape whether collaboration becomes realistic in daily work.

Using DT methods helped participants deal with some of the identified challenges, although only within the workshop setting. The main value was that the DT workshop gave them time and structure to talk about shared problems, listen to each other, and work toward possible solutions. The early phases helped them to translate broad concerns into more specific priorities, while the later phases helped to identify possible next steps. Similar findings have been reported by Abich et al. (2024) and Carlgren and BenMahmoud-Jouini (2022), who show that DT can support communication, shared understanding and structured problem solving. This study adds that DT can also be useful when subsidiaries need to discuss shared problems and clarify responsibilities.

At the same time, the participants in the workshop could not change the deeper conditions behind the collaboration challenges. The structure of the workshop made it possible for them to discuss the problems in a more focused way, but they did not have the power to change financial models, parent-company decisions, incentives, or long-term ownership. Such issues were outside the scope of the workshop, and beyond the decision-making power of the participants. This indicates that DT methods can be supportive of collaboration when participants are working with communication, shared understanding, and role clarification. But when the challenge is related to financial structures or decision-making power, the process needs to include people who have the authority to change those conditions.

Furthermore, the workshop indicates that the effect of DT methods may depend on the relationship between the participants. In this study, the participants were located in the same office and already knew each other to some extent. This may explain why trust was not a strong outcome of the workshop. Some trust and familiarity already existed before the session. The workshop activities were therefore more useful for making communication focused and structured than for building trust from the beginning. The influence may therefore be different between subsidiaries that are geographically distant or less familiar with each other.

Overall, the study suggests that cross-subsidiary collaboration depends on both relationships and structure. Relationships helped people initiate collaboration but were not sufficient to sustain it. Stable collaboration also required clearer routines, ownership,

incentives, and follow-up. The workshop supported part of this process by making the challenges more visible and giving participants a clearer way to work with them. Its main value was not that it solved the collaboration problems, but that it helped participants discuss them in a more focused and shared way.

6.2 Implications for Practice

For subsidiary organisations, the study suggests that adopting DT methods can effectively surface and mitigate collaboration challenges caused by the lack of unstructured processes and the lack of formality between the subsidiaries. However, to use DT workshops more broadly, subsidiaries would need employees who can guide the process and help participants move from problem framing to possible solutions. A suitable candidate could be a project leader, because this role acts as a connection point between the decision makers (managers) and the operators (e.g. electricians). Therefore, the project leaders should have a better point of view regarding who should be invited to the workshop.

When selecting participants to attend the DT workshop, the facilitator needs to make sure all the relevant stakeholders may affect and be affected to the issues should be involved. Moreover, for complex problems or when most of the participants have no experience of using DT before, it is suitable to divide the DT process into several workshops. In this way, participants can follow the process better, and most importantly, avoid the rush to generate solutions without proper investigation in the problem framing, which in this case most participants experience as the most difficult and critical phase.

For parent organisations, this study highlights challenges that can occur when the parent company lacks sufficient mechanism for consistently enabling feedback from its subsidiaries. Such lack of systematic communication may lead to a disconnection between strategic decision-making at the corporate level and operational requirements at the subsidiary level. Therefore, this study recommends that representatives from the parent company participate in the DT process alongside subsidiary teams. By doing so, the parent company could gain a deeper understanding of frontline operational challenges and identify what tools and strategies can best support the front-line operations. Moreover, the increased understanding of subsidiary operation challenges could help the parent organization to establish an appropriate degree of subsidiary autonomy, allowing local entities to respond more effectively to the changes of market requirements and collaboration conditions.

6.3 Limitations and Future Research

This study has some limitations that provide promising avenues for future research. First, it is based on one corporate group and one focal subsidiary based in Sweden. This made it possible to study the case in depth, but the findings cannot be seen as representative of all technical installation and service firms. The findings are mainly relevant for similar groups where specialised subsidiaries are expected to collaborate while still working with separate routines, responsibilities, and priorities.

Second, the study mainly reflects the perspective of the focal subsidiary and selected sister subsidiaries. No parent-company representatives were interviewed. This limits the study's capacity to fully consider the impact of group-level decisions, financial models and strategic priorities on the collaboration between subsidiaries.

Third, external customers were not included. This means that the study focuses mainly on internal collaboration. The customer purchasing requirements were mentioned as a factor that can constrain integrated offers.

Fourth, the study conducted only one DT workshop with four participants from two subsidiaries located in the same office. This contributed to active discussion but also limited the range of perspectives and the full potential of DT contributions. Since the participants were physically close and already knew each other to some extent, this may have affected the perception of trust and understanding observed in the findings. The workshop may therefore not fully reflect how DT would work between subsidiaries that are more distant or less familiar with each other.

Lastly, the study did not follow up on implementation over time. The workshop illustrated how participants discussed challenges, ideated and reflected on the use of DT methods. But the research can't say whether the ideas would work in practice or lead to sustainable change. Therefore, the findings should be interpreted as illustrating what DT supported in the workshop, not as proof of long-term improvement.

6.4 Future Research

Based on above mentioned limitations, the future research could follow four directions. First, future research could study more than one technical service group to examine whether similar collaboration challenges appear in other settings, especially when subsidiaries do not have the physical proximity. This would strengthen the understanding of how cross-subsidiary collaboration works across different organisational contexts.

Second, future research could also involve representatives of the parent company. This would enable investigation into how decisions at the group level, financial structures, strategic priorities and incentive models affect collaboration between subsidiaries.

Third, future research could include customer perspectives to better understand how external expectations affect cross-subsidiary collaboration.

Last, future research could therefore follow the use of DT methods over time, which would make it possible to examine whether ideas developed in workshops are implemented, sustained and translated into daily work.

7.0 Conclusion

Prior research has demonstrated the potential of DT methods in enhancing collaboration in both inter- and intra- organizational contexts. This study investigates how the use of DT methods can help address cross-subsidiary collaboration challenges in a Swedish technical installation and service firm. It employed a case study design, drawing on insights from eight semi-structured interviews, secondary data, and a DT workshop with participants from different positions and subsidiary entities. This enabled the identification of different cross-subsidiary collaboration challenges and assessment of the potential usefulness of DT mechanisms in mitigating these challenges in a workshop setting.

The findings show that collaboration among subsidiaries is often constrained by the unstructured and informal process, leaving information sharing and collaboration initiatives largely dependent on individual personal experience and relationships. This informal structure provides a weak foundation for consistent joint-delivery, which is further exacerbated by the external market preference and internal financial model. However, by adopting a structured DT framework, subsidiaries can effectively exchange information based on objectives instead of personal preference. This deepens understanding among different stakeholders and makes collaboration more actionable.

Conclusively, this study provides an in-depth analysis of how DT methodology can help subsidiaries to address collaboration challenges, highlighting its contribution to overcome relational based collaboration issues. The finding revealed a clear need to bridge the information gap between subsidiaries and the parent group, offering implications for both organizational tiers.

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Appendix 1: Interview Guide

1. Opening and role context - 5 min

1.1 Could you briefly describe your role and how you are involved in customer delivery or coordination with other subsidiaries?

1.1.1 Following questions (Options):

- What are your main responsibilities?
- What types of projects or services do you work with the most?
- At what point in the customer process are you usually involved?
- **The Identity Litmus Test:** When you walk onto a job site, do you introduce yourself as "[Subsidiary Name]" or as part of the "Nimlas Group"? Why?

1.2 Which other subsidiaries do you interact with most often and in what situations?

1.2.1 Following questions (Options):

- In your experience, how often do you interact with other specialist subsidiaries (e.g., electrical, fire safety, ventilation) in your day-to-day work?

2. How collaboration works in practice -10 min

2.1 Thinking of a case where a customer needs to involve more than one technical area, what usually happens in practice from first contact with the customer to delivery?

2.2 When you notice a customer needs help in another area (e.g., you see a fire safety issue while doing electrical work), how do you react to that?

2.2.1 Following questions (Options):

- Do you have the obligation to recommend another subsidiary when you identify opportunities for them?
- Who takes the lead when working together?
- How is contact initiated between subsidiaries?
- Is there any routine, template, or formal process, or is it mainly informal, like different people doing it in different ways? In which ways do you do it?
- How do you feel about the current way? Good or bad? Why?
- What information is typically shared at handover points?
- Are there any obstacles, for example: Billing, prices, Insurances, responsibility agreements, safety that affects whether collaboration happens?
- Is it common that a client asks for a single contract for a complete solution or multiple services from different subsidiaries? Do you see any trends?

3. Concrete examples of successful collaboration - 8 min

3.1 Can you briefly describe a case where collaboration with another subsidiary worked well?

3.1.1 Following questions (Options)

- What made that case work well?

- Was it because of people, trust, timing, routines, customer clarity, close location, communication or something else?
- Were roles and responsibilities clear?
- Did the customer experience it as one coordinated service or as separate companies?
- What do you think is the biggest benefit of working together?

4. Concrete examples of failed collaboration - 8 min

4.1 Can you describe a recent case where collaboration became difficult?

4.1.1 Following questions (Options)

- What happened?
- At what point did the difficulty appear?
- What do you think made collaboration harder in that situation?
- Were there issues related to contact paths, responsibility, and risk, lack of experience, time, priorities, or different ways of working?
- Was there a bad consequence for the work or for the customer?

5. Group structure, identity, and coordination conditions -7 min

5.1 Now that you are part of the same group, does it make collaboration easier, harder, or both? Why?

5.1.1 Following questions (Options):

- Do customers seem to see you as one group or as separate companies?
- Does the Nimlas group have a strategy that includes a clear guideline for subsidiary collaboration?
 - If yes, what does it look like? Is it good enough to support your needs?
 - If not, do you think it is necessary to have one? Why?

6. What would improve collaboration - 5 min

6.1 What would need to change to make cross-subsidiary collaboration more attractive to you?

6.1.1 Following questions (Options):

- What kind of support, routine, or coordination mechanism would make the biggest difference?
- What should remain flexible and not become too formalised (maybe parallel communication between subsidiaries, paper work)?
- If you could change one thing first, what would it be?

7. Closure - 3 min

7.1 Is there anything important about collaboration between subsidiaries that we have not covered?

Appendix 2: Workshop feedback

Please rate the statements below:

1 ----- 5
1 = strongly disagree 5 = strongly agree

Statement	1	2	3	4	5
The workshop was easy to understand.	☐	☐	☐	☐	☐
The activities helped me stay engaged.	☐	☐	☐	☐	☐
The workshop gave enough space for different perspectives.	☐	☐	☐	☐	☐
The DT process helped structure the discussion.	☐	☐	☐	☐	☐
The workshop made it easier to discuss collaboration challenges.	☐	☐	☐	☐	☐
I gained a deeper understanding of other sister companies.	☐	☐	☐	☐	☐
The workshop felt relevant to my work.	☐	☐	☐	☐	☐
I would be open to using this type of workshop again.	☐	☐	☐	☐	☐

Which part of the workshop felt most useful? Choose one.

- ☐ Defining the problem
- ☐ Brainstorming ideas
- ☐ Choosing solutions
- ☐ Prototyping
- ☐ Reflection
- ☐ Not sure

Which part of the workshop felt most difficult? Choose one.

- ☐ Defining the problem
- ☐ Brainstorming ideas
- ☐ Choosing solutions
- ☐ Prototyping
- ☐ Reflection
- ☐ Not sure

- 1. Was there anything in the workshop format that made it easier or harder to participate?**

- 2. Did using this methodology help you look at our problem from a new or different angle?**



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