PhD in Business // No. 89 - 2021

Managing multiple goals in university-industry collaboration

Irina Nikolayevna Isaeva

NORD UNIVERSITY BUSINESS SCHOOL

NORD University

www.nord.no

Managing multiple goals in university-industry collaboration

Irina Nikolayevna Isaeva

PhD in Business
Nord University Business School

PhD in Business no. 89 (2021)
Managing multiple goals in university-industry collaboration
Irina Nikolayevna Isaeva

ISBN: 978-82-92893-79-1
ISSN: 2464-4331

Print: Trykkeriet NORD

Nord University
N-8049 Bodø
Tel: +47 75 51 72 00
www.nord.no

Acknowledgements

"Everything that has a beginning has an end. I see the end coming"

– Oracle, The Matrix Revolutions (2003)

As this PhD-journey is coming to an end, I would like to take some time to thank the people who has been by my side from the start. First of all, I would like to thank my main supervisor, Associate Professor Marianne Steinmo. I cannot express how grateful I am for your guidance throughout these years. Your encouragement, support, and advice have meant the world to me, and this thesis would never have been written without you. Thank you for always being there for me and discussing my numerous questions during this process. To my co-supervisor, Professor Einar Rasmussen, I am so grateful for all your encouragement, help and patience. Thank you for taking the time to discuss and answer my numerous questions. Your feedback and constructive questions related to my work have pushed me to improve my research. I am grateful you have been by my side during this process.

I would also like to give a special thanks to my colleagues in Mo I Rana. Thomas, thank you for including me in a data collection process and writing a paper with me. I have learned a great deal from our discussions. Siri, my fellow dog-mom, thank you so much for letting me talk in excruciating details about my dog. The support on all things dog-related (and work-related) have made this PhD process both fun, educational, and inspiring (I am sorry for the excruciating details about the dog). Jenny, you are probably the kindest person in the world. I am so grateful that I have gotten to know you during our PhD-processes. Thank you so much for your enthusiasm, humor, and kindness. Marit, I am amazed by your superpowers in how you have finished you PhD while balancing three kids, one husband and remodeling your home. Thank you so much for all your humor, advice and morning coffees.

I would also like to express my profound gratitude to Rannveig, Maryna, Micaela and Morten for all your support and encouragement during this process. I am also very grateful to the administration and faculty at Nord University Business School for all

their help and service. A special thanks goes out to Irene Bursvik and Anneke Sijtske Leenheer for always being supportive and showing me the ropes at the Business school.

I have also been fortunate enough to collaborate with brilliant people outside of Nord University. Associate professor Ward Ooms: it has been a pleasure writing a paper with you, and I have learned so much from this process. Jens Petter Johansen, I have had a blast collecting data and writing papers with you. You have thought me a lot about data collection and energy efficient innovations. Monica Paulsen and Tone Jakobsen, thank you for letting me be a part of ACT. I have learned a lot about the industry in Northern Norway from you.

I would also like to express my gratitude for all the people I have interviewed during the research process. Thank you for sharing your insights and experiences with me. Without your participation, there would not have been any PhD.

Finally, I would like to thank my family and friends for supporting me during this process. Particularly, I would like to thank my mum, Nataliya, for always believing in me. You are an inspiration to me. I also want to express my love and gratitude to my dear Mats, for your love, patience, and support. Thank you for taking on the role of a single dog-dad these last months.

Irina Nikolayevna Isaeva

Mo i Rana, October 2021

Abstract

This thesis examines how multiple goals influences the process of university-industry collaborations (UICs). For the partners involved, UICs are known to yield positive outcomes, such as academic publications, patents, and innovations. However, the attainment of these benefits is found to be challenging. A key challenge in these collaborations is that partners typically have multiple and potentially conflicting goals. These goals can be found at various levels in UICs, and especially in university-industry research centers. University-industry research centers are often set up to pursue two overarching goals related to high-quality research and innovation. Research centers also establish sub-goals at the project level that are more or less related to the overarching goals of innovation and research. Moreover, firms and university partners establish their own goals, which they want to attain during the collaboration process. This multiplicity of goals can complicate and in the worst case, hamper the collaborations, because firms and university partners may disagree about the course of action in research centers. Prior research has shown that firms and university partners can achieve successful collaboration with goals of innovation and research, despite the partners inherent differences. However, less is known about how these multiple goals are managed and achieved in UICs, and how these multiple goals are integrated in UICs by the partners. This thesis addresses this issue by asking the following overarching research question: *How do multiple goals influence university–industry collaboration processes?*

This research question is explored through a longitudinal and multiple level case study of seven Norwegian university-industry research centers, that are created to attain high-quality research and innovation. The four empirical papers in this thesis draw on the organizational goal literature and three theoretical frameworks: coordination mechanisms, strategic responses and goal attainment strategies, to elucidate how multiple goals influences the collaborative processes in UICs at the research center, firm, and project level.

Paper 1 draws on the coordination mechanisms framework and examines how firms' goals of research center involvement can affect how firms coordinate towards the research center. The findings show that the firms' goals influence whether they partake in steering the research center or adjusting to the research center. Paper 2 draws on the strategic responses framework and explores how firm strategies influence goal conflicts with university partners, showing that bridging strategies helps mitigating goal conflicts in UICs.

Paper 3 draws on the coordination mechanisms perspective and explores how firms and university partners in a research center manage to attain conflicting goals at the project level by aligning themselves towards each other by using both structured and unstructured coordination activities at various levels.

Paper 4 draws on the framework of goal attainment strategies and explores how firms and university partners attain to the research centers' overarching goals of research and innovation. The findings show that the attainment of research and innovation goals happens through two strategies: research attainment strategy and hybrid strategy employed during different phases of the research centers lifespan.

Overall, the findings in this thesis shows how firms and university partners can collaborate to manage and attain the multiple and potentially conflicting goals in UICs, at the research center, firm, and project level. This thesis offers important implications for how firms and university partners should engage in UICs to ensure that the multiple goals of UICs are attained.

Table of Content

List of Tables

List of Figures

1. Introduction

This thesis explores how the multiple goals of university and industry partners influence the process of university–industry collaboration (UIC).

UICs are important for firm innovation (Perkmann et al., 2013) and academic productivity (Garcia et al., 2020). They enable firms to gain access to specialized knowledge, high-quality novel research, technological expertise and know-how, and other resources (Cohen et al., 2002, Laursen and Salter, 2004, Perkmann et al., 2013, Vega-Jurado et al., 2017), all of which contribute to the competitive advantage and innovativeness of firms (Mowery and Sampat, 2004). UICs also help university partners increase their research output, disseminate scientific knowledge, and capture value spinouts and patenting (Gulbrandsen and Smeby, 2005, Beck et al., 2020). These outcomes have triggered policy makers to amplify policy instruments that stimulate UIC relationships (García-Aracil and Fernández De Lucio, 2008, Villani et al., 2017), with university–industry research centers (henceforth research centers) being one of the key policy instruments (Ponomariov and Boardman, 2010).

Research centers can be defined as a "(…) joint venture between the university, industry and governmental funding organizations, identifying some domain of research where industry and academia can benefit from collaborating" (Styhre and Lind, 2010, p. 910). Compared to other forms of UICs (e.g., short-term firm-driven projects), research centers aim to develop research and innovation through long-term collaborations between firms and universities and managed by a university partner (Boardman and Gray, 2010).

More precisely, research centers often establish two overarching goals to bridge the different interests of firms and university partners: (1) the development of high-quality research and (2) the development of innovations (Ponomariov and Boardman, 2010, Gulbrandsen et al., 2015). To attain these overarching goals, partners in research centers also establish goals at multiple levels. For instance, in their specific projects, research centers establish sub-goals that are more or less related to the overarching goals of research and innovation (Derakhshan et al., 2020). Goals are also established

at the organizational level, where firms and university partners establish their own goals of desired outcomes in the collaboration (Bruneel et al., 2010).

Firms often establish goals related to knowledge and technologies, which can provide direct benefits (Murray and O'Mahony, 2007, Abramovsky et al., 2009). They also establish goals related to refining and assessing new technologies (Perkmann and Walsh, 2007) or developing innovations (Lam, 2011). University partners often establish their own goals, which mainly relate to the development of novel scientific knowledge that can be publicly available (Aghion et al., 2008, Gilsing et al., 2011, Canhoto et al., 2016), and goals related to specific firm-oriented knowledge as well as technology and innovation developments (Tijssen, 2018).

Given that the establishment of goals often determines which actions to take in research centers, firms and university partners often strive to manage the multiple and potentially conflicting goals established by each partner (Morandi, 2013). Consequently, misalignments and conflicts between the partners may occur (Gagné, 2018). Even though UIC partners sometimes have similar interests and goals, the translations of these goals can be different due to fundamental differences between the partners (Ranganathan et al., 2018). These differences can make the partners' goal alignment even more challenging and harm the collaboration at both research center and project level.

Previous research has keyed into how successful collaborations (with goals of innovation and research) are developed despite the inherent differences between UIC partners (Steinmo, 2015, Lauvås and Steinmo, 2019). The key findings of these studies highlight the value of strong social relations, shared understanding, mutual commitment, and trust between UIC partners (e.g., Barnes et al., 2002, Steinmo, 2015, Lauvås and Steinmo, 2019). Moreover, scholars have emphasized the importance of governing UICs, such as through contractual agreements and management practices, to help structure and manage UIC processes (Okamuro, 2007, Morandi, 2013). Others have contributed with insights into the importance of establishing processes of transferring knowledge and technology across partner boundaries, such as different

types of interaction mechanisms and processes (Gilsing et al., 2011, De Fuentes and Dutrénit, 2012, De Fuentes and Dutrénit, 2016).

However, existing literature seems to have threefold ambiguity related to how goals influence UICs (Fini et al., 2019). In particular, there exists fragmented understanding about (1) the integration processes of organizational goals in UICs (Vedel, 2021), (2) the attainment of multiple goals in UICs (Skute et al., 2019), and (3) the management of multiple goals in UICs (de Wit-de Vries et al., 2018).

This thesis responds to these shortcomings by asking the following overarching research question: *How do multiple goals influence university–industry collaboration processes?*

To provide an in-depth understanding of how multiple goals influence UIC processes in research centers, this thesis focuses on two aspects of multiple goals: 1) how firms manage multiple goals in research centers and (2) how UIC partners attend to multiple goals in research centers. These aspects are addressed through two sub-research questions answered by four individual papers that examine UICs at multiple levels (research center, firm, and project) of analysis (Table 1.1).

TABLE 1.1: Overview of sub-research questions in this thesis and the research papers addressing these questions

	Sub-research questions:	**Research papers (level of analysis)**
1	How do firms manage multiple goals in UICs?	1 (firm level) 2 (firm level)
2	How do firm and university partners collaborate to achieve multiple goals in UICs?	3 (Research center and project level) 4 (Research center level)

1.1. Management of multiple goals in UICs

Taking a firm-level perspective, the first sub-research question keys into how firms manage multiple goals in UICs.

Goals influence behavior during collaborations and the possibility of achieving outcomes (Kotlar et al., 2018). Thus, it is important to understand how multiple goals affect the behavior of the partners in UICs (Fini et al., 2019). Taking a firm-level analysis,

the first sub-research question focuses on how firms manage their own and their university partner's goals when they collaborate in a research center. Focusing on firms is important to gain a more comprehensive understanding of the complex processes in UICs, because prior studies have mainly explored UICs from the university perspective (Skute et al., 2019).

Prior studies have found that firms and university partners involved in UICs often translate the mutually established overarching goals of UICs into entities that they want to achieve (Bruneel et al., 2010, Ranganathan et al., 2018). The multiplicity of goals in UICs influences how the partners behave (Gagné, 2018) and can create goal conflicts and dispersed focus among the collaborative partners (Ranganathan et al., 2018). The diverse nature of the firms' and university partners' different UIC goals is well known (Kotlar et al., 2018, Tijssen, 2018). However, less attention has been to how these goals influence the behavior of partners in UICs (Fini et al., 2019) and *how* the partners manage the multiple goals in UICs (de Wit-de Vries et al., 2018). Hence, the first sub-research question aims for an in-depth investigation of *how* multiple goals in UICs influence the behavior of firms:

Sub-RQ1: *How do firms manage multiple goals in UICs?*

1.2. Attainment of UIC goals

Taking the research center and project level perspective, the second sub-research question keys into how firms and university partners collaborate to attain the UIC goals at multiple levels.

Firms and university partners often develop overall research center goals that are supposed to yield positive outcomes for both partners (Gulbrandsen et al., 2015). They also establish a set of short-term project goals that are supposed to contribute to the achievement of the overall research center goals (Derakhshan et al., 2020). However, how these multiple goals are attended to by the UIC partners requires more in-depth understanding (Derakhshan et al., 2020). Skute et al. (2019) highlighted the need to investigate the collaborative process over time and across different stages for

an in-depth understanding of how the partners actually collaborate and manage to achieve the multiple goals of the UIC. Thus, the second sub-research question keys into the process of goal attainment of the UIC partners:

Sub-RQ2: *How do firm and university partners collaborate to achieve multiple goals in UICs?*

1.3. Research context and empirical data

To address the overarching research question and the sub-research questions, this study takes place within the context of research centers. Research centers are a suitable context to examine how multiple goals influence UIC processes for three main reasons. First, it captures a UIC where multiple sets of firms and university partners collaborate to develop high-quality research and innovations (Gulbrandsen et al., 2015). Second, due to their long-term existence, the context of research centers presents the opportunity to examine the underlying dynamics of the firms' and university partners' collaborative processes over time (Plewa et al., 2013, Okamuro and Nishimura, 2018). Third, research centers have become one of the leading policy instruments to facilitate long-term collaboration between firms and university partners (Boardman and Gray, 2010) and are one of the most common types of UICs (Villani et al., 2017).

The main source of empirical data for this thesis is two data sets. The first data set represents a Norwegian-based research center established in 2017 (operational until 2024), where the primary data are based on 45 interviews with firms and university partners collected in 2017, 2018, and 2019. The second data set represents six Norwegian-based research centers (operational from 2009 to 2017) and includes 72 interviews with firms and university partners collected in 2013, 2015, and 2019.

These two data sets serve the fundament of four papers, which will provide insights into the management and attainment of multiple goals in UICs (Table 1.2.).

TABLE 1.2: Overview of research papers in this thesis

Research paper	Title of the paper	Research questions	Data source
1.	*How firms use coordination activities in university-industry collaboration: Adjusting to or steering a research center?*	How do firms' different goals influence their coordination activities in a university-industry research center?	1 research center with 8 firms and 6 university partners
2.	*How firms use different strategies to manage goal conflicts in university-industry collaborations*	How do firm strategies influence goal conflicts in university-industry research centers over time?	1 research center with 14 firms and 6 university partners
3.	*Attaining jointly beneficial outcomes: How partner alignment influences the achievement of outcomes in open innovation with science-based partners*	How does partner alignment at the partnership level and the project level influence jointly beneficial outcomes in science-based open innovation partnerships?	1 research center with 6 university partners and 3 R&D projects
4.	*Overcoming conflicting goals in university-industry research centers: Integrating and attaining academic research and firm Innovation*	How are 'conflicting' goals attained to in UICs over time?	6 research centers

1.4. Contributions to the UIC literature

This thesis aims to contribute to the UIC literature by exploring the underlying organizational dynamics of UICs (Perkmann and Walsh, 2007) at multiple levels of analysis (research center, firm, and project). Moreover, this thesis extends our understanding of how multiple goals at multiple levels in UICs influence the collaborative processes (Fini et al., 2019). To contribute toward gaining an in-depth understanding of multiple goals in UICs, this thesis draws on several well-established theoretical frameworks, such as organizational goal theory (Cyert and March, 1963), coordination mechanisms (Argote, 1982), strategic responses (Oliver, 1991), and goal attainment strategies (Greve, 2008, Gaba and Greve, 2019). By drawing on these theoretical frameworks, this thesis contributes to the UIC literature in two ways.

First, this study contributes insights into how goals influence the behavior of firms in collaborations with university partners (Skute et al., 2019) and how firms manage the conflicting goals of their university partners within research centers (de Wit-de Vries et al., 2018). Accordingly, by exploring how the firms' goals influence firm

behavior in research centers, this study extends prior research on how the variety of firms' goals can influence how the firms are involved in research centers (Skute et al., 2019).

Exploring how firms manage the conflicting goals of university partners contributes to the UIC literature by distinguishing between the different conflicts firms and university partners may experience and proposing how specifically goal conflicts can be mitigated (de Wit-de Vries et al., 2018). Studying the strategies of firms when dealing with goal conflicts extends prior research on UICs suggesting that mitigation of goal conflicts happens through specific actions. Thus, the present study contributes to the UIC literature by suggesting how firms should be involved in UICs to mitigate goal conflicts (Howard et al., 2016, Steinmo and Rasmussen, 2016). In sum, this study contributes novel insights into the management of UICs and the governance mechanisms at play over time in research centers (Skute et al., 2019).

Second, this study contributes to the UIC literature with new insights into how firms and university partners integrate multiple goals in the collaborative process (Skute et al., 2019). By drawing on organizational goal literature (Greve, 2008), this thesis shows that firms and university partners integrate the overarching goals of high-quality research and innovation through two goal attainment strategies: research goal attainment strategy and hybridized goal attainment strategy. Used at different phases in the collaboration, these strategies show that research centers incorporate and prioritize the research goal during the first phase and then combine the goals of research and innovation during the second phase, which in turn enables the attainment of the overarching goal of innovation.

Moreover, prior studies have often dealt with multiple goals in UICs at a firm or research center level (Derakhshan et al., 2020). The current study extends these finding by showing how firms and university partners manage to attain research and innovation goals at the project level by coordinating through informal and unstructured ways. Accordingly, this study further contributes to the UIC literature by

showing how the collaborations are managed through formality and informality at multiple levels over time (de Wit-de Vries et al., 2018, Skute et al., 2019).

This thesis presents implications for how firms and university partners may manage and attain multiple goals in UICs. It also provides implications for how research centers may be governed to facilitate effective collaborations and achievement of research and innovation goals.

Overall, the findings demonstrate that even though firms and university partners may experience collaborative processes in research centers as challenging due to the multiple and sometimes conflicting goals, the use of governance mechanisms and strategies may align the partners to achieve the goals of both research and innovation (Gulbrandsen et al., 2015) at multiple levels.

1.5. Outline of the thesis

This thesis is structured as follows. Chapter 2 presents the theoretical framework used to explore multiple goals in UICs. The chapter will start by giving a brief overview of UIC literature before highlighting prior research on organizational goals in UICs. Next, the knowledge gaps related to multiple goals will be presented. The focus will then move to the theoretical frameworks used in this thesis. At the end of Chapter 2, a conceptual framework for this study will be presented. Chapter 3 will discuss the methodological stance of this thesis, including the setting, research design, data collection, and analysis. The ethical considerations will be presented as well. Chapter 4 provides a summary of all four papers. Chapter 5 concludes and discusses the overall findings, contributions, and implications, both theoretical and practical. Chapter 6 contains the four articles upon which this thesis is built.

2. Theoretical background

To explore the overall research question: "How do multiple goals influence UIC processes?," this chapter starts by presenting prior literature on UICs and organizational goals. From there, I will present the research gaps and three theoretical frameworks that can shed light on how multiple and potentially conflicting goals influence UICs. The theoretical frameworks used examined: coordination mechanisms, strategic responses, and goal attainment strategies, which can contribute to insights into the research question of how multiple goals influence UICs processes.

2.1. University-industry collaborations

Engaging with external actors is a way for firms to enhance firm competitiveness, because external actors may contribute with knowledge and resources (Cohen et al., 2002, Laursen and Salter, 2004, Perkmann et al., 2013). Thus, when firms are focused on innovation developments they often engage in interorganizational collaborations, as collaborations across organizational boundaries contribute to access of knowledge, reduce risks related to innovation development, and improve the time-to-market of firms' innovations (Chesbrough, 2003). As such, firms have begun to embrace open innovation and invited external partners into their internal innovation processes (Dahlander and Gann, 2010, Markovic et al., 2021).

Open innovation is defined as "a distributed innovation process based on purposively managed knowledge flows across organizational boundaries" (Chesbrough and Bogers, 2014, p. 17) and relates to firms' use of external knowledge sources inside their innovation processes (Dahlander and Gann, 2010). Interorganizational partnerships collaborating on open innovation focus on purposeful knowledge flows across the partners' organizational boundaries (Dahlander and Gann, 2010). The purposeful knowledge flows can happen through three processes: inbound, outbound, and coupled knowledge flow processes (Chesbrough and Bogers, 2014). Inbound knowledge flows are related to knowledge provided by the external partners that is

used by the firm to enhance their innovation process (West and Bogers, 2014). Outbound knowledge flows relate to firms contributing with internal knowledge and assets to the external partners so the external partners can use this knowledge and assets in their own businesses (Dahlander and Gann, 2010). Coupled knowledge flows are combinations of inbound and outbound knowledge flows, with the aim of joint innovation development collaboration (Gassmann and Enkel, 2004).

These interorganizational partnerships focusing on open innovation may be market-based, involving mainly firms such as suppliers and customers (Du et al., 2014), or they may include partners that are public or scientific (e.g., public-private partnerships, community partnerships, UICs) (Jay, 2013, Steinmo, 2015, Bohn and Roelfs, 2020).

Interorganizational partnerships with university partners may take many different forms (Perkmann and Walsh, 2007). These partnerships can involve contractual agreements such as commercialization projects and licensing agreements (Perkmann and Walsh, 2007, Vega-Jurado et al., 2017). Furthermore, some partnerships focus on academic entrepreneurship and human resource transfer (e.g., educational and training purposes) and some partnerships are established as formal research center (Perkmann and Walsh, 2007, Boardman and Gray, 2010).

This thesis will focus on research center, because in most developed countries, research center are among the leading policy initiatives used to increase UIC (Ponomariov and Boardman, 2010, Gulbrandsen et al., 2015). Moreover, research center are created to foster long-term interaction between the partners (Thune and Gulbrandsen, 2011), while they often struggle with institutional complexity (Greenwood et al., 2011) and conflicting goals (Lauvås and Steinmo, 2019). Thus, exploring multiple goals in UICs in the setting of a research center contributes to shedding light on how partners over time are influenced by these multiple goals and at the same time both manage and attain these goals.

Styhre and Lind (2010, p. 910) define these research center as a "(…) joint venture between the university, industry and governmental funding organizations,

identifying some domain research where industry and academy can benefit from collaborating." This joint venture is usually based in a university context, where a university partner leads the research center and researchers are the main working force. The firm partners are involved by contributing with funding through membership fees (Perkmann et al., 2018) and partaking in establishment and operation of research center activities (Morandi, 2013). Furthermore, in contrast to other forms of partnerships, research center have one specific mission, namely to promote a long-term, cross-sector collaboration between firms and universities (Boardman and Gray, 2010) and enable mutual knowledge transfer between firms and universities, which in turn can contribute to the development of novel research and innovations (Styhre and Lind, 2010). To achieve this, research center establish multiple organizational goals (Gulbrandsen et al., 2015, Derakhshan et al., 2020). Thus, the next section will take a digression into the literature of organizational goals, which explains how multiple goals in UICs can be understood.

2.2. Organizational goals

Organizational goals are central in understanding how and why organizations and firms behave the way they do. The goals of firms and organizations give insights into decision-making processes, employee behavior, and how employees work together to achieve desired outcomes (Gagné, 2018, Linder and Foss, 2018). However, scholars in various fields have struggled to come to an agreement on what actually constitutes an organizational goal (Linder and Foss, 2018). Thus, I will briefly go through some of the more commonly used definitions and theoretical traditions that have aimed to define organizational goals.

Early studies in classic economic theory suggested that firms were a single entity and they pursued one unitary and universal goal: profit maximation (Kotlar et al., 2018). Scholars in the organization and management field, on the other hand, argued that organizational goals do not dictate any specific outcomes (March et al., 1958) and can be defined as "non-operational goals," which means that an organizational goal can be

something like “enhancing competitiveness.” From a behavioral perspective on firms, Cyert and March (1963) suggested in their book *A behavior theory of the firm* that firms do not actually have goals, but rather, it is the individuals within these firms and organizations who have goals and firms and organizations establish organizational goals through processes of negotiation and bargaining between the individuals, which in turn enables them to unify the individuals.

This way of understanding organizational goals has made researchers define organizational goals as an “end state an organization wishes to attain” (Gagné, 2018, p. 84) and “desired organizational outcomes that can be used to guide action and appraise organizational performance” (Kotlar et al., 2018, p. 3). These definitions may include various types of goals, and at the same time include the behavioral aspect, showing that organizational goals also relate to the behavior of firms and organizations (Shinkle, 2012). Thus, this thesis uses these definitions when trying to understand what organizational goals are.

The behavioral view on organizational goals and organizations’ behavior, which was first mentioned by Cyert and March (1963), brought new perspectives into the literature on organizational goals and enabled researchers to gain more insights into how firms and organizations operate, with a focus on the people within these establishments. These new perspectives have had an internal focus and extended Cyert and March’s (1963) findings related to how employees and managers have worked to establish and attend to organizational goals.

Thus, empirical studies suggest that goals established in firms and organizations are often influenced by those individuals and groups that have the most power, such as the family in family firms (Kotlar and De Massis, 2013) or those who own the most shares (Martin et al., 2013). In addition, organizational goals are also influenced by the external environment (e.g., competitors, stakeholders, customers) (Kotlar et al., 2018). Organizations may therefore establish various goals, often influenced and determined by the organizations’ characteristics, such as the sector in which they operate, their ownership, institutional pressure, experience, size and governance type (Greve, 2003a,

Greve and Teh, 2018, Kotlar et al., 2018). Organizations also tend to establish goals that are either financial (e.g., profitability, market shares, and sales) (Greve, 2003b, Baum et al., 2005) or non-financial (social responsibility, learning, research, and innovation) (Zellweger et al., 2013, Miron-Spektor and Beenen, 2015) or a combination of such goals by establishing a combination of multiple sets of goals (e.g., Kruglanski et al., 2002, Greve, 2008, Kacperczyk et al., 2015).

Multiple organizational goals can be either facilitative or conflicting (Kruglanski et al., 2002, Gaba and Greve, 2019). Facilitative goals often capture different hierarchical levels. For example, firms can establish overarching goals and interrelated sub-goals, where employees' attention on the sub-goals influences the attainment of the overarching organizational goal (Gagné, 2018). Facilitative goals can also include goals that are related through activation links, where one goal may have a triggering effect on another goal (Unsworth et al., 2014).

Conflicting goals are not triggered by activation links (Unsworth et al., 2014) and require often conflicting actions (Salvato and Rerup, 2018). Examples of conflicting goals include goals of profitability and CSR (Stevens et al., 2015, Markman et al., 2016), goals of exploitation of existing assets and exploration of new ideas (Billinger et al., 2020), and goals of competitiveness and environmentally friendly production (Hermundsdottir and Aspelund, 2021). As such, drawing on organizational goal literature can increase our understanding of how multiple goals influence UIC processes.

2.3. Multiple goals in university-industry collaborations

Research center aim to establish long-term collaborations between firms and universities (Boardman and Gray, 2010), guided by two overarching goals (Gulbrandsen et al., 2015) at the partnership level (Derakhshan et al., 2020). One goal is related to high-quality research, while the other focuses on innovation developments (Ponomariov and Boardman, 2010). The aim of these goals is to bridge the firm and university partners' different interests and enable long-term collaboration

(Gulbrandsen et al., 2011, Gulbrandsen et al., 2015). To achieve these overarching goals, the research center also establish sub-goals at the project level, which are inclined to be related to innovation and/or research (Derakhshan et al., 2020).

However, when firms and university partners enter research center, they also establish their own goals related to what they want to achieve (Bruneel et al., 2010). Firms often have goals related to knowledge and/or innovation that directly benefit the firms' processes (Abramovsky et al., 2009). These goals can be more "general and long-term goals" and/or "specific and short-term goals" (Shah and Kruglanski, 2002). Murray and O'Mahony (2007) suggest that firms often establish goals related to knowledge development that can enhance the firms' internal processes. Some firms also have goals aiming to appropriate technological knowledge, which can be used internally in the firm (Canhoto et al., 2016). Firms may also establish goals related to refining and testing new technologies (Perkmann and Walsh, 2007) or developing innovations (Lam, 2011).

When entering a research center, university partners often establish goals related to scientific novelty (Aghion et al., 2008) and publicly available knowledge (Gilsing et al., 2011, Canhoto et al., 2016). They may also establish goals related to firm-specific knowledge development (applied research) and technological developments (Tijssen, 2018).

In sum, when engaging in research center, the firm and university partners must deal with multiple goals at multiple levels (see Figure 2.1).

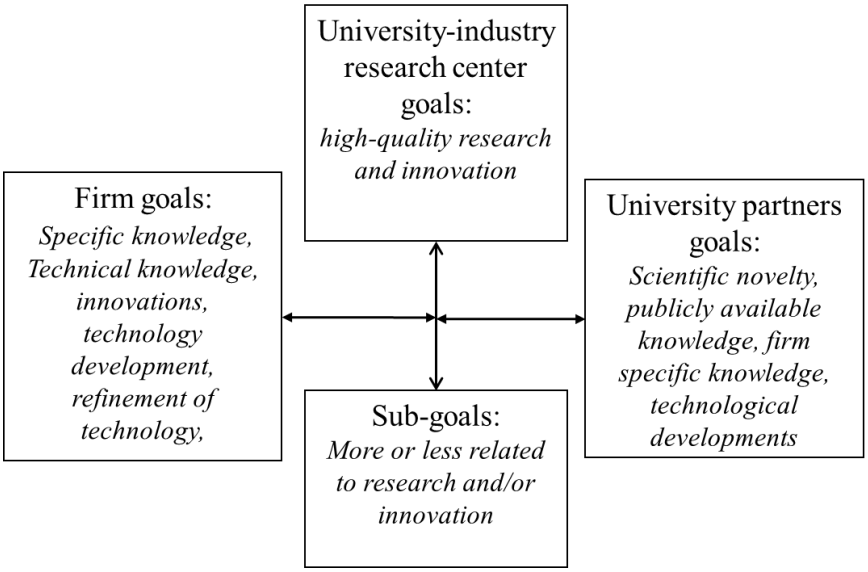


FIGURE 2.1: Multiple goals in research center, at multiple levels.

These multiple goals at multiple levels are often the reason why firms and university partners experience goal conflicts in research center (Steinmo, 2015, Lauvås and Steinmo, 2019). At the research-center level, the overarching goals of innovation and high-quality research are often understood as conflicting (Lauvås and Steinmo, 2019). Because goals often determine which actions firms and organizations take (Gagné, 2018), the multiplicity of firms' and university partners' goals often impose challenges such as misalignments and conflicts in the collaboration (Ranganathan et al., 2018), especially if there are multiple firms and university partners partaking in the university-industry research center (Morandi, 2013). Furthermore, even though some firms and university partners may establish similar goals, the partners' translation of these goals into actions may still be conflicting (Ranganathan et al., 2018), which can complicate the establishment of sub-goals at the project level.

These goal conflicts and differences in action preferences are often related to the partners' different institutional logics (Alford and Friedland, 1985). Institutional logics can be defined as "sets of core organizing principles associated with a specific societal domain and the related beliefs, practices, and arrangements" (Schildt and

Perkmann, 2017, p. 140) and shape the behavior of the partners involved (Thornton et al., 2012). Institutional logics that the UIC-partners subscribe to include different norms, practices, identities, and goals (Friedland and Alford, 1991, Schildt and Perkmann, 2017). As such, the firms adhere to a commercial logic and university partners mainly subscribe to an academic logic (Sauermann and Stephan, 2013, Perkmann et al., 2018).

Commercial logics usually include missions related to concrete problems and solutions that are valued in the marketplace and create economic rewards (Murray, 2004). The goals of commercial science are related to financial returns (Sauermann and Stephan, 2013) and short-to medium-term results (Perkmann et al., 2011). In collaboration with researchers, the firms often try to limit the researchers' freedom and try to steer the researchers towards the firms' needs (Aghion et al., 2008).

Academic science logics usually include missions related to public knowledge development (Murray, 2004, Perkmann et al., 2018). The goals are related to publications (Sauermann and Stephan, 2013) and implementing long-term frameworks (Perkmann et al., 2011). Usually, academic researchers want to work based on academic freedom, where they can focus on their own personal interests in regards to research (see Table 2.1.) (Sauermann and Stephan, 2013). The differences between the commercial and academic logic not only make the partners inherently different, but also make collaborations challenging (Perkmann et al., 2018).

TABLE 2.1: Differences between academic and commercial logic in research centers

	Academic logic	**Commercial logic**
Goals	Scientific novelty and public knowledge development	Profitable solutions, product developments
Results	Publications	Financial returns
Working practices	Driven by individual and personal interests	Hierarchically managed and coordinated
Timeframes	Long-term, scientifically driven outcomes	Short-term and medium-term outcomes

Based on Sauermann and Stephan (2013), Steinmo (2015), and Perkmann et al. (2018).

In sum, these multiple goals at multiple levels (research center level, firm and university partner level, and project level) make collaborations in research center challenging. Thus, the next section will focus on prior research that has contributed with knowledge on how to manage these challenges, before presenting knowledge gaps that still need to be addressed.

2.4. Management of goals in UICs and knowledge gaps

To further the management of goal dissimilarities and goal conflicts, prior studies have emphasized the importance of various aspects, such as prior collaborative experience, that enable the partners to develop trust and mutual understanding (Barnes et al., 2002, Steinmo, 2015) or establishment of a common goal for all the partners involved (Mesny and Mailhot, 2007). In addition, one of the most mentioned aspects that have been emphasized is high involvement in collaborations (Perkmann and Walsh, 2007, Steinmo, 2015, Lauvås and Steinmo, 2019), which entails partaking in informal communication and engagement in projects (Lauvås and Steinmo, 2019). Some studies have also proposed solutions such as good project management, clear channels for communication, and progress plans (Morandi, 2013, Ghauri and Rosendo-Rios, 2016). However, how firms are actually involved in these types of activities is still underexplored, and scholars have called for more insights into how the partners may actually be involved in these activities (Howard et al., 2016, Steinmo and Rasmussen, 2016).

Moreover, scholars who have suggested solutions to goal conflicts have often integrated goals into more overarching challenges, such as differences in institutional logics (Steinmo, 2015) or different cultures (Galán-Muros and Plewa, 2016, Ghauri and Rosendo-Rios, 2016). This complicates the issue, because different elements (e.g., different norms, management styles, resources, and timeframes) within these institutional logics and cultural differences influence the collaboration differently (Estrada et al., 2016), and firms and university partners may choose to handle these challenges differently (Smith and Lewis, 2011). Thus, scholars have called for more

knowledge on specific differences, such as goals, to gain a more comprehensive understanding of how firms and university partners can manage these differences (de Wit-de Vries et al., 2018).

The UIC literature has emphasized that formal UICs, such as research center, often have two overarching goals related to research and innovation developments (Ponomariov and Boardman, 2010), which are translated into sub-goals at the project level (Derakhshan et al., 2020). In addition, UIC literature has highlighted that firm and university partners often establish their own predetermined and diverse sets of goals (e.g., technology goals vs. research goals) that they enter the collaboration with (e.g. Holstein et al., 2018, Kotlar et al., 2018, Tijssen, 2018). However, how these goals influence the collaboration is still scarcely investigated (Fini et al., 2019). For example, scholars have called for more insights into how firms' own goals influence their behavior in UICs (Skute et al., 2019). Scholars have also called for more insights into the formal and informal management mechanisms used to ensure a successful collaboration (de Wit-de Vries et al., 2018) at the different levels of the collaboration, such as the project level (Derakhshan et al., 2020). Additionally, the mechanisms used to integrate multiple goals of the firm and university partners at different phases of the collaboration are also scarcely investigated (Vedel, 2021).

In sum, all of these gaps illustrate that we still have a scarce understanding of how multiple and potential goals at multiple levels influence UICs (Fini et al., 2019). Thus, building on these knowledge gaps, this thesis aims to contribute with more in-depth insights into how multiple and potentially conflicting goals influence UIC processes (de Wit-de Vries et al., 2018, Fini et al., 2019) and how firms and university partners manage and achieve these goals during the collaboration process (Skute et al., 2019).

To address the overall research question of this thesis and contribute to closing the knowledge gaps presented, I draw upon three theoretical frameworks: the coordination mechanism, strategic responses, and goal attainment strategies. These frameworks are focused on management of processes, and the behavior of those

involved, and can contribute to insights into how multiple goals influence UIC processes and how the partners involved behave when managing and dealing with multiple goals.

As such, the coordination mechanisms framework (Argote, 1982) has been used for understanding how firms and partners can coordinate partnerships to achieve effective collaborations (Barbosa et al., 2020b). Thus, it is a suitable framework for gaining more in-depth insights into partners' behavior in UICs when they work to align their multiple goals. This thesis refers to two papers (Paper 1 and 3) that engage with the coordination framework. The strategic responses framework (Oliver, 1991), which is often used in contexts that deal with institutional differences, focuses on specific actions and decisions that firms and organizations take to manage conflicting demands (Ahmadsimab and Chowdhury, 2019). I have used and extended the strategic response framework in relation to UICs and multiple goals in one paper (Paper 2). The last paper (Paper 4) draws on the goal attainment strategies framework (Greve, 2008, Gaba and Greve, 2019) used in organizational goals literature (Gagné, 2018), and focuses on how firms can attain multiple and conflicting goals, through different strategies.

This framework contributes with insights into how firms and university partners work to achieve conflicting goals over time (see Table 2.2. for overview of theoretical frameworks). Moreover, combining these theoretical frameworks enables us to gain a more comprehensive understanding of how firms and university partners behave in UICs when they are influenced by and must deal with multiple goals.

TABLE 2.2: Overview of the theoretical frameworks used in this thesis

	Coordination mechanism	Strategic responses	Goal attainment strategies
Main focus	Alignment and adjustment of partners, employees, and processes to achieve jointly established goals	Strategies used to respond to demands imposed by external partners	The behavior of firms when dealing with and achieving multiple goals
Main characteristics	Structured and unstructured coordination mechanisms and activities: Structured coordination: • Predetermined activities • Decided by a centralized management • Coordination through formal activity processes Unstructured coordination: • Unscripted activities • Decided through decentralized management or partners involved in the collaborations • Coordination through informal activities and processes	Defensive and acceptive strategies: Defensive strategies: • Protection of own goals and interests • Rejections of imposed demands • Changing the imposed demands Acceptive strategies: • Bridging partners interests' and practices • Engaging in compromises between the partners	Sequential, simultaneous, and performance-based strategies: Sequential strategy: • Sequential attention to goals • Temporal attention to goals Simultaneous strategy: • Simultaneous attention to goals • Spatial differentiation of goals Performance-based strategy • Attainment of goals is decided by the organizations' performance feedback on the different goals
Strengths	• Suitable to explain how partners try to adjust and align themselves to collaborate on a joint goal • Has the ability to capture the formal and informal aspects of UIC processes • Can explain how firms and university partners collaborate to attain goals • Suitable to study longitudinal processes	• Suitable to explain how partners respond to conflicting demands in collaborations • Can explain the underlying causes for how and why partners manage collaboration • Suited to explain in-depth the partners' actions when imposed on by conflicting demands • Suitable to study longitudinal processes	• Suitable to explain how partners attend to multiple goals • Can capture the practices used by the partners to attain multiple goals • Suitable to study longitudinal processes
Weaknesses	• Dimensions of coordination are used differently across different disciplines • No unitary agreement across disciplines related to the tools and activities included in the different dimensions	• Mainly used to study intra-organizational dynamics and hybrid organizations (except Perkmann et al. (2018))	• Not widely used in institutionally complex settings • Mainly built on the notion that multiple goals often have a clear priority order
Used in paper	Paper 1 (to capture firms' activities in UIC) and Paper 3 (to capture alignment processes and the triggering of the coordination)	Paper 2 (to capture different firm strategies to handle goal conflicts in UIC)	Paper 4 (to capture UIC partners' achievement and management of overarching research center goals)

2.5. Theoretical framework: management and attainment of goals

The theories of coordination mechanisms and strategic responses and goal attainment strategies are well-established frameworks for exploring and developing knowledge of the behavioral aspects of collaborative partners when dealing with multiple goals These frameworks are presented below.

2.5.1. Coordination mechanisms framework

The theoretical framework of coordination mechanisms can be particularly useful for the study of how firms and university partners deal with multiple goals in UICs. In particular, the framework shows how firms and university partners behave to manage the collaboration process and attain multiple and conflicting goals related to scientific research and innovation developments (Barbosa et al., 2020b, Zacharias et al., 2020).

The concept of coordination mechanisms is a well-established framework in the management and organization literature (Van de Ven et al., 1976, Mom et al., 2009), especially in research focusing on intrafirm organizational management (e.g. Argote, 1982, Mom et al., 2009). In addition, the framework has been adapted in interorganizational contexts (Oliveira and Lumineau, 2017, Nguyen et al., 2018), including supply-chain management (Cäker, 2008); national and international markets (Koçak et al., 2014, Piazzai, 2018), and in settings such as strategic alliances, open innovation, and UICs (Gulati et al., 2012, Morandi, 2013, Oliveira and Lumineau, 2017, Barbosa et al., 2020b). Coordination mechanisms are often employed at the firm or organizational level.

In contexts of interorganizational collaborations, coordination mechanisms are often defined as “the deliberate and orderly alignment or adjustments of partners’ actions to achieve jointly determined goals” (Gulati et al., 2012, p. 12), which seems fitting in the context of UIC since this conceptualization entails multiple partners that may adhere to different institutional logics, have multiple and conflicting goals, and must align their actions to attain valuable outcomes (Barbosa et al., 2020b), not least

their own goals (Morandi, 2013). In addition, UICs are often prone to unexpected developments during the lifespan of the collaboration, which in turn requires that the partners be able to align and adjust their actions (Schilke and Goerzen, 2010).

Coordination activities have been defined in various ways, such as programmed and nonprogrammed (Argote, 1982), formal and informal (Tsai, 2002, Fernandes et al., 2018), standardized and mutual adjustments (Malone, 1987), and organic and mechanistic (Andres and Zmud, 2002). However, the key takeaway from these definitions is that coordination mechanisms can be split into two dimensions: One dimension relates to governance styles that are formalized, predetermined, and organized by the management (Argote, 1982, Tsai, 2002, Fernandes et al., 2018). The second dimension relates to governance styles that are ad hoc and determined by the partners involved (Argote, 1982, Malone, 1987, Tsai, 2002, Barbosa et al., 2020b). Thus, following this understanding of coordination mechanisms, I draw on the definition of Claggett and Karahanna (2018) and define the coordination mechanisms as structured and unstructured coordination activities. *Structured coordination activities* are predetermined and initiated by the management, while *unstructured coordination activities* are ad hoc and initiated by the partners involved (Claggett and Karahanna, 2018).

Structured coordination activities are mainly established prior to the implementation of tasks (Fernandes et al., 2018) and include activities such as contract development (Oliveira and Lumineau, 2017), development of overall goals and progress plans, scheduled meetings, projects, and workshops (Willem et al., 2006, Fernandes et al., 2018). The establishment of these activities often happens on the partnership level of a collaboration (Barbosa et al., 2020b) and is formalized by the management of the collaboration (Fernandes et al., 2018) through policies, work procedures, and rules (Hanisch and Wald, 2014).

Establishing such activities is often useful when the collaboration is initiated because they contribute to alignment of the collaboration through the establishment of a clear direction with agreed-upon goals (Morandi, 2013). Furthermore, structured

coordination activities also contribute to formalizing tasks that are crucial to achieving the established goals (Mom et al., 2009).

Summing up, engaging in structured coordination activities enables the partners to partake in steering the collaboration's behavior and enables the completion of goal-related tasks (Dao and Strobl, 2019). However, if the collaboration is steered too much through structured coordination activities, partners such as university partners productivity may be hampered because much time must be spent on scheduled meetings and progress reporting (Du et al., 2014, Barbosa et al., 2020a). *Unstructured coordination activities* relate to ad hoc activities and actions (Argote, 1982), including unplanned meetings (Arenas and Ayuso, 2016), information and knowledge sharing (Claggett and Karahanna, 2018), and unplanned resource allocation (Geringer and Hebert, 1989). The engagement in these types of unstructured activities is often favorable when partners are dealing with uncertainty (Morandi, 2013), such as explorative goals (Dao and Strobl, 2019). In UICs, engagement in these activities often happens at the project level (Barbosa et al., 2020b), where the partners involved focus attention on knowledge and innovation. The use of and engagement in unstructured coordination activities enables the partners to collaborate on advancing and exploring radical ideas (Morandi, 2013, Dao and Strobl, 2019).

Unstructured coordination activities are useful when the partners involved are dealing with their conflicting goals and logics (Sauermann and Stephan, 2013) because the presence of conflicting goals and logics may require them to handle unexpected demands (Caldwell et al., 2017). Unexpected demands may require that partners engage in unexpected activities so that they can align themselves with each other, which may be difficult to do through structured coordination activities alone (Caldwell et al., 2017). If the partners do not manage these unexpected demands, the collaboration's performance may be hampered, and in the worst case, the unexpected demands may dissolve the collaboration (Ashraf et al., 2017).

2.5.2. Strategic responses framework

The strategic responses theoretical framework can help us gain in-depth knowledge into how firms and university partners respond to and manage the conflicting goals of UICs (Estrada et al., 2016, de Wit-de Vries et al., 2018). Specifically, this theoretical framework can contribute insights into how firms and university partners should be involved to achieve effective collaborations and valuable outcomes (Steinmo and Rasmussen, 2016, de Wit-de Vries et al., 2018).

The theoretical framework of strategic responses originates from institutional theory (Alford and Friedland, 1985, Friedland and Alford, 1991) and was developed as a response to the lack of studies focusing on organizations' behavior when dealing with the institutional environment (Oliver, 1991). The framework has become well established in intra- and interorganizational contexts (Oliver, 1991, van Fenema and Keers, 2018, Ahmadsimab and Chowdhury, 2019), especially in institutionally complex contexts such as social enterprises (Pache and Santos, 2013), global strategic alliances (Luo et al., 2008), R&D alliances (Oxley and Sampson, 2004), and public-private partnerships (Battilana and Dorado, 2010). These contexts are all influenced by partners that adhere to different institutional logics and usually have different goals, values, and behaviors (Pache and Santos, 2010, A.M. Vermeulen et al., 2016).

The concept of strategic responses can be defined as "behaviors that organizations may enact in response to pressure toward conformity with the institutional environment" (Oliver, 1991, p. 151); it focuses on how organizations or firms take different strategic actions to manage institutional demands imposed on them by partners adhering to different institutional logics (Pache and Santos, 2010).

Strategic responses can be categorized as either defensive or acceptive (van Fenema and Loebbecke, 2014). *Defensive responses* are strategies used by firms when the aim is to protect the firms' interest (Pache and Santos, 2010) and may involve explicit rejection of the demands imposed on them by their partners or stakeholders. The explicit rejection of partners' demands entails actions such as changing the partners' demands and ensuring that the firms' goals are attended to (Oliver, 1991).

The use of defensive strategies may also include actions such as persuasion, focusing on influencing specific partners, and altering the partners' demands to follow the firms' action plan (Suddaby and Greenwood, 2005). In addition, actions included in defensive strategies may also be superficially adhering to the demands imposed by them by symbolically incorporating these demands, even though the focus is protecting the firms' own interests and values (Boxenbaum and Jonsson, 2017).

Using defensive strategies to manage conflicting and imposed demands is often beneficial in short-term projects (Vega-Jurado et al., 2017), especially if the firm partners are in a position of power, having resources that can be bargained with (Luo et al., 2008). Thus, firms use defensive strategies when the partners may succumb to the pressure imposed by the firms (Jakobsen et al., 2019). However, the use of defensive strategies in collaborations where the partners are mutually dependent may be more risky, as the lack of outcomes for one of the partners may impede the collaboration (Perkmann et al., 2018).

Acceptive responses are strategies focusing on balancing and bridging the demands of the partners involved (Pache and Santos, 2010, van Fenema and Loebbecke, 2014). These acceptive strategies can involve taking time to develop a mutual understanding of the different partners' needs (Ahmadsimab and Chowdhury, 2019). Furthermore, acceptive strategies may include actions such as selective coupling of practices to ensure that both partners' demands and goals are at least partially met (Pache and Santos, 2013). Selective coupling often happens when the partners have practices that are amenable to both partners so that they can combine them and find compromises related to their different demands (Pache and Santos, 2013).

Acceptive responses also include passive strategies (Oliver, 1991), where firms accede to imposed demands and interests and choose to incorporate the partners' practices (Oliver, 1991, Ahmadsimab and Chowdhury, 2019). Thus, in long-term collaborations, firms may decide to use more acceptive strategies to ensure that the

collaboration proceeds (Estrada et al., 2016), and the partners may be able to attain at least some of the outcomes they desire (Pache and Santos, 2021).

2.5.3. Goal attainment strategies

The goal attainment theoretical framework strategies can contribute in-depth insights into how firms and university partners collaborate to integrate the multiple goals of research and innovation into the collaboration process (Skute et al., 2019). Accordingly, this theoretical framework can elucidate how the establishment of multiple goals influences the interaction between firms and university partners in UICs (Fini et al., 2019).

Goal attainment strategies can be traced back to the behavioral theory of the firm, which was developed in the early 1960s by Cyert and March (1963). The aim of the behavioral theory was to focus on firms' decision-making and behavior, including how firms behave to attain multiple goals (Cyert and March, 1963).

The multiple goals of firms were found to be either facilitative or conflicting (Unsworth et al., 2014). Studies on facilitative goals (i.e., goals interrelated through hierarchical levels or through activation links) suggest that multiple goals are attained through a sequential attention strategy, where the employees in the firm work to attain one goal at a time (Greve, 2008). This means that the goals are temporally separated (Ethiraj and Levinthal, 2009) and all other goals are attended to only when the first one is achieved (Unsworth et al., 2014). A sequential attention strategy is mainly based on the notion that multiple goals have a predetermined priority order, thus suggesting that the decision-makers in organizations agree about which goal to attend to first (Gaba and Greve, 2019); for example, profitability is often considered the dominant goal and is thus the goal that is attended to first (Shinkle, 2012).

Moreover, organizations may also have conflicting goals (e.g., profitability and safety) that require conflicting actions (Gaba and Greve, 2019). Prior studies have suggested that to attain these conflicting goals, organizations may try to work on both goals simultaneously (Zellweger et al., 2013) by, for example, spatially separating the

different goals (Ethiraj and Levinthal, 2009), allowing one department to work on one goal and another department to work on another goal, which in turn ensures that the goals are attended to simultaneously. However, this strategy is often resource intensive and financially costly (Zellweger et al., 2013, Obloj and Sengul, 2020). Simultaneous attainment may also cause internal coordination problems, because different actors may want to pursue different goals (Ethiraj and Levinthal, 2009). Conflicting goals can also be sequentially attended to in response to feedback about the firms' or organizations' performance (Gaba and Greve, 2019). For example, Gaba and Greve (2019) studied the goals of safety and profitability in airlines and found that firms chose to attend to goals based on the performance of the firm (e.g., the safety goal is pursued when safety performance is low).

While these strategies can help shed light on how firms and university partners attend to the multiple goals of research and innovation in research centers, scholars have mainly had an internal firm focus (e.g., Greve, 2008, De Massis et al., 2018, Hu and Bettis, 2018). Thus, these strategies are scarcely investigated in institutionally complex settings (Audia and Greve, 2021) such as research centers, where there is no clear order of priority for the established goals (Gaba and Greve, 2019).

2.6. Conceptual framework

To answer the overarching research question, this thesis uses the theoretical frameworks of coordination mechanisms, strategic responses, and goal attainment strategies to shed light on how firms and university partners may manage and achieve multiple goals in UICs (de Wit-de Vries et al., 2018, Fini et al., 2019, Skute et al., 2019) (see Table 2.3.). In this section, I will summarize the gaps presented and the theoretical frameworks that will contribute to addressing the research sub-questions, which in turn will contribute to the answer to the overall research question, How do multiple goals influence UIC processes?

The overarching purpose of this study is to respond to the call made by Fini et al. (2019), namely, that we need more insights into the multiple goals of UICs and the

influence these goals have on collaboration processes. Thus, all the papers in this thesis draw on the organizational goal literature (Cyert and March, 1963, Greve, 2008), focus on multiple goals from various perspectives, and contribute insights at the research center level, project level, and firm and university partner level. However, these papers use different theoretical perspectives to explain different aspects of how multiple goals influence the collaboration process. Therefore, these different theoretical frameworks, and different aspects of research center, can help us develop our theoretical and empirical understanding of how multiple goals influence UIC processes through the behavior and actions of the partners involved (see Table 2.3).

The first research sub-research question, *How do firms manage multiple goals in UICs?* is addressed in Papers 1 and 2. Paper 1 has a firm-level focus and explores how firms' own UIC goals influence how they coordinate with the university-industry research center and answers the calls made by Skute et al. (2019) related to how firms' goals influence firm behavior in UICs. Drawing on the framework of coordination mechanisms enables us to explain how, based on the firms' different goals, firms try to adjust to (Caldwell et al., 2017) or steer the research centers' actions (Dao and Strobl, 2019) through formal and informal activities. Thus, drawing on coordination mechanisms enables us to get more in-depth insights into how firms try to manage the research centers' focus on the attainment of their own goals.

While Paper 1 focuses mainly on how firms' own goals influence their management of UIC processes, Paper 2 focuses on how firms try to manage the university partners' goals in a university-industry research center. By specifically studying how firms manage and deal with the university partners' conflicting goals in UICs, Paper 2 answers the call made by de Wit-de Vries et al. (2018) for a more structured approach to studying single attributes of cultural differences and the attributes' effect on collaboration success. Thus, Paper 1 takes on a firm-level

perspective and focuses specifically on how firms deal with goal conflicts and how the management of goal conflicts can influence the collaboration process.

To examine how firms manage the university partners' conflicting goals (Paper 2), I draw on the strategic response framework, which is suitable for exploring in depth how firms respond to the goal conflicts present and as such complements the findings in Paper 1 by focusing specifically on *how* firms are involved in different activities to manage goal conflict. This in turn extends prior studies related to how firms are involved in UICs (Howard et al., 2016, Steinmo and Rasmussen, 2016). The framework has mostly had an intraorganizational focus related to how organizations manage institutional demands imposed on them by external partners with different institutional logics (Pache and Santos, 2010). The framework has only recently begun to focus on the outcomes of these strategies (Pache and Santos, 2021). Thus, to explore how firms manage their university partners' conflicting goals, I extend this strategic response literature into the UIC context by suggesting specific strategies that firms may use to manage the conflicting goals of university partners.

In sum, drawing on coordination mechanisms and strategic responses enables us to get more comprehensive knowledge of how firms, through actions and involvement in various activities, manage multiple goals in UICs.

The second sub-research question, *How do firm and university partners collaborate to achieve multiple goals in UICs?* is addressed through Papers 3 and 4. Paper 4 takes a research center perspective and focuses on how the partners in six research center develop, manage, and attain the university-industry research center goals of high-quality research and innovation during the lifespan of the research center. This paper focuses on the discussion of how multiple goals are integrated into UICs during different stages of the collaboration (Vedel, 2021) and how multiple goals are managed in institutionally complex settings (Greve and Teh, 2018, Audia and Greve, 2021).

Prior studies of UICs and organizational goal theory have established that research center have multiple and potentially conflicting goals (Gulbrandsen et al.,

2015, Steinmo and Rasmussen, 2018). However, we still do not know how these goals are integrated into the UICs and how firms and university partners manage this process (Vedel, 2021). Thus, drawing on the framework of goal attainment strategies (Greve, 2008) contributes insights into the decision-making processes and the activities established to integrate the overarching goals into the collaboration process. While this framework has mainly been used to explore how firms internally manage multiple goals (Greve, 2008), it can contribute insights into the decision-making processes and attainment activities of firms and university partners when they collaborate to attain multiple goals (Greve and Teh, 2018). Thus, extending the framework into the multiple goals of the UIC setting can contribute to understanding how firms and university partners manage goal-integrating processes.

Paper 3 takes on a multiple-level perspective and extends the work done in Papers 1 and 4. First, using the coordination mechanisms framework at multiple levels contributes in-depth insights into how firms and university partners align themselves toward each other, showing that formality and informality happen at different levels of the collaboration (Barbosa et al., 2020b). Thus, the coordination mechanisms framework is a suitable tool for understanding how partners align themselves, because the framework focuses on activities and mechanisms that contribute to the alignment and adjustment of partners (Gulati et al., 2012, Morandi, 2013). Prior studies have often suggested that UIC processes must be managed both formally and informally, depending on the nature of the task (e.g., explorative or exploitative work) (Morandi, 2013). By studying the coordination mechanisms at multiple levels, this study extends this research, suggesting that formality and informality happen at different levels in research center (de Wit-de Vries et al., 2018).

Second, the coordination framework is suitable for studying longitudinal processes by identifying how partners behave during various phases (Oliveira and Lumineau, 2017). Thus, drawing on the coordination mechanisms framework to study multiple levels over time enables us to gain more insights into how the partners manage the UIC process across stages (Skute et al., 2019).

Moreover, extending Paper 4, this study shows how firms and university partners manage to achieve the multiple goals of research and innovation at the project level. Thus, by drawing on the coordination mechanisms, this study offers insights into the processes of goal achievement and partner alignment at the project level, which have been less explored in the UIC context (Derakhshan et al., 2020).

TABLE 2.3: Overview of papers including theoretical frameworks and research gaps addressed in this thesis

Research paper	Title of the paper	Research questions	Theoretical framework	Addressed gaps
1	*How firms use coordination activities in university-industry collaboration: Adjusting to or steering a research center?*	How do firms' different goals influence their coordination activities in a university-industry research center?	Coordination mechanisms	How firms' goals influence firm behavior in UICs (Skute et al., 2019)
2	*How firms use different strategies to manage goal conflicts in university-industry collaborations*	How do firm strategies influence goal conflicts in university-industry research centers over time?	Strategic responses	Lack of adequately structured approach that distinguishes between the effects of single attributes of cultural differences and their effect on collaboration success (de Wit-de Vries et al., 2018) How firms are involved in UICs (Howard et al., 2016, Steinmo and Rasmussen, 2016)
3	*Attaining jointly beneficial outcomes: How partner alignment influences the achievement of outcomes in open innovation with science-based partners*	How does alignment at the partnership level and the project level influence jointly beneficial outcomes in science-based open innovation partnerships?	Coordination mechanisms	Empirical studies have examined how collaborations are managed over time to achieve set goals (Skute et al., 2019) Insight into management of the collaboration at the project level in university-industry research centers is needed (Derakhshan et al., 2020) Understanding of when informal or formal management mechanisms are used (de Wit-de Vries et al., 2018)
4	*Overcoming conflicting goals in university-industry research centers: Integrating and attaining academic research and firm Innovation*	How do partners in university-industry research centers establish and attain conflicting goals?	Organizational goal literature and goal attainment strategies	Understanding of the mechanisms to effectively integrate different goals of U–I collaboration partners during different stages of U–I collaborations (Vedel, 2021) Further research that explores how various goals at different levels influence the selection and interaction between the partners involved (Fini et al., 2019)

Summing up, the frameworks of coordination mechanisms, strategic responses, and goal attainment strategies are all focused on the behavior and actions of firms and organizations (Cyert and March, 1963, Argote, 1982, Oliver, 1991). Thus, they all contribute to exploring how the partners manage and attain multiple goals in UICs while also showing how the attempt to achieve multiple goals influence the behavior of firms.

To explore the behavioral aspect of firms when dealing with multiple goals, other theoretical frameworks might have been used, such as the social network framework (Brass et al., 2004), which is suitable for studying how UICs develop and survive (Geisler, 1995). However, the social network framework focuses mainly on the informality aspects of collaborations, such as the social interactions between partners, and these interactions rarely account for the more formal ways in which the collaboration is managed (Ankrah and Al-Tabbaa, 2015). Thus, the coordination framework was deemed more suitable for understanding how firms and university partners managed multiple goals and attained those goals.

Moreover, some scholars have suggested that influencing strategies can be suitable in the UIC context for understanding how firms manage UIC collaborations (Armenakis et al., 1993) because influencing strategies focus on activities related to imposing change into the collaboration (Thakhathi et al., 2019). However, the strategic response literature offers a more specific focus on how firms and organizations manage conflicting demands imposed by different partners (Pache and Santos, 2021).

Thus, the framework of strategic responses was deemed most suitable for gaining in-depth insights into how firms deal with their university partners' conflicting goals in UICs. Lastly, the use of goal attainment strategies (Greve, 2008) seems appropriate because it focuses on how organizations, through a set of practices and decision-making processes, attend to multiple goals (Ethiraj and Levinthal, 2009). Thus, by drawing on these frameworks, this thesis aims to contribute to theory-building related to firms' and university partners' behavior when dealing with multiple goals in UICs. This will hopefully improve our understanding of how UICs can achieve successful

collaborations that achieve both research and innovation goals at multiple levels (see Figure 2.2.)

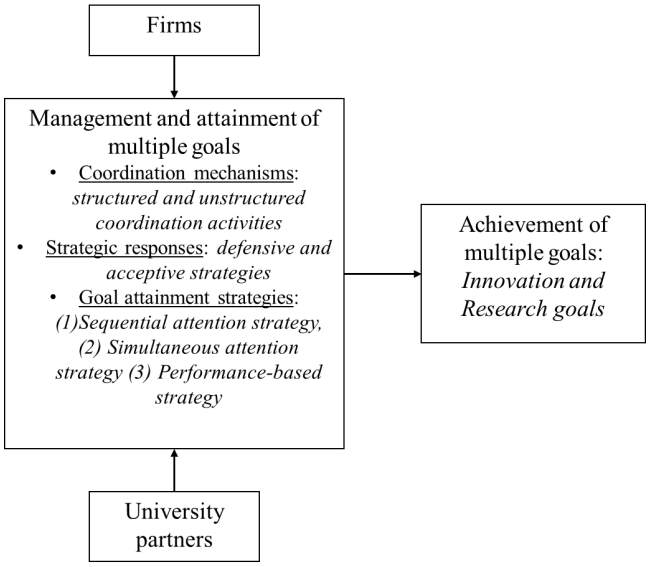


FIGURE 2.2: Overview of the theoretical frameworks used in this thesis

3. Methodology

In this chapter, I will present the methodological approach used to explore the overall research question: "How do multiple goals influence university-industry collaboration processes?" and the sub-research questions presented in the introduction. First, I will present critical realism, which is the philosophy of science this thesis is inspired by. Second, I will present, empirical setting, the choice of design, case selections, collection of data, data analysis, and quality of the research. Third, I will reflect on the ethical considerations of this thesis.

3.1. Critical realism

This thesis is inspired by a critical realism approach, which can be understood as a "middle-way" between positivism and social constructivism (Easterby-Smith et al., 2012). The critical realism approach was developed as an alternative to positivism and social constructivism, and has some similar characteristics to each of the approaches, but also includes some differences (see Table 3.1.) (Danermark et al., 2005). Positivism and critical realism share the same view of the world, which includes an understanding of reality as an objective truth (Danermark et al., 2005). This means that critical realists and positivists believe that reality is real and independent from those who observe it and that attaining knowledge about reality is possible. In this thesis, I aim to contribute with knowledge and insights into how multiple goals influence the collaborative processes. However, in contrast to positivists, critical realists also believe that reality is imperfectly apprehendable (Guba and Lincoln, 1994). As such, I also recognize that beyond the articles included here, there are other possible mechanisms, theoretical frameworks, and processes that may explain and provide other insights into the multiplicity of goals and the influence they have on collaborative processes.

Further, critical realists try to find or create plausible generative mechanisms for the observed patterns within the world (Archer et al., 2013). These patterns or mechanisms, which can contribute to knowledge about the world, are not fully

objective. Rather, this knowledge is fallible. As such, the developed knowledge about the world may not be "a single, 'correct' understanding of the world" (Maxwell, 2012b, p. 5), because knowledge development is a social practice, and knowledge created is socially constructed (Easton, 2010), similarly as in the social constructivism perspective (Easterby-Smith et al., 2012). However, where social constructivism believes that true objective facts and laws on behavior and actions cannot be found (Burr, 2015), critical realists believe that if occurrences and events are occurring enough and can be tested through multiple theories and by multiple researchers, we can understand some of the features that occur in the real world (Easton, 2010). Thus, because UICs are complex processes, I recognize that each paper in this thesis only provides some insights into the multifaceted parts of multiple goals in UICs. However, this also provides possibilities for further research, which can ensure that, ultimately, we gain a more comprehensive understanding of what actually happens in UICs as related to multiple goals.

In sum, critical realism is built on the belief that there is a reality and a real world independent from the human aspect, and that events can happen without being observed. It also acknowledges that events and mechanisms can be differently interpreted and understood by people because knowledge is socially constructed. However, critical realists believe that it is possible to gain some insights into reality, even if these insights are imperfect (Sayer, 2000, Easton, 2010).

TABLE 3.1: Comparing positivism, critical realism, and social constructivism

	Positivism	Critical realism	Social constructivism
Ontology	Reality is real, apprehensible, external, and objective	Reality is real but imperfectly apprehensible	The society's reality is socially constructed
Epistemology	Objectivist: findings are true	Modified objectivist: findings are probably true, but we cannot be sure	Subjectivist: findings are created in collaboration with others
Methodology	Mainly quantitative; experiments/surveys	Quantitative and qualitative; both interviews and surveys	Mainly qualitative; in-depth interviews and observations
Research approach	Deductive	Abductive	Inductive

(based on and inspired by Guba and Lincoln, 1994, Healy and Perry, 2000)

Related to methodology, critical realism is known to accept multiple methods, both quantitative and qualitative (Bergin et al., 2008). This is mainly because, as Sayer (2000) emphasizes, the particular methodological choice depends on the nature of the object, including what the researchers want to learn about the object. Critical realism also endorses the use of different theoretical frameworks to provide an in-depth understanding into the features of people's actions (Easton, 2010). Thus, to explore multiple goals and the influence they have on UIC processes, I have used three different theoretical frameworks: coordination mechanisms, strategic responses, and goal attainment strategies, which contributes to understanding how multiple goals influence the collaboration process in UICs.

Following the critical realist stance, this study alternates between inductive and deductive approaches (Easton, 2010). The inductive approach can be understood as a theory-building process, which begins with an open mind before searching for general themes in the data. A deductive approach can be understood as theory-testing process, where theory is tested on specific instances (Hyde, 2000). In this study, I started by using an inductive approach to explore the phenomenon of multiple goals in UICs (see Chapter 3.7). However, during the analysis process, I alternated between theory and empirical facts (Dubois and Gadde, 2002). Thus, following a critical realism approach, I

do not reject prior theoretical preconceptions, and the approach of the papers in this thesis are overall more in line with the abduction approach.

3.2. Empirical setting

The empirical setting for my thesis consists of seven Norwegian research centers, which are or were a part of a public program funded by the Research Council of Norway. To become a part of this program and attain funding from the Research Council of Norway, firms and university partners needed to develop research centers that met three specific criteria: (1) contribute to innovation and knowledge development through long-term research (Vie et al., 2014); (2) enhance research, knowledge, and innovation developments in areas that are of importance to the Norwegian industry and for the firms that are engaged in the centers; (3) the host institution for these centers had to be a university, independent research organization, or university college (Research Council of Norway, 2016).

Six of the research centers that were chosen for this study were established in 2009 with the focus of enhancing research and innovations in fields such as CO_2 storage, bioenergy, zero-emission buildings, offshore wind energy, and solar energy. These centers received up to 50% funding from the research council during the eight years in which they were active, while the firms and university partners needed to contribute with the remaining 50%. The continued funding from the Research Council was also dependent on the midway evaluation. This means that the funding for the last three years was dependent on a positive evaluation conducted by an international expert panel. All the centers in this study received funding over all eight years, which was finalized in 2017.

The last research center in this study is from the second round of approved research centers, established in 2017, and has a duration until 2024. This research center focuses on energy efficiency and has approximately 40 partners, including firms and university partners. During 2020, they went through a midway evaluation and were approved for funding for the last period. The research center was established to

focus on a specific area of innovation development, where firms and university partners are supposed to work on short-term projects that are focused on applied research and technological development, assessment, and refinement.

As such, even if there are some differences between the first round of research centers and the second round, all the centers in this study are well suited to study multiple goals in UICs' processes because the research centers include a variety of firms and university partners that collaborate to achieve high-quality research and innovations (Gulbrandsen et al., 2015). Moreover, the research centers are long-term, which enables the examination of the underlying dynamics of firms and university partners' collaborative processes over time (Plewa et al., 2013, Okamuro and Nishimura, 2018).

3.3. Case study design

To explore how multiple goals influence UIC processes in research centers, this study uses a qualitative research method. Qualitative research methods enable the research process to be open and flexible (Denzin and Lincoln, 1994) and are suitable when the aim of the study is to gain an in-depth understanding of complex processes or complex phenomena such as UICs (Boardman and Gray, 2010, Easton, 2010), which is in line with the critical realism approach (Sayer, 2000, Maxwell, 2012a).

There are numerous qualitative research methods (Creswell and Poth, 2017). However, the case study approach was deemed most appropriate for several reasons. First, case studies aim to explore and enhance the understanding of specific settings (Eisenhardt, 1989). This thesis addresses a specific setting, namely research centers (Yin, 2014). Second, case study designs are especially warranted when studying a phenomenon that requires theory-building, rather than theory-testing (Eisenhardt, 1989). In that regard, my study aims to build theory (Eisenhardt and Graebner, 2007, Yin, 2014) on how multiple goals are managed and influence UICs.

Third, when the aim of the research is to explore a phenomenon and explain some circumstances through research questions starting with "how," such as "How do

multiple goals influence UIC processes?," the case study approach is deemed appropriate (Yin, 2014). In my case, all the papers and the sub-research questions start with "how" and aim to explore various circumstances related to multiple goals in UICs. Fourth, case study designs often require being developed over time, where the data collection processes are conducted longitudinally (Yin, 2014). This thesis has had a development process spanning a number of years, which enabled me to collect longitudinal data. A longitudinal case study approach enabled the attainment of in-depth insights into how specific conditions and dynamics can change over time (Yin, 2014). Thus, the case study approach is selected because it offers an opportunity to explore how multiple goals influence collaborative processes over time in UICs.

Fifth, case study designs are commonly used in settings where the researcher cannot manipulate or control the situations (Yin, 2014). This also applied for my study, where the established goals (at multiple levels in UICs) and how firms and university partners were influenced by and managed these goals were out of my control. However, in line with critical realism, I knew that my understanding of the circumstances and dynamics that occurred were subjective. Thus, to minimize the risk of a scarce understanding of the dynamics within university-industry research centers, I combined and collected data from multiple sources (Yin, 2014). This also enabled me to conduct an in-depth exploration of the phenomenon I was studying.

Case study designs can take on various forms, such as multiple case study design, or single case study design (Creswell and Poth, 2017). For this thesis, I have combined both a single embedded case study design and multiple case study design in various papers (see Table 3.2.).

The single case study design is appropriate under five conditions. The five conditions involve having a case that is either (1) critical, (2) unusual, (3) common, (4) revelatory, and/or (5) longitudinal (Yin, 2014). The single embedded case study (Yin, 2014) in my thesis is both critical and longitudinal. The case in my thesis is a university-industry research center and is both longitudinal and of critical strategic importance to

better understand firms and university partners' collaboration processes when they collaborate to attain research and innovations goals.

In one of the papers, a multiple case study design was used because it could contribute with strong results. The design allows for examination of the similarities between cases and contributes to theory building (Eisenhardt, 1989, Eisenhardt and Graebner, 2007).

To get in-depth insights into these processes, this thesis operates with different units of analysis at multiple levels (research center, firm, and project). This is in line with the critical realism approach, because multiple levels of analysis enable a more comprehensive understanding of UICs (Sayer, 2000, Maxwell, 2012b). The units of analysis were based on the developed research questions (Yin, 2014). The main research question of this thesis focuses on and explores how multiple goals influence the UIC processes, which means the units of analysis are not UICs in particular, but rather the processes between firms, university partners, and the research center that influence and are influenced by the multiple goals present. Thus, to explore the overarching research center, this study uses different levels of analysis, where the units of analysis are the research centers, firms, and three R&D projects (see Table 3.2. for an overview).

TABLE 3.2: Methodology used in the papers

Paper	Title of the paper	Research questions	Methodology	Case selection	Unit of analysis
1	"How firms use coordination activities in university-industry collaboration: Adjusting to or steering a research center?"	How do firms' different goals influence their coordination activities in a university-industry research center?	Embedded case study design	8 firms and 6 university partners in 1 research center	1 research center and the firms' relations towards the research center
2	"How firms use different strategies to manage goal conflicts in university-industry collaborations"	How do firm strategies influence goal conflicts in university-industry research centers over time?	Embedded case study design	14 firms and 6 university partners in 1 research center	1 research center and the relationship between firms and university partners
3	"Attaining jointly beneficial outcomes: How partner alignment influences the achievement of outcomes in open innovation with science-based partners"	How does partner alignment at the partnership level and the project level influence jointly beneficial outcomes in science-based, open-innovation partnerships?	Embedded case study design	Eight university partners at the partnership level and 3 R&D projects at the project level	1 research center and the relationship between firms and university partners at multiple levels
4	"Overcoming conflicting goals in university-industry research centers: Integrating and attaining academic research and firm innovation"	How are "conflicting" goals attained in UICs over time?	Multiple case study design	6 research centers	6 research centers and the practices between the partners within the centers

3.4. Data collection

The main data source of my work is interviews, where the two data sets were used in different papers (see Table 3.4 for an overview of data sets and papers). In data set 1, I had the lead role in collecting data from 2018. In data set 2, I lead the follow-up interviews in 2019. In line with the critical realism approach (Easton, 2010) and case study design, I triangulated the interviews with different data sources such as observations and written documents (Yin, 2014). *Data triangulation* is an opportunity to use various sources of data to gain an in-depth account of the processes that are

being studied while minimizing misinterpretations and increasing the internal validity of the study (Yin, 2014).

TABLE 3.3: Overview of papers using data sets 1 and 2

Research paper	Type of study	Data set	Case selection	Unit of analysis
1	Embedded case study	Data set 1: 1 research center	8 firms in a research center	Firms in the research center
2	Embedded case study	Dataset 1: 1 research center	14 firms in a research center	Firms and their relation to the university partners in the research center
3	Embedded case study	Dataset 1: 1 research center	1 university-industry research center and 3 R&D projects	Firms and the university partners involved in the research center and the R&D project
4	Multiple case study	Data set 2: Six research centers	Six research centers	Firms and university partners within the research centers

3.4.1. Interview process

The main sources of data in both data sets were interviews with firms and university partners partaking in the research center, collected by two research teams. Data set 1 includes 45 interviews with a variety of firms and university partners. Data set 2 includes 72 interviews. Most of these interviews were conducted face-to-face, while some were conducted over the phone by the research teams due to geographical distances and the informants' time constrains.

The interviews conducted for both data sets were semi-structured in nature, which was suitable because the aim of this study was to explore the underlying dynamics of how firms and university partners collaborated to achieve the goals of the research centers, their own goals, and sub-goals in projects, rather than test theory through a deductive approach (Healy and Perry, 2000). By interviewing both firm representatives and university partners, I attained a comprehensive understanding of how various processes developed through multiple accounts from the different partners (Eisenhardt and Graebner, 2007).

The semi-structured interviews included open-ended questions and themes that we thought could be important. Using a semi-structured interview approach opens the process up for unexpected topics to be introduced by the informants and enables the interviewer and interviewees to steer the interview together (Harvey-Jordan and Long, 2001). Thus, we made sure to follow up on themes and topics the informants wanted to talk about.

During the data collection process for both data sets, we developed two interview guides. One guide was used to interview firm representatives and the other was used to interview the university partners. The differences in the interview guides were mostly related to the firms and university partners' internal processes. Mainly, we included questions related to how the firms were involved in the research center and how they decided to partake in the research centers. For the university partners, we included questions focused on their usual working practices, the process of how the research centers were initiated, and the process of developing an application to the Research Council of Norway. In the parts of the interview guide where we focused specifically on the collaboration process in the research centers, we made sure to use the same type of questions about the same aspects so we could extract information about how both partners experienced these aspects, activities, or projects.

For Data set 1, we revised the interview guide after we had conducted a small number of interviews during 2018. The revision of the interview guides was mainly done in response to some informants going into specific topics that we had not included priorly but were deemed important for obtaining more information from other informants. Moreover, we revised the interview guide to focus more on multiple goals, as the informants' experiences and narrative accounts of the collaborations often included goals at multiple levels. Thus, we asked questions related to how they worked to attain these multiple goals, and what was important for the firms and university partners when they collaborated to attain these goals and desired outcomes (Yin, 2014). When we collected follow-up interviews during 2019 for Data set 1, we

revised the interview guide to include questions related to changes and developments the informants had experienced during the last year.

For Data set 2, we collected follow-up interviews with the informants from 2015. During these interviews, we focused on the last years of the research centers. In particular, we focused on how firms and universities collaborated and the various activities and projects that had been developed throughout the operational period of the research centers (see Table 3.5. for overview of data sources used in this thesis).

TABLE 3.4: Overview of primary data sources and secondary data sources

Data set	Secondary sources	Informant interviews					
		2013	2015	2017	2018	2019	SUM:
Research center (2017–2019)	CEER-application, annual progress rapports, participation lists, meeting summaries			8 firm partners, 6 university partners	12 firm partners, 6 university partners	6 firm partners, 7 university partners	45 interviews
6 research centers (2009 - 2017)	CEER-application, midway evaluation, finalized reports	18 firm partners, 14 university partners	14 firm partners, 15 university partners			5 firm partners, 6 university partners	72 interviews

3.4.2. Observations and written documents

In line with both a case study design (Yin, 2014), and following the critical realism approach (Easton, 2010), I tried to gather enough data and information about the university-industry research centers to gain a comprehensive understanding of how the research centers operated. In particular, I focused on attaining information on the collaborative processes between firms and university partners through documents and observations. Attaining such information about the research centers in this study allows coming closer to the actually reality of research centers (Healy and Perry, 2000).

Both data sets (data sets 1 and 2) were supplemented by written documents. These written documents included the original research center application to the

Research Council of Norway, midway evaluations, newsletters, and annual reports. In addition, for Data set 1, I collected participation lists from various activities and project results. For Data set 2, I collected the finalized reports from the research centers. The finalized reports included an overview of all the activities the partners partook in and the outcomes that were developed in the research centers. The written documents were used to increase the validity of the study (Yin, 2014) and limit the risk of retrospective bias (Eisenhardt, 1989).

Additionally, for Dataset 1, I partook in annual meetings and workshops to understand how the research center was operated and how firms and university partners partook in these activities. The observations enabled me to understand the current situations of the research center (Kawulich, 2005).

3.5. Data analysis processes

All the papers in this study followed an abductive approach (Yin, 2014) where I alternated between empirical findings and priorly established theories (Dubois and Gadde, 2002). Specifically, the analysis processes in all four papers started through an inductive approach, where I began with an open mind and searched for general themes in data. Inductively coding the data enabled me to contribute to theory-building in UICs, rather than theory-testing of already established constructs and theories (Hyde, 2000). However, when I had coded the data, I began alternating between the empirical constructs and priorly established theories in line with a case study approach and critical realism (Dubois and Gadde, 2002, Gehman et al., 2018) because other theories could perhaps explain the findings I found inductively (Gehman et al., 2018).

As such, all the interviews were recorded and transcribed shortly after being collected (Yin, 2014) and the data analysis for all the papers started inductively. First, I used time to get an understanding of the data. During the early phases of the data analysis processes, I wrote down descriptive write-ups for all the cases in this study (Eisenhardt, 1989). This enabled me to become familiar the data and gain a more comprehensive understanding of the collaborative processes in the research centers.

In papers 1, 3, and 4, the research teams discussed the main themes of the write-ups and our understanding of the data. We tried to see if there were similarities or differences across the cases. This process of both discussing the data and writing contributed to becoming familiar with the data (Eisenhardt, 1989). For Paper 2, I performed this process alone and read through the writeups to gain an understanding of the data. This process presented some descriptive findings that were relevant to follow further. Next, when I had become familiar with the data, I used an analysis approach inspired by Gioia et al. (2013), which had three steps.

First, I took an open coding approach (Saldaña, 2015) guided by the research questions in the papers using NVivo 12. This means that the research questions set some boundaries for what I wanted to explore, which in turn steered what I looked for in the data. The open coding approach enabled me to identify the first-order codes (Gioia et al., 2013). Establishing first-order codes included coding all segments in the interviews that seemed relevant to the research question. These segments were sentences, which were categorized together. I established first-order codes for every interview and every case. When I had coded all interviews, I searched for similarities and differences among the categories, from one interview to another, then I merged the codes from the various interviews into one table (Gioia et al., 2013). This process could be understood as a spiral, where the data was coded and recoded until the codes covered the main aspects of the data.

Second, when the codes were established, the codes were grouped into themes and second-order codes. Because the codes from the first order explained a specific segment in the data, the codes were categorized into themes, focusing more on explaining the segments of the data (Saldaña, 2015). This process can also be understood as a spiral because I went from the raw data to the first-order code, and then the second-order themes, to ensure that the second-order code represented the raw data. Moreover, while the first two steps within the analysis focused heavily on categorizing the data into first-order codes and themes, the last step focused on structuring the data, as Gioia et al. (2013, p. 286) explained: “You got no data structure,

you got nothing." The structure of the data highlighted some preliminary dimensions that emerged from the themes and codes. These dimensions where made into tables and compared across the other dimensions that had appeared when the data became more structured.

Hence, up till this point, the analysis process focused on categorizing the data into codes, and the codes into themes. The next step was to pull the themes together into theoretical dimensions (Gioia et al., 2013, Gehman et al., 2018). These theoretical dimensions made it possible to highlight some aspects of how firms and university partners managed and attained multiple goals in UICs.

Third, when the theoretical dimensions were established, I compared the constructs and dimensions with established theories (Eisenhardt, 1989). This means that the analyzed dimensions were compared to the preceding literature to find similarities and differences with previous concepts, theory, and hypotheses (Eisenhardt, 1989). In Paper 1, I found a theoretical framework that could explain my findings. In papers 2, 3, and 4, I built upon prior theories and extended them into the context of UICs. These contributions are visualized in figures in the papers (Gioia et al., 2013). Thus, while the data analysis process began inductively, this study alternated between an inductive approach (Easton, 2010) and comparing it previously established theories (Järvensivu and Törnroos, 2010), which can be categorized as an abductive approach to data analysis, which is also in line with a critical realist approach (Easton, 2010).

The last of step of the analysis process for all the papers of this study related to understanding how the identified constructs developed over time, as this thesis is built on longitudinal data. As such, I tried to provide some explanations of the findings over time (Easton, 2010). In papers 1 and 4, these explanations were developed into propositions. In papers 2 and 3, we developed specific implications and made suggestions for further research.

3.6. Reflections on research quality

The validation of qualitative research can be evaluated through *credibility*, *confirmability*, *dependability*, and *transferability* (Lincoln and Guba, 1985, Nolan and Behi, 1995). I will use these criteria to evaluate the quality of my research.

Credibility can be understood as internal validity, and is concerned with how credible the findings and conclusions are in relation to those who are the subjects of the study (Nolan and Behi, 1995). To ensure that the findings and results in my work are credible and have internal validity, all the papers in this study used method triangulation, which means that multiple data sources were triangulated (Yin, 2014). The data triangulation contributes to ensuring that the findings in the papers were recognized by other informants. Additionally, documents such as participation lists, project reports, and annual progress reports were used to ensure that the findings matched with the developments and the activities in the research centers. Moreover, the co-authors in papers 1, 2, and 4 partook in the data collection and analysis process, which ensured that the findings and conclusions were in line with the raw data (Yin, 2014). In addition to collecting the data for this thesis and developing papers, I have engaged in various practical activities related to the dissemination and discussion of my research on multiple goals in UICs (see Table 3.9 for overview).

The participation in these activities have given me a better understanding of how the firms and university partners work. Simultaneously, the possibility to present my work in various forums (e.g., annual research center meetings and industrial clusters) enabled me to obtain feedback on the work and ensured the practical relevance of this thesis while I was working on it. Moreover, being able to collaborate with another PhD. student from a different university (NTNU) in a different research field, visit another university, and present my work for researchers enabled me to get feedback from experts in the field and contributed to the development of the papers and the thesis as a whole.

TABLE 3.5: Overview over practical activities

Practical activities related to the research process	
2018 – 2021	Collected data and participated in a project (ACT) developed by industrial actors in northern Norway[1]
2019 – 2021	Collected data and wrote a research paper with a PhD-student at NTNU[2]
2020	Visiting scholar at the university of Bologna, Italy
2020	Presented paper 1 at an annual meeting in the research center I was studying
2020	Collected data and partook in developing an application for the Arena Pro initiative[3]

Confirmability can be understood as objectivity, and relates to the reality of the conclusions drawn by the researchers (Nolan and Behi, 1995). In other words, confirmability concerns the researchers' ability to present findings as objectively as possible without letting potential biases influence the analysis, while also being open about the possibility of existing biases (Lincoln and Guba, 1985). Accordingly, in all the papers, I present the data collection and analysis process, and I illustrate this often in figures and tables. Moreover, the empirical findings are presented with the actual quotes from interviews (and documents in Paper 4) in text and tables (Eisenhardt, 1989). By highlighting these aspects of the data collection and data analysis process, I render the data collection and analysis processes transparent, showing the process behind the conclusions I draw.

Dependability can be understood as reliability in quantitative studies (Lincoln and Guba, 1985) and relates the studies' consistency across both researchers and methods. In other words, dependability refers to the stability of data over time and

[1] ACT was a project funded by industry actors in northern Norway and Innovation Norway, which aimed to develop a world class industry by increasing the regions attractiveness, enhancing competence and create radical innovation, which generates global impacts. To learn more about project see: https://arcticclusterteam.no/about-act/

[2] The research paper was published in September 2021 in Journal of Cleaner Production: https://doi.org/10.1016/j.jclepro.2021.129077

[3] Arena Pro initiative is funded by Innovation Norway, that aim to strengthen the collaboration between firms and research organizations through cluster and network programs. This new initiative was a further development of the Arena-cluster project which I partook in from 2018. During this process we interviewed about 40 firms and had workshops with firms and research organizations. I summarized our findings and presented them for the board of directors in ACT.

under various conditions (Ali and Yusof, 2011). Thus, to ensure a dependability in the findings and conclusions, the researchers collecting the data often interviewed the informants together, especially in the first interviews, to ensure that we all had a consistent interviewing style. Moreover, all the co-authors were involved in data analysis and discussions related to the findings (Miles et al., 2014).

Transferability can be understood as external validity and concerns the generalizability of findings and conclusions (Lincoln and Guba, 1985). Moreover, it relates to the extent to which the results can be applied in similar settings (Nolan and Behi, 1995). Generalizing findings stemming from qualitative research is always challenging, especially if the generalizability is supposed to be statistical (Yin, 2014). However, generalizability is often not the point of qualitative research, because qualitative researchers are often more concerned with understanding (Miles et al., 2014). Therefore, qualitative research often prefers the term transferability and collects enough data to make transferability possible (Lincoln and Guba, 1985). Thus, to enhance the transferability in this study, all the papers in this study include a context section and a description about the case and the analytical method, both in text and visually. This ensures that the findings, settings, and analytical method are transparent. Moreover, all papers include a further research section, with suggestions on how the results can be further tested in other contexts and settings. Papers 1 and 4 also include propositions, suggesting how relationships between variables can exist outside of these studies. Thus, during the research process, I have sought to develop high-quality research and provide as much transparency as I can while simultaneously protecting my informants.

3.7. Ethical considerations

Ethical issues and considerations in qualitative research can be distinguished into two groups: *procedural ethics* and *ethics in practice*.

Procedural ethics relates to seeking approval from ethical committees that are relevant when conducting research that involves human beings (Guillemin and Gillam,

2004). To ensure that my research is in line with the ethical guidelines in Norway, I sent in my proposed study to the Norwegian Center for Research Data (NSD). I included the interview guide and a plan for protecting the collected data. This application was approved by NSD. During the PhD. process I have revised this application to ensure that the NSD has the newest information related to the type of data I have collected and how I have stored it.

Ethics in practice relates to the day-to-day issues that might arise during the research process (Guillemin and Gillam, 2004). This can be understood as ethical considerations of the human subject and those related to the research community.

As such, the most important aspect when dealing with human beings is to protect them (Yin, 2014). To protect the informants in this study, I have followed criteria used by Christians (2000).

First, *informed consent* relates to the information the informants receive related to the use of the data and the aims of the research (Christians, 2000). All the informants in this research project were informed about it and what the aim of project was, both in writing and verbally. They also were informed that participation is voluntary, and that they could withdraw from the study when they wanted. The anonymity was clarified and agreed upon before the interviews began. Second, *deception* relates to providing the informant with enough information about the research (Christians, 2000). I explained in detail what the data would be used for and how they would be handled.

Third, *privacy and confidentiality* relates to unwanted exposure of the informants and the accuracy in how data is analyzed (Christians, 2000). In this thesis I have made sure that all the informants and their companies are anonymous. Moreover, I have been vigilant in not including quotes and statements that are related to the firms' and university partners' confidential information. Thus, I have to the best of my ability tried to protect the informants of this study to ensure that their privacy and anonymity is intact.

Ethical considerations related to the research community is also important and have to be considered. In this thesis, I have taken seriously the responsibility of

transparency in research. This means that I have presented the data accurately and described the methodology used in each paper so that others can read through my methodology and findings and understand how I retrieved the results that I did. Moreover, I have presented all the papers at academic conferences such as the Technology, Transfer and Society Conference 2018 (Paper 1), R&D Management Conference 2021 (Paper 2), Innovation and Product Development Management Conference 2021 (Paper 3), and Academy of Management Conference 2021 (Paper 4).

Further, I have ensured that my research cites the sources used to ensure that prior research is not understood as my own. Paper 1 has been through a peer review process with a journal, while all the other papers will be sent (or have already been) to academic journals for review. Lastly, to ensure transparency, I have acknowledged everyone who has contributed with feedback and suggestions on my work, and I have disclosed funding received from the Research Council of Norway, even though this funding has not impacted or influenced the research.

4. Summary of empirical studies

In this section I will present the research papers contributing to answering the overarching research question.

Table 4.1. provides a summary of the research papers, including authors, research questions, theoretical perspective, type of study, focus and publication status.

TABLE 4.1: Overview over research papers

	Authors	Title	Research question	Theoretical frameworks	Type of studies	Focus	Publication status
1	Isaeva, I Steinmo, M, Rasmussen, E	How firms use coordination activities in university-industry collaboration: Adjusting to or steering a research center?	*How do firms' different goals influence their coordination activities in a university-industry research center?*	Coordination mechanisms	Qualitative: Eight firms and six university partners in one research center	Examines how firms coordinate towards research center	Published chapter in Journal of Technology Transfer
2	Isaeva, I	How firms use different strategies to manage goal conflicts in university-industry collaborations	*How do firm strategies influence goal conflicts in university-industry research centers over time?*	Strategic responses	Qualitative: 14 firms and six university partners in one research center	Explore how firms' use of various strategies influence goal conflicts	Presented at the R&D Management Conference (2021). Currently preparing for submission to a journal.
3	Isaeva, I, Ooms, W, Johansen, J. P	Attaining jointly beneficial outcomes: How partner alignment influences the achievement of outcomes in open innovation with science-based partners	*How does partner alignment at the partnership and the project level influence jointly beneficial outcomes in science-based open innovation partnerships?*	Coordination mechanisms	Qualitative: One research center and three R&D projects	Examines how firms and university partners align themselves towards each other to attain goals of research and innovation at the project level	Presented at Innovation and Product Management Development Conference (2021). Currently preparing for submission to a journal
4	Isaeva, I, Lauvås, T, Steinmo, M, Rasmussen, E	Overcoming conflicting goals in university-industry research centres: Integrating and attaining academic research and firm Innovation	*How do partners in university-industry research centres establish and attain conflicting goals?*	Organizational goal literature and goal attainment strategies	Qualitative: Six research centers	Explores goal attainment strategies to achieve the goals of research and innovation in research centres	Presented at Academy of Management (2021). Currently preparing for submission to journal.

4.1. Paper 1: How firms use coordination activities in university-industry collaboration: Adjusting to or steering a research center?

4.1.1. Introduction and research question

This study explores how firms' goals influence firm behavior in research center. The UIC literature has emphasized that firms and university partners often have diverse sets of goals, which can hamper the collaboration process and knowledge and technology transfer (e.g. Holstein et al., 2018, Kotlar et al., 2018, Tijssen, 2018). However, prior studies have given less attention to how differences in these goals may influence the UIC processes (de Wit-de Vries et al., 2018), and how these goals influence the decision making and behavior in UICs (Fini et al., 2019). Hence, in this study we focus on how firms' different goals may influence their behavior in research centers by addressing the following research question: *How do firms' different goals influence their coordination activities in a university-industry research center?*

4.1.2. Theoretical approach

To understand how firms behave in research center, this study draws on the coordination mechanism literature, which is a well-established framework in the management and organization literature (e.g. Argote, 1982, Malone, 1987, Mom et al., 2009). Coordination mechanisms can be defined as 'activities towards the aim of … cooperative agreement" (Morandi, 2013, p. 71), which is suitable for studying firms actions in a research center.

Coordination mechanisms can be divided into two categories: structured coordination activities and unstructured coordination activities (Claggett and Karahanna, 2018). Structured coordination activities are established by a central management, and are predetermined and established prior to task execution (Fernandes et al., 2018). Unstructured coordination activities relates to activities which are unscripted and ad hoc (Argote, 1982), and are often executed by a decentralized

management or the partners involved in collaborations (Arenas and Ayuso, 2016). In this paper we use the coordination mechanisms framework to understand how firms with various goals behave in UIC to attain their goals.

4.1.3. Methodology

To address the research question, we used a qualitative embedded case study design (Eisenhardt, 1989, Yin, 2014) of one university-industry research center. The primary data were based on 28 semi-structured interviews; 16 interviews with eight firm representatives, and 12 interviews with university partners. These interviews were collected in two rounds: the first round in 2017, and the second round in 2018. The data was first coded inductively following a within case analysis (Eisenhardt, 1989) to get familiar with each case.

Next, we conducted an inductive data-analysis process inspired by the Gioia-method (Gioia et al., 2013). When we had identified the firms' activities, we used the research question and the theoretical framework to label the codes. After this was done, we structured the codes based on the two phases in our study (preformation and formation phase). From there, we did a cross case comparison of the firms' goals and coordination activities, to seek out similarities and differences between the firms' goals and their activities during the two phases (Eisenhardt, 1989). This analysis process enabled us to construct a theoretical model showing how firms with different goals adjusted to or steered the research center.

4.1.4. Key findings and contribution to thesis

This study takes a firm level perspective and explores how firms with different goals coordinate towards the university-industry research center, which addresses sub research question 1: *"How do firms manage multiple goals in UIC?"*. This study shows that firms enter research center with multiple goals, which can be categorized as either highly knowledge intensive goals, or less-knowledge intensive goals. Thus, in comparison to prior studies (Ankrah and Al-Tabbaa, 2015, Steinmo, 2015), this study

highlights the diversity in firms and their goals, and as such contributes to diversifying our understanding of firms that are partaking in these types of UICs.

Additionally, the key findings show that based on the different goals the firms enter the collaboration with, they coordinate differently towards the university-industry research center with the aim of attaining these goals. Hence, our findings highlight the link between what firms want to achieve, and how they engage in and manage the research center to attain these goals, which is a less investigated area (Skute et al., 2019).

Furthermore, a notable finding from this study is that firms with less knowledge-intensive goals were more active in the research center in activities such as contract development, and partook more in predetermined research activities, while firms with highly-knowledge intensive goals engaged more in ad hoc and unscripted activities, that were mainly established by the firms. Hence, this study suggests that firms with less-knowledge intensive goals coordinate through structured activities in a larger degree, and in turn engage in steering the university-industry research center towards the firms' goals. The firms with highly-knowledge intensive goals coordinated towards the university-industry research center more ad hoc, and in a larger degree through unstructured activities, which in turn led the firms to adjust towards the research center. As such, these findings contribute to the UIC literature by highlighting how the firms engage and coordinate their behavior towards the research center over time (Skute et al., 2019)

4.2. Paper 2: How firms use different strategies to manage conflicting goals in a university-industry collaborations

4.2.1. Introduction and research question

In this paper, I explore the strategies firms use to manage goal conflicts in research center. Collaborations in research center often experience goal conflicts, because firms and university partners generally want to achieve different outcomes (Lauvås and Steinmo, 2019). Firms often want to attain outcomes that are related to knowledge, technology and innovations which are directly beneficial for the firms' processes, while university partners often aim to develop high-quality research and knowledge which can be publicly shared (Canhoto et al., 2016). These goals often influence what the firm and university partners give attention to in these collaborations, and this conflicting focus may impede the collaboration (Lauvås and Steinmo, 2019), because of the misalignment between partners (Pache and Santos, 2010).

To manage the conflicting goals prior studies have emphasized the need to be highly involved in the collaboration, however, what actions firms undertake when they are involved (Howard et al., 2016, Steinmo and Rasmussen, 2016), and especially how they manage conflicting goals are less studies (de Wit-de Vries et al., 2018). Thus, this study draws on the strategic response literature (Oliver, 1991, Pache and Santos, 2021), which focuses on firms responses to conflicting demands in institutionally complex settings (Pache and Santos, 2010) and addresses the following research question: *How do firm strategies influence goal conflicts in university-industry research centers over time?*

4.2.2. Theoretical framework

Literature highlights the importance of being involved in the collaboration process to manage and mitigate tensions and conflicts, and in turn achieve valuable outcomes (Steinmo and Rasmussen, 2016, Lauvås and Steinmo, 2019). In this paper, I draw on strategic response framework to get in-depth insights into how firms are involved to manage conflicting goals.

Strategic response literature focuses on firms' responses and strategies to manage conflicting demands imposed on them by external and different partners (Pache and Santos, 2010). Strategic responses can be categorized into two groups: defensive responses and acceptive responses (Oliver, 1991).

Defensive responses can be understood as strategies that focus on protecting the firms' interests and goals (Oliver, 1991), and studies suggest that these strategies are often used in situations where firms are in a position of power and have resources that can be used to bargain with (Luo et al., 2008).

Acceptive responses are strategies which focus on bridging and aligning the partners' different interests, actions and goals (van Fenema and Loebbecke, 2014). Acceptive strategies often entail the use of selective coupling, where firms and their partners couple specific practices to find a balance between firms' practices and the partners' practices (Pache and Santos, 2013). These different strategies are found to be important for managing partners in institutionally complex settings, such as interorganizational partnerships (van Fenema and Keers, 2018, Ahmadsimab and Chowdhury, 2019).

4.2.3. Methodology

To address the research question: "*How do firm strategies influence goal conflicts in university-industry research centers over time?",* qualitative research seemed to be most suitable, because qualitative research can contribute with in-depth insights into firms strategies and actions (Cunningham et al., 2017). Furthermore, I used an embedded multiple case study design to better illuminate how firm strategies

influenced the goal conflicts, by studying 14 firms in one university-industry research center, from 2017 until 2019. The data analysis process was inspired by an inductive coding approach (Gioia et al., 2013), which illuminated the various activities within each strategy. When the strategies were identified, I mapped these strategies over time, to see how they were used, and how they influenced the goal conflicts.

4.2.4. Key findings and contributions to thesis

This study takes on a firm level perspective, draws on strategic response literature and contributes to theory-building in UICs by addressing sub research question 1: *"How do firms manage multiple goals in UIC?".* This study shows that due to the challenging collaborative processes with dissimilar partners (Bruneel et al., 2010), firm strategies are important to manage and mitigate goal conflicts between firms and university partners.

As such, this study shows that firms may use different strategies (e.g., assertive strategy, bridging strategy and passive strategy) to manage the conflicting goals of university partners. However, only the use of bridging strategy actually enables the partners to mitigate the goal conflicts. This strategy enables the firm partners to be involved in the research center activities in such a way that firms and university partners manage to bridge their different goals within a timeframe that suits both of the partners. As such, the most notable finding from this study is related to how firms' involvement in UICs influences goal conflicts. Prior studies have highlighted the importance of being highly involved in UICs to ensure effective collaborations, and mitigating challenges such as goal conflicts (Steinmo, 2015, Lauvås and Steinmo, 2019). However, this study extends these findings, by suggesting that goal conflicts are actually mitigated and managed through specific strategies and sets of activities which the partners are involved in (Steinmo and Rasmussen, 2016). Thus, this study suggests that to manage goal conflicts, firms need to be involved in specific sets of activities that bridge the firms and university partners interests and timeframes.

Moreover, by focusing specifically on conflicting goals, this study contributes with more in-depth insights into one specific challenge which UICs often experience. While prior studies often explore multiple challenges, there have been calls made to separate these challenges (de Wit-de Vries et al., 2018), because firms may use different strategies to manage different challenges (Smith and Lewis, 2011). In addition, different challenges may also influence the collaborative process differently (Estrada et al., 2016).

These findings have important implications for when firms engage in UICs, suggesting that firms need to be involved in specific activities to achieve effective collaborations(Howard et al., 2016, Steinmo and Rasmussen, 2016), and as such extends the UIC literature by showing how firms may manage conflicting goals in collaboration with university partners(Estrada et al., 2016).

4.3. Paper 3: Attaining jointly beneficial outcomes: How partner alignment influences the achievement of outcomes in open innovation with science-based partners

4.3.1. Introduction and research question

In this paper, we examine partner alignment at the partnership (research center level) and project level to achieve goals of research and innovations in science-based partnerships. Although science-based partnerships are a way to organize for open innovations and are known to yield positive outcomes for the partners involved (Perkmann and Walsh, 2007, Du et al., 2014, Beck et al., 2020). Prior studies have shown mixed results related to achieving these outcomes and attaining a successful collaboration (Laursen and Salter, 2006). A plausible reason for mixed results, may be that much research on open innovation and science-based partnerships have mainly focused on the firm level (Du et al., 2014, Barbosa et al., 2020b), and overlooked the project level.

When engaging in science-based partnerships, firms are likely to work on multiple projects, which means that the firm level results obtained in science-based partnerships, may differ from the results obtained at the project level (Vanhaverbeke et al., 2014, Gama et al., 2017, Kobarg et al., 2019). Hence, to understand how firms and science-based partners may achieve jointly beneficial outcomes, such as research and innovation, this study draws on the coordination mechanisms concept (Claggett and Karahanna, 2018), which focuses on how partners can align themselves with each other (Gulati et al., 2012). In addition, this study takes on a multi-level perspective, exploring a science-based partnership and three R&D projects by asking the following research question: *How does partner alignment at the partnership and the project level influence jointly beneficial outcomes in science-based open innovation partnerships?*

4.3.2. Theoretical framework

The coordination mechanisms framework is a well-established concept focusing on activities and tools which can be used to manage uncertainty in collaborative processes (Argote, 1982). According to prior studies, there are two types of coordination mechanisms: structured and unstructured activities (Claggett and Karahanna, 2018). Structured coordination activities are formal, predetermined, and established by a centralized management (Argote, 1982, Andres and Zmud, 2002), whereas unstructured coordination activities are informal, ad hoc, and often determined by a decentralized management (Van de Ven et al., 1976, Tsai, 2002).

4.3.3. Methodology

The research question is addressed through an embedded multiple case study (Yin, 2014), and builds on longitudinal data from 2017 – 2019 focusing on the partnership level of a science-based partnership and three R&D projects within the partnership. The primary data source builds on 27 semi-structured interviews with firms and science-based partners. The transcribed interviews were first coded based on an initial coding (Saldaña, 2015) to structure and identify the main concepts in the data, before following the Gioia-method (Gioia et al., 2013) to find out how firms and science-based partners aligned themselves towards each other to achieve shared benefits. From there we did a cross-case comparison at the project level (Eisenhardt, 1989) to discover patterns which could explain how various forms of alignment through coordination activities influenced the attainment of jointly beneficial outcomes.

4.3.4. Key findings and contribution to thesis

This study focuses on partner alignment at multiple levels (research center and project level) and addresses sub research question 2: "*How do firm and university partners collaborate to attain to multiple goals of UICs?".*

By studying partner alignment at multiple levels in a university-industry research center and three R&D projects, this study contributes with new insights into how partner alignment between firms and university partners may contribute to achieve jointly beneficial outcomes such as research and innovation at the project level, while also highlighting how some firm and university partners may fail in attaining these benefits. This study contributes with more in-depth insights into how the collaboration process between firms and university partners develops over time (Skute et al., 2019), and how firms and university partners manage the collaboration process at multiple levels, which still is a scarcely investigated area (Derakhshan et al., 2020).

The main finding from this study relates to how firms and university partners coordinate their actions to align themselves towards each other at the research center and the project level. Thus, our findings show that at the research center level, the partners partake in structured coordination activities, while at the project level they engage and partake in unstructured coordination activities. Moreover, this study suggests that while coordination and alignment at the partnership level enables the partners to collaborate at the project level, it is the unstructured and informal coordination at the project level that seems decisive for attaining the outcomes of both research and innovations.

Lastly, this study extends prior UIC literature by highlighting the formality and informality which is required to achieve partner alignment and jointly beneficial outcomes (Skute et al., 2019).

4.4. Paper 4: Overcoming conflicting goals in university-industry research centers: Integrating and attaining academic research and firm innovation

4.4.1. Introduction and research question

In this paper, we explore how the overarching goals of high-quality research and innovation developments in research center are attended to over time.

Research centers are contractual agreements between firms and university partners, that enables the partners to collaborate across institutional boundaries (Gulbrandsen et al., 2015). To enable collaboration between these partners, research center often establish two overarching goals: (1) high-quality research and (2) innovation developments (Gulbrandsen et al., 2015). The firms and university partners partaking in these centers often establish their own goals when entering into these sorts of collaborations (Bruneel et al., 2010, Ranganathan et al., 2018).

Firms' goals are often related to specific knowledge, technology, and innovation developments, which can contribute to the firms' innovative efforts (Abramovsky et al., 2009, Gilsing et al., 2011, Canhoto et al., 2016). University partners establish goals related to achieving academic novelty and developing publicly available knowledge (Aghion et al., 2008, Perkmann et al., 2018). Hence, firms and university partners often favor the overarching goals differently, which in turn can create conflicts (Lind et al., 2013, Sjöö and Hellström, 2021) related to what goal should get priority (Ambos et al., 2008).

Thus, research center have specific organizational structures that are supposed to ensure that the firms and university partners can achieve these conflicting goals by engaging in projects that adhere to both partners (Gulbrandsen et al., 2015). These organizational structures include a blended board of directors, including both firms and university partners, a budget, and a workforce mainly comprising researchers (Perkmann et al., 2018). However, how firms and university partners, partake in these institutionally complex research centers and attain these multiple and conflicting goals,

is still scarcely investigated (Audia and Greve, 2021). Especially, there seems to be a bit ambiguity related to how these partners, that adhere to different institutional logics prioritize conflicting goals (Gaba and Greve, 2019). Thus, this study addresses these ambiguities by asking the following question: *How do partners in university-industry research centers establish and attain conflicting goals?*

4.4.2. Theoretical framework

This paper is built upon the organizational goal literature (Gagné, 2018), and goal attainment strategies (Greve, 2008, Gaba and Greve, 2019). Organizational goal literature suggests that attainment of multiple goals is influenced by the characteristics of goals (Unsworth et al., 2014). If the goals are facilitative (Kruglanski et al., 2002), organizations can attain one goal after the other (Gagné, 2018), through a sequential goal attainment strategy (Greve, 2008)

When the multiple goals are conflicting, and require conflicting actions, the attainment of these goals are often more complicated, because agreeing on an attainment strategy may be difficult (Gaba and Greve, 2019). Thus, some studies suggest that conflicting goals can be attained simultaneously, through a simultaneous goal attainment strategy. A simultaneous goal attainment strategy relates to attending to the multiple goals at the same time. However, this is often a very resource demanding process. In addition, conflicting goals may also be attended to, based on how the firms perform, and the firms' aspiration level for each goal (Gaba and Greve, 2019).

Drawing on this line of literature, this study employs an inductive approach, to explore how firms and university partners attend the multiple and conflicting goals of research centers.

4.4.3. Methodology

The research question is addressed through a longitudinal multiple case study (Yin, 2014), and builds on data from 2009-2019. This paper focuses on six research

centers, and how the firms and university partners collaborate to attain the goals of the research centers. The primary data source is 72 semi-structured interviews with firms and university partners. The analysis process was inspired by the Gioia-method (Gioia et al., 2013). As such, the analysis process included establishment of first-order codes, which were grouped into second-order codes, before aggregating the second-order codes into aggravated dimensions (Gioia et al., 2013). When this was done, we developed a process model of how the firms and university partners attained the goals of high-quality research and innovation during two phases: The first phase focusing on research goal attainment, and the second phase focusing on hybrid goal attainment. When the analysis was done, we proposed some propositions for further testing.

4.4.4. Key findings and contribution to thesis

This study focuses on firms and university partners goal attainment strategies and addresses sub-research question 2: "*How do firm and university partners collaborate to attain to multiple goals of UICs?".*

The key findings in this study reveal specific dynamics in how the partners managed to attend to the conflicting goals of research and innovations in research centers. Thus, this study suggests that after the two overarching goals are established, the collaboration accedes to goals and practices of university partners, and in turn contributed to the attainment of the overarching research goals during the first four years. However, acceding to the research goals, created a growing pressure imposed by the firm partners, which triggered a change in how the research centers operated. Thus, during the last four years, the collaboration accentuated the innovation goals, which lead to an increase in hybrid goal practices and the attainment of innovation goals.

This study also suggests that by establishing research practices and sub-goal measurements for the overarching research goal, the university partners create a goal priority order, which in turn ensures that the first goal which is attended to is the research goal (Audia and Greve, 2021). Additionally, this study suggests that the firm partners can trigger changes in research centers, by using formal feedback mechanisms, which can ensure that the innovation goals are also attended to.

5. Conclusions and implications

This chapter sums up the main findings and contribution of this thesis on how multiple goals influences UICs processes. Further, implications and suggestions for future research are discussed.

5.1. Contribution from the thesis

By exploring how multiple goals in UICs influences the collaborative process (Fini et al., 2019), at the firm, project and research center levels of analysis, this thesis adds insights to the underlying organizational dynamics of UICs (Perkmann and Walsh, 2007). To do so, this thesis draws on the organizational goals literature (Cyert and March, 1963), and combines three well-established theoretical frameworks; coordination mechanisms (Argote, 1982), strategic responses (Oliver, 1991), and goal attainment strategies (Greve, 2008, Gaba and Greve, 2019).

The current body of research that examines the underlying organizational dynamics of UICs mainly focuses on how firms and universities, despite their inherent differences, develop successful collaborations aiming for research and innovations (Bruneel et al., 2010, Steinmo, 2015, Lauvås and Steinmo, 2019). Key findings from this research highlights the importance of governing UICs through formal mechanisms (e.g., contractual agreements and organizational structures) and informal mechanisms (e.g., informal communication and knowledge sharing), which ensures that the partners are aligned and committed to the collaboration (Okamuro, 2007, Morandi, 2013, Gretsch et al., 2020). Scholars have also highlighted the importance of high involvement and social relation between UI-partners for successful collaborations, which relates to the development of a shared understanding, mutual commitment and trust (Steinmo, 2015, Lauvås and Steinmo, 2019). Key findings from UIC-studies have also elucidated the importance of establishing knowledge and technology transfer processes (e.g., interaction mechanisms and processes), which contribute to the transfer of novel knowledge and technology between firms and university partners across organizational boundaries (Gilsing et al., 2011, De Fuentes and Dutrénit, 2012, De Fuentes and Dutrénit, 2016).

However, the existing UIC literature seems to offer limited insights on how multiple goals in UICs influence the collaboration (Fini et al., 2019). More precisely, the

UIC literature is still unclear on (1) the integration process of multiple goals (Vedel, 2021), (2) the attainment of goals in UICs, and (3) the management of the multiple and potentially conflicting goals in UICs (de Wit-de Vries et al., 2018). The overarching research question of this thesis: *"How do multiple goals influence university-industry collaboration processes?"* addresses this ambiguity and fragmented understanding through the two sub-research questions discussed next.

5.1.1. Sub-research question 1: How do firms manage multiple goals of UICs?

Sub-research question 1 keys into the debate on how multiple goals influences the UIC processes, at the firm level of analysis, and is addressed in Paper 1 and 2. These papers contribute with new insights into the management of UICs, namely research centers, and the management mechanisms at play when dealing with multiple and conflicting goals, and firm actions through two theoretical perspectives (coordination mechanisms and strategic responses), when being influenced by multiple goals in UICs.

By adopting the coordination mechanisms framework, Paper 1 highlights the formal and informal ways (de Wit-de Vries et al., 2018) firms may engage in a research center to steer or adjust to the research center. Paper 1 shows how firms with a various sets of goals coordinate towards a research center, and illustrate that firms enter a research center with multiple goals, that can be either highly knowledge intensive or more focused on innovation developments. By accounting for the diversity and multiplicity of firms' goals when entering into UICs, Paper 1 extends prior UIC literature, that has mainly focused on the distance between firms and university partners goals (Ankrah and Al-Tabbaa, 2015, Steinmo, 2015).

Paper 1 also shows how the variety of firm goals influence firms' behavior in research centers and suggests that firms entering research centers with less knowledge intensive goals are more engaged in structured coordination activities during the preformation and formation phase of the research center. Meaning that firms who establish goals related in a larger degree to innovations and specific technological developments are more involved in predetermined activities (e.g., contract

developments, scheduled meetings with university partners), and in turn focus on steering the research center agenda. Firms with goals that are highly knowledge intensive focus in a larger degree on being involved in unstructured activities (e.g., ad-hoc meetings and ad hoc resource allocation), and in turn adjust their behavior following the development of the research centers.

Drawing on the strategic response literature to examine how firms may manage the conflicting goals of university partners, Paper 2 suggests that firms may use specific firm strategies to mitigate goal conflicts in UICs. Prior UIC-studies have mainly focused on firms and university partners' different cultures and institutional logics (Bruneel et al., 2010, Steinmo, 2015), and suggested that the development of social relations high involvement mitigates tensions associated with different organizational cultures and institutional logics (Steinmo, 2015, Lauvås and Steinmo, 2019). However, some scholar have suggested that firms may take different actions towards different challenges and conflicts (Estrada et al., 2016), during different collaborative phases (Smith and Lewis, 2011). Thus, scholars have called for more insights into specific conflicts, and how firms may manage these specific conflicts such as conflicting goals (de Wit-de Vries et al., 2018). This thesis responds to these calls, by showing that firms may take different strategic actions to deal with goal conflicts arising partners' different goals.

The use of the strategic response literature contributes to in-depth insights into firms' responses to goal conflicts and insights into the firms' strategies when dealing with goal conflicts. As such, the findings in Paper 2 suggests that firms can use three strategies to manage goal conflicts. These strategies can be assertive (e.g., protecting firms' interests' and challenging the temporal norms), bridging (e.g., alignment of the partners interests and balancing the temporal norms) or passive (e.g., complying to the partners and acceding to the temporal norms).

Findings in Paper 2 shows that firms following the bridging strategy manage to mitigate goal conflicts over time, while the use of an assertive strategy actually intensifies the goal conflicts over time. By identifying specific strategies firms use when dealing with goal conflicts in UIC, this thesis extends prior studies by suggesting that it

is not actually general involvement in research center activities that mitigates goal conflicts, but rather it is how the firms are involved in research activities with the university partners that mitigates goal conflicts. Paper 2 also shows that managing goal conflicts through an assertive strategy actually intensifies the goal conflicts, even if the firm partners are highly involved.

5.1.2. Sub-research question 2: How do firms and university partners attain multiple goals in UICs?

Sub-research question 2 keys into the debate on multiple goals from a project and a research center level of analysis, and are addressed in Paper 3 and 4. This research question extends the UIC literature, by showing how firms and university partners may attend to the multiple and potentially conflicting goals of UICs (de Wit-de Vries et al., 2018, Skute et al., 2019), at multiple levels in research centers. As few empirical studies have focused specifically on how multiple goals are integrated into the collaboration during the different stages of UICs (Vedel, 2021), this research adds new insights on how the multiple and conflicting goals of research and innovation (Lauvås and Steinmo, 2019) are attended to during the lifespan of research centers.

Building on insights from the organizational goals literature, and goal attainment strategies (Greve, 2008), Paper 4 identifies two goal strategies that integrates the goals of high-quality research and innovation into UIC processes: Research attainment strategy, and hybrid goal attainment strategy. The research attainment strategy includes specific activities such as establishing research practices and establishing research-based goal measurements. The hybridizing goal attainment strategy includes specific activities, such as adjusting goal-attainment practices and modifying goal measurements to be more in line with the innovation goals of the research centers.

The findings of Paper 4 shows that during the first phase of the research center (year 1-4), the collaboration accedes to the goals and practices of the university partners, while during the second phase (year 5-8), the collaboration accentuate firms' goals and practices which in turn lead to an increased hybridized goal practice, which

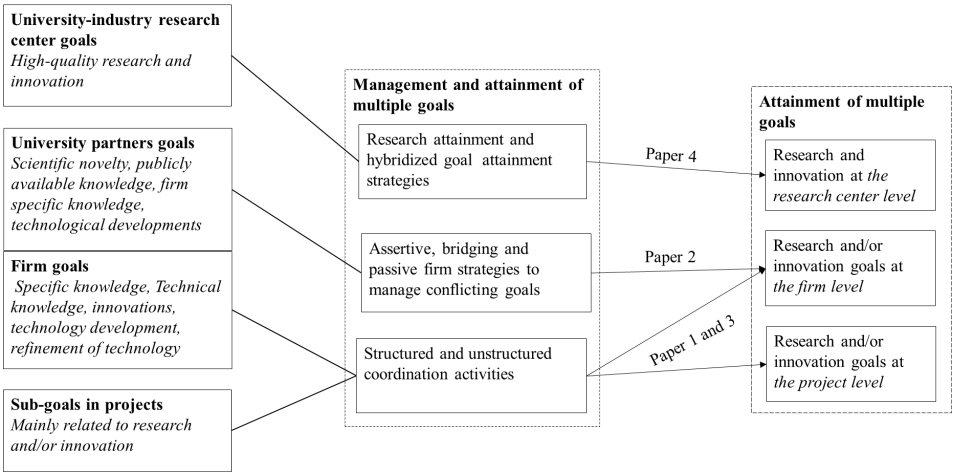
combine the research outcomes with firm practices, and in turn achieve the innovation goals. Thus, by drawing on organizational goal theory and goal attainment strategies, Paper 4 suggests that firms and university partners first need to attend to the research goals, before attending to goals of innovation. By using research attainment strategy and hybrid goal attainment strategy, firms and university partners are able to integrate both goals into the UIC process. Thus, this study extends the UIC literature showing how multiple and conflicting goals are integrated into the UIC processes (Vedel, 2021), and increases our understanding of how multiple goals are prioritized in collaborations which are institutionally complex (Audia and Greve, 2021).

Adapting the project and research center levels of analysis, Paper 3 contributes with a multiple level understanding of UIC, that often adapts firm and university level focus even though many UICs, especially research centers, often establish short-term projects (Derakhshan et al., 2020). In these projects, firms and university partners establish sub-goals (Derakhshan et al., 2020). Drawing on structural coordination mechanisms, Paper 3 shows how firms and university partners manage the collaboration through unstructured and structured coordination activities at the research center and the project level (de Wit-de Vries et al., 2018, Skute et al., 2019). Paper 3 extends findings of Paper 1 and 4, by showing that at the research center level, firms and university partners are aligned through structured coordination activities, while at the project level firms and university partners aligns through unstructured coordination. Moreover, Paper 3 suggests that while the partner alignment at the research center level enables the partners to collaborate at the project level, it is the alignment at the project level that seems crucial to attain the subgoals of research and innovation.

5.1.3. Overall research question*:* How do multiple goals influence university-industry collaboration processes?

Based on the two sub-research questions above, this thesis contributes with insights on the underlying organizational dynamics of UICs and on how multiple goals influences university-industry collaboration processes at the research center, firm and project level of analysis. Figure 5.1. summarizes the relations between the four empirical papers included in this thesis.

FIGURE 5.1: A multiple level perspective on management and attainment of goals in UICs



Using multiple levels of analysis, the four empirical papers in this thesis elucidates the presence of multiple goals in UICs. At the research center level, Paper 4 shows that firms and university partners establish the two overarching goals of research and innovation (Gulbrandsen et al., 2015). At the firm level, Paper 1 and 2 highlight that firms and university partners also establish their own goals when entering research centers (Aghion et al., 2008, Gilsing et al., 2011, Lam, 2011). Paper 1 extends prior research (Skute et al., 2019), suggesting that firms actually establish multiple goals which they want to achieve in research centers. These goals may be either highly knowledge intensive or less knowledge intensive focusing in a larger degree on various technologies and innovation developments. Further, Paper 2

highlights that both firms and university partners experience that their goals are conflicting and must be dealt with to achieve an effective collaboration without goal conflicts.

Finally, at the project level, Paper 3 highlights that firms and university partners also establish goals in specific projects established in the research center. Thus, this thesis suggests that the goals established at the project level are facilitative with the research center goals, while the firms and university partners experience that the research center goals and firms and university partners goals are conflicting (Lauvås and Steinmo, 2019). Hence, firms and university partners are influenced by both facilitative and conflicting goals at the various levels. To explain how these multiple goals influences the UIC processes at multiple levels, this thesis focuses on the behavioral aspect of the partners' collaboration process, because goal setting often influences organizational decision-making and behavior (Kotlar et al., 2018).

Examining the behavioral aspect of UIC in research centers, at firm, project and research center levels of analysis, this thesis contributes with new insights to the UIC literature based on three theoretical frameworks: coordination mechanisms, strategic responses, and goal attainment strategies.

Drawing on the *organizational goal literature* and *goal attainment strategies* at the research center level, this thesis identified two *goal attainment strategies* (e.g., research attainment strategy and hybrid strategy) that enables the attainment of research centers' overarching goals of research and innovation. This shows how firms and university partners integrate the overarching goals of research and innovation into the collaboration process. Moreover, employing the theoretical framework of goal attainment strategies in the context of UIC, contributes to the organizational goal literature by showing how firms and university partners prioritize and attain multiple and conflicting goals in institutionally complex settings (Gaba and Greve, 2019, Audia and Greve, 2021).

Drawing on the *strategic responses* framework, at the firm level, enabled the operationalizing of firms' strategies when dealing with conflicting goals in UIC (de Wit-

de Vries et al., 2018), which in turn shows that firms involvement with university partners should be based on firm strategies that are focused towards aligning the goals of firms and university partners in UICs (Steinmo and Rasmussen, 2016, Lauvås and Steinmo, 2019). Thus, this thesis extends prior UIC literature by suggesting that successful collaboration without goal conflicts are dependent on firm strategies which align the partners interests and timeframes (de Wit-de Vries et al., 2018).

Drawing on the *coordination mechanisms* framework at the firm level, this thesis identified specific coordination activities that firms, and university partners took part in to either steer the research center or adjust to it, which in turn shows how firms' goals influence firm behavior in research centers. Thus, this thesis extends prior UIC-literature, by suggesting that firms mainly aiming at exploring novel knowledge should be engaged in the research center through unstructured coordination mechanisms, while firms aiming at attaining technologies and specific innovations need to be engaged in the research center through structured coordination mechanisms.

Finally, examining *coordination mechanisms* at the project and research center level, this thesis identified different sets of coordination activities at play at the research center and project level (Derakhshan et al., 2020), showing how UICs are managed both formally and informally at different levels (de Wit-de Vries et al., 2018). Thus, this thesis extends prior UIC-literature by suggesting that project goals in UICs are attended to formal and informal management at different levels over time.

5.2. Implications for practice

The key findings of this thesis also provide important implications for firms and university partners that are involved in research centers aiming for research and innovation, and for policy makers that dedicate resources and provide structures for such collaborations.

5.2.1. Implications for firm partners

Firms that enter research centers, often establish multiple sets of goals. These goals can be either long-term or short-term. Firms that establish goals which are too short-term and specific may experience challenges related to taking advantages of the full breadth of knowledge and innovation activities in the research center. Thus, firms should consider establishing goals that likely lead to various outcomes in research centers, because by establishing additional long-term, explorative goals, firms may enhance their chances of obtaining new ideas that contributes to firm innovativeness.

This thesis shows that firms can be involved in the research center through structured and unstructured coordination activities with the aim of either steering or adjusting to the research center. On the one hand, engaging in structured coordination activities, is beneficial for firms wanting to have a say in the direction the research center is developing. On the other hand, being involved in unstructured coordination activities enables the firm partner to attain novel and explorative ideas developed by the university partners. Thus, the firm partners could engage in both structured and unstructured activities, to be able to take advantages of all the knowledge and innovation activities in the research center.

This thesis also shows that when dealing with goal conflicts in UICs, firms may use different strategies that might lead to different outcomes. The use of an assertive strategy to manage goal conflicts can actually intensify the goal conflicts, because in research centers firms and university partners are supposed to attain both research and innovation goals. The use of an assertive strategy may hamper the university partners' possibilities to attain their own goals, which in turn can lead to ending the collaboration (Perkmann et al., 2018). The use of a bridging strategy to manage goal conflicts enables the firm partner to mitigate the goal conflicts and achieve a collaboration where both firms and university partners attain their own goals. The use of a passive strategy may also mitigate the goal conflicts. However, firms might be careful in using a passive strategy as it may impede the firms' attainment of their own goals.

Another key finding of this thesis shows that when firms and university partners work on projects in research centers, they often take different actions to attain to the partners` goals. These actions are often unstructured and informal. Hence, to ensure that the collaboration at the project level is successful, firm partners could partake and engage in three sets of activities: Aligning commitment to the project, establishing project structure, and harmonizing project understanding. Moreover, it is important that the firms partake in discussions related to establishing the project structure and using time to develop a mutual understanding of the possible outcomes and timeframes in these projects. Being involved in these activities, can contribute to achieve the project goals and thereby provide jointly beneficial outcomes for both the firms and university partners.

Finally, a key finding of this thesis is that when firms enter UICs aiming to develop research and innovation, it is important that the firms are involved in and partake in all the phases of the collaboration. If firms are passively involved in the first phase of the collaboration, the university partners will most likely attend to the overarching goal of research. Although research goals can be beneficial for the firms, passive firm involvement in the research center, might hamper the attainment of innovation goals. Thus, this thesis shows that it is even more important that firm partners are involved in establishing practices and accentuating the innovation goal during the second phase of the collaboration, as their involvement in establishing and advocating innovation goals, triggers the university partners to attention overarching goal of innovation.

5.2.2. Implications for university partners

The most important implications directed to university partners, relates to the need to develop their understanding of the firm partners involved. If firms enter the collaboration with short-term and specific goals, university partners could include these goals into the research center activities. Incorporating the short-term and specific goals of the firms into research center activities can ensure that the firm

partners continue to be involved in the research center and contribute with funding. When firms enter the collaboration with long-term and explorative goals, university partners could benefit from taking on a more explorative strategy and focus more on explorative activities, because it enables goal attainment for both the firms and university partners.

When dealing with conflicting goals, university partners might benefit from adapting different strategies towards different firms partaking in the research center. Firms that are using assertive strategies are more likely to exit the collaboration if their goals are ignored. Thus, to ensure that the collaborative process continues, university partners may benefit from acceding to and attending to the firms' goals. When firms use a bridging strategy towards goal conflicts, university partners could use the same strategy towards the firm partners. University partners' use of a bridging strategy towards the firm partners may enables both parties to achieve their goals. When firms use a passive strategy, the university partners should make sure to at least attend to some of the firms' goals, because the lack of outcomes for firm partners can lead to them leaving the collaboration (Perkmann et al., 2018).

When collaborating at the project level in research centers, this thesis suggests that university partners should use time on both establishing the project structures and harmonizing a common project understanding between the partners. The lack of organizational interaction at the project level, may cause the collaboration to fail, because the firms and university partners do not manage to come to an agreement on the boundaries of the project. Moreover, to establish projects that is beneficial for both parties, university partners ought to communicate their own expectations and boundaries in the project, and how they can contribute to the project.

Moreover, this thesis shows that using time on harmonizing project understanding, enables the firms and university partners to closely collaborate in the projects and attain mutually beneficial outcomes related to research and innovation. In cases where university partners and firm partners do not manage to harmonize the project understanding, university partners can experience that only the firm partners

achieve the outcomes they want. Thus, university partners should be encouraged to use time trying to establish this mutual understanding of the project, as it can benefit all partners.

Lastly, the findings from this thesis suggests that during the lifespan of the research center, the achievement of high-quality research relies on university partners' use of a research attainment strategy, that includes the establishment of academic practices and academic sub-goal measurements during the first phase of the collaboration. By establishing sub-goal measurements and academic practices, the university partners are able to establish a priority-order on the overarching research center goals, that enables the university partners to work on long-term research projects that can contribute to the achievement of high-quality long-term research. However, university partners must also focus their attention on the overarching goal of innovation, to ensure that the firm partners continue partaking in the research center.

5.2.3. Implications for policy makers

This thesis suggests that managers of research centers can benefit from using different strategies towards firms with different goals. When engaging firms with goals that are highly-knowledge intensive, research centers can benefit from using an explorative strategy focusing on the development of novel knowledge and innovation. When engaging firms with goals that are less knowledge-intensive, research centers may benefit from using a strategy that focus on attaining the firms' specific goals. Thus, policymakers that are involved in establish research centers, should be aware of the vale of creating management structures that involves the attention on different strategies towards different types of firms.

Moreover, this thesis suggests that research center structures should allow for different types of management mechanisms at the research center and the project level. As such, because research centers can benefit from being managed through structured coordination (including establishment of contracts, progress plans,

overarching goals and scheduled meetings) at the research center level, policy-makers ought to ensure that the research center management allows the projects to be managed through unstructured coordination and informality (e.g., informal contact, ad hoc meetings, knowledge sharing and information generation) by the firms and university partners involved in the projects. By exposing the university partners to too many structured and formal management activities, the research center management can hamper the progress of the research center, as some university partners can experience that their productivity is hampered by the formal and structured processes (Du et al., 2014).

Lastly, to ensure that the overarching goals of both research and innovation in research centers is attended to, policy makers might ensure that the research centers include specific tools that allows the partners to give formal feedback on the developments in the research center. These formal feedback tools can contribute to trigger a change in the goal attainment strategies used in the research center.

5.3. Limitation and implications for further research

Overall, this thesis has contributed with important insights into the multiplicity of goals in UICs, and how multiple goals influence the UIC processes in research centers. However, this study also has some limitations related to the methodology, analytical focus, and the theoretical frameworks, which provides possibilities for further research.

The methodological limitations of this study relates to three aspects. First, the reliance on mainly qualitative data, limits the possibility of generalizing the findings to other contexts (Yin, 2014). However, in line with the critical realism approach (Maxwell, 2012b), this limitation also opens up for new research avenues. Future studies could therefore use quantitative methods to test key findings and propositions from this thesis, using larger samples. Second, three of the individual papers in this thesis are built on a single embedded case study, which has contributed to an in-depth investigation of UIC processes. However, because the case is a single embedded study, future research could benefit from adopting a fuzzy-set of qualitative comparative

analysis method (Fiss, 2011) to further test through a combination of quantitative and qualitative measurements, how multiple coordination activities and strategic responses can collectively attain the goals of research and innovation at various levels (Kraus et al., 2018). Third, the longitudinal data used in this thesis have highlighted how multiple goal attainment in research centers change over time, including the behavior of firms and university partners. However, because the findings from this thesis explore various phases in the UIC processes, there is an opportunity to further explore the longitudinal aspect of research centers, to clarify and specify how specific actions, activities and events unfold over time (Skute et al., 2019, Vedel, 2021) when dealing with multiple goals in UICs.

The analytical focus of this thesis has in a larger degree emphasized the firm level, exploring in-depth how firms coordinate towards the research center, to attain the firm goals, and how firms manage the conflicting goals of university partners. Thus, to get a more comprehensive understanding of these processes, there is an opportunity to further explore how firms' strategies and firms' behavior influence the university partners' behavior. The inclusion of university partners' responses when exploring how firms manage multiple goals in UICs can provide a more dynamic understanding of how these strategies and behaviors impact the collaboration.

The theoretical limitation of this thesis relates to three aspects. First, the use of the coordination mechanisms framework in this thesis have contributed with insights into how firms engage in research centers, at the research center, firm and project level. Hence this thesis extends research that mainly have used coordination mechanisms at separate levels (e.g., Morandi, 2013, Barbosa et al., 2020b), overlooking that different coordination mechanisms can be used at various levels at the same time. Although this thesis provides some evidence of coordination mechanisms at multiple levels, future research requires more in-depth studies to capture how the UI-partners coordinate towards each other at multiple levels in UIC.

Second, drawing on strategic responses, enabled this thesis to explore the firms' specific involvement activities when dealing with goal conflicts in UIC. However,

strategic responses have been limited employed in UIC settings (for exeption, see: Perkmann et al., 2018), which warrants further examination on how firms and university partners employ strategic responses in UIC. Moreover, while prior studies on strategic responses have argued that strategies build on compromises are not suitable when dealing with conflicting goals (Pache and Santos, 2021), the findings in Paper 2 shows that bridging strategy in UIC, actually mitigates goal conflicts in UICs. Thus, this finding seems to warrant further testing in the setting of UIC.

Third, drawing on goal attainment strategies, this study contributed with insights into how firms and university partners integrate multiple goals in UICs. However, this focus may overemphasize some mechanisms, and downplay other factors that can contribute to understanding the use of goal attainment strategies in UICs. Thus, there is a need for more research using this theoretical framework in UICs, but also include frameworks such as feedback loops (Audia and Greve, 2021), to further investigate the mechanisms that influence the use of various goal attainment strategies.

Lastly, even though the use of coordination mechanisms, strategic responses and goal attainment strategies in this thesis have contributed with insights into how multiple goals influence the UIC processes, this study is explorative in nature. Thus, I encourage further research using these theoretical frameworks to get a more comprehensive understanding of firms' behavior when managing and attaining multiple goals in UICs.

6. References

A.M. VERMEULEN, P., ZIETSMA, C., GREENWOOD, R. & LANGLEY, A. 2016. Strategic responses to institutional complexity. *Strategic Organization,* 14**,** 277-286.

ABRAMOVSKY, L., KREMP, E., LÓPEZ, A., SCHMIDT, T. & SIMPSON, H. 2009. Understanding co-operative innovative activity: evidence from four European countries. *Economics of Innovation and New Technology,* 18**,** 243-265.

AGHION, P., DEWATRIPONT, M. & STEIN, J. C. 2008. Academic freedom, private-sector focus, and the process of innovation. *The RAND Journal of Economics,* 39**,** 617-635.

AHMADSIMAB, A. & CHOWDHURY, I. 2019. Managing Tensions and Divergent Institutional Logics in Firm–NPO Partnerships. *Journal of Business Ethics***,** 1-20.

ALFORD, R. R. & FRIEDLAND, R. 1985. *Powers of theory: Capitalism, the state, and democracy*, Cambridge University Press.

ALI, A. M. & YUSOF, H. 2011. Quality in qualitative studies: The case of validity, reliability and generalizability. *Issues in Social and Environmental Accounting,* 5**,** 25-64.

AMBOS, T. C., MÄKELÄ, K., BIRKINSHAW, J. & D'ESTE, P. 2008. When Does University Research Get Commercialized? Creating Ambidexterity in Research Institutions. *Journal of Management Studies,* 45**,** 1424-1447.

ANDRES, H. P. & ZMUD, R. W. 2002. A contingency approach to software project coordination. *Journal of Management Information Systems,* 18**,** 41-70.

ANKRAH, S. & AL-TABBAA, O. 2015. Universities—industry collaboration: A systematic review. *Scandinavian Journal of Management*.

ARCHER, M., BHASKAR, R., COLLIER, A., LAWSON, T. & NORRIE, A. 2013. *Critical realism: Essential readings*, Routledge.

ARENAS, D. & AYUSO, S. 2016. Unpacking transnational corporate responsibility: Coordination mechanisms and orientations. *Business Ethics: A European Review,* 25**,** 217-237.

ARGOTE, L. 1982. Input uncertainty and organizational coordination in hospital emergency units. *Administrative science quarterly***,** 420-434.

ARMENAKIS, A. A., HARRIS, S. G. & MOSSHOLDER, K. W. 1993. Creating readiness for organizational change. *Human relations,* 46**,** 681-703.

ASHRAF, N., AHMADSIMAB, A. & PINKSE, J. 2017. From Animosity to Affinity: The Interplay of Competing Logics and Interdependence in Cross-Sector Partnerships. *Journal of Management Studies,* 54**,** 793-822.

AUDIA, P. G. & GREVE, H. R. 2021. Organizational Learning from Performance Feedback: A Behavioral Perspective on Multiple Goals: A Multiple Goals Perspective. Cambridge: Cambridge University Press.

BARBOSA, A. P. F. P. L., SALERNO, M. S., NASCIMENTO, P. T. D. S., ALBALA, A., MARANZATO, F. P. & TAMOSCHUS, D. 2020a. Configurations of project management practices to enhance the performance of open innovation R&D projects. *International Journal of Project Management*.

BARBOSA, A. P. P. L., SALERNO, M. S., BRASIL, V. C. & NASCIMENTO, P. T. D. S. 2020b. Coordination Approaches to Foster Open Innovation R&D Projects Performance. *Journal of Engineering and Technology Management,* 58**,** 101603.

BARNES, T., PASHBY, I. & GIBBONS, A. 2002. Effective University – Industry Interaction:: A Multi-case Evaluation of Collaborative R&D Projects. *European Management Journal,* 20**,** 272-285.

BATTILANA, J. & DORADO, S. 2010. Building sustainable hybrid organizations: The case of commercial microfinance organizations. *Academy of management Journal,* 53**,** 1419-1440.

BAUM, J. A., ROWLEY, T. J., SHIPILOV, A. V. & CHUANG, Y.-T. 2005. Dancing with strangers: Aspiration performance and the search for underwriting syndicate partners. *Administrative Science Quarterly,* 50**,** 536-575.

BECK, S., BERGENHOLTZ, C., BOGERS, M., BRASSEUR, T.-M., CONRADSEN, M. L., DI MARCO, D., DISTEL, A. P., DOBUSCH, L., DÖRLER, D. & EFFERT, A. 2020. The Open Innovation in Science research field: a collaborative conceptualisation approach. *Industry and Innovation*, 1-50.

BERGIN, M., WELLS, J. S. G. & OWEN, S. 2008. Critical realism: a philosophical framework for the study of gender and mental health. *Nursing Philosophy,* 9, 169-179.

BILLINGER, S., SRIKANTH, K., STIEGLITZ, N. & SCHUMACHER, T. R. 2020. Exploration and exploitation in complex search tasks: How feedback influences whether and where human agents search. *Strategic Management Journal*.

BOARDMAN, C. & GRAY, D. 2010. The new science and engineering management: cooperative research centers as government policies, industry strategies, and organizations. *The Journal of Technology Transfer,* 35, 445-459.

BOHN, H. J. & ROELFS, D. J. 2020. How Hybrid Institutional Logics Matter: The Importance of Trust and Embeddedness in Neighborhood Revitalization Collaborations. *Journal of Applied Social Science,* 14, 145-161.

BOXENBAUM, E. & JONSSON, S. 2017. Isomorphism, diffusion and decoupling: Concept evolution and theoretical challenges. *The Sage handbook of organizational institutionalism,* 2, 79-104.

BRASS, D. J., GALASKIEWICZ, J., GREVE, H. R. & TSAI, W. 2004. Taking stock of networks and organizations: A multilevel perspective. *Academy of Management Journal,* 47, 795-817.

BRUNEEL, J., D'ESTE, P. & SALTER, A. 2010. Investigating the factors that diminish the barriers to university–industry collaboration. *Research policy,* 39, 858-868.

BURR, V. 2015. *Social constructionism*, Routledge.

CALDWELL, N. D., ROEHRICH, J. K. & GEORGE, G. 2017. Social value creation and relational coordination in public-private collaborations. *Journal of Management Studies,* 54, 906-928.

CANHOTO, A. I., QUINTON, S., JACKSON, P. & DIBB, S. 2016. The co-production of value in digital, university–industry R&D collaborative projects. *Industrial Marketing Management,* 56, 86-96.

CHESBROUGH, H. & BOGERS, M. 2014. Explicating open innovation: Clarifying an emerging paradigm for understanding innovation. *New Frontiers in Open Innovation. Oxford: Oxford University Press, Forthcoming*, 3-28.

CHESBROUGH, H. W. 2003. *Open innovation : the new imperative for creating and profiting from technology,* Boston, Mass., Harvard Business School Press.

CHRISTIANS, C. G. 2000. 6 ETHICS AND POLITICS IN QUALITATIVE RESEARCH.

CLAGGETT, J. L. & KARAHANNA, E. 2018. Unpacking the structure of coordination mechanisms and the role of relational coordination in an era of digitally mediated work processes. *Academy of Management Review,* 43, 704-722.

COHEN, W. M., NELSON, R. R. & WALSH, J. P. 2002. Links and impacts: the influence of public research on industrial R&D. *Management science,* 48, 1-23.

CRESWELL, J. W. & POTH, C. N. 2017. *Qualitative inquiry and research design: Choosing among five approaches*, Sage publications.

CUNNINGHAM, J. A., MENTER, M. & YOUNG, C. 2017. A review of qualitative case methods trends and themes used in technology transfer research. *The Journal of Technology Transfer,* 42, 923-956.

CYERT, R. M. & MARCH, J. G. 1963. A behavioral theory of the firm. *Englewood Cliffs, NJ,* 2, 169-187.

CÄKER, M. 2008. Intertwined coordination mechanisms in interorganizational relationships with dominated suppliers. *Management Accounting Research,* 19, 231-251.

DAHLANDER, L. & GANN, D. M. 2010. How open is innovation? *Research policy,* 39, 699-709.

DANERMARK, B., EKSTROM, M. & JAKOBSEN, L. 2005. *Explaining society: An introduction to critical realism in the social sciences*, Routledge.

DAO, M. A. & STROBL, A. 2019. Exploration outcomes of M&A: the interplay between coordination mechanisms and acquisition experience. *R&D Management,* 49, 86-102.

DE FUENTES, C. & DUTRÉNIT, G. 2012. Best channels of academia-industry interaction for long-term benefit. *Research Policy,* 41, 1666-1682.

DE FUENTES, C. & DUTRÉNIT, G. 2016. Geographic proximity and university–industry interaction: The case of Mexico. *The Journal of Technology Transfer,* 41**,** 329-348.
DE MASSIS, A., KOTLAR, J., MAZZOLA, P., MINOLA, T. & SCIASCIA, S. 2018. Conflicting selves: Family owners' multiple goals and self-control agency problems in private firms. *Entrepreneurship Theory and Practice,* 42**,** 362-389.
DE WIT-DE VRIES, E., DOLFSMA, W. A., VAN DER WINDT, H. J. & GERKEMA, M. P. 2018. Knowledge transfer in university–industry research partnerships: a review. *The Journal of Technology Transfer*.
DENZIN, N. K. & LINCOLN, Y. S. 1994. *Handbook of qualitative research*, Sage publications, inc.
DERAKHSHAN, R., FERNANDES, G. & MANCINI, M. 2020. Evolution of Governance in a Collaborative University–Industry Program. *Project Management Journal***,** 8756972820911245.
DU, J., LETEN, B. & VANHAVERBEKE, W. 2014. Managing open innovation projects with science-based and market-based partners. *Research Policy,* 43**,** 828-840.
DUBOIS, A. & GADDE, L.-E. 2002. Systematic combining: an abductive approach to case research. *Journal of Business Research,* 55**,** 553-560.
EASTERBY-SMITH, M., THORPE, R. & JACKSON, P. R. 2012. *Management research*, Sage.
EASTON, G. 2010. Critical realism in case study research. *Industrial Marketing Management,* 39**,** 118-128.
EISENHARDT, K. M. 1989. Building Theories from Case Study Research. *The Academy of Management Review,* 14**,** 532-550.
EISENHARDT, K. M. & GRAEBNER, M. E. 2007. Theory building from cases: Opportunities and challenges. *Academy of management journal,* 50**,** 25-32.
ESTRADA, I., FAEMS, D., MARTIN CRUZ, N. & PEREZ SANTANA, P. 2016. The role of interpartner dissimilarities in Industry-University alliances: Insights from a comparative case study. *Research Policy,* 45**,** 2008-2022.
ETHIRAJ, S. K. & LEVINTHAL, D. 2009. Hoping for A to Z while rewarding only A: Complex organizations and multiple goals. *Organization Science,* 20**,** 4-21.
FERNANDES, A., SPRING, M. & TARAFDAR, M. 2018. Coordination in temporary organizations. *International Journal of Operations & Production Management*.
FINI, R., RASMUSSEN, E., WIKLUND, J. & WRIGHT, M. 2019. Theories from the lab: how research on science commercialization can contribute to management studies. *Journal of Management Studies,* 56**,** 865-894.
FISS, P. C. 2011. Building Better Causal Theories: A Fuzzy Set Approach to Typologies in Organization Research. *Academy of Management Journal,* 54**,** 393-420.
FRIEDLAND, R. & ALFORD, R. R. 1991. Bringing society back in: Symbols, practices, and institutional contradictions. *The new institutionalism in organizational analysis***,** 232-263.
GABA, V. & GREVE, H. R. 2019. Safe or Profitable? The Pursuit of Conflicting Goals. *Organization Science*.
GAGNÉ, M. 2018. From Strategy to Action: Transforming Organizational Goals into Organizational Behavior. *International Journal of Management Reviews,* 20**,** 83-104.
GALÁN-MUROS, V. & PLEWA, C. 2016. What drives and inhibits university-business cooperation in Europe? A comprehensive assessement. *R&D Management,* 46**,** 369-382.
GAMA, F., SJÖDIN, D. R. & FRISHAMMAR, J. 2017. Managing interorganizational technology development: Project management practices for market-and science-based partnerships. *Creativity and Innovation Management,* 26**,** 115-127.
GARCÍA-ARACIL, A. & FERNÁNDEZ DE LUCIO, I. 2008. Industry–university interactions in a peripheral European region: an empirical study of Valencian firms. *Regional Studies,* 42**,** 215-227.
GARCIA, R., ARAÚJO, V., MASCARINI, S., SANTOS, E. & COSTA, A. 2020. How long-term university-industry collaboration shapes the academic productivity of research groups. *Innovation,* 22**,** 56-70.
GASSMANN, O. & ENKEL, E. 2004. Towards a theory of open innovation: three core process archetypes.

GEHMAN, J., GLASER, V. L., EISENHARDT, K. M., GIOIA, D., LANGLEY, A. & CORLEY, K. G. 2018. Finding theory–method fit: A comparison of three qualitative approaches to theory building. *Journal of Management Inquiry,* 27**,** 284-300.
GEISLER, E. 1995. Industry–university technology cooperation: a theory of inter-organizational relationships. *Technology Analysis & Strategic Management,* 7**,** 217-229.
GERINGER, J. M. & HEBERT, L. 1989. Control and performance of international joint ventures. *Journal of international business studies,* 20**,** 235-254.
GHAURI, P. & ROSENDO-RIOS, V. 2016. Organizational cross-cultural differences in the context of innovation-oriented partnerships. *Cross Cultural & Strategic Management,* 23**,** 128-157.
GILSING, V., BEKKERS, R., FREITAS, I. M. B. & VAN DER STEEN, M. 2011. Differences in technology transfer between science-based and development-based industries: Transfer mechanisms and barriers. *Technovation,* 31**,** 638-647.
GIOIA, D. A., CORLEY, K. G. & HAMILTON, A. L. 2013. Seeking qualitative rigor in inductive research: Notes on the Gioia methodology. *Organizational research methods,* 16**,** 15-31.
GREENWOOD, R., RAYNARD, M., KODEIH, F., MICELOTTA, E. R. & LOUNSBURY, M. 2011. Institutional complexity and organizational responses. *Academy of Management annals,* 5**,** 317-371.
GRETSCH, O., TIETZE, F. & KOCK, A. 2020. Firms' intellectual property ownership aggressiveness in university–industry collaboration projects: Choosing the right governance mode. *Creativity and Innovation Management,* 29**,** 359-370.
GREVE, H. R. 2003a. A behavioral theory of R&D expenditures and innovations: Evidence from shipbuilding. *Academy of management journal,* 46**,** 685-702.
GREVE, H. R. 2003b. *Organizational learning from performance feedback: A behavioral perspective on innovation and change*, Cambridge University Press.
GREVE, H. R. 2008. A behavioral theory of firm growth: Sequential attention to size and performance goals. *Academy of Management Journal,* 51**,** 476-494.
GREVE, H. R. & TEH, D. 2018. Goal selection internally and externally: A behavioral theory of institutionalization. *International Journal of Management Reviews,* 20**,** S19-S38.
GUBA, E. G. & LINCOLN, Y. S. 1994. Competing paradigms in qualitative research. *Handbook of qualitative research,* 2**,** 105.
GUILLEMIN, M. & GILLAM, L. 2004. Ethics, reflexivity, and "ethically important moments" in research. *Qualitative inquiry,* 10**,** 261-280.
GULATI, R., WOHLGEZOGEN, F. & ZHELYAZKOV, P. 2012. The two facets of collaboration: Cooperation and coordination in strategic alliances. *The Academy of Management Annals,* 6**,** 531-583.
GULBRANDSEN, M., MOWERY, D. & FELDMAN, M. 2011. Introduction to the special section: Heterogeneity and university–industry relations. *Research Policy,* 40**,** 1-5.
GULBRANDSEN, M. & SMEBY, J. C. 2005. Industry funding and university professors' research performance. *Research Policy,* 34**,** 932-950.
GULBRANDSEN, M., THUNE, T., BORLAUG, S. B. & HANSON, J. 2015. Emerging hybrid practices in public-private research centres. *Public Administration,* 93**,** 363-379.
HANISCH, B. & WALD, A. 2014. Effects of complexity on the success of temporary organizations: Relationship quality and transparency as substitutes for formal coordination mechanisms. *Scandinavian Journal of Management,* 30**,** 197-213.
HARVEY-JORDAN, S. & LONG, S. 2001. The process and the pitfalls of semi-structured interviews: The Journal of the Health Visitors' Association. *Community Practitioner,* 74**,** 219.
HEALY, M. & PERRY, C. 2000. Comprehensive criteria to judge validity and reliability of qualitative research within the realism paradigm. *Qualitative Market Research: An International Journal,* 3**,** 118-126.
HERMUNDSDOTTIR, F. & ASPELUND, A. 2021. Sustainability innovations and firm competitiveness: A review. *Journal of Cleaner Production,* 280**,** 124715.
HOLSTEIN, J., STARKEY, K. & WRIGHT, M. 2018. Strategy and narrative in higher education. *Strategic Organization,* 16**,** 61-91.

HOWARD, M., STEENSMA, H. K., LYLES, M. & DHANARAJ, C. 2016. Learning to collaborate through collaboration: How allying with expert firms influences collaborative innovation within novice firms. *Strategic Management Journal,* 37**,** 2092-2103.
HU, S. & BETTIS, R. A. 2018. Multiple organization goals with feedback from shared technological task environments. *Organization Science,* 29**,** 873-889.
HYDE, K. F. 2000. Recognising deductive processes in qualitative research. *Qualitative market research: An international journal*.
JAKOBSEN, S., LAUVÅS, T. A. & STEINMO, M. 2019. Collaborative dynamics in environmental R&D alliances. *Journal of Cleaner Production,* 212**,** 950-959.
JAY, J. 2013. Navigating paradox as a mechanism of change and innovation in hybrid organizations. *Academy of management journal,* 56**,** 137-159.
JÄRVENSIVU, T. & TÖRNROOS, J.-Å. 2010. Case study research with moderate constructionism: Conceptualization and practical illustration. *Industrial Marketing Management,* 39**,** 100-108.
KACPERCZYK, A., BECKMAN, C. M. & MOLITERNO, T. P. 2015. Disentangling Risk and Change:Internal and External Social Comparison in the Mutual Fund Industry. *Administrative Science Quarterly,* 60**,** 228-262.
KAWULICH, B. B. 2005. Participant Observation as a Data Collection Method. *2005,* 6.
KOBARG, S., STUMPF-WOLLERSHEIM, J. & WELPE, I. M. 2019. More is not always better: Effects of collaboration breadth and depth on radical and incremental innovation performance at the project level. *Research Policy,* 48**,** 1-10.
KOÇAK, Ö., HANNAN, M. T. & HSU, G. 2014. Emergence of market orders: Audience interaction and vanguard influence. *Organization Studies,* 35**,** 765-790.
KOTLAR, J. & DE MASSIS, A. 2013. Goal setting in family firms: Goal diversity, social interactions, and collective commitment to family-centered goals. *Entrepreneurship Theory and Practice,* 37**,** 1263-1288.
KOTLAR, J., MASSIS, A., WRIGHT, M. & FRATTINI, F. 2018. Organizational Goals: Antecedents, Formation Processes and Implications for Firm Behavior and Performance. *International Journal of Management Reviews,* 20**,** 3-18.
KRAUS, S., RIBEIRO-SORIANO, D. & SCHÜSSLER, M. 2018. Fuzzy-set qualitative comparative analysis (fsQCA) in entrepreneurship and innovation research – the rise of a method. *International Entrepreneurship and Management Journal,* 14**,** 15-33.
KRUGLANSKI, A. W., SHAH, J. Y., FISHBACH, A., FRIEDMAN, R., CHUN, W. & SLEETH-KEPPLER, D. 2002. A theory of goal systems. *Advances in experimental social psychology,* 34.
LAM, A. 2011. What motivates academic scientists to engage in research commercialization: 'Gold', 'ribbon' or 'puzzle'? *Research Policy,* 40**,** 1354-1368.
LAURSEN, K. & SALTER, A. 2004. Searching high and low: what types of firms use universities as a source of innovation? *Research policy,* 33**,** 1201-1215.
LAURSEN, K. & SALTER, A. 2006. Open for innovation: the role of openness in explaining innovation performance among UK manufacturing firms. *Strategic management journal,* 27**,** 131-150.
LAUVÅS, T. & STEINMO, M. 2019. The role of proximity dimensions and mutual commitment in shaping the performance of university-industry research centres. *Innovation***,** 1-27.
LINCOLN, Y. S. & GUBA, E. G. 1985. *Naturalistic inquiry*, sage.
LIND, F., STYHRE, A. & AABOEN, L. 2013. Exploring university-industry collaboration in research centres. *European Journal of Innovation Management,* 16**,** 70-91.
LINDER, S. & FOSS, N. J. 2018. Microfoundations of organizational goals: a review and new directions for future research. *International Journal of Management Reviews,* 20**,** 39-62.
LUO, Y., SHENKAR, O. & GURNANI, H. 2008. Control-cooperation interfaces in global strategic alliances: A situational typology and strategic responses. *Journal of International Business Studies,* 39**,** 428-453.
MALONE, T. W. 1987. Modeling coordination in organizations and markets. *Management science,* 33**,** 1317-1332.
MARCH, J. G., SIMON, H. A. & GUETZKOW, H. 1958. *Organizations,* New York, Wiley.

MARKMAN, G. D., RUSSO, M., LUMPKIN, G., JENNINGS, P. D. & MAIR, J. 2016. Entrepreneurship as a platform for pursuing multiple goals: A special issue on sustainability, ethics, and entrepreneurship. *Journal of Management Studies,* 53**,** 673-694.
MARKOVIC, S., BAGHERZADEH, M., VANHAVERBEKE, W. & BOGERS, M. 2021. Managing business-to-business open innovation: A project-level approach. *Industrial Marketing Management,* 94**,** 159-163.
MARTIN, G. P., GOMEZ-MEJIA, L. R. & WISEMAN, R. M. 2013. Executive stock options as mixed gambles: Revisiting the behavioral agency model. *Academy of Management journal,* 56**,** 451-472.
MAXWELL, J. A. 2012a. *Qualitative research design: An interactive approach*, Sage publications.
MAXWELL, J. A. 2012b. *A realist approach for qualitative research*, Sage.
MESNY, A. & MAILHOT, C. 2007. The Difficult Search for Compromises in a Canadian Industry/University Research Partnership. *The Canadian Journal of Sociology / Cahiers canadiens de sociologie,* 32**,** 203-226.
MILES, M. B., HUBERMAN, A. M. & SALDAÑA, J. 2014. *Qualitative data analysis : a methods sourcebook,* Los Angeles, Sage.
MIRON-SPEKTOR, E. & BEENEN, G. 2015. Motivating creativity: The effects of sequential and simultaneous learning and performance achievement goals on product novelty and usefulness. *Organizational Behavior and Human Decision Processes,* 127**,** 53-65.
MOM, T. J., VAN DEN BOSCH, F. A. & VOLBERDA, H. W. 2009. Understanding variation in managers' ambidexterity: Investigating direct and interaction effects of formal structural and personal coordination mechanisms. *Organization Science,* 20**,** 812-828.
MORANDI, V. 2013. The management of industry–university joint research projects: how do partners coordinate and control R&D activities? *The Journal of Technology Transfer,* 38**,** 69-92.
MOWERY, D. C. & SAMPAT, B. N. 2004. The Bayh-Dole Act of 1980 and university–industry technology transfer: a model for other OECD governments? *The Journal of Technology Transfer,* 30**,** 115-127.
MURRAY, F. 2004. The role of academic inventors in entrepreneurial firms: sharing the laboratory life. *Research Policy,* 33**,** 643-659.
MURRAY, F. & O'MAHONY, S. 2007. Exploring the foundations of cumulative innovation: Implications for organization science. *Organization Science,* 18**,** 1006-1021.
NGUYEN, N. P., NGO, L. V., BUCIC, T. & PHONG, N. D. 2018. Cross-functional knowledge sharing, coordination and firm performance: The role of cross-functional competition. *Industrial Marketing Management,* 71**,** 123-134.
NOLAN, M. & BEHI, R. 1995. Alternative approaches to establishing reliability and validity. *British Journal of Nursing,* 4**,** 587-590.
OBLOJ, T. & SENGUL, M. 2020. What Do Multiple Objectives Really Mean For Performance? Empirical Evidence From the French Manufacturing Sector. *Strategic Management Journal*.
OKAMURO, H. 2007. Determinants of successful R&D cooperation in Japanese small businesses: The impact of organizational and contractual characteristics. *Research Policy,* 36**,** 1529-1544.
OKAMURO, H. & NISHIMURA, J. 2018. Whose business is your project? A comparative study of different subsidy policy schemes for collaborative R&D. *Technological Forecasting and Social Change,* 127**,** 85-96.
OLIVEIRA, N. & LUMINEAU, F. 2017. How coordination trajectories influence the performance of interorganizational project networks. *Organization Science,* 28**,** 1029-1060.
OLIVER, C. 1991. Strategic responses to institutional processes. *Academy of management review,* 16**,** 145-179.
OXLEY, J. E. & SAMPSON, R. C. 2004. The scope and governance of international R&D alliances. *Strategic Management Journal,* 25**,** 723-749.
PACHE, A.-C. & SANTOS, F. 2010. When worlds collide: The internal dynamics of organizational responses to conflicting institutional demands. *Academy of management review,* 35**,** 455-476.

PACHE, A.-C. & SANTOS, F. 2013. Inside the hybrid organization: Selective coupling as a response to competing institutional logics. *Academy of management journal,* 56**,** 972-1001.
PACHE, A.-C. & SANTOS, F. 2021. When worlds keep on colliding: Exploring the consequences of organizational responses to conflicting institutional demands. *Academy of Management Review*.
PERKMANN, M., KING, Z. & PAVELIN, S. 2011. Engaging excellence? Effects of faculty quality on university engagement with industry. *Research Policy,* 40**,** 539-552.
PERKMANN, M., MCKELVEY, M. & PHILLIPS, N. 2018. Protecting Scientists from Gordon Gekko: How Organizations Use Hybrid Spaces to Engage with Multiple Institutional Logics. *Organization Science,* 30**,** 298-318.
PERKMANN, M., TARTARI, V., MCKELVEY, M., AUTIO, E., BROSTRÖM, A., D'ESTE, P., FINI, R., GEUNA, A., GRIMALDI, R., HUGHES, A., KRABEL, S., KITSON, M., LLERENA, P., LISSONI, F., SALTER, A. & SOBRERO, M. 2013. Academic engagement and commercialisation: A review of the literature on university–industry relations. *Research Policy,* 42**,** 423-442.
PERKMANN, M. & WALSH, K. 2007. University–industry relationships and open innovation: Towards a research agenda. *International Journal of Management Reviews,* 9**,** 259-280.
PIAZZAI, M. 2018. *The Cognitive Infrastructures of Markets Empirical Studies on the Role of Categories in Valuation and Competition, and a Formal Theory of Classification Systems Based on Lattices and Order.* Delft University of Technology.
PLEWA, C., KORFF, N., BAAKEN, T. & MACPHERSON, G. 2013. University–industry linkage evolution: an empirical investigation of relational success factors. *R&D Management,* 43**,** 365-380.
PONOMARIOV, B. L. & BOARDMAN, P. C. 2010. Influencing scientists' collaboration and productivity patterns through new institutions: University research centers and scientific and technical human capital. *Research Policy,* 39**,** 613-624.
RANGANATHAN, R., GHOSH, A. & ROSENKOPF, L. 2018. Competition–cooperation interplay during multifirm technology coordination: The effect of firm heterogeneity on conflict and consensus in a technology standards organization. *Strategic Management Journal,* 39**,** 3193-3221.
SALDAÑA, J. 2015. *The coding manual for qualitative researchers*, Sage.
SALVATO, C. & RERUP, C. 2018. Routine Regulation: Balancing Conflicting Goals in Organizational Routines. *Administrative Science Quarterly,* 63**,** 170-209.
SAUERMANN, H. & STEPHAN, P. 2013. Conflicting logics? A multidimensional view of industrial and academic science. *Organization science,* 24**,** 889-909.
SAYER, R. A. 2000. *Realism and social science,* London ; Thousand Oaks, Calif., Sage.
SCHILDT, H. & PERKMANN, M. 2017. Organizational settlements: Theorizing how organizations respond to institutional complexity. *Journal of Management Inquiry,* 26**,** 139-145.
SCHILKE, O. & GOERZEN, A. 2010. Alliance management capability: an investigation of the construct and its measurement. *Journal of Management,* 36**,** 1192-1219.
SHAH, J. Y. & KRUGLANSKI, A. W. 2002. Priming against your will: How accessible alternatives affect goal pursuit. *Journal of Experimental Social Psychology,* 38**,** 368-383.
SHINKLE, G. A. 2012. Organizational aspirations, reference points, and goals: Building on the past and aiming for the future. *Journal of management,* 38**,** 415-455.
SJÖÖ, K. & HELLSTRÖM, T. 2021. The two sides of the coin: joint project leader interaction in university-industry collaboration projects. *R&D Management*.
SKUTE, I., ZALEWSKA-KUREK, K., HATAK, I. & DE WEERD-NEDERHOF, P. 2019. Mapping the field: a bibliometric analysis of the literature on university–industry collaborations. *The Journal of Technology Transfer,* 44**,** 916-947.
SMITH, W. K. & LEWIS, M. W. 2011. Toward a theory of paradox: A dynamic equilibrium model of organizing. *Academy of management Review,* 36**,** 381-403.
STEINMO, M. 2015. Collaboration for innovation: A case study on how social capital mitigates collaborative challenges in university–industry research alliances. *Industry and innovation,* 22**,** 597-624.

STEINMO, M. & RASMUSSEN, E. 2016. How firms collaborate with public research organizations: The evolution of proximity dimensions in successful innovation projects. *Journal of Business Research,* 69**,** 1250-1259.
STEINMO, M. & RASMUSSEN, E. 2018. The interplay of cognitive and relational social capital dimensions in university-industry collaboration: Overcoming the experience barrier. *Research Policy,* 47**,** 1964-1974.
STEVENS, R., MORAY, N., BRUNEEL, J. & CLARYSSE, B. 2015. Attention allocation to multiple goals: The case of for-profit social enterprises. *Strategic Management Journal,* 36**,** 1006-1016.
STYHRE, A. & LIND, F. 2010. Balancing centripetal and centrifugal forces in the entrepreneurial university: a study of 10 research centres in a technical university. *Technology Analysis & Strategic Management,* 22**,** 909-924.
SUDDABY, R. & GREENWOOD, R. 2005. Rhetorical strategies of legitimacy. *Administrative science quarterly,* 50**,** 35-67.
THAKHATHI, A., LE ROUX, C. & DAVIS, A. 2019. Sustainability leaders' influencing strategies for institutionalising organisational change towards corporate sustainability: A strategy-as-practice perspective. *Journal of Change Management,* 19**,** 246-265.
THORNTON, P. H., OCASIO, W. & LOUNSBURY, M. 2012. *The Institutional Logics Perspective: A New Approach to Culture, Structure and Process,* Oxford, Oxford University Press.
THUNE, T. & GULBRANDSEN, M. 2011. Institutionalization of university-industry interaction: an empirical study of the impact of formal structures on collaboration patterns. *Science and Public Policy,* 38**,** 99-107.
TIJSSEN, R. J. W. 2018. Anatomy of use-inspired researchers: From Pasteur's Quadrant to Pasteur's Cube model. *Research Policy,* 47**,** 1626-1638.
TSAI, W. 2002. Social structure of "coopetition" within a multiunit organization: Coordination, competition, and intraorganizational knowledge sharing. *Organization science,* 13**,** 179-190.
UNSWORTH, K., YEO, G. & BECK, J. 2014. Multiple goals: A review and derivation of general principles. *Journal of Organizational Behavior,* 35**,** 1064-1078.
VAN DE VEN, A. H., DELBECQ, A. L. & KOENIG JR, R. 1976. Determinants of coordination modes within organizations. *American sociological review***,** 322-338.
VAN FENEMA, P. C. & KEERS, B. M. 2018. Interorganizational performance management: A co-evolutionary model. *International Journal of Management Reviews,* 20**,** 772-799.
VAN FENEMA, P. C. & LOEBBECKE, C. 2014. Towards a framework for managing strategic tensions in dyadic interorganizational relationships. *Scandinavian Journal of Management,* 30**,** 516-524.
VANHAVERBEKE, W., DU, J., LETEN, B. & AALDERS, F. 2014. Exploring open innovation at the level of R&D projects. *New frontiers in open innovation.* Oxford University Press Oxford.
VEDEL, J. B. 2021. Balancing Conflicting Goals in Interorganizational Collaborations in the Pharmaceutical Industry: A Contractual Dynamics View. *European Management Review,* 18**,** 71-83.
VEGA-JURADO, J., KASK, S. & MANJARRÉS-HENRIQUEZ, L. 2017. University industry links and product innovation: cooperate or contract? *Journal of technology management & innovation,* 12**,** 1-8.
VILLANI, E., RASMUSSEN, E. & GRIMALDI, R. 2017. How intermediary organizations facilitate university–industry technology transfer: A proximity approach. *Technological forecasting and social change,* 114**,** 86-102.
WEST, J. & BOGERS, M. 2014. Leveraging External Sources of Innovation: A Review of Research on Open Innovation. *Journal of Product Innovation Management,* 31**,** 814-831.
WILLEM, A., BUELENS, M. & SCARBROUGH, H. 2006. The role of inter-unit coordination mechanisms in knowledge sharing: a case study of a British MNC. *Journal of Information Science,* 32**,** 539-561.
YIN, R. K. 2014. *Case study research : design and methods,* Los Angeles, SAGE.
ZACHARIAS, N. A., DALDERE, D. & WINTER, C. G. H. 2020. Variety is the spice of life: How much partner alignment is preferable in open innovation activities to enhance firms' adaptiveness and innovation success? *Journal of Business Research,* 117**,** 290-301.

ZELLWEGER, T. M., NASON, R. S., NORDQVIST, M. & BRUSH, C. G. 2013. Why do family firms strive for nonfinancial goals? An organizational identity perspective. *Entrepreneurship Theory and practice,* 37**,** 229-248.

7. Research papers

The following research papers are included in this section:

1. Isaeva, I., Steinmo, M, and Rasmussen, E (2021) “How firms use coordination activities in university-industry collaboration: Adjusting to or steering a research center?
2. Isaeva, I. “How firms use different strategies to manage goal conflicts in university-industry collaborations”
3. Isaeva, I., Ooms, W., and Johansen, J. P. “Attaining jointly beneficial outcomes: How partner alignment influences the achievement of outcomes in open innovation with science-based partners”
4. Isaeva, I., Lauvås, T., Steinmo, M., and Rasmussen, E. “Overcoming conflicting goals in university-industry research centres: Integrating and attaining academic research and firm Innovation”

7.1. Research paper 1: How firms use coordination activities in university-industry collaboration: Adjusting to or steering a research center?

How firms use coordination activities in university-industry collaboration: Adjusting to or steering a research center?

Abstract

University-industry collaboration (UIC) is an important source of knowledge and innovation for firms but is often challenging due to the partners' different goals. Thus, formal research centers have become a key policy instrument to foster stronger UIC whereby strong mutual relationships are created. This study investigates the establishment of a university-industry research center to gain insights into the coordination activities the focal firms used to achieve their goals with UIC. We find that the firms with goals related to specific innovations and technology development took a more active role by using structured coordination activities in the preformation phase of the research center, whereas the firms with goals related to general knowledge development mainly coordinated through unstructured activities when the center began operations. We map the specific coordination activities used in UIC and theorize on how the partners' different organizational goals influenced their use of these activities. Our findings have important implications for how activities in UIC, particularly in research centers, can be designed to strengthen the collaboration between universities and their firm partners to enhance knowledge development and innovation.

Keywords: *Coordination activities, Firm innovation, Organizational goals, Research centers, University-industry collaboration*

Introduction

Rapid technological change and globalization have forced firms to accelerate their innovation processes (Burnett and Williams, 2014) and engage in university-industry collaboration (UIC) to enhance technology transfer (Gilsing et al., 2011). While a range of formal and informal UIC linkages that can facilitate knowledge transfer exist (Azagra-Caro et al., 2017, Schaeffer et al., 2020), one key linkage is the establishment of formal research centers (Perkmann and Walsh, 2007, Boardman and Gray, 2010, Azagra-Caro et al., 2017). Research centers facilitate formal technology transfer mechanisms through administrative and infrastructural arrangements, such as collaboration contracts and licensing and legal agreements between the partners involved (Azagra-Caro et al., 2017). Research centers also contribute to developing informal technology and knowledge transfer between partners (Ankrah and Al-Tabbaa, 2015, Hayter et al., 2020), for instance through meeting arenas and workshops.

While it is well documented that formal research centers can yield positive firm outcomes (Vega-Jurado et al., 2017), partners often experience challenges that inhibit effective UIC (Ambos et al., 2008, Bruneel et al., 2010, de Wit-de Vries et al., 2018) and technology transfer (Gilsing et al., 2011). These challenges are typically rooted in differences between partners, such as differences in their time and resource allocation, management styles (Morandi, 2013), languages, and goals (Harrison and Klein, 2007, Galán-Muros and Plewa, 2016, Ghauri and Rosendo-Rios, 2016, Holstein et al., 2018). For example, firms often aim to exploit available knowledge to improve their products and processes (Murray and O'Mahony, 2007, Perkmann et al., 2018), whereas university partners aim for scientific novelty (Aghion et al., 2008). When engaging in UIC, firms' goals are often to develop firm-specific knowledge and technologies, while the goals of university partners are related to developing more general knowledge for the public domain (Gilsing et al., 2011, Canhoto et al., 2016).

Prior research has emphasized that firms and university partners often have a diverse set of goals that hamper UIC and technology transfer (e.g. Holstein et al., 2018, Kotlar et al., 2018, Tijssen, 2018). Still, the literature overlooks the behavior and

strategies of firms in research centers (Estrada et al., 2016) and how differences in these firms' goals influence the UIC process (de Wit-de Vries et al., 2018). Hence, there is a need to explore how firms' goals influence their decision making and behavior in research centers (Fini et al., 2019).

To explore how firms' goals influence their behavior in research centers, we draw on the organizational goal literature (Gagné, 2018), since goal setting is an important predictor of organizational behavior and decision making (Kotlar et al., 2018). Moreover, we draw on the literature on *coordination mechanisms* which concerns how firms coordinate their actions and behavior in a collaboration with partners (Argote, 1982, Morandi, 2013). By exploring firms' actions and goals during the establishment of a research center, we seek to develop a more comprehensive understanding of *what goals* firms want to achieve in their research partnerships with universities and which strategies they use to achieve these goals. Hence, we ask the following research question: *how do firms' different goals influence their coordination activities in a university-industry research center?*

As establishing goals and coordinating activities are particularly important in the early stages of a research collaboration (Canhoto et al., 2016), we conducted a longitudinal case study of the initial phases of a research center, whereby we followed the coordination activities used by different firm partners with various goals for collaboration. The chosen research center is part of the Norwegian scheme for the Center for Environment-friendly Energy Research (CEER), whose mission is to develop innovations and long-term world-class research related to reducing greenhouse gas emissions (Research Council of Norway, 2016).

Our findings make three key contributions. First, we contribute to the UIC literature by outlining the specific actions firms use to achieve their desired UIC outcomes. We find that the firms that entered the research center with the goal of gaining more specific technological improvements mainly relied on structured coordination activities (e.g., annual meetings initiated by the center's management), whereas the firms with general goals of research and knowledge development mainly

relied on unstructured coordination activities (e.g., ad hoc meetings initiated by the firm partners).

Second, our study in the UIC context provides a unique setting to assess how different firm goals can lead to different firm behavior (Gagné, 2018). By applying organizational goal theory and the literature on coordination mechanisms to the UIC context, we elaborate on how firms with different goals use different strategies to engage in a research center, such as strategies related to steering the research center or adjusting to the research center.

Third, by empirically examining the earliest stages of a research center, our study contributes to the dynamism of the technology transfer literature by providing a novel assessment of the conditions and processes by which formal technology transfer mechanisms may emerge. In sum, our study offers important implications for policy and practice related to the establishment of research centers, indicating that firms' goals for engaging in research centers are an important precondition for what activities these centers should prioritize and how collaboration should be coordinated.

Theoretical framework

University-industry research centers and firms' goals

The overall goal of university-industry research centers is to produce high-quality, long-term research and contribute to the innovativeness and competitiveness of the firms involved (Styhre and Lind, 2010). Although firm and university partners often agree on the overall goals of such centers, translating these goals into specific activities can create conflicts and fluctuating focus between the partners (Ranganathan et al., 2018), which tend to increase when the number of partners is high (Morandi, 2013). Indeed, when entering a research center, firm and university partners often create their own goals and expectations of what they want to achieve (Bruneel et al., 2010), but achieving these different goals simultaneously could be quite challenging (Morandi, 2013).

When entering into UIC, university partners generally have their own goals and expectations (Ranganathan et al., 2018), which mainly relate to scientific novelty (Aghion et al., 2008) and knowledge production for the public domain (Gilsing et al., 2011, Canhoto et al., 2016, Perkmann et al., 2018). However, some university partners focus on goals related to applied research and technological development based on specific firm needs (Tijssen, 2018).

Firms, on the other hand, often enter into UIC with a set of goals related to attaining knowledge and/or advancing innovative efforts (Abramovsky et al., 2009). These sets of goals tend to influence such firms' desired "end state" (Greve, 2008) and are often a combination of "general and long-term" and "concrete and specified" goals (Shah and Kruglanski, 2002). As such, Murray and O'Mahony (2007) found that firms' goals in UIC often relate to attaining specific knowledge related to their internal processes, while Gilsing et al. (2011) found that firms' goals in UIC often focus on appropriating novel technological knowledge that is relevant for their production processes. Other firms may focus on specific technologies (Canhoto et al., 2016) or developing innovations and services (Lam, 2011) by exploiting the knowledge and resources accessible through their university partners (Abramovsky et al., 2009).

Once a firm has decided on its goals (single and/or multiple) for engaging in a research center, it mainly focus its attention and behavior on achieving and steering these goals (Gagné, 2018), which might result in conflicts and misalignments between the firm and its university partners (Ranganathan et al., 2018). Prior literature has devoted much attention to the misalignments between collaborating firm and university partners and how to overcome them (Harrison and Klein, 2007, Galán-Muros and Plewa, 2016, Ghauri and Rosendo-Rios, 2016), for instance, by focusing on research center management (Morandi, 2013), reducing UIC tensions (Steinmo, 2015), and enabling technology and knowledge transfer between the partners (Segarra-Blasco and Arauzo-Carod, 2008). However, this study responds to calls to investigate firms' goals (de Wit-de Vries et al., 2018), the diversity of these goals (Estrada et al., 2016), and the way firms behave when trying to attain these goals (Fini et al., 2019) in

UIC by investigating how firms achieve their goals in a research center through coordination activities.

Firms' coordination activities in a research center

The concept of coordination activities is well established in the management and organization literature, mainly through research on intrafirm organizational management (e.g. Argote, 1982, Malone, 1987, Mom et al., 2009). The concept has also been adapted to interorganizational contexts (Nguyen et al., 2018), such as supply-chain management (Cäker, 2008); national and international markets (Koçak et al., 2014, Piazzai, 2018); networks and strategic alliances (Gulati et al., 2012, Oliveira and Lumineau, 2017); and UIC, where Morandi (2013) studied the management of research centers through coordination activities.

We understand the concept of coordination activities as firms' "*activities toward the aim of . . . cooperative agreement"* (Morandi, 2013, p. 71), which is well suited for investigating firms' actions in a research center for two main reasons. First, this conceptualization is appropriate because research centers involves a range of partners with different goals, and firms need to coordinate research center activities to achieve their own goals (Morandi, 2013). Second, this conceptualization is apt because unexpected developments may arise over the lifespan of a research center, so firms must be able to adjust to and align with these developments (Schilke and Goerzen, 2010).

To coordinate within a research center, firms can engage in structured and unstructured coordination activities (Claggett and Karahanna, 2018) (see Table 1 for an overview). *Structured coordination activities* are predetermined and established prior to the execution of tasks (Fernandes et al., 2018) and include activities like developing contracts (Oliveira and Lumineau, 2017) and engaging in formal partnerships (Argote, 1982, Willem et al., 2006), scheduled meetings, workshops, and projects (Willem et al., 2006, Fernandes et al., 2018). These activities are often formalized by research center management (Fernandes et al., 2018) through long-term and short-term plans (Willem

et al., 2006, Fernandes et al., 2018), work procedures, rules, and policies (Hanisch and Wald, 2014). Structured coordination activities are often beneficial when firms need to establish a clear direction for their goals in a research center (Kim et al., 2003) because such activities contribute to aligning decisions and focusing collaboration toward established goals (Morandi, 2013). Structured coordination activities also contribute to formalizing the tasks needed to achieve established goals (Mom et al., 2009). In sum, firms' engagement in structured coordination activities implicitly steers the respective research center's behavior and enables task completion (Dao and Strobl, 2019).

Unstructured coordination activities involve ad hoc actions (Argote, 1982), such as unplanned meetings initiated by firm members (Arenas and Ayuso, 2016), unscheduled resource allocation (Geringer and Hebert, 1989), and informal knowledge sharing between actors (Claggett and Karahanna, 2018). Engaging in unstructured coordination activities is often favorable when dealing with uncertainty (Morandi, 2013), such as explorative goals (Dao and Strobl, 2019). Indeed, when dealing with explorative goals, unstructured coordination activities contribute to knowledge creation, which facilitates decision making and goal achievement (Kim et al., 2003). In addition, unstructured coordination activities help align partners by establishing mutual understanding (Koçak et al., 2014) and facilitating mutual adjustments to develop the focal research center (Danese et al., 2004, Dao and Strobl, 2019). In sum, unstructured coordination activities contribute to firms' ability to collaboratively explore and advance new and radical ideas (Morandi, 2013, Dao and Strobl, 2019) by aligning with and adjusting to the focal research center's development (Danese et al., 2004).

Hence, exploring firms' structured and unstructured coordination activities in UIC is particularly valuable, not only because it is important for researchers to gain a more comprehensive understanding of the coordination between partners in UIC (Morandi, 2013), but also because the multiple firm partners involved in these endeavors have diverse goals, so more knowledge is needed on how firms behave in UIC to achieve their goals (Fini et al., 2019).

Insert Table 1 about here

Research method

Research design, context, and case selection

To increase our understanding of firms' use of coordination activities and the underlying dimensions of firm behavior and actions in UIC, we conducted a qualitative embedded case study of a research center (Eisenhardt, 1989, Yin, 2014). The embedded case study design provides the ability to examine how firms (subunits) adjust to their goals within the context of a research center (the larger unit) and to analyze these firms both separately and in a cross-case manner (Baxter and Jack, 2008)

The research center in our study is part of the Norwegian scheme for CEER. CEER was established to promote innovation and long-term world-class research related to reducing greenhouse gas emissions (Research Council of Norway, 2016). The research center comprises about 40 partners, including 20 firms, and offers a unique context for gaining an in-depth understanding of firm behavior and actions in UIC (Eisenhardt and Graebner, 2007, Bruneel et al., 2010, Plewa et al., 2013, Okamuro and Nishimura, 2018) through its various data sources, such as the CEER application and annual rapports, meeting documents, and interviews with both firm and university partners.

Our interview sample includes informants from different firms within several heavy industrial sectors who could shed light on our research question and could describe and highlight different perspectives on the focal points of this study (Creswell and Poth, 2017). The chosen firms differ in size, ownership, and R&D experience to provide contextual variety (Yin, 2014) and improve the internal validity of the embedded cases (Creswell and Poth, 2017) (see Table 2).

Insert Table 2 about here

Data collection

The primary data for the study consists of 28 interviews, including 16 semi-structured interviews with eight firm representatives and 12 semi-structured interviews with six university partners (Eisenhardt, 1989), at two points in time (2017 and 2018) as well as observations during this period. The first round of interviews (eight firm informants and six university researchers) was conducted face to face in early 2017, not long after the research center had officially opened, with the aim to get a retrospective view of how and why the UIC was initiated and why the firms were motivated to get involved in the research center. The research team also participated as observers in research center activities, such as annual consortium meetings, workshops with firms and university partners, and one monthly research manager meeting, to observe how the collaboration unfolded. We used the interviews with the university partners and the fieldnotes from the observations to increase our contextual understanding of how the firm and university partners interacted and to identify and access relevant documents and informants for interviews.

Based on our observations and analysis of how the firms coordinated their activities in the research center, we conducted a second round of interviews with the same firm and university representatives in Autumn 2018. All interviews lasted about one hour and were face to face or by telephone, and the informants were asked to describe the developments of their engagement in the research center. We asked open questions before asking follow-up questions (e.g., “Can you tell us a bit more about that project?” or “How did you experience this activity?”) to obtain a more in-depth understanding of critical events.

To prevent recall bias from retrospective data and to validate our findings of the collaborative process and timeline of critical events, we applied method triangulation (Yin, 2014), whereby interviews from firm informants were supplemented with

interviews from university representatives and secondary data sources, such as documents (Denzin and Lincoln, 1994, Denzin, 2012, Yin, 2014). The documents included the application to the CEER program, participation lists from various research center meeting areas and workshops, as well as notes on firm projects and meetings conducted in the research center (see Table 3).

Insert Table 3 about here

Data analysis

As part of the data-analysis process, we recorded and transcribed all interviews shortly after they were completed (Yin, 2014). We then continued our data analysis with an inductive, within-case analysis (Eisenhardt, 1989) to obtain an overview and become familiar with the data. Next, we conducted an inductive data-analysis process inspired by the Gioia method (Gioia et al., 2013), starting with initial coding (Saldaña, 2015) to broadly identify, structure, and label the firms' goals. This analysis resulted in four second-order themes and two overarching dimensions of the firms' goals in the research center (see Figure 1). Next, we undertook initial coding of the firms' activities. Once we had identified the first-order codes, we used our research question (*How do firms' different goals influence their coordination activities in a university-industry research center?*) and the coordination activity framework presented in Section 2 to structure and label our codes. We used the outputs of this step to analyze how the firm partners engaged in the research center to ensure their goals were attended to, which resulted in four second-order themes related to the firms' activities, which we then aggregated to overarching concepts (Gioia et al., 2013) (see Figure 2).

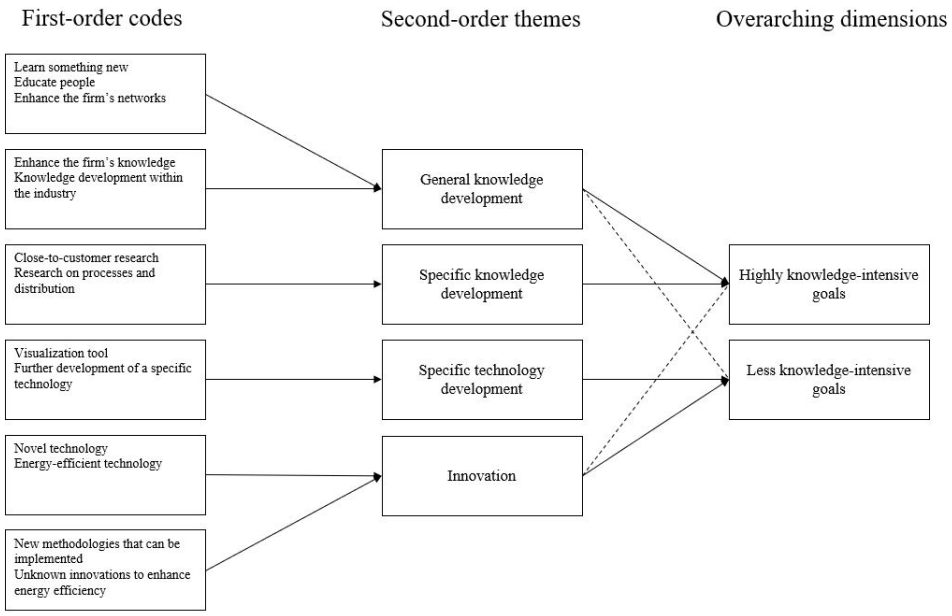


Figure 1: Overview of the goal structure across the firms

After identifying the firms' goals and activities, we structured the codes based on two critical phases we noticed in the data: the *preformation* phase (before the research center was operational) and the *formation* phase (the first official year). We also conducted a cross-case comparison of the firms' goals and coordination activities in the observed phases to identify similarities and differences among the firms' goals and their activities over time (Eisenhardt, 1989). From this, we constructed a theoretical model on how firms with different goals adjusted to or steered the research center (Vega-Jurado et al., 2017). Lastly, we derived propositions to clarify our theoretical arguments.

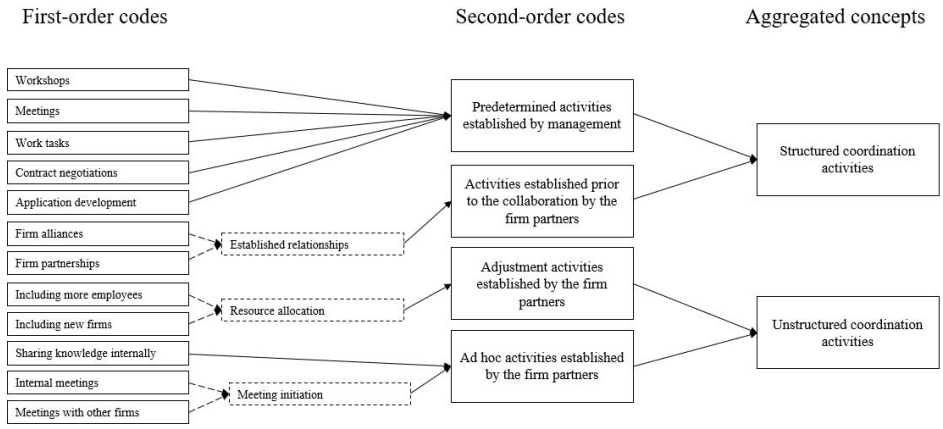


Figure 2: Overview of the firms' coordination activities to achieve their goals

Findings

We first present findings regarding the firms' goals in the research center. Then, we present the firms' structured and unstructured coordination activities in the preformation and formation phases of the research center.

Firms' goals for their research center involvement

We observed that the firms in this study entered the research center with two types of goals: (1) long-term *general goals* (for overall research topics), which were oriented more toward general innovation and knowledge development, and (2) short-term *specific goals* (for specific research topics), which were more firm oriented (Shah and Kruglanski, 2002, Gagné, 2018).

As shown in Table 4, all eight firms in this study had general goals related to innovation (in both the preformation and formation phases), as stated by the representative from Firm 1: "We want to develop methods or technologies that we can implement that will result in a reduction of emission gasses or more energy-efficient production." All of the firms (except Firm 7) also had general goals related to knowledge development, as explained by the informant from Firm 6: "Knowledge and

networks that we [the firm] can use in the future." As this statement indicates, firms usually establish multiple general goals to achieve the results they want (Gagné, 2018).

Most of the firms (1–7) also had specific goals related to innovation and knowledge development, which were mostly apparent in the preformation phase. During this phase, three of the firms (5–7) wanted to develop a specific new or improved technology. For example, Firm 6 wanted the research center to develop a technology to monitor the firm's production process, as one representative explained: "Maybe there is some type of sensor or temperature measurements that lets us control [our processes] in a more dynamic way." Moreover, four of the firms (1–4) wanted the research center to focus on specific knowledge development by concentrating on a particular research area, such as "close-to-customer" research: "We are used to researching the large processes, and even though that is important, it is also vital to research the smaller aspects [of processes] that are also central for the firm" (Firm 2).

Hence, we identified a distinction between two groups of firms: (1) firms with highly knowledge-intensive goals that tended to have stronger (specific and general) goals related to knowledge development and (2) firms with less knowledge-intensive goals that tended to be more innovation and technology oriented. Based on this firm distinction, we next explore how the firms' goals influenced the way they coordinated activities within the research center (Ambos et al., 2008, Bruneel et al., 2010, de Wit-de Vries et al., 2018).

Insert Table 4 about here

Firms' coordination activities within the research center

Both groups of firms (with more and less knowledge-intensive goals) engaged in two types of coordination activities related to the research center: *structured activities*, concerning the firms' engagement in predetermined activities organized by the research center management and themselves during the first years of the collaboration, and *unstructured activities*, involving adjustment activities and ad hoc activities initiated and undertaken by the firms in a way that influenced the collaboration in the research center.

Firms' structured coordination activities

The firms used two types of structured activities in the preformation phase before the research center officially started: *application development*, which concerns the firms' contributions to the research center's application to the CEER program, and *predetermined relationships,* which refer to established alliances and partnerships between the various firm partners before the research center was established. Furthermore, the firms used two activities during both the preformation and formation phases: *meetings and workshops* and *work tasks* (see Table 5).

Insert Table 5 about here

Preformation phase

Application development. The group of firms with less knowledge-intensive goals (5–8) was highly involved in developing the research center's application to the CEER program. These firms shared their internal challenges and proofread the application: "We went through the application before it was delivered [to the Research Council] and gave feedback on it before it was written [by the universities]" (Firm 5). This group of firms was also more involved in contract negotiations with the university partners: "Everything in [research collaborations] must go through our legal department to handle what [knowledge and results] we can share and not share [with

the other partners]" (Firm 7). This involvement implies that these firms made use of the application and contract development to govern their relationships with and the outcomes of the research center (Oliveira and Lumineau, 2017).

The firms with highly knowledge-intensive goals (1–4) were only partially or not at all involved in the application process, as stated by the representative from Firm 4: "I think [the application and the center structure] were already outlined before we came in." Similarly, Firm 1 became more involved only after "the goals of the center were established." This group of firms was also less involved in contract negotiations. For example, the information from Firm 2 noted, "I became involved right after the application had been approved . . . and [the research center and other firm partners] spent a long time on [contract negotiations] related to the establishment of the research center. It was these legal assessments of the rights." Hence, the firms with highly knowledge-intensive goals seemed more concerned with exploring the full breadth of the research center's knowledge and not with steering the research center toward their firm-specific objectives, unlike the firms with less knowledge-intensive goals (Oliveira and Lumineau, 2017, Vega-Jurado et al., 2017).

Predetermined relationships. Independent of their goals, size, R&D experience, and ownership, all the firms entered the research center with previously established firm alliances and/or partnerships. Some of the firms (3, 6 and 8) were part of an industry alliance with several other firm partners that joined the research center together, as decided by the alliance. Other firms joined the research center together, such as Firms 2 and 4, which had a close partnership prior to their involvement in the research center. These firms had various reasons for joining the research center, as stated by the representative from Firm 4: "We can't be a fully worthy partner in these types of research programs because we don't have the capacity [alone]."

Thus, Firm 2 involved Firm 4 to enhance the resources it brought to the research center, as the Firm 2 informant explained: "First, [we included] Firm 4 because the firm representative [in Firm 4] is an important resource [for Firm 2 in the research center]. He has contributed in many of the meetings toward the research center." Hence, one

of the main reasons the firms joined the research center together and brought their previously established relationships was to coordinate their actions in the center to reap common benefits. This motivation was explained by the representative from Firm 7, which, along with its customer, had specific goals related to innovation development in the early stages of the collaboration: “As of now, we are backing [Firm 5] in a project [in the research center] because we can learn something in relation to our projects. The priorities have been sensible, but in the next eight years, we expect a specific work project related to our supply chain.”

Preformation and formation phases

Meetings and workshops. Several of the firms with less knowledge-intensive goals were highly involved in the meetings and workshops established by the research center in the preformation phase: “We have participated in almost every [meeting] so far” (Firm 5). As the firms entered the formation phase of the research center, they continued to be highly involved in the research center’s meetings and workshops, and Firm 6 even increased its involvement in these activities in the formation phase. Conversely, the firms with more knowledge-intensive goals were only partially involved in the research center’s meetings and workshops in both phases: “We choose some of [the meetings and workshops] because the research center is so large, and much that happens there is not interesting for us. It isn’t valuable for us” (Firm 1). Only two of these firms (2 and 4) became more involved in meetings and workshops during the formation phase: “We have been present in the large workshops with two or three participants” (Firm 2).

Work tasks. The firms with less knowledge-intensive goals were more involved in influencing the research center’s work tasks and projects during both phases. For example, the representative from Firm 7 described how his firm had influenced such tasks and projects: “[We] have been in a dialogue with the research center about various work tasks, and have actually landed one … we have also evaluated other work tasks, which have been discussed [with the university partners].” The group of firms

with highly knowledge-intensive goals, on the other hand, was less involved in influencing work tasks and projects during both phases: “Our engagement will be passive in the beginning” (Firm 4).

Firms’ unstructured coordination activities

Our analysis revealed that both groups of firms were involved in three types of unstructured coordination activities in the preformation and formation phases of the research center: *resource allocation*, which relates to how the firms allocated their resources in the research center; *knowledge integration/transfer*, which concerns how the firms integrated knowledge from the center; and *meeting initiation*, which refers to how the firms called meetings with other firms and university partners involved in the research center (see Table 6 and 7).

Insert Table 6 about here

Preformation phase

The firms had limited involvement in unstructured coordination activities in the preformation phase.

Resource allocation. During this phase, many of the firms dedicated a few selected employees to engage with the research center before its official start. If necessary, the firms drew on internal expertise to contribute in the research collaboration: “I am the contact person from our R&D department [who works with] the research center, but I have the coordination role. We engage people from, for example, the process department, who work as our experts” (Firm 7).

Knowledge integration/transfer. In the preformation phase, most of the firms did not engage the other firms and did not use resources to integrate knowledge from the center. However, they were aware that integrating such knowledge into their own

operations could be important. For example, during this phase, Firm 3 (with highly knowledge-intensive goals) was aware of knowledge outputs from the research center that eventually needed to be transferred to the firm: "We have to ensure that [the knowledge outputs] which are relevant [for us] are implemented and distributed internally."

Meeting initiation. Almost none of the firms facilitated internal meetings or meetings with other firm or university partners during the preformation phase, except for Firm 2 (with highly knowledge-intensive goals), which had meetings both internally and with other firms in the research center (see Table 4). Firm 2 arranged internal meetings to "discuss what is important to us [in the research center]," which were likely needed because this firm had limited involvement in developing the center's application and needed to coordinate more internally to achieve its goals. Firm 4, which was also not involved in the center's application development, initiated some internal meetings with its firm partner (i.e., the firm it had a prior relationship with) to coordinate activities in the research center to attain results that could benefit their industry overall rather than the firm individually: "As of now, everything is decided through Firm 2."

In sum, both groups of firms were minimally involved in unstructured coordination activities in the preformation phase; however, some firms with highly knowledge-intensive goals were slightly more engaged during this phase.

Formation phase

As shown in Table 7, during the first official year of the research center, several of the firms became more involved in the research center through unstructured coordination activities.

Resource allocation. Firms with highly knowledge-intensive goals dedicated more firm resources to the research center during the formation phase. For example, Firm 2 involved a researcher (subcontractor): "He comes from a research organization. He has a prior relationship with the researchers [in the research center]. He seeks them

out, makes contact, and follows up with the activities [in the research center]. It has worked for us." The new research subcontractor contributed to the firm's understanding of the research center and bridged the gap between the firms and university (Al-Tabbaa and Ankrah, 2018). Firm 1 also increased the resources it allocated toward the research center by hiring people to work directly with the research center: "[A particular employee] is engaged in the research center activities." Firms with less knowledge-intensive goals, however, were less involved in resource-allocation activities during the research center' first year, as explained by a representative from Firm 7: "In regard to resources, it's only one person that follows up [with the research center], in addition to me on the administrative side."

Knowledge integration/transfer. Some of the firms with highly knowledge-intensive goals started to internally integrate the knowledge provided by the research center among several of their employees: "We try to tell the employees what we are doing [in the research center]" (Firm 2). Firm 4 also started to discuss research center activities during informal meetings, considering, for example, "What kind of possibilities [the research center] can give us." The firms with less knowledge-intensive goals were less engaged in integrating knowledge in their firms, except for a few that reported the research center's progress to a small group of firm employees for evaluation reasons. For example, Firm 5 reported this progress to an evaluation committee: "[The firm representative in the research center] receives evaluations from others within the firm on [research and results] that have come from the research center."

Meeting initiation. Several of the firms with highly knowledge-intensive goals continued to facilitate internal meetings in which they involved another firm to coordinate together toward the research center: "We [the firm] have coordination meetings with [a firm partner] where we agree upon what is important and what we should follow up with in the research center" (Firm 1). However, only a few firms with less knowledge-intensive goals started to facilitate internal meetings with other firms and university partners during the formation phase. For instance, Firm 6 initiated

meetings with the university partners: “We had an initiative [for the research center] to get [research and results] that were more in line with our expectations. We have had meetings with particular researchers, but we are not yet exactly in line with what we want.”

Insert Table 7 about here

Discussion and propositions

In this section, we discuss the key findings and develop propositions regarding how different types of firms use coordination activities to achieve their goals within the research centers.

Firms’ goals for their research center involvement

The firm and university partners translated the overall goals of the research center into more specific outcomes. This potentially created goal conflicts and fluctuating focus between the firm and university partners in the research center (Ranganathan et al., 2018). While firms’ multiple goals have largely been overlooked in the UIC literature (Ankrah and Al-Tabbaa, 2015, Steinmo, 2015, Fini et al., 2019), we found that the firms in our sample established both general and more specific goals that jointly influenced their desired outcomes. The notion of firms having multiple goals is well established in the literature on organizational goals (Shah and Kruglanski, 2002, Gagné, 2018). In our context, we found that the firms had multiple goals that were more or less related to knowledge development. While some firms had *highly* knowledge-intensive goals that focused mostly on developing and exploring new knowledge, other firms had goals that were *less* knowledge intensive and focused more on developing specific innovation solutions.

How firms coordinate through structured activities

All the firms in our study, regardless of their goals, size, ownership, and R&D experience, had established partnerships and alliances with other firms in the research center. These alliances and partnerships usually enabled the firms to sustain a cooperative advantage and enhance their resources relative to the other firm partners and the research center in general (Lorenzoni and Lipparini, 1999). We suggest that the firms used their relationships with other firms as a coordination activity to enhance their position within the research center. We also found that the firms that maintained their involvement in alliances and firm partnerships were more engaged in the research center and participated in research center activities and internal activities related to the research center to a greater extent, while the firms that left such alliances and firm partnerships became less engaged with the research center over time (see Tables 6 and 7). Thus, we suggest that when firms enter a research center together with other firms, they find it easier to coordinate with the research center because of their combined resources.

The firms with less knowledge-intensive goals were generally more involved in the preplanned and predetermined activities established by the research center in both the preformation and formation phases, such as *application development*, *meetings*, *workshops*, and *work tasks* (Mom et al., 2009). When firms establish goals, they usually focus their behavior on achieving those goals (Shah and Kruglanski, 2002, Gagné, 2018). Hence, the firms with less knowledge-intensive goals wanted the research center to produce specific solutions for their problems and may have engaged in structured coordination activities to include these problems in the research center's contracts and application, with the ultimate goal of ensuring the research center would attend to their goals (Oliveira and Lumineau, 2017, Vangen, 2017, Vega-Jurado et al., 2017).

Furthermore, we suggest that the firms engaged in these types of activities to enhance their interactions with the university partners such that these partners would focus on the firms' goals and ultimately incorporate the firms' goals into the research

center's overall goals (Perkmann and Walsh, 2007). By doing this, the firms managed to keep the focus on their goals and therefore steer the research center's activities (Mom et al., 2009). Hence, the firms with highly knowledge-intensive goals were less involved in predetermined activities as these firms were more explorative and did not expect specific problems to be solved. Indeed, the development of novel knowledge usually follows a more unpredictable path and is continuously adjusted during the lifespan of a research center. Thus, the firms with highly knowledge-intensive goals were less involved in these types of structured activities because their goal attainment did not depend on steering the research center (Vega-Jurado et al., 2017). Thus, we propose the following:

> **Proposition 1:** Firms with less knowledge-intensive goals use structured activities to coordinate their participation in a research center more than firms with highly knowledge-intensive goals.

How firms coordinate through unstructured activities

The firms with highly knowledge-intensive goals became more engaged in unstructured coordination activities during the first official year (formation phase) of the research center. These firms allocated resources to the research center, integrated the center's knowledge within their own firms, and initiated internal meetings with other firm partners. Our findings illustrate that when firms' goals were rather unspecific and relate to a high degree of knowledge development, the firms adjusted to the development and progress of the focal research center through unstructured coordination activities (Geringer and Hebert, 1989, Morandi, 2013).

Furthermore, the firms with highly knowledge-intensive goals left room for unexpected changes during the research center's lifespan and reacted to events that occurred in the research center (Morandi, 2013). We argue that these firms focused more on exploring new tacit knowledge and taking advantage of the full breadth of the research centers' and the university partners' knowledge. Hence, the firms engaged in unstructured activities to follow up on unforeseeable changes (Vega-Jurado et al., 2017)

and enhance their development of new knowledge. Moreover, by integrating knowledge from the university partners and the research center, the firms enhanced their possibility of developing new ideas and exploring new possibilities that may contribute to achieving their goals (Spee et al., 2016, Dao and Strobl, 2019). However, firms with less knowledge-intensive goals were more focused on attaining their specific goals and did not explore new possibilities to the same degree. Thus, we propose the following:

> **Proposition 2:** Firms with highly knowledge-intensive goals use unstructured activities to coordinate their participation in a research center more than firms with less knowledge-intensive goals.

How firms' goals affect their behavior

While prior literature has focused on goal divergence between firms and university partners as a single entity (Ankrah and Al-Tabbaa, 2015, Steinmo, 2015), our study shows that firms enter a research center with a set of multiple goals (Gagné, 2018). As shown in Figure 3, we found that some firms had goals that were highly knowledge intensive and were oriented toward knowledge development (Styhre and Lind, 2010); these firms aimed to achieve outcomes that involved exploring novel knowledge (Vega-Jurado et al., 2017). However, the other firms had goals that were less knowledge intensive and more oriented toward innovation development (Styhre and Lind, 2010), and they aimed to attain specific technological solutions for predetermined problems (Vega-Jurado et al., 2017). Thus, our analysis further confirms that firms' goals affect their behavior (Shah and Kruglanski, 2002, Gagné, 2018), as shown in Figure 3.

As such, we suggest that the firms' different behavior toward the research center can be explained by their attempts to attain their goals for research center involvement. The firms with highly knowledge-intensive goals focused on exploring the different possibilities within the research center to a larger degree (Vega-Jurado et al., 2017), which means that they mainly tried to adjust to the development of the

research center. In contrast, the firms with less knowledge-intensive goals focused on attaining their specific goals for research center involvement to a larger degree, which means that they tried to steer the development of the research center. Thus, we propose the following:

Proposition 3: Firms with highly knowledge-intensive goals are more willing to adjust to the development of a research center compared to firms with less knowledge-intensive goals, which are more interested in actively steering the development of a research center based on their own needs.

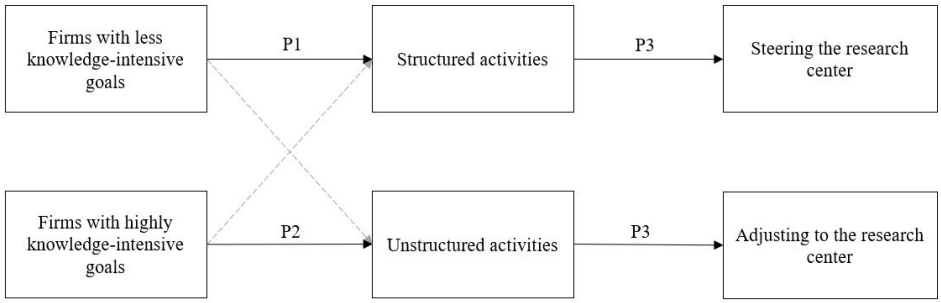


Figure 3: How firms' goals affect their behavior toward a research center

Conclusion and implications

By investigating the collaborative relationships between firms and a research center from its establishment, we contribute to a more in-depth understanding and dynamic perspective of technology transfer in UIC, particularly in relation to the scarcely investigated creation phase of new UIC (Skute et al., 2019, p. 934-935) in the context of research centers (Skute et al., 2019, p. 918). By following eight firms during the preformation and formation phases of a research center, we showed how different firms coordinated their activities to achieve their goals in the research center.

Overall, we found that the firms with highly knowledge-intensive goals and the firms with less knowledge-intensive goals used different coordination activities to attain their goals in the research center. While previous UIC research has focused on

the distance between firms' and universities' goals, our study contributes with new insights by highlighting the diversity in firms and their goals for research center involvement (Ankrah and Al-Tabbaa, 2015, Steinmo, 2015). Hence, we extend the UIC literature by showing that firms within a research center likely have multiple goals, which are more or less focused on knowledge development or innovation development. Moreover, by drawing on the coordination mechanisms literature, we outlined the various coordination activities firms with different goals engaged in during the preformation and formation phases of a research center (Larsen et al., 2013, Asmussen et al., 2016). We showed how the firms with less knowledge-intensive goals adopted a more active role by engaging in predetermined research center activities, while the firms with highly knowledge-intensive goals engaged more in unstructured coordination activities that were ad hoc and determined by the firms.

Drawing on organizational goal theory and the coordination literature, we outlined how the firms' goals and coordination activities enabled them to steer or adjust to the research center (Oliveira and Lumineau, 2017). We found that the firms with less knowledge-intensive goals coordinated through structured activities to a larger degree, ultimately steering the research center toward their own goals. The firms with highly knowledge-intensive goals, on the other hand, coordinated through unstructured activities to a larger degree, which ultimately caused these firms to adjust to the research center. Thus, this study demonstrates how firms use different types of specific structured and unstructured coordination activities to achieve their goals in research centers.

Implications

Our findings have important implications for organizations that are structured around the production and exchange of knowledge (Weick, 1976), such as research centers and related firms, as well as for policymakers who support such collaborations.

Firms with highly knowledge-intensive goals and firms with less knowledge-intensive goals use different coordination activities to attain their goals for research

center involvement. Consequently, research centers should use different strategies to get these different types of firms involved and committed to their endeavors. As such, when trying to engage firms with highly knowledge-intensive goals, research centers can use an explorative strategy focusing more on the development of novel knowledge. However, when working with firms with less knowledge-intensive goals, research centers can focus on attaining the firms' specific goals to a larger degree. These different strategies may contribute to the more successful management of research centers, which can be organizationally complex and have weak linkages between their different components (Weick, 1976). For policymakers and research center managers, this finding indicates that the structure of research centers should include better tools to incorporate various firm goals as part of overall center goals by establishing subgoals. These subgoals should cover both knowledge-intensive and more innovation-intensive goals, which—in combination—are important to achieve the overall long-term goals of knowledge and innovation development. Importantly, firms should be heavily involved in the development of these goals early in UIC to secure their engagement and commitment in the research center.

Lastly, our findings suggest that firms should dedicate resources to become involved in both structured and unstructured coordination activities in research centers to reap the potential (short- and long-term) benefits of knowledge and innovation development. Moreover, as our findings show that firms with too specific goals may experience difficulties in taking advantage of the full breadth of research center activities (Vega-Jurado et al., 2017), we echo Spee et al. (2016) and suggest that firms should use more explorative strategies in research centers to enhance their chances of developing new ideas and exploring new possibilities that may contribute to their innovativeness.

Limitations and further research

While our study provides several new insights into UIC, it has some limitations that may limit the generalizability of our findings, and/or open new avenues for

research. First, research centers in different fields might experience other types of mismatches between firms' goals and coordination activities. Our findings may be restricted to research centers involving firms in technology-based heavy industries, such as energy, processing, and infrastructure, while centers in more science-based industries, such as biotechnology, may have firm partners with more developed links to universities (Gilsing et al., 2011). Studying only one research center may also be a limitation because comparative studies are often recommended to ensure the transferability of findings (Eisenhardt, 1989). Hence, future research could perform case studies in several research centers in different fields to obtain a more comprehensive understanding of how firms coordinate within a research center to achieve their goals.

Moreover, while our analysis did not reveal direct relationships between firm heterogeneity (e.g., in R&D experience, size, ownership) and the use of coordination activities in the research center, our findings hinted that small and medium-sized firms with lower R&D experience had challenges engaging in both structured and unstructured coordination activities unless they were involved in prior firm alliances and/or partnerships (e.g., Firm 4 and 8). Thus, we suggest that future studies look more closely at the use of prior relationships as a coordination activity and whether these relationships influence how firms of different sizes and with different R&D experience engage in and use coordination activities in a research center.

In addition, our findings show that the firms' goals in the preformation and formation phases of the research center were more or less constant. Thus, future studies should specifically focus on how the development of a research center influences the firms' goals in later phases, to explore whether firms' engagement in various research center activities affect their goals over time. Lastly, our findings suggest that some of the firms' goals were rather specific, which further opens up questions related to what strategies firms use after their specific goals have been achieved, and whether firms with mostly general goals develop more specific goals during the collaboration.

Acknowledgements

First, the authors want to thank the participants at the Technology Transfer and Society conference (2018) for their feedback on an early version of this paper. The authors would also like to thank the anonymous reviewers for their useful comments and suggestions, enabling us to improve the paper. The research was funded by the Norwegian Research Council (project number: 257632), which is gratefully acknowledged. The funding has not influenced the research process or results.

Tables

	Structured coordination activities	Unstructured coordination activities
Type of activities	Predetermined activities and specified relationships	Ad hoc non-institutionalized activities
Examples	Scheduled meetings and workshops, formal action plans and strategies, contract developments and project developments	Meeting arenas with members involved in the organization, such as workshops, visits, and ad hoc resource allocation
Initiated and implemented by	Research center management	Firms that adjust to the actions and activities implemented by management
Goal	Engagement in formal decision making to reach goals and steer the organization	Informal knowledge sharing between members to reach goals and adjust to the organization

Table 1: Structured and unstructured coordination activities

Firms	Industry	Ownership	Size	Type of products	R&D experience
Firm 1	Processing industry	Publicly listed	Large	Raw materials	High: Experience with long- and short-term R&D projects with firm and university partners, internal R&D projects, internal R&D department
Firm 2	Infrastructure industry	Private	Medium	End products	Some: Experience with short-term R&D projects with university partners, some R&D contracting projects, no internal R&D department
Firm 3	Processing industry	Private	Medium	Raw materials	Some: Experience with one long-term R&D project with university partners, some R&D projects with other firms, some short-term R&D projects, no internal R&D department
Firm 4	Infrastructure industry	Private	Micro	End products	Low: Experience with some short-term R&D projects with firm partners, a few R&D contracting projects, no internal R&D department
Firm 5	Energy industry	Publicly listed	Large	Raw materials	High: Experience with long- and short-term R&D projects with firm and university partners, multiple R&D contracting projects, large internal R&D department
Firm 6	Processing industry	Publicly listed	Large	Raw materials	Some: Experience with one long-term R&D project with university partners, some short-term R&D projects with firm and university partners, internal R&D department
Firm 7	Energy industry	Publicly listed	Large	End products	High: Experience with long- and short-term R&D projects with university and firm partners, R&D contracting projects, large internal R&D department
Firm 8	Processing industry	Publicly listed	Medium	Raw materials	Low: Experience with short-term R&D projects, R&D contracting projects, no internal R&D department

We use the European Union's categories for firm size: large > 250, medium < 250, small < 50, and micro < 10 employees

Table 2: Overview of the embedded cases—Firm descriptions

Primary data sources

	Interviews for analysis	*Interviews for method triangulation*
1	Firm representative (*)	Research center manager (*)
2	Firm representative (*)	University project manager (*)
3	Firm representative (*)	University project manager (*)
4	Firm representative (*)	University project manager (*)
5	Firm representative (*)	University project manager (*)
6	Firm representative (*)	University project manager (*)
7	Firm representative (*)	
8	Firm representative (*)	
Sum	16	12

Observations for method triangulation (2017–2018): annual consortium meetings, workshops with the firm and university partners, and a research meeting with research managers. Written fieldnotes from the observations.

Secondary data sources

Documents for method triangulation: CEER application, firms' letters of intent, annual progress reports, participation lists, project documents, PowerPoint presentations about projects and research center progress.

*Interviewed in both periods: preformation phase (2017) and formation phase (2018)

Table 3: Key data sources and interviews

	Innovation development		**Knowledge development**	
Firm	Specific goals	General goals	Specific goals	General goals
1		<u>Both phases</u> Innovation developments: *Innovations from research.* *Develop ideas that can lead us forward regarding our work with energy efficiency.*	<u>Both phases</u> Specific research area: *We want the research center to manage "near-customer"—research that enables us to make simple improvements in many areas [within the firm].*	<u>Both phases</u> Learning effects: *Our goal is to learn something new.* *It is also very important goal setting for us to get researchers to our firm. We have seen that we get a lot out of it, not just because we then become an attractive collaboration partner in relation to science but also so we can learn things from [the researchers].*
2	<u>Both phases</u> Concrete innovation outcomes: *When I say eight years, that may not be very long from a researcher's perspective, but with that many resources and expertise, I have to expect that there will be something concrete that will come out of this [the research center].*	<u>Both phases</u> Technology development: *We want to go forward on the technology side to produce power from heat.*	<u>Both phases</u> Knowledge development: *[Knowledge that] increases the efficiency and reduces the investments costs [of firm processes].* Access to new customers: *We need to find customers who need heat.*	<u>Both phases</u> Knowledge sharing: *We need to share the knowledge; that is one of the fundamentals.* Useful research: *We want the research [in the research center]to give results that we can show off.*
3		<u>Both phases</u> Technological improvements in the firm's processes and production: *We have some relatively low-hanging fruits [technology related] on the energy side that we could maybe utilize better through participation. I hope that [the research center] can give us some input [on technology implementation] to make better choices in relation to the road ahead [for the firm].*	<u>Both phases</u> Useful research: *We expect that there will be results that are useful for us.* Access to new customers: *We have a lot of surplus heat, and we don't have any customers for that heat. It would be very interesting to get access to energy-demanding industries [in the research center].*	<u>Both phases</u> Long-term knowledge development: *Knowledge and networks that we can utilize in the future.* Knowledge as the basis for decision making: *The research [developed in the research center] and the suggestions that come from the relevant research areas in the research center can give us a better foundation.*

4		Both phases Technological opportunities: *It should be concrete suggestions for technologies [from the research center] and, gladly, things that are already in operations or have been tried at least at a small scale.* *The safest for us is that it [technology] is something that has been tried out, so we get the information, references, and descriptions about how things [in the technology] work.* *We want to explore the window of opportunity [in relation to useful technology for the firm].*	Both phases Specific research area: *Everything that focuses on general recovery and utilizing surplus energy and low-tempered energy that is in some way are useful for us.*	Both phases Increase knowledge about the industry: *Enhance the understanding of how things are connected and what potential may lie in the areas we are working on in relation to optimizing the digitalization, mathematical modeling, and prediction of both surplus heating access and efficiency of the grid.* Knowledge development relevant to the firm: *However, we have an expectation that it [the research center] will be working seriously on the work tasks they have. Also, that the other partners will be active [in the research center].*
5	Preformation phase Specific technology/process improvements: *We want to find out what will happen if we take with us [a specific technology] that is already developed and see if it will change our operation costs, operation conditions, and production.* Formation phase New technology to increase efficiency: *We want to reduce emissions from heat a given amount. How we do it is not that important.*	Both phases Technology development that benefits the firm: *We are only interested in technology that makes things better for us.* *For us to test something, it must be mature and developed enough to be a case that can give us a dividend.*		Both phases Educate personnel: *We want to educate people who we can use both directly or indirectly to get candidates we can hire or increase the expertise within this field in research organizations.*
6	Both phases Specific process/technology developments:	Both phases Technology development that benefits the firm:		Both phases Knowledge exchange between partners:

	We want the research center to develop an innovative way to control the energy flow within our [production processes]. *There have been some studies done on this [energy flows in the firms' process] earlier, but maybe they can do it in an even more detailed and structured way so they can confirm what has been found earlier.*	*I hope that we will get so far [during the eight years] that there will be suggestions for improvements [within our field/firm] and that some experiments [relevant to our process] can be conducted.*		*I hope that we find an opportunity to transfer knowledge and competence [between the partners in the research center].* Networking: *I hope that we can get a kind of industrial forum, where we can exchange experiences.*
7	<u>Both phases</u> Specific technology development: *We want to achieve a supply-chain [technology] from the core process and to the market to ensure energy efficiency through the whole supply chain.* <u>Formation phase</u> Research related to the firm's production process: *We expect that we will get a project that is directly relevant for our operations.*	<u>Both phases</u> Technological developments/improvements: *We have expectations that we will get something concrete, so we can get some dividends out of it [the research center].* *Energy efficiency in a broader perspective rather than suboptimizing.*		<u>Both phases</u> Knowledge that suits the firm's strategy: *You get access to pretty much knowledge and resources. It [the research center] fits with our strategy, and we understand the research center as a possible opportunity to study business cases that are specific for our firm.*
8	<u>Both phases</u> Expect "specific" innovations outcomes: *We are not very hyped on research for the sake of research, but we have some specific ideas we want to move forward with, but we might take a shortcut and test things rather than research beforehand. We are practically oriented.*	<u>Both phases</u> New technological solutions in several areas: *New views related to making our processes more effective.* *We hope that we get closer to solutions that we can implement in our production.*		

Table 4: The firms' goals before the official start of the research center and during the first year of operation

	Preformation phase		Preformation and formation phases	
Firm	**Participation in *developing the research center's application to CEER* (including contract negotiations)**	**Engaged in *predetermined relationships***	**Participation in *meetings and workshops***	**Development of and participation in *work tasks***
1	Partially involved: *We contributed to developing the application [after the goals were established.* Discussed the use of in-kind contributions in contract negotiations: *Half of it [the cash contribution] is in-kind, which can be used on meetings and things like that.*	Involved in a partnership with a firm in the research center: *In these kinds of large projects, we collaborate with a firm partner.*	<u>Both phases</u> Partially involved: *We participate in relevant [for the firm] workshops and meetings.*	<u>Preformation phase</u> Minimally involved: *We haven't done that [influencing the research topics] yet.* <u>Formation phase</u> Partially involved: *When we participated at the opening of the center, we found three to four themes that were relevant. However, we have to pay attention. There can be other areas that can develop in a direction that is relevant to us.*
2	Minimally involved: *We became involved pretty early in the research center, but I can't remember if we discussed the [research center's] objective. It was probably made very early in the application process toward the Research Council.* Did not participate in contract negotiations: *The other firm partners' lawyers have worked a lot with technology rights. We haven't worried that much about that and have thought that somebody else will deal with that.*	Involved in a partnership with Firm 4, which they engaged in the research center in the preformation phase: *I understand that they [Firm 4] are engaged through us.*	<u>Preformation phase</u> Partially involved: *I have represented the firm in meetings, and on Monday, I will go to participate in a workshop.* <u>Formation phase</u> Highly involved: *There have been meetings with the different work task researchers.*	<u>Preformation phase</u> Minimally involved: *I am not sure that we were contacted beforehand, but those who have written it [the work tasks] have done a good job.* <u>Formation phase</u> Partially involved: *We have studied the work tasks in the research center and chosen those that seem most relevant to us.*
3	Minimally involved:	Involved in an industry alliance: *After a board meeting with [industry alliance], we agreed that it was*	<u>Both phases</u> Minimally involved:	<u>Preformation phase</u> Partially involved:

	We on the [industry alliance] board chose three to four people to contribute [to the application], but I was not a part of that.	*reasonable to join [the research center], and we, the firm, became a partner.*	*I haven't participated in all of them [meetings], but I have been at three or four.*	*We have been involved in the workshops that lay the foundation for the work tasks.* <u>Formation phase</u> Partially involved: *[Participated in one of the work-tasks] I don't remember the number of work tasks, but it is the one that is most relevant for our industry.*
4	Minimally involved: *We haven't had so much to do with the application.*	In a partnership with Firm 2 and a research firm: *It [the initiative to join the research center] was proposed by Firm 2. They wanted me to represent them.*	<u>Both phases</u> Partially involved: *I have had a bit of an irregular role in the meetings.*	<u>Preformation:</u> Minimally involved: *[The firm's] role will not be very large or very active. That will be difficult.* <u>Formation phase</u> Partially involved: *I and Firm 2 are the ones who were most active [in the center] until the research subcontractor became engaged as our project manager.*
5	Highly involved: *We joined in the preformation phase, where we told about our challenges, and have partly participated in developing the details for it [the application].* Participated in contract negotiations: *During the contract negotiation, we discussed publication rights.*	In a partnership with Firm 7: *We have specified collaborations with Firm 7.*	<u>Both phases</u> Highly involved: *We have partaken in meetings and workshops that have been arranged [so far].*	<u>Both phases</u> Highly involved: *[Talks about the firm's involvement in developing the work tasks] The universities took account of the general challenges in the industry and wrote down some technologies and methods.*
6	Highly involved: *I was in the writing group for the application.* Discussed the results from the contract negotiation process:	Involved in an industry alliance: *The firm is involved in the research center through the industry alliance.*	<u>Preformation phase</u> Partially involved: *There has been limited contact with those who do the job [researchers], so we currently have only*	<u>Preformation phase</u> Partially involved: *There are two work tasks that we are specifically interested in.* <u>Formation phase</u>

	We must pay a given sum. That's the least we shall do. In addition, we will contribute with other things.		*participated in these large workshops.* <u>Formation phase</u> Highly involved: *I think the meetings have been well organized.*	Highly involved: *We have had meetings about work task, but we are not fully in line with what we wanted.*
7	Minimally involved: *There were some drafts in the beginning. With the possibility to comment, but I must admit, I don't remember to what degree we engaged in that process.* Detailed the results from the contract negotiation process: *We were aware when we signed the deal with the research center regarding what lies within confidentiality and publishing.*	In a partnership with Firm 5: *We have a close dialogue with Firm 5, and we expect to agree upon the things that are proposed and that we stick together about the things we want the research center to focus on. We already discussed this before entering the research center.*	<u>Preformation phase</u> Partially involved: *I have participated in the kick-off, and my colleague participated in a workshop.* <u>Formation phase</u> Minimally involved: *I have had a more administrative role, and he [the other employee] has contributed mostly because I have had some challenges with my calendar and their [the research centers] meetings.*	<u>Both phases</u> Partially involved: *We have contributed through Firm 5.*
8*	Minimally involved: *We [the firm] were not so involved in the application process, but we were invited as a partner by those who manage the research center.*	<u>Preformation phase</u> Involved in an industry alliance: *I'm on the executive board of the [industry alliance].*	<u>Both phases</u> Minimally involved: *They [the research center] have annual and semiannual meetings, but we haven't been very active.*	<u>Both phases</u> Minimally involved: *I wasn't very involved in that process [developing the work tasks].*

***** This firm left the industry alliance in the formation phase: *We were a partner in the industry alliance until this year, but now we have left it.*

Table 5: The firms' structured coordination activities in the research center—Activities determined by the research center's plans and programs and predetermined relationships

Firm	**Resource allocation (in kind)**	**Knowledge integration within the firm**	**Meeting initiation internally and with other firms**
1	Engaged a couple of people to work with the research center and plan to engage more: *We try to engage a larger professional environment in the firm. As of now, there are two people who have been involved, but it might be four or five or maybe six who contribute from us.*	Limited knowledge integration: *My expectation is that the [research center] is open for various solutions. That there are many ways to have contact. The research center often has meetings in [specific city] with presentations, but [the firm] thinks it is useful to have workshops at the firm's [location]. We have good experience with researchers coming to us because then we can reach more widely internally.*	Partially involved: *[Employees join internal meetings]to follow up [with the research center's activities] and that type of thing.*
2	Involved another firm and an internal resource to contribute to the research center: *He [the firm representative] from Firm 4 and another one from our energy department [work with the research center].*	Limited knowledge integration: *We haven't decided on anything yet—not the time we will use on this or other things.*	Highly involved: *[The firm has] internal meetings where we [the firm] prepare what is going to happen.*
3	Contributed internal resources when doing so was seen as profitable: *It will depend on what the results from the work projects are. That we value as expedient.*	Limited knowledge integration internally; the firm had not decided to facilitate knowledge integration internally: *It will depend on what [knowledge] is produced [in the research center] and how easy it is to integrate [the knowledge] related to what we want to focus on.*	Minimally involved: *Even though the industry alliance isn't a formal partner, it may be that we engage through it and that it chooses which member firms will engage here or there and that we do our part though the alliance. It will be the firm that engages, but it is the alliance that makes the decision that our industry will engage.*
4	Limited resources to allocate toward the research center: *The research center is larger and a heavier boost than anything we have ever been involved in, and therefore, we can't be very involved. We are not able to be very deeply involved in something like this because we have limited resources.*	Limited knowledge integration; the firm partners were not very focused on knowledge integration: *We don't have enough time or people to focus a lot on the R&D.*	Highly involved: *We don't have any formal agreement between us [the firm and Firm 2] about the activity engagement. It is divided between us.*
5	Allocated resources based on need: *There is a different degree of involvement. When we are discussing work tasks, many employees are involved. In the daily work, it's me and one other.*	Limited focus on knowledge integration: *In the relevant work projects, it will be important [to integrate the knowledge internally] because it will have a value for us. If not, then we will get nothing for [the knowledge].*	Partially involved; the firm sometimes initiated internal meetings with employees: *We don't want general research center presentations held by the research center*

			[when the research center visits the firm]. Those are things we'd rather do internally.
6	Let employees be involved if they want to: *Those who are interested have been invited to workshops, and if they want to go, they can.*	Limited knowledge integration: *They [other employees] are involved in getting the information [about the research center] and supporting me to ensure I do a good job by communicating their wishes.*	Minimally involved: *I have discussed with those responsible for the work tasks that we are interested, but as of now, there hasn't been specific work meetings.*
7	Allocated resources based on need: *[If we get a specific work project] then we will typically connect more people to the project. We have a technical support group. They have been somewhat involved but only sporadically. We use them to discuss projects and come up with suggestions for projects.*	Limited knowledge integration: *We have in-kind resources to follow up with the research center. But this year, it is only some thousands. This is because we are just starting and haven't contributed yet. It [knowledge integration] will depend on what type of activities are initiated in the center. How relevant it is for us.*	Minimally involved: *I haven't had the opportunity to discuss with my colleague the workshop he participated in.*
8	Struggled with resource allocation to the research center: *The biggest challenge is to come up with resources. Both cash contributions and in-kind contributions, contributions from the firm and the employees.*	Limited knowledge integration: *[Talks about their focus on knowledge integration] We are kind of a small organization, and we don't have so many to play ball with. I was chosen as the formal contact person, so I try to be updated, but sometimes, I have to send somebody else to participate.*	Minimally involved: *As of now, no [initiating meetings with researchers], but it may be relevant later if we have some questions or need to clarify something.*

Table 6: The firms' use of unstructured coordination activities in the preformation phase—Adjustment activities and ad hoc activities established by the firm partners

Firm	**Resource allocation (in kind)**	**Knowledge integration within the firm**	**Meeting initiation internally and with other firms**
1	Engaged another employee to work specifically on the project: *It's not practical to be only one person. It becomes so non-robust. We need to engage as many as we can. Our goal is to engage even more people.*	Partial knowledge integration: *We have begun inviting researchers to us and offer ourselves as a research facility to get more people involved.*	Highly involved by coordinating with their firm partner: *We have had meetings with the firm partner, where it was only us. It was easier because then we made the decisions together with the firm partner.*
2	Included another firm in the research center: *Maybe six months ago, we applied and got a research organization approved as our subcontractor.* Engaged people internally: *We have about five people who are engaged [in the research center].*	High knowledge integration: *We try to tell the employees what we are doing. It is usually a topic at our assemblies. [We are] telling them what we are engaged in within the research center.*	Highly involved: *[In internal meetings with partner firms] We decide on what we will focus on now in relation to the workplan for next year.*
3	Experienced internal challenges with resource allocation: *We have struggled to find the organizational form internally this first year.*	Limited knowledge integration: *Yes, some, a bit at least. Some I would say. I must admit, [knowledge transfer from the center to the firm] is not our highest priority. But we use some of our time on it.*	Minimally involved: *We have someone in the industry alliance who does the main communication with the research center, and I have not been one of them.*
4	Allocated resources based on need: *We use a technical employee, who gets the raw data, and discuss technical issues*	High knowledge integration: *During the lunches, we discuss what is going on [in the research center].*	Highly involved: *We have discussions where we discuss the program for the next year. We contribute with ideas and try to make things relevant for us and for Firm 2.*
5	Use of employees: *Two to four people—depends on how you look at it—but they are not involved full time.*	Limited knowledge integration; the firm representative reported the research center's activity internally: *Let's say we give a sum each year to this project [the research center], I have to defend it internally each year. If we don't get anything. The money will stop.*	Partially involved: *We have [some] discussions with firms, for example, Firm 4.*
6	The firm had two people working with the research center:	Limited knowledge integration: *We try to get others from the firm who work in the energy field to contribute on workshops or do*	Highly involved: *We [the firm] have invited the researchers to meetings with the industry alliance, where*

	In practice, it is my coworker, who focuses on one work task, and I, who work toward a project. That's our hours.	*some of the work. However, since there are currently so few activities that are of direct interest for us, it is quite difficult to get any involvement from the other people in the firm.*	*they showed up and were willing to discuss and ensure progress.*
7	Involved one extra employee in the research center: *In practice, it is mostly my coworker that follows up the activities. I have mostly an administrative role toward the research center.*	Limited knowledge integration; a coworker gave summaries to the firm representative after participating in the research center. *[The coworker] has given summaries to me after [participating].*	Minimally involved; the firm followed up with activities in the research center but did not initiate meetings: *[The employee] follows up, is positive, and believes that we will get the case [project task] when it is suitable.*
8	Engaged engineers when support is needed: *We have some senior engineers that have participated.*	Limited knowledge integration: *Now, the last half a year, it has been quiet. Maybe the whole last year. There hasn't been anything concrete.*	Limited involved: *We haven't been that active, more that we have been pulled into some ideas.*

Table 7: The firms' use of unstructured coordination activities in the formation phase—Adjustment activities and ad hoc activities established by the firm partners

References

ABRAMOVSKY, L., KREMP, E., LÓPEZ, A., SCHMIDT, T. & SIMPSON, H. 2009. Understanding co-operative innovative activity: evidence from four European countries. *Economics of Innovation and New Technology,* 18**,** 243-265.

AGHION, P., DEWATRIPONT, M. & STEIN, J. C. 2008. Academic freedom, private-sector focus, and the process of innovation. *The RAND Journal of Economics,* 39**,** 617-635.

AL-TABBAA, O. & ANKRAH, S. 2018. 'Engineered'University-Industry Collaboration: A Social Capital Perspective. *European Management Review*.

AMBOS, T. C., MÄKELÄ, K., BIRKINSHAW, J. & D'ESTE, P. 2008. When Does University Research Get Commercialized? Creating Ambidexterity in Research Institutions. *Journal of Management Studies,* 45**,** 1424-1447.

ANKRAH, S. & AL-TABBAA, O. 2015. Universities—industry collaboration: A systematic review. *Scandinavian Journal of Management*.

ARENAS, D. & AYUSO, S. 2016. Unpacking transnational corporate responsibility: Coordination mechanisms and orientations. *Business Ethics: A European Review,* 25**,** 217-237.

ARGOTE, L. 1982. Input uncertainty and organizational coordination in hospital emergency units. *Administrative science quarterly***,** 420-434.

ASMUSSEN, C. G., LARSEN, M. M. & PEDERSEN, T. 2016. Organizational adaptation in offshoring: The relative performance of home-and host-based learning strategies. *Organization Science,* 27**,** 911-928.

AZAGRA-CARO, J. M., BARBERÁ-TOMÁS, D., EDWARDS-SCHACHTER, M. & TUR, E. M. 2017. Dynamic interactions between university-industry knowledge transfer channels: A case study of the most highly cited academic patent. *Research Policy,* 46**,** 463-474.

BAXTER, P. & JACK, S. 2008. Qualitative case study methodology: Study design and implementation for novice researchers. *The qualitative report,* 13**,** 544-559.

BOARDMAN, C. & GRAY, D. 2010. The new science and engineering management: cooperative research centers as government policies, industry strategies, and organizations. *The Journal of Technology Transfer,* 35**,** 445-459.

BRUNEEL, J., D'ESTE, P. & SALTER, A. 2010. Investigating the factors that diminish the barriers to university–industry collaboration. *Research policy,* 39**,** 858-868.

BURNETT, S. & WILLIAMS, D. 2014. The role of knowledge transfer in technological innovation: an oil and gas industry perspective. *Knowledge Management Research & Practice,* 12**,** 133-144.

CANHOTO, A. I., QUINTON, S., JACKSON, P. & DIBB, S. 2016. The co-production of value in digital, university–industry R&D collaborative projects. *Industrial Marketing Management,* 56**,** 86-96.

CLAGGETT, J. L. & KARAHANNA, E. 2018. Unpacking the structure of coordination mechanisms and the role of relational coordination in an era of digitally mediated work processes. *Academy of Management Review,* 43**,** 704-722.

CRESWELL, J. W. & POTH, C. N. 2017. *Qualitative inquiry and research design: Choosing among five approaches*, Sage publications.

CÄKER, M. 2008. Intertwined coordination mechanisms in interorganizational relationships with dominated suppliers. *Management Accounting Research,* 19**,** 231-251.

DANESE, P., ROMANO, P. & VINELLI, A. 2004. Managing business processes across supply networks: the role of coordination mechanisms. *Journal of Purchasing and Supply Management,* 10**,** 165-177.

DAO, M. A. & STROBL, A. 2019. Exploration outcomes of M&A: the interplay between coordination mechanisms and acquisition experience. *R&D Management,* 49**,** 86-102.

DE WIT-DE VRIES, E., DOLFSMA, W. A., VAN DER WINDT, H. J. & GERKEMA, M. P. 2018. Knowledge transfer in university–industry research partnerships: a review. *The Journal of Technology Transfer*.

DENZIN, N. K. 2012. Triangulation 2.0. *Journal of mixed methods research,* 6**,** 80-88.
DENZIN, N. K. & LINCOLN, Y. S. 1994. *Handbook of qualitative research*, Sage publications, inc.
EISENHARDT, K. M. 1989. Building Theories from Case Study Research. *The Academy of Management Review,* 14**,** 532-550.
EISENHARDT, K. M. & GRAEBNER, M. E. 2007. Theory building from cases: Opportunities and challenges. *Academy of management journal,* 50**,** 25-32.
ESTRADA, I., FAEMS, D., MARTIN CRUZ, N. & PEREZ SANTANA, P. 2016. The role of interpartner dissimilarities in Industry-University alliances: Insights from a comparative case study. *Research Policy,* 45**,** 2008-2022.
FERNANDES, A., SPRING, M. & TARAFDAR, M. 2018. Coordination in temporary organizations. *International Journal of Operations & Production Management*.
FINI, R., RASMUSSEN, E., WIKLUND, J. & WRIGHT, M. 2019. Theories from the lab: how research on science commercialization can contribute to management studies. *Journal of Management Studies,* 56**,** 865-894.
GAGNÉ, M. 2018. From Strategy to Action: Transforming Organizational Goals into Organizational Behavior. *International Journal of Management Reviews,* 20**,** 83-104.
GALÁN-MUROS, V. & PLEWA, C. 2016. What drives and inhibits university-business cooperation in Europe? A comprehensive assessement. *R&D Management,* 46**,** 369-382.
GERINGER, J. M. & HEBERT, L. 1989. Control and performance of international joint ventures. *Journal of international business studies,* 20**,** 235-254.
GHAURI, P. & ROSENDO-RIOS, V. 2016. Organizational cross-cultural differences in the context of innovation-oriented partnerships. *Cross Cultural & Strategic Management,* 23**,** 128-157.
GILSING, V., BEKKERS, R., FREITAS, I. M. B. & VAN DER STEEN, M. 2011. Differences in technology transfer between science-based and development-based industries: Transfer mechanisms and barriers. *Technovation,* 31**,** 638-647.
GIOIA, D. A., CORLEY, K. G. & HAMILTON, A. L. 2013. Seeking qualitative rigor in inductive research: Notes on the Gioia methodology. *Organizational research methods,* 16**,** 15-31.
GREVE, H. R. 2008. A behavioral theory of firm growth: Sequential attention to size and performance goals. *Academy of Management Journal,* 51**,** 476-494.
GULATI, R., WOHLGEZOGEN, F. & ZHELYAZKOV, P. 2012. The two facets of collaboration: Cooperation and coordination in strategic alliances. *The Academy of Management Annals,* 6**,** 531-583.
HANISCH, B. & WALD, A. 2014. Effects of complexity on the success of temporary organizations: Relationship quality and transparency as substitutes for formal coordination mechanisms. *Scandinavian Journal of Management,* 30**,** 197-213.
HARRISON, D. A. & KLEIN, K. J. 2007. What's the difference? Diversity constructs as separation, variety, or disparity in organizations. *Academy of management review,* 32**,** 1199-1228.
HAYTER, C. S., RASMUSSEN, E. & ROOKSBY, J. H. 2020. Beyond formal university technology transfer: innovative pathways for knowledge exchange. *The Journal of Technology Transfer,* 45**,** 1-8.
HOLSTEIN, J., STARKEY, K. & WRIGHT, M. 2018. Strategy and narrative in higher education. *Strategic Organization,* 16**,** 61-91.
KIM, K., PARK, J. H. & PRESCOTT, J. E. 2003. The global integration of business functions: a study of multinational businesses in integrated global industries. *Journal of International Business Studies,* 34**,** 327-344.
KOÇAK, Ö., HANNAN, M. T. & HSU, G. 2014. Emergence of market orders: Audience interaction and vanguard influence. *Organization Studies,* 35**,** 765-790.
KOTLAR, J., MASSIS, A., WRIGHT, M. & FRATTINI, F. 2018. Organizational Goals: Antecedents, Formation Processes and Implications for Firm Behavior and Performance. *International Journal of Management Reviews,* 20**,** 3-18.
LAM, A. 2011. What motivates academic scientists to engage in research commercialization: 'Gold', 'ribbon' or 'puzzle'? *Research Policy,* 40**,** 1354-1368.

LARSEN, M. M., MANNING, S. & PEDERSEN, T. 2013. Uncovering the hidden costs of offshoring: The interplay of complexity, organizational design, and experience. *Strategic Management Journal,* 34**,** 533-552.
LORENZONI, G. & LIPPARINI, A. 1999. The leveraging of interfirm relationships as a distinctive organizational capability: a longitudinal study. *Strategic Management Journal,* 20**,** 317-338.
MALONE, T. W. 1987. Modeling coordination in organizations and markets. *Management science,* 33**,** 1317-1332.
MOM, T. J., VAN DEN BOSCH, F. A. & VOLBERDA, H. W. 2009. Understanding variation in managers' ambidexterity: Investigating direct and interaction effects of formal structural and personal coordination mechanisms. *Organization Science,* 20**,** 812-828.
MORANDI, V. 2013. The management of industry–university joint research projects: how do partners coordinate and control R&D activities? *The Journal of Technology Transfer,* 38**,** 69-92.
MURRAY, F. & O'MAHONY, S. 2007. Exploring the foundations of cumulative innovation: Implications for organization science. *Organization Science,* 18**,** 1006-1021.
NGUYEN, N. P., NGO, L. V., BUCIC, T. & PHONG, N. D. 2018. Cross-functional knowledge sharing, coordination and firm performance: The role of cross-functional competition. *Industrial Marketing Management,* 71**,** 123-134.
OKAMURO, H. & NISHIMURA, J. 2018. Whose business is your project? A comparative study of different subsidy policy schemes for collaborative R&D. *Technological Forecasting and Social Change,* 127**,** 85-96.
OLIVEIRA, N. & LUMINEAU, F. 2017. How coordination trajectories influence the performance of interorganizational project networks. *Organization Science,* 28**,** 1029-1060.
PERKMANN, M., MCKELVEY, M. & PHILLIPS, N. 2018. Protecting Scientists from Gordon Gekko: How Organizations Use Hybrid Spaces to Engage with Multiple Institutional Logics. *Organization Science,* 30**,** 298-318.
PERKMANN, M. & WALSH, K. 2007. University–industry relationships and open innovation: Towards a research agenda. *International Journal of Management Reviews,* 9**,** 259-280.
PIAZZAI, M. 2018. *The Cognitive Infrastructures of Markets Empirical Studies on the Role of Categories in Valuation and Competition, and a Formal Theory of Classification Systems Based on Lattices and Order.* Delft University of Technology.
PLEWA, C., KORFF, N., BAAKEN, T. & MACPHERSON, G. 2013. University–industry linkage evolution: an empirical investigation of relational success factors. *R&D Management,* 43**,** 365-380.
RANGANATHAN, R., GHOSH, A. & ROSENKOPF, L. 2018. Competition–cooperation interplay during multifirm technology coordination: The effect of firm heterogeneity on conflict and consensus in a technology standards organization. *Strategic Management Journal,* 39**,** 3193-3221.
SALDAÑA, J. 2015. *The coding manual for qualitative researchers*, Sage.
SCHAEFFER, V., ÖCALAN-ÖZEL, S. & PÉNIN, J. 2020. The complementarities between formal and informal channels of university–Industry knowledge transfer: A longitudinal approach. *The Journal of Technology Transfer,* 45**,** 31-55.
SCHILKE, O. & GOERZEN, A. 2010. Alliance management capability: an investigation of the construct and its measurement. *Journal of Management,* 36**,** 1192-1219.
SEGARRA-BLASCO, A. & ARAUZO-CAROD, J. M. 2008. Sources of innovation and industry-university interaction: Evidence from Spanish firms. *Research Policy,* 37**,** 1283-1295.
SHAH, J. Y. & KRUGLANSKI, A. W. 2002. Priming against your will: How accessible alternatives affect goal pursuit. *Journal of Experimental Social Psychology,* 38**,** 368-383.
SKUTE, I., ZALEWSKA-KUREK, K., HATAK, I. & DE WEERD-NEDERHOF, P. 2019. Mapping the field: a bibliometric analysis of the literature on university–industry collaborations. *The Journal of Technology Transfer,* 44**,** 916-947.
SPEE, P., JARZABKOWSKI, P. & SMETS, M. 2016. The influence of routine interdependence and skillful accomplishment on the coordination of standardizing and customizing. *Organization Science,* 27**,** 759-781.

STEINMO, M. 2015. Collaboration for innovation: A case study on how social capital mitigates collaborative challenges in university–industry research alliances. *Industry and innovation,* 22**,** 597-624.
STYHRE, A. & LIND, F. 2010. Balancing centripetal and centrifugal forces in the entrepreneurial university: a study of 10 research centres in a technical university. *Technology Analysis & Strategic Management,* 22**,** 909-924.
TIJSSEN, R. J. W. 2018. Anatomy of use-inspired researchers: From Pasteur's Quadrant to Pasteur's Cube model. *Research Policy,* 47**,** 1626-1638.
VANGEN, S. 2017. Developing Practice-Oriented Theory on Collaboration: A Paradox Lens. *Public Administration Review,* 77**,** 263-272.
VEGA-JURADO, J., KASK, S. & MANJARRÉS-HENRIQUEZ, L. 2017. University industry links and product innovation: cooperate or contract? *Journal of technology management & innovation,* 12**,** 1-8.
WEICK, K. E. 1976. Educational organizations as loosely coupled systems. *Administrative science quarterly***,** 1-19.
WILLEM, A., BUELENS, M. & SCARBROUGH, H. 2006. The role of inter-unit coordination mechanisms in knowledge sharing: a case study of a British MNC. *Journal of Information Science,* 32**,** 539-561.
YIN, R. K. 2014. *Case study research : design and methods,* Los Angeles, SAGE.

7.2. Research paper 2: How firms use different strategies to manage goal conflicts in university-industry collaborations

How firms use different strategies to manage goal conflicts in university-industry collaborations

Abstract

University-industry research centers are an important source of knowledge and innovation in industry. However, research organizations and firms often experience goal conflicts when collaborating, but how to manage goal conflicts in these types of collaborations remains underexplored. Through a longitudinal case study of 14 firms in a Norwegian research center, this study focuses on how firms' use of strategies may influence goal tensions between firm and research partners. The findings from this study suggest that goal conflicts in university-industry research centers are mitigated through firms' involvement and chosen strategy. In particular, this study suggests that (1) using an assertive strategy over time intensifies goal conflicts, (2) using a bridging strategy mitigates goal conflicts, and (3) using a passive strategy might mitigate goal conflicts. Based on these findings, this study has important implications for how firms should be involved in research centers and with researchers to mitigate goal conflicts.

Keywords: goal conflicts, university-industry collaboration, firm strategies, strategic responses

Introduction

Innovations are vital for the survival of firms and a critical source of competitive advantage in ever-changing environments (Crossan and Apaydin, 2010, Eveleens, 2018). The innovation literature has emphasized the importance of external knowledge sources, such as research organizations and universities, to contribute to firms' innovation development (Chesbrough et al., 2006, Chesbrough, 2012), which is

also evident by the growing trend of university-industry research centers (Boardman and Gray, 2010).

Engagement in university-industry research centers can yield positive outcomes for the firms involved, such as the refinement of technologies and innovations (Laursen and Salter, 2004, Perkmann et al., 2013). However, collaborations with research organizations in university-industry research centers are often influenced by goal conflicts (Bruneel et al., 2010, de Wit-de Vries et al., 2018). Goal conflicts arise in university-industry research centers because firms and research organizations generally want to achieve different outcomes from their collaborations (Lauvås and Steinmo, 2019). Firms often have goals related to technology and innovation development, while research organizations often aim to develop high-quality research and publicly available knowledge (Canhoto et al., 2016). These conflicting goals influence what firm and research partners want to focus on and which goal to attend to (Lauvås and Steinmo, 2019), which may in turn impede collaborations because of misalignment between the partners (Pache and Santos, 2010).

To ensure successful collaborations, firms and research organizations need to manage and mitigate the goal conflicts imposed by the different partners (Greenwood et al., 2011). Prior empirical studies have suggested that partners can manage and mitigate goal conflicts by being highly involved in a collaboration (Steinmo, 2015, Canhoto et al., 2016, Lauvås and Steinmo, 2019) because high involvement enables firm partners to attain management capabilities, develop a mutual understanding, and utilize the knowledge and innovations developed within the collaboration (Steinmo, 2015, Al-Tabbaa et al., 2019, Lascaux, 2019), thereby enabling the partners to attain both the firm and research partners' conflicting goals (Lauvås and Steinmo, 2019).

However, we still need more insights into what high involvement entails; which actions firms undertake when they are highly involved (Howard et al., 2016, Steinmo and Rasmussen, 2016); and more specifically, how firms should be involved to manage and mitigate goal conflicts (de Wit-de Vries et al., 2018). Thus, to increase knowledge on firms' actions when dealing with goal conflicts, I explore the collaboration process

in university-industry research centers as goal conflicts are prominent in these types of collaborations (Perkmann et al., 2018). I draw on the strategic response literature (Oliver, 1991, Pache and Santos, 2021), which focuses on firms' strategic actions when dealing with demands imposed by external partners (Pache and Santos, 2010). Scholars have suggested that firms may use either strategies that protect their interests or strategies that focus on bridging the different partners' goals (Pache and Santos, 2010). Thus, by exploring the different strategies firms use and how these strategies might influence goal conflicts, this study seeks to contribute a more comprehensive understanding of *how* firms should be involved to mitigate goal conflicts and achieve effective collaborations. Hence, I ask the following research question: *How do firm strategies influence goal conflicts in university-industry research centers over time?*

I answer this research question through a qualitative longitudinal embedded case study of 14 firms in one Norwegian research center. The research center is a good context for studying firm strategies to manage goal conflicts because research centers include both firm and research partners, which are known for having different institutional logics (Sauermann and Stephan, 2013, Perkmann et al., 2018), and conflicting goals are prominent in these types of collaborations (Lauvås and Steinmo, 2019).

The findings of this study make three key contributions to the university-industry collaboration (UIC) literature. First, this study contributes in-depth insights into how firms manage and deal specifically with goal conflicts (Fini et al., 2019), which is imperative as firms and research organizations often experience multiple conflicts in collaborations and might use different strategies for these different conflicts (Smith and Lewis, 2011). Second, by identifying three strategies (e.g., assertive strategy, bridging strategy, and passive strategy) firms use to manage goal conflicts in collaborations, this study contributes to the UIC literature by highlighting how firms behave and which actions they take to manage goal conflicts (de Wit-de Vries et al., 2018). Finally, this longitudinal study contributes new insights to the UIC literature by showing how firms should be involved in collaborations with research organizations to

achieve success without goal conflicts (Howard et al., 2016, Steinmo and Rasmussen, 2016). In particular, this study suggests that to achieve successful collaborations, firms must engage in aligning the partners' interests and balancing the partners' temporal norms (e.g., bridging strategy).

In addition, this study has important managerial impactions related to how firms should be involved in university-industry research centers and suggests that being involved for the sake of involvement might actually hamper the collaboration process. Hence, the way firms are involved matters when dealing with goal conflicts.

This paper is structured as follows: the next section (Section 2) presents the theoretical framework; Section 3 highlights the methodical approach; Section 4 displays the findings; Section 5 contains the discussion; and Section 6 includes the conclusion, implications, and limitations of the study.

Theoretical framework

Goal conflicts in university-industry research centers

University-industry research centers are established to create long-term collaborations between firm and research partners (Ponomariov and Boardman, 2010, Thune and Gulbrandsen, 2011). The purpose of research centers is to bridge these partners' different practices and goals (Gulbrandsen et al., 2015, Perkmann, 2017) to enhance national innovation performance (Bishop et al., 2011) by attaining valuable outcomes for the partners involved, such as increased publications for the research partners (Gulbrandsen and Smeby, 2005) and innovation developments for the firm partners (Bishop et al., 2011). As such, research centers often establish two overarching goals related to the development of high-quality research and innovations (Ponomariov and Boardman, 2010). However, firms and research organizations often experience goal conflicts related to the different goals established in research centers (Lauvås and Steinmo, 2019). These goal conflicts are usually rooted in differences between the partners, often termed "institutional logics" (Alford and Friedland, 1985),

and relates to how these partners behave, the values the partners have, and what they focus on (Perkmann, 2017).

Firms often establish and prioritize goals related to financial returns (Perkmann et al., 2011a), and when firms engage in UICs, they often establish and prioritize goals related to technology and innovations, which they may directly benefit from (Murray and O'Mahony, 2007, Abramovsky et al., 2009). In contrast, research organizations often establish and pursue goals focused on academic novelty and the development of public knowledge (Canhoto et al., 2016). Thus, when partaking in university-industry research centers that have two overarching goals related to innovation and research development (Gulbrandsen et al., 2015), firm and research partners often favor different goals, which can create conflicts (Lind et al., 2013, Sjöö and Hellström, 2021) related to which goal should get attention (Ambos et al., 2008).

To handle these conflicting goals of high-quality research and innovation, prior studies have emphasized a set of key aspects that can mitigate goal conflicts and ensure successful collaborations (Sjöö and Hellström, 2021). In particular, prior studies have suggested that goal conflicts can be mitigated by the development of collaborative experience (Bruneel et al., 2010, D'Este and Perkmann, 2011). Prior collaborative experience enables partners to develop trust within a collaboration (Barnes et al., 2002), which in turn enables these partners to develop shared goals (Steinmo, 2015). In addition, some studies (e.g., Mesny and Mailhot, 2007) have proposed that goal conflicts can be mitigated by setting a larger common goal, such as achieving national competitiveness for all partners involved. However, one of the most important key aspects that can contribute to mitigating goal conflicts is high involvement in a collaboration (Perkmann and Walsh, 2007, Steinmo, 2015). High involvement enables partners to develop a mutual understanding of the collaboration process and the possibilities to achieve valuable outcomes (McCabe et al., 2016). To achieve these outcomes, high involvement involves engagement in various types of activities, such as informal communication between firms and research organizations and participation in joint projects in which partners are able to share knowledge and

build personal relationships (Barnes et al., 2002). High involvement also includes engagement in research and innovation development activities, such as sharing firm-specific data, jointly analyzing project data, and contributing to the problem formulation in a project (e.g., McCabe et al., 2016). Participating in these types of activities enables partners to overcome goal conflicts and achieve successful collaborations because high involvement spurs partners' mutual commitment. Mutual commitment enables partners to engage in a two-way collaboration process that focuses on attaining the conflicting goals of research and innovation (Lauvås and Steinmo, 2019).

As such, while prior studies have contributed insights into how goal conflicts can be managed to achieve successful university-industry collaborations, less is known about *how* partners are involved in these types of activities (Howard et al., 2016, Steinmo and Rasmussen, 2016) and what strategic actions partners take to manage goal conflicts (de Wit-de Vries et al., 2018). Thus, this paper draws on the strategic response literature to gain more in-depth insights into *how* partners should be involved in various activities to manage the goal conflicts present in university-industry research centers.

Strategic firm responses to goal conflicts in collaborations

The strategic response literature focuses on how organizations manage demands imposed by external partners with different institutional logics in organizations and collaborations (Oliver, 1991, Pache and Santos, 2010, Ahmadsimab and Chowdhury, 2019). This framework is well established in both inter- and intraorganizational contexts (Oliver, 1991, van Fenema and Keers, 2018, Ahmadsimab and Chowdhury, 2019) and in institutionally complex settings that are influenced by multiple partners with different goals, values, and behaviors (Pache and Santos, 2010, A.M. Vermeulen et al., 2016), such as in university-industry research centers (Perkmann et al., 2018) and public-private partnerships (Battilana and Dorado, 2010),.

Studies focusing on strategic responses have suggested that firms use different strategies and make different strategic decisions regarding their partners to manage goal conflicts (Pache and Santos, 2010). These strategic strategies can be *defensive* and focus on protecting firms' interests, or they may be *acceptive* and focus on bridging the different interests within a partnership (van Fenema and Loebbecke, 2014). If one strategy does not yield positive outcomes, firms can switch to another strategy (Smith and Lewis, 2011).

Defensive strategies aim to prevent firms from complying with partners' demands (Pache and Santos, 2010) and are often used when a firm experiences conflicting goals and demands (Pache and Santos, 2010). Defensive strategies can involve explicit rejection of the demands partners put on firms such that firms will try to change the partners' demands to ensure their own goals are attained (Oliver, 1991). Firms may also try to influence and alter partners' demands by persuading the partners to follow their own action plans (Suddaby and Greenwood, 2005). In addition, to protect their own goals, some firms try to superficially abide to partners' demands while continuing to work on their own goals (Boxenbaum and Jonsson, 2017).

The use of defensive strategies is often more prominent when firms are in a position of power in their collaborations and have resources that can be used to bargain with the other partners (Luo et al., 2008). As such, in collaborations with researchers, firms may use defensive strategies when they have resources to bargain with because when researchers depend on firms' financial resources, they are more likely to succumb to the firms' pressure (Jakobsen et al., 2019) and allow the firms to demand more focus on their own goals and objectives. Using defensive strategies to manage goal conflicts is often beneficial in short-term collaborations, such as contracting collaborations (Vega-Jurado et al., 2017). However, using defensive strategies in long-term collaborations, such as university-industry research centers, might be risky because they may impede collaborations altogether. This impediment often stems from a lack of outcomes, which may happen if one of the partners focuses too much on attaining their own goals (Perkmann et al., 2018)

Acceptive strategies relate to the actions firms take to bridge and balance partners' conflicting goals and demands (Pache and Santos, 2010, van Fenema and Loebbecke, 2014). To bridge these interests and demands, firms often opt to selectively couple the different partners practices' to ensure that the partners behavior is aligned (Pache and Santos, 2013). Meaning that selective coupling may happen when the partners in a collaboration choose specific practices to align with both partners' usual practices, and thus manage to find a compromise for the different practices and behaviors (Pache and Santos, 2013). At the same time, firms may also take a more passive approach (Oliver, 1991) and comply with partners demands and goals. When firms accede to partners' demands and goals, they incorporate the partners' norms and practices and follow the partners' behavior and decisions (Oliver, 1991, Ahmadsimab and Chowdhury, 2019). In collaborations with research partners, prior studies have suggested that firms need to use acceptive strategies focusing on bridging the different partners objectives because conflicting goals can hamper these collaborations (Estrada et al., 2016). Thus, firms might need to include long-term plans for collaborations instead of only focusing on short-term outcomes (Bjerregaard, 2010) because research partners often have longer timeframes (Schildt and Perkmann, 2017). Indeed, the use of acceptive strategies often contributes to secure long-term collaborations since all partners manage to achieve some of the outcomes they desire (Pache and Santos, 2021).

In sum, firms may use different strategies to deal with goal conflicts in institutionally complex organizations (See Table 1) (Pache and Santos, 2021), such as university-industry research centers (Perkmann et al., 2018). Hence, through an inductive study of 14 firms within one university-industry research center, this study aims to explore how firm strategies influence goal conflicts, contribute a more in-depth understanding on how to manage goal conflicts (de Wit-de Vries et al., 2018, Fini et al., 2019), and provide insights into how firms should be involved in university-industry research centers to achieve effective collaborations (Steinmo and Rasmussen, 2016, de Wit-de Vries et al., 2018).

Data and methodology

Research design

To answer the research question about how firm strategies influence goal conflicts in a university-industry research center over time, qualitative research seemed most appropriate since such research offers more in-depth insights into firm strategies and actions (Cunningham et al., 2017). Moreover, an embedded multiple case study design was used to better illuminate how firm strategies influence goal conflicts and contribute to theory building on how firm strategies may mitigate or intensify goal conflicts in institutionally complex settings, such as university-industry research centers (Baxter and Jack, 2008, Yin, 2014).

Case selection

One university-industry research center and 14 firm partners were chosen because this combination offered unique access to multiple informants (both firms and research organizations) and was of theoretical relevance for contributing to the literature on UIC (de Wit-de Vries et al., 2018) and, more specifically, university-industry research centers (Skute et al., 2019).

The chosen university-industry research center has a duration of eight years (2016–2024) and aims to develop high-quality research and innovations through long-term collaborations between firms and research organizations. The research center has about 40 partners, of which about 25 are firm partners from various industries, such as the food industry, energy industry, and process industry. Firm selection was based on maximum variation sampling and theoretical sampling (Creswell and Poth, 2017). The firms that were selected were both large and small, came from different industries, and had different levels of involvement (Steinmo, 2015), with some firms having multiple employees and resources allocated to the research center and some having very few employees and resources earmarked for research center involvement. This variation in firms was important as these types of characteristics might influence

the dynamics of the research center (Ghauri and Rosendo-Rios, 2016), while also contributing to the internal validity of the study (Yin, 2014). The final sample comprises 14 firms (see Table 1).

Table 1: Firm characteristics and level of involvement

Firms	Industry	Size	Level of involvement	Quote related to the firms' involvement
1	Large process industry	Large	High involvement	There are multiple people involved [in the research center].
2	Large process industry	Large	High involvement	We have a number of people that are active [in the research center].
3	Food industry	Large	High involvement	In the beginning, it was me and another guy who sat and worked with this . . . but we have also another one who has worked with [the research center]. We have also one more who has been pretty involved in the processes.
4	Large process industry	Large	High involvement	We are trying to sort of involve a larger group of experts from the firm.
5	Petroleum industry	Large	High involvement	There are various levels of involvement. When we work with a project, a lot of us are involved, but day to day, it's me and another one.
6	Food industry	Large	High involvement	[We have] hired [a] project manager, part-time project managers, and coordinators [to work toward the research center].
7	Infrastructure industry	Medium	High involvement	We have about five people [including the subcontractor] who are engaged.
8	Petroleum industry	Large	Low involvement	In terms of resources, it's only one person following up [with the research center], in addition to me, who works on the administrative part. He doesn't work with this 100%.
9	Infrastructure industry	Small	Low involvement	Basically, it is me who takes time and participates in various meetings and forums [within the research center].
10	Manufacturing industry	Small	Low involvement	It is mainly me [who works with the research center].
11	Manufacturing industry	Large	Low involvement	One of our hardest constraints when participating in these projects is more resources—human resources. We have very little time, and we need to make the best of the time that we have with the resources we have available.
12	Food industry	Large	Low involvement	My challenge is basically to get internal resources to be involved with me in the work [in the research center].
13	Large process industry	Medium	Low involvement	It has been quite a challenge to use time and resources to follow up [with the research center] while not using time on things that are not relevant.
14	Large process industry	Medium	Low involvement	We are a pretty small staff, and we have a lot of other things to do.

Note: The European Union's categories for firm size are used: large > 250, medium < 250, small < 50, and micro < 10 employees.

Data collection

To attain in-depth knowledge about the firms' strategies when they dealt with goal conflicts, I conducted semi-structured interviews with 14 firms and six research partners (Eisenhardt, 1989).

The first interviews were collected early in 2017, not long after the research center had officially started. These interviews were mainly to understand how the firm and research partners experienced the research center, what they thought about the different partners' goals, how they understood the collaborations in the research center, and how they dealt with potential conflicts between partners. The interviews were conducted face to face and lasted approximately one hour. To capture possible changes in how firm partners adapted their strategies, the second and third rounds of interviews were conducted in autumn 2018 and spring 2019. Due to geographical distance, most of the later interviews with the firms were conducted over the phone, while some of the interviews with the research partners were conducted face to face. These interviews lasted for about one hour and focused on what the firms had done during the first year of the research center.

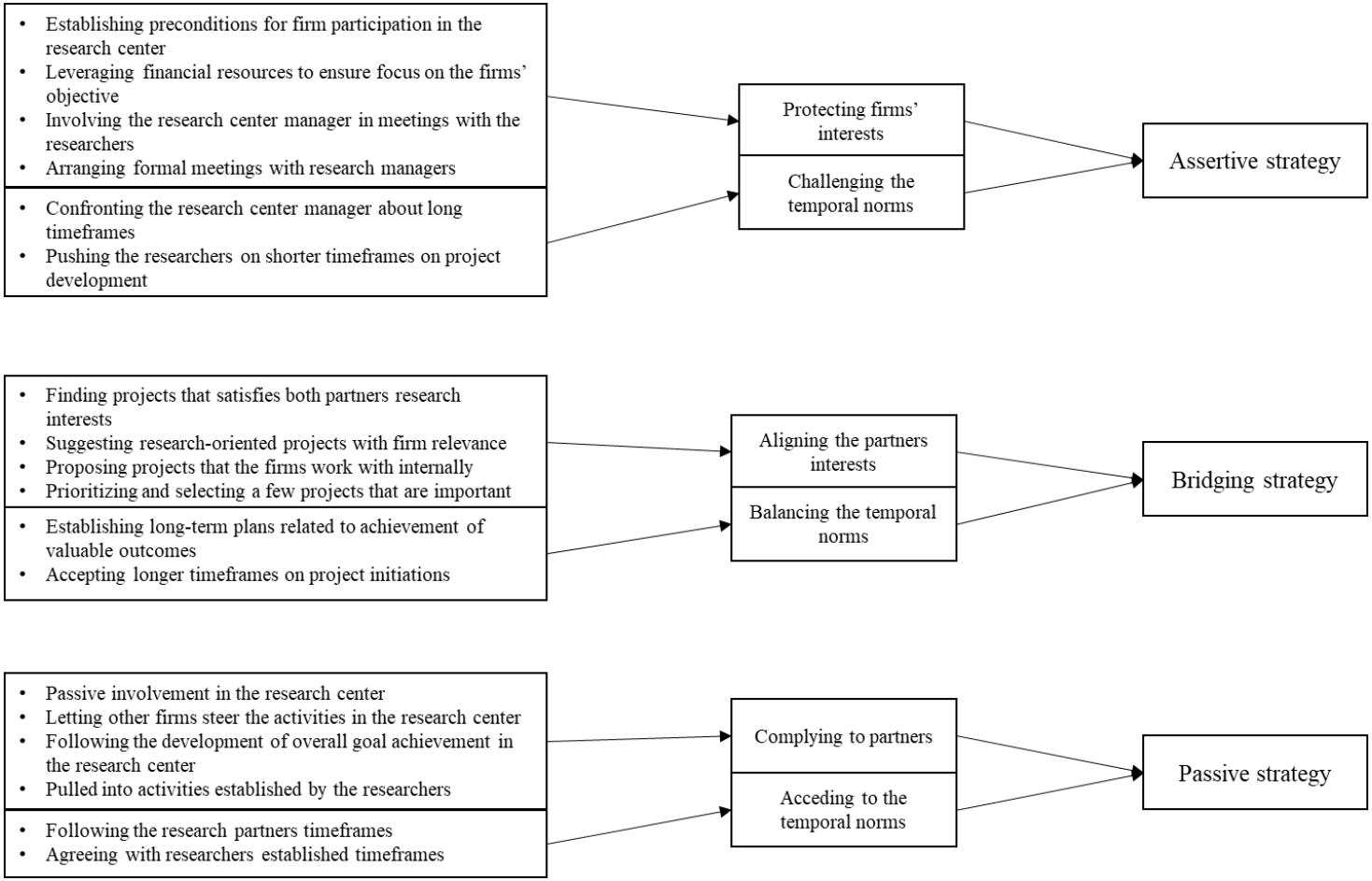
All the interviews from 2017, 2018, and 2019 were recorded and transcribed shortly after they were finished (Yin, 2014). The primary data was supplemented with observations and documents (Denzin and Lincoln, 1994, Denzin, 2012, Yin, 2014). Observations of workshops and annual meetings contributed to increasing knowledge about how the research center operates. To obtain information about the collaborative process between the firm and research partners, documents detailing the original research center description, firm participation, and firm projects and even some notes from the meetings between the firm and research partners were included in this study. These secondary data sources increased my knowledge base about the research center and simultaneously validated and complemented the information from the interviews (Yin, 2014, Creswell and Poth, 2017). In summary, the final sample consists of 14 firms, six research partners, one research center manager, and multiple documents (see Table 2)

Table 2: Overview of data sources for the research center collaboration process

Interviews	**2017**	**2018**	**2019**
Center manager	1	1	
Research managers	5	5	1
Firm representatives	8	11	3
Sum of interviews	14	17	4
Total			34 interviews
Secondary sources	Research center description, participation lists, project documents, newsletters, observations	Annual progress reports, participation lists, newsletters, fieldnotes, project documents, observations, participation in meetings	Annual progress reports, project documents, observations, participation in meetings

Data analysis

The data-analysis process began with mapping the firm and research partners' goals within the research center and how they experienced goal conflicts within the research center to get an understanding of potential goal conflicts between the partners. From there, I began coding the data inductively inspired by the Gioia method (Gioia et al., 2013). I used Nvivo12 to identify empirical constructs related to the strategies firms used when dealing with conflicting goals. This process identified 18 first-order codes related to the firms' activities and decisions to manage the conflicting goals. Next, I collapsed the first-order codes into second-order themes related to the firms' different ways of dealing with goal conflicts. Once the second-order themes represented the first-order codes and the raw data, I aggregated the second-order themes into firm strategy constructs, identifying three strategies the firms used to deal with goal conflicts (see Figure 1 for an overview of the data structure). Once these aggregated strategy constructs were established, I did a cross-case comparison to find similarities and differences between the firms and their use of the aggregated strategies that could explain which type of strategy the different firms used. Next, I mapped out which strategy was used during which collaboration phase by which firm and explored how the use of these various strategies influenced the goal conflicts present in the research center over time.


• Establishing preconditions for firm participation in the research center
• Leveraging financial resources to ensure focus on the firms' objective
• Involving the research center manager in meetings with the researchers
• Arranging formal meetings with research managers
• Confronting the research center manager about long timeframes
• Pushing the researchers on shorter timeframes on project development
Protecting firms' interests
Challenging the temporal norms
Assertive strategy
• Finding projects that satisfies both partners research interests
• Suggesting research-oriented projects with firm relevance
• Proposing projects that the firms work with internally
• Prioritizing and selecting a few projects that are important
• Establishing long-term plans related to achievement of valuable outcomes
• Accepting longer timeframes on project initiations
Aligning the partners interests
Balancing the temporal norms
Bridging strategy
• Passive involvement in the research center
• Letting other firms steer the activities in the research center
• Following the development of overall goal achievement in the research center
• Pulled into activities established by the researchers
• Following the research partners timeframes
• Agreeing with researchers established timeframes
Complying to partners
Acceding to the temporal norms
Passive strategy

Findings

The findings are presented in three parts. First, I present an overview of the firm partners' involvement in the research center and the firm partners' experiences with goal conflicts in the research center. Next, I present the different strategies the firms used to manage these goal conflicts. Last, I present how the various firms used these strategies during the two phases (establishment phase and operational phase) and highlight how these strategies influenced the goal conflicts in the research center.

Goal conflicts and firm involvement

The firm partners in this study can be divided into two distinct types of firm groups: highly involved firms (1–7) and less involved firms (8–14) (see Table 2). Regardless their involvement, all of the firms experienced that the firm and research partners had different goals during the establishment phase of the research center, which created goal conflicts between the partners (see Table 3).

Table 3: Quotes related to the firm and research partners' conflicting goals

	Firms	Research partners
Goals	All the firms in the research center pursued goals related to firm-specific technology development.	All the university partners pursued goals related to knowledge development and generic research that multiple firms could benefit from.
Illustrative quotes related to goals	"There are two research areas [in the research center] where I expect innovations." (FP1) "We hope and expect that we get some results that can contribute to reach the internal goals the firm has developed. Within this [the results], we expect that there will be some new technology that can contribute to renewing our factories." (FP12) "[We want] new technological solutions, basically." (FP14)	"For researchers within this field, the research center contributes continuity and a base where we can develop knowledge, hire people, and educate people. We can develop knowledge that is relevant for the whole world." (RCM) "We are interested in getting some research results, for example, comparisons of concepts, and getting results that are transferable to other industries and processes." (RP7) "Now we have the possibility to have large visions and not just stress with this must be solved for the firm partner today." (RP2)
Goal conflicts	The firm partners were concerned about the researchers' focus, mainly that the researchers wanted to do research that was irrelevant for the firms.	The research partners experienced conflicts related to the work they wanted to do and focus on.
Illustrative quotes on goal conflicts	"The research center can't just work with things that are interesting for the researchers that are participating; it has to be interesting for us too." (FP5) "I can't picture that the theoretical contributions [from the research center] can in any way be good enough for us to make any decisions." (FP9)	"We are doing research, so there will always be challenges." (RP1) "I had hoped that the firm partners would want to research the long-term things that they struggle to solve themselves." (RP5).

I found that to deal with the goal conflicts, the highly involved (Firm 1–7) and less involved firms (8–14) approached goal conflicts differently and used three different strategies, which were adapted in different time periods (establishment phase and the operational phase). The three identified strategies are (1) assertive strategy, (2) bridging strategy, and (3) passive strategy, which are presented below.

Assertive strategy used to deal with goal conflicts

To deal with the goal conflicts in the research center, some of the firms used the assertive strategy, which involved endorsing the firms' interests and working practices. The findings show that the assertive strategy was reinforced by two specific types of

activities the firms engaged in. The first activity was related to *protecting firms' interests*, and the second activity focused on *confronting the temporal norms* of the researchers within the research center. As such, the assertive strategy included engagement in specific activities focused on attaining the firms' goals within the temporal norms of the firms.

Protecting firms' interests

The firm partners that used the assertive strategy focused on protecting their interests related to attaining innovation outcomes. This protection involved specific activities the firms engaged in to ensure that their goals were prioritized by the research center and the research partners involved.

To protect their interests, the firms established preconditions for participation in the research center. Specifically, these firm partners agreed to be part of the research center and contribute financial resources if the research partners would focus on attaining the firms' goals, as one of the firm representatives (FP1) explained: "We have suggested some ideas, and especially one, where we want the researchers to come up with some better ideas than the ideas we have had earlier." The firm representative (FP1) elaborated: "We are positive to [other projects] with the condition that the main focus will be on the first idea we have suggested." As such, some of the firm partners established boundaries for their participation within the research center, which revolved around attaining their own goals.

The firm partners also leveraged their own financial resources within the research center to ensure their goals would be attended to, explaining that they would not provide financial resources unless the research center focused more on the firms' objectives when establishing projects and research activities. One of the firm partners (FP4) illustrated how her firm financial resources to ensure the research center understood the firm's expectations related to activities and project establishment:

> I told [the research manager] that during the lifespan of the research center, we would make sure that we will use all of the in-kind [financial resources put aside to use in the research center], but I do not plan on paying it this year. I feel that they had done too poor of a job in being "sellers" related to [projects].

These firms also actively pursued the research center manager and, through him, attempted to ensure the research partners attended to the firms' goals. The firm partners had meetings with the research center manager so the research center manager would make the researchers focus more on the firms' goals when establishing projects and activities, as one of the firm partners (FP2) explained: "We have tried to influence the activities and the [research center's] focus toward our firm [goals] by going all the way to the top." The firm partner (FP2) elaborated: "We use a lot of energy on promoting our goals [and expectations], and we have taken it all the way up to the top [to the center manager]." Since the firms were focused on protecting their own interests, they were in less interested in projects that did not align with their own goals, as one of the firm partners (FP1) explained: "The researchers have worked on a project [that is relevant for the firm], and that was okay, but I wish they would work on what we wanted them to"

The firm partners also protected their own interests by arranging formal meetings with both the research center manager and the research partners to try to make sure that all the involved parties were clear on what the firm partners expected and what the focus should be. One of the firm partners (FP2) explained how the firm representative used these formal meetings: "We have been very clear toward the research center about our expectations. That's how the process must be. We need to describe what we expect, and then we have to see what the researchers can do with [the firm's expectations]." As such, the firms' use of the assertive strategy was related to protecting the firms' interests by asserting their own goals and interests through specific activities.

Challenging temporal norms

The next set of activities of the assertive strategy relates to challenging the temporal norms of the research partners in the research center, which I define as the activities the firms involved themselves in to ensure the research activities and projects within the research center followed the firms' own timeframes. In particular, the firms engaged in *confronting the research center manager about long timeframes* and *pushing the researchers on shorter timeframes on project development.*

First, some of the firm partners partaking in the research center confronted the research center manager about long timeframes and demanded shorter timeframes for project initiation and development. By confronting the research center manager, the firms wanted to put pressure on the research partners so they would be more inclined to speed up the process of establishing and developing projects that could attain the firms' goals. For instance, one of the firm partners (FP4) explained, "I was a bit hard toward the research center manager related to the researchers, and [demanded] that they must work faster on planning what our money goes to."

The firms also challenged the temporal norms by initiating formal meetings with the researchers to push for shorter timeframes on project development. The firm partners used these formal meetings to highlight the importance of accelerating project development since long timeframes could, in the worst case, result in firm dropout. One of the firm partners (FP1) elaborated on how he pushed for shorter timeframes on project development: "I invited them [researchers] to a meeting. They came and wanted to discuss [possible projects], and [how they could] make sure that there will be progress."

Bridging strategy used to manage goal conflicts

Some of the firms chose to use the bridging strategy to manage goal conflicts, which focused on *aligning the partners' interests and goals* and *balancing temporal norms*. The bridging strategy was underpinned by the firm partners' engagement in activities

that enabled the firm and research partners to bridge their differences related to goals and develop temporal norms that both sides were satisfied with.

Aligning the partners' interests

Using the bridging strategy toward the research organizations involved aligning the firm and research partners' different goals so both parties could achieve valuable outcomes. The activities focusing on aligning the partners were related to the firms' engagement in the research center and different activities. In particular, some of the firm partners tried to find projects that satisfied both parties' goals. Finding such projects demanded that the firms were open and including with the researchers to ensure that the collaborations could satisfy both the firms and the researchers, as one of the firm representatives (FP11) explained: "We basically share both results [on internal projects] and information related to what we come up with and what we need to do [related to projects] in order to have a good collaboration [with the researchers]."

The firm partners also began by suggesting research-oriented projects to the researchers that were of interest to the firms. By suggesting research-oriented projects, the firms tried to compromise with the researchers and focus on projects that could contribute relevant results for both the firms and the researchers, as one of the firm partners (FP10) illustrated: "We suggest projects. If they [the projects] are relevant enough and have a high level of research, then the researchers decide that they are interested to look closer at the project." In addition, some of the firm partners not only suggested research-oriented projects and problem areas they wanted to work on but also proposed projects that the firms were already working on internally, as one of the firm partners (FP9) described: "The research areas in the research center are in a large degree related to our field, so we are involved by suggesting reasonable projects and discussing some problem areas that we want to work with or that we have already began working on." As such, some firm partners invited the researchers into the firms' internal projects, trying to align the partners' different goals and interests.

The firm partners also prioritized and selected a few projects that were important for the firms and tried to persuade the researchers into working on these projects. The firm partners prioritized these projects to ensure that they got at least some results that they deemed important. For instance, a firm partner (FP7) reported, "We prioritized what we thought is important, and we made a plan to try to influence the right people to get the activities approved." By prioritizing some of their own favored projects, the firms were then open to new suggestions made by the researchers, as one of the firm partners (FP4) explained: "In relation to collaborating with researchers, I think it is important that we [the firm] are open to their [the researchers'] suggestions—that they might have ideas and wishes that we can develop further [together]."

Balancing temporal norms

The bridging strategy also involved balancing the temporal norms established within the research center. For the firms, balancing temporal norms was related to adjusting the firms' timeframes and finding compromises related to the pace in which the partners collaborated, developed projects, and achieved outcomes within the research center.

As such, some of the firm partners established long-term plans related to achieving valuable outcomes. These long-term plans involved adjusting the firms' timeframes by accepting that some of the outcomes the firms desired would be developed over time rather than pushing for fast results. One of the firm partners (FP7) explained this adjustment as follows:

> Eight years, which may not be very long from a research perspective, but at the same time, with those kinds of resources and expertise [present in the research center], I expect that we will get something [outcomes] that is specific—research that gives us results that we can use. At the same time, I respect that this is long-term work. For example, steam engines are not a new invention, and they have been improved for over 150 years, so I don't think there are any quick fixes in the next five years.

Thus, some of the firm partner established long-term plans that revolved around outcomes over an eight-year period rather than focusing on short-term projects and outcomes. At the same time, some of the firms also balanced temporal norms by accepting longer timeframes for project development. The firm partners adjusted their usual timeframes and accepted that while some of the projects and topics they were interested in would be attended to, it might take more time than they are used to. For instance, one of the firm partners (FP8) noted, "We have suggested some [project] ideas, but the researchers let us know that these projects would be considered next year." The firm partner (FP8) elaborated: "I think that we have a constructive and good dialogue, and I believe that the researchers will contribute to establishing a project for us [over time]." Thus, by balancing the temporal norms within the research center, the firm partners adjusted their own temporal norms and timeframes toward those of the researchers.

Passive strategy used in the research center

When dealing with goal conflicts, some of the firms used the passive strategy. The passive strategy mainly revolved around an approach where the firms did not try to highlight their own goals or timeframes and did not question the work the researchers did, instead focusing on what the researchers wanted. Thus, the passive strategy was underpinned by two specific activities: *complying with partners* and *acceding to temporal norms*.

Complying with partners

The firm partners that employed the passive strategy largely complied with the research partners within the research center. Complying with the partners related to the firm partners' passive engagement in the research center in that they did not actively engage in trying to assert their goals and objectives or bridge their own and the researchers' different goals and objectives by finding projects and subjects that suited both types of partners.

As such, some of the firms that complied with the partners in the research center did not engage in the different activities established by the researchers and did not partake in deciding which projects or research should be established. For instance, one of the firm partners (FP13) said, “There are a lot of activities [in the research center] that we can benefit from, which we could not see before we became involved in the research center and engaged in discussions [with the researchers].” These firm partners also let other firms steer project development and research focus in the research center. These firm partners were mainly involved in the research center through other firms’ engagement; namely, other firms had discussions and established projects with the researchers. One of the firm partners (FP13) explained, “There are a couple of representatives from other firms that have been heavily involved [in the research center], while we have been a bit more passive.”

Some of the firms engaged in the research center to follow collaborations and observe the activities and projects that were developed and finalized to ensure they did not miss out on opportunities formed in the research center without actually participating in the projects or highlighting their own goals and needs. For instance, one of the firm partners (FP14) said, “We are involved in order to develop ourselves and keep track of the ideas or technologies [that come out of the research center] that we can use internally.”

These firm partners were pulled into activities established by the researchers in the research center and became involved when the research partners specifically focused on them. As such, these firm partners’ goals received attention mainly when the research partners chose to focus on the firms’ goals, as one of the firm partners (FP12) explained: “The researchers have been involved and pulled us into activities and projects, so it has been very good for us.”

Acceding to temporal norms

The firm partners that used the passive strategy also acceded to the researchers’ temporal norms. Acceding to temporal norms related to how the firm partners

complied with and accepted that the research partners would decide when attention would be given to the firms' goals and objectives. Hence, these firm partners followed the research partners' timeframes, letting the research partners decide the focus of the collaborations and when to include the firm partners, as one of the firm partners (FP14) explained: "We haven't been involved enough to partake in discussions related to what should be prioritized or not."

These firm partners also settled with the research partners' established timeframes and the pace at which the research partners worked and engaged the firm partners. For instance, one of the firm partners (FP9) explained, "It is important to get good projects related to the number of hours we spend on the research center. As of now, we do not manage to deliver on it."

Thus, the firms that used the passive strategy to manage goal conflicts mainly focused on complying with the research partners, acceding to the researchers' preestablished temporal norms, and being pulled in on projects when the researchers saw fit.

Firms' use of strategies to manage goal conflicts over time

To recap, this study reveals two distinct firm groups partaking in the research center: Firms 1–7 were highly involved (with multiple employees and resources allocated toward the research center) and Firms 8–14 were less involved (with few resources and employees dedicated to the research center). All these firms experienced that they and the research organizations had conflicting goals, which in turn fueled goal conflicts within the research center. The findings showed that to manage these goal conflicts, the firms used different strategies during different phases, which will further be presented (see Table 3).

Table 3: Firm strategies over time and goal conflict development

Firms		Establishment phase	Operational phase	Goal conflicts
Highly involved	Firm 1–3	Assertive strategy	Assertive strategy	Goal conflicts intensified
	Firm 4–7	Assertive strategy	Bridging strategy	Goal conflicts mitigated
Less involved	Firm 8–11	Bridging strategy	Bridging strategy	Goal conflicts mitigated
	Firm 12–14	Passive strategy	Passive strategy	Goal conflicts mitigated

Establishment phase (creating the foundation for collaborations)

During the establishment phase of the research center, the highly involved firms (1–7) used the assertive strategy to deal with goal conflicts. Specifically, the highly involved firms focused on protecting their own interests, making sure the researchers attended to their goals and trying to ensure the researchers established and developed innovation projects and research within the firms' usual timeframes.

Some of the less involved firms (9–11) used the bridging strategy to manage goal conflicts and focused on aligning the firms' and researchers' interests while also attending to both parties' goals. These firms also focused on finding a compromise related to the researchers' temporal norms such that the firm partners established long-term plans and accepted that project development could take longer than what they were used to.

The rest of the firms that were less involved (12–14) used the passive strategy to deal with goal conflicts, which meant they were mainly engaged in the research center to make sure they did not miss out on anything important without taking the lead in collaborations, as one of the research partners explained: "They [the firms] contribute money to be a part [of the research center] and don't miss out on [project development]." They also accepted the researchers' temporal norms and let the researchers decide on the development of the research center by being pulled into research activities and projects without pressuring the researchers to focus on the firms' goals.

7.2.1. Operational phase (collaborations between firms and research partners)

During the operational phase, some of the highly involved firms (1–3) continued to use the assertive strategy to deal with goal conflicts. The firms that continued to use the assertive strategy found that it was difficult to collaborate with the researchers. These firms continued to experience goal conflicts since the researchers had not managed to attend to the firms' goals as the firms had wanted. One of the firm partners (FP1) explained his frustration: "One of the projects we want . . . we still haven't gotten. It doesn't seem that they [researchers] understand the seriousness here." The firms that continued to use the assertive strategy also experienced that the goal conflicts intensified and began to influence their collaborations, as one of the firm partners (FP1) explained: "We really hope that something will happen during the fall. If not, we will be frustrated and disappointed. I'm not sure what will happen, but one of our firm partners [FP2, in the research center] is considering leaving the research center."

The other highly involved firms (4–7), however, changed their strategy during the operational phase. These firms began to use the bridging strategy to manage goal conflicts and focused on finding and developing projects in which both the firm and researcher partners could achieve some desired outcomes. Essentially, these firms shifted their focus to how they could achieve effective collaborations rather than protecting their own interests, as one of the firm partners (FP4) explained: "We have discussed back and forth with the researchers, trying to find some [area] where we can contribute, where we [and the researchers] can have a project. Because that's the important thing, that we have a shared project."

The less involved firms (8–14) continued using their original strategies, with some of the firms continuing to use the bridging strategy and some (12–14) continuing to use the passive strategy.

The firms that used the bridging strategy and the passive strategy (Firm 4–14) found that the goal conflicts were eventually mitigated and that their engagement in the research center began to yield positive results, as one of the firm partners (FP4)

explained: “[The developments in the research center] have become better than last year. There is an increase in the program. . .. We are closing in on things [projects and research activities] that are relevant for us [the firm].”

In sum, the findings show that the firms that used the assertive strategy during both phases experienced that the goal conflicts remained and began to affect their collaborations, while the firms that used the bridging strategy or the passive strategy during at least one of the phases found that the goal conflicts were mitigated and that they achieved effective collaborations (see Table 4).

Discussion

The detailed analysis of the how the various firm strategies influenced goal conflicts over time highlights some important insights into the different sets of activities the firms undertook. By highlighting the various sets of activities the firms engaged in and how they were involved in these activities to manage goal conflicts, this study extends prior literature on university-industry research centers (Gulbrandsen et al., 2015, Steinmo, 2015, Lauvås and Steinmo, 2019), by showing how firms should be involved (Steinmo and Rasmussen, 2016) to achieve effective collaborations without goal conflicts (de Wit-de Vries et al., 2018, Fini et al., 2019). In the next part, I discuss how firms’ involvement through different strategies influences the goal conflicts present, which in turn influences the achievement of effective collaborations without goal conflicts in university-industry research centers.

Firm involvement through different strategies influences’ goal conflicts

The case of goal conflicts between firms and research partners in research centers is nothing new (Gulbrandsen et al., 2015), and prior studies have emphasized that the institutional differences between firms and research organizations often entail conflicting goals between the partners involved (Lauvås and Steinmo, 2019). This study

suggests that to manage these goal conflicts, firms can approach goal conflicts with three different strategies adapted in different phases of collaborations. However, not all strategies will mitigate the goal conflicts present (See Figure 2). As such, this study suggests that firm strategies influence goal conflicts differently, as elaborated next.

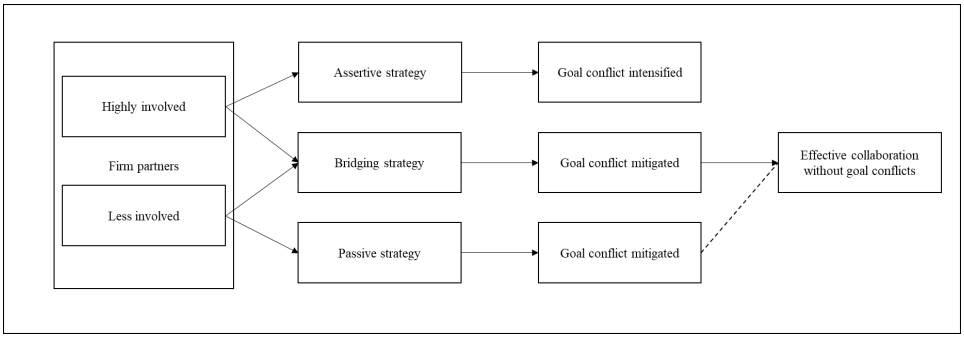


Figure 2: Firms' use of strategies to manage tensions and achieve effective collaborations

The findings in this study show how the firms had various levels of involvement within the research center. Some of the firms (1–7) were highly involved with multiple resources and multiple employees who partook in the research center, while the other firms (8–14) were less involved with limited resources and only a few employees engaged in the research center. Furthermore, the highly involved firms (1–7) used the assertive strategy during the establishment phase of the research center. The assertive strategy involved a set of activities focusing on protecting the firms' interests and established timeframes. This strategy can be seen in relation to the defensive strategies proposed by Oliver (1991), whereby firms defend their goals and reject partners' demands (Pache and Santos, 2010). In my study, the firms challenged the researchers' established norms and rejected projects and outcomes the researchers wanted to work with (Pache and Santos, 2010). They did so by leveraging their financial resources (Liu et al., 2017) and taking time to influence and persuade the researchers to focus on the firms' goals by involving the research center manager (Suddaby and Greenwood, 2005).

Some of the less involved firms (8–11) used either the bridging or the passive strategy to deal with goal conflicts during the establishment phase, which can be understood as acceptive strategies (Oliver, 1991) as the firms tried to align their own and the research partners' different interests, goals, and temporal norms (van Fenema and Loebbecke, 2014). The firms' (8–11) use of the bridging strategy involved prioritizing and suggesting projects that could be of interest to the researchers (Pache and Santos, 2010).

While the passive strategy, which was also used by the less involved firms (12–14), included a set of passive activities, whereby the firms mainly acceded to and complied with the research partners' goals and temporal norms (Oliver, 1991).

Interestingly, though, when comparing the passive strategy to prior studies on acceptive strategies in the strategic response literature (Pache and Santos, 2021), I suggest that the passive activities and compliance with the research partners found in this study might actually be a false acceptive strategy because of the lack of firm resources and employees engaged in the research center. This lack of resources and employees is a large barrier for firms when trying to engage in collaborations (Bertello et al., 2021), which can also influence how firms engage with researchers and how they are involved to mitigate goal conflicts. However, the use of a passive strategy might also be a result of partners' lack prior experience with these types of collaborations since prior collaborative experience enables firm partners to develop an understanding of how these collaborations work and how firm partners should be involved in such collaborations (Steinmo and Rasmussen, 2018). By identifying various firm strategies used to deal with goal conflicts, this study extends prior literature on university-industry research centers by contributing in-depth insights into how firms may be involved in various activities to deal with goal conflicts (Steinmo and Rasmussen, 2016, Fini et al., 2019).

Moreover, while the less involved firms (8–14) continued to use either the bridging strategy or the passive strategy to deal with goal conflicts during the operational phase, some of the highly involved firms (4–7) changed their strategy from

the assertive strategy to the bridging strategy to manage goal conflicts. Moreover, during the operational phase, the firms experienced that the goal conflicts were either intensified or mitigated. In particular, the findings show that the goal conflicts intensified for the firms that used the assertive strategy. However, the firms that used the bridging strategy and the passive strategy during both phases and the firms that changed their strategy to the bridging strategy during the operational phase managed to mitigate goal conflicts and achieve effective collaborations without goal conflicts.

Interestingly, prior studies on strategic responses, argues that strategies which are focused on compromises, such as the bridging strategy is not suitable when dealing with goal conflicts (Pache and Santos, 2021) In this study, the findings show that it is indeed these compromises, alignment and balancing activities that actually mitigate goal conflicts. The differences in strategy outcomes can be explained by the research center setting. Meaning that participations in research centers often yield additional benefits for the firms involved, such as increasements of R&D funding, or a direct link to new recruits (Perkmann et al., 2011b), thus firm partners may be more inclined to compromise on their goals, to attain the additional benefits.

In sum, contrary to prior UIC studies (Steinmo, 2015, Lauvås and Steinmo, 2019), this study suggests that being highly involved with multiple resources and employees does not guarantee effective collaborations or the mitigation of goal conflicts. Rather, firms manage to mitigate goal conflicts by engaging in a set of specific activities that align firm and research partners' goals and interests.

Conclusion

By following 14 firms from the establishment phase of a research center and during the operational phase, this study aimed to explore how firms can use various strategies to manage goal conflicts that arise when dissimilar partners with conflicting goals engage in collaborations (Steinmo and Rasmussen, 2016, de Wit-de Vries et al., 2018, Fini et al., 2019) since goal conflicts and lack of goal attainment may impede or, in the worst case, end collaborations (Perkmann et al., 2018).

This study proposes that due to the challenging landscape when collaborating with dissimilar partners (Bruneel et al., 2010), firm strategies are important for goal conflict mitigation between firm and research partners to ensure that collaborations can attain the goals of producing novel research and developing innovations (Gulbrandsen et al., 2015, Lauvås and Steinmo, 2019). This study proposes that only a specific firm strategy (i.e., bridging strategy) might actually mitigate goal conflict because the bridging strategy enables firms to be involved in research center activities in such a way that the firm and researcher partners manage to collaborate to achieve both partners' objectives within a timeframe that suits both. Hence, the use of the bridging strategy aligns partners' conflicting goals and objectives and enables partners to work together to achieve mutual benefits.

These findings contribute to the UIC research in at least three ways. First, by specifically studying goal conflicts in a university-industry research center, this study contributes more in-depth knowledge of goal conflicts present in these types of collaborations. This focus might provide more in-depth insights into the different conflicts present in these types of collaborations since prior studies have emphasized that specific tensions and conflicts may influence the collaboration process differently (Estrada et al., 2016) and that firms might manage various tensions and conflicts differently (Smith and Lewis, 2011). Thus, it is important to get more insights into how these different conflicts may influence collaborations (de Wit-de Vries et al., 2018). Furthermore, by specifically focusing on goal conflicts, this study contributes insights into how firms' use of specific strategies might mitigate goal conflict and achieve effective collaborations that are not influenced by conflicting goals (Fini et al., 2019).

Second, the findings contribute to the UIC literature by showing how firms may try to manage collaborations and the research partners involved when dealing with goal conflicts stemming from the partners' different institutional logics (de Wit-de Vries et al., 2018). As such, this study identifies three strategies firms may use when dealing with goal conflicts: (1) the assertive strategy, which focuses on protecting firms' interests and challenging researchers' temporal norms to achieve outcomes within

firms' timeframes; (2) the bridging strategy, which entails aligning firm and research partners' interests and balancing different temporal norms; and (3) the passive strategy, which focuses on complying with research partners and acceding to researchers' temporal norms.

Third, the most notable finding relates to how firms' involvement in research center activities influences goal conflicts. As such, this study contributes to the UIC literature by showing *how* firms should be involved to manage goal conflicts (Steinmo and Rasmussen, 2016, Fini et al., 2019). Prior studies in the UIC literature have highlighted that high involvement often mitigates tensions related to goal conflicts (Steinmo, 2015, Lauvås and Steinmo, 2019). This study extends this line of research by suggesting that goal conflicts are actually mitigated through specific sets of activities that firms are involved in (Steinmo and Rasmussen, 2016) and that it is not the involvement that actually mitigates goal conflicts but rather how firms are involved. In particular, the findings show that firms with less involvement mitigated conflicting goals, while goal conflict became intensified for some of the highly involved firms.

Lastly, this study contributes to the strategic response literature (Pache and Santos, 2021) by showing how firms respond to research partners' conflicting goals in the context of UICs. As such, this study proposes that in the context of university-industry research centers, firms may use variations of defensive strategies and acceptive strategies to manage goal conflicts. Additionally, this study suggests that acceptive strategies that include passive actions and actions that accede to partners' demands and goals might be falsely passive. This may especially be the case if the firms using these strategies have few or limited resources, since a lack of resources is often the largest barrier for firms to be active (Bertello et al., 2021) and might actually prevent firms from taking active actions toward goal conflicts.

Managerial implications

The findings in this study also have important implications for firm and research partners engaging in research centers when these partners aim to develop innovations

and novel research. Specifically, this study suggests that to achieve effective collaborations and mitigate goal conflicts, firms should use bridging strategies (e.g., aligning partners' interests and balancing temporal norms) when dealing with goal conflicts. In addition, the use of assertive strategies (e.g., protecting firms' interests and challenging temporal norms) to manage goal conflicts might actually intensify goal conflicts and hamper the collaboration process. Hence, these findings imply that involvement for the sake of involvement does not guarantee effective collaborations and that firms should use strategies focusing on bridging the conflicting goals between the firm and research partners.

Limitations and future research

Even though I did not intend to develop generalizable findings but rather intended contribute to theory building by exploring how firm strategies may mitigate goal conflicts between firms and research partners in research centers, the findings presented in this study are limited to the context in which the study is set. Thus, different firm strategies to manage goal conflicts may be found in other types of research centers and among different firms. Thus, I suggest that other studies focusing on goal conflicts seek to replicate my findings across different firms or in different types of UICs. Such research might contribute to extending our knowledge on goal conflicts and the management of goal conflicts in UICs (Fini et al., 2019). Furthermore, while my study focused on how firm strategies influence goal conflicts, I did not explicitly focus on why some of the firms (4–7) changed their strategy midway. Thus, there is an opportunity to investigate why some firms choose to change their strategy when dealing with goal conflicts (Smith and Lewis, 2011). Lastly, while the aim of my study was to focus on one specific tension—namely, goal conflicts in UICs—in line with de Wit-de Vries et al. (2018), I suggest that future studies focus on other types of tensions and conflicts that may arise in UICs because firm and research partners may use different strategies for different tensions and conflicts (Smith and Lewis, 2011). Thus, I

think there is an opportunity to contribute more in-depth knowledge on the tensions and barriers that arises in UICs and how to manage each of them.

Literature

A.M. VERMEULEN, P., ZIETSMA, C., GREENWOOD, R. & LANGLEY, A. 2016. Strategic responses to institutional complexity. *Strategic Organization,* 14**,** 277-286.

ABRAMOVSKY, L., KREMP, E., LÓPEZ, A., SCHMIDT, T. & SIMPSON, H. 2009. Understanding co-operative innovative activity: evidence from four European countries. *Economics of Innovation and New Technology,* 18**,** 243-265.

AHMADSIMAB, A. & CHOWDHURY, I. 2019. Managing Tensions and Divergent Institutional Logics in Firm–NPO Partnerships. *Journal of Business Ethics***,** 1-20.

AL-TABBAA, O., LEACH, D. & KHAN, Z. 2019. Examining alliance management capabilities in cross-sector collaborative partnerships. *Journal of Business Research,* 101**,** 268-284.

ALFORD, R. R. & FRIEDLAND, R. 1985. *Powers of theory: Capitalism, the state, and democracy*, Cambridge University Press.

AMBOS, T. C., MÄKELÄ, K., BIRKINSHAW, J. & D'ESTE, P. 2008. When Does University Research Get Commercialized? Creating Ambidexterity in Research Institutions. *Journal of Management Studies,* 45**,** 1424-1447.

BARNES, T., PASHBY, I. & GIBBONS, A. 2002. Effective University – Industry Interaction:: A Multi-case Evaluation of Collaborative R&D Projects. *European Management Journal,* 20**,** 272-285.

BATTILANA, J. & DORADO, S. 2010. Building sustainable hybrid organizations: The case of commercial microfinance organizations. *Academy of management Journal,* 53**,** 1419-1440.

BAXTER, P. & JACK, S. 2008. Qualitative case study methodology: Study design and implementation for novice researchers. *The qualitative report,* 13**,** 544-559.

BERTELLO, A., FERRARIS, A., DE BERNARDI, P. & BERTOLDI, B. 2021. Challenges to open innovation in traditional SMEs: an analysis of pre-competitive projects in university-industry-government collaboration. *International Entrepreneurship and Management Journal***,** 1-16.

BISHOP, K., D'ESTE, P. & NEELY, A. 2011. Gaining from interactions with universities: Multiple methods for nurturing absorptive capacity. *Research Policy,* 40**,** 30-40.

BJERREGAARD, T. 2010. Industry and academia in convergence: Micro-institutional dimensions of R&D collaboration. *Technovation,* 30**,** 100-108.

BOARDMAN, C. & GRAY, D. 2010. The new science and engineering management: cooperative research centers as government policies, industry strategies, and organizations. *The Journal of Technology Transfer,* 35**,** 445-459.

BOXENBAUM, E. & JONSSON, S. 2017. Isomorphism, diffusion and decoupling: Concept evolution and theoretical challenges. *The Sage handbook of organizational institutionalism,* 2**,** 79-104.

BRUNEEL, J., D'ESTE, P. & SALTER, A. 2010. Investigating the factors that diminish the barriers to university–industry collaboration. *Research policy,* 39**,** 858-868.

CANHOTO, A. I., QUINTON, S., JACKSON, P. & DIBB, S. 2016. The co-production of value in digital, university–industry R&D collaborative projects. *Industrial Marketing Management,* 56**,** 86-96.

CHESBROUGH, H. 2012. Open Innovation: Where We've Been and Where We're Going. *Research-Technology Management,* 55**,** 20-27.

CHESBROUGH, H. W., VANHAVERBEKE, W. & WEST, J. 2006. *Open innovation : researching a new paradigm,* Oxford, Oxford University Press.

CRESWELL, J. W. & POTH, C. N. 2017. *Qualitative inquiry and research design: Choosing among five approaches*, Sage publications.

CROSSAN, M. M. & APAYDIN, M. 2010. A Multi-Dimensional Framework of Organizational Innovation: A Systematic Review of the Literature. *Journal of Management Studies,* 47**,** 1154-1191.
CUNNINGHAM, J. A., MENTER, M. & YOUNG, C. 2017. A review of qualitative case methods trends and themes used in technology transfer research. *The Journal of Technology Transfer,* 42**,** 923-956.
D'ESTE, P. & PERKMANN, M. 2011. Why do Academics Engage with Industry? The Entrepreneurial University and Individual Motivations. *The Journal of Technology Transfer,* 36**,** 316-339.
DE WIT-DE VRIES, E., DOLFSMA, W. A., VAN DER WINDT, H. J. & GERKEMA, M. P. 2018. Knowledge transfer in university–industry research partnerships: a review. *The Journal of Technology Transfer*.
DENZIN, N. K. 2012. Triangulation 2.0. *Journal of mixed methods research,* 6**,** 80-88.
DENZIN, N. K. & LINCOLN, Y. S. 1994. *Handbook of qualitative research*, Sage publications, inc.
EISENHARDT, K. M. 1989. Building Theories from Case Study Research. *The Academy of Management Review,* 14**,** 532-550.
ESTRADA, I., FAEMS, D., MARTIN CRUZ, N. & PEREZ SANTANA, P. 2016. The role of interpartner dissimilarities in Industry-University alliances: Insights from a comparative case study. *Research Policy,* 45**,** 2008-2022.
EVELEENS, C. 2018. *Innovation management; a literature review of innovation process models and their implications*.
FINI, R., RASMUSSEN, E., WIKLUND, J. & WRIGHT, M. 2019. Theories from the lab: how research on science commercialization can contribute to management studies. *Journal of Management Studies,* 56**,** 865-894.
GHAURI, P. & ROSENDO-RIOS, V. 2016. Organizational cross-cultural differences in the context of innovation-oriented partnerships. *Cross Cultural & Strategic Management,* 23**,** 128-157.
GIOIA, D. A., CORLEY, K. G. & HAMILTON, A. L. 2013. Seeking qualitative rigor in inductive research: Notes on the Gioia methodology. *Organizational research methods,* 16**,** 15-31.
GREENWOOD, R., RAYNARD, M., KODEIH, F., MICELOTTA, E. R. & LOUNSBURY, M. 2011. Institutional complexity and organizational responses. *Academy of Management annals,* 5**,** 317-371.
GULBRANDSEN, M. & SMEBY, J.-C. 2005. Industry funding and university professors' research performance. *Research Policy,* 34**,** 932-950.
GULBRANDSEN, M., THUNE, T., BORLAUG, S. B. & HANSON, J. 2015. Emerging hybrid practices in public-private research centres. *Public Administration,* 93**,** 363-379.
HOWARD, M., STEENSMA, H. K., LYLES, M. & DHANARAJ, C. 2016. Learning to collaborate through collaboration: How allying with expert firms influences collaborative innovation within novice firms. *Strategic Management Journal,* 37**,** 2092-2103.
JAKOBSEN, S., LAUVÅS, T. A. & STEINMO, M. 2019. Collaborative dynamics in environmental R&D alliances. *Journal of Cleaner Production,* 212**,** 950-959.
LASCAUX, A. 2019. Absorptive Capacity, Research Output Sharing, and Research Output Capture in University-Industry Partnerships. *Scandinavian Journal of Management,* 35**,** 101045.
LAURSEN, K. & SALTER, A. 2004. Searching high and low: what types of firms use universities as a source of innovation? *Research policy,* 33**,** 1201-1215.
LAUVÅS, T. & STEINMO, M. 2019. The role of proximity dimensions and mutual commitment in shaping the performance of university-industry research centres. *Innovation***,** 1-27.
LIND, F., STYHRE, A. & AABOEN, L. 2013. Exploring university-industry collaboration in research centres. *European Journal of Innovation Management,* 16**,** 70-91.
LIU, Y., LUO, Y., HUANG, Y. & YANG, Q. 2017. A diagnostic model of private control and collective control in buyer-supplier relationships. *Industrial Marketing Management,* 63**,** 116-128.
LUO, Y., SHENKAR, O. & GURNANI, H. 2008. Control-cooperation interfaces in global strategic alliances: A situational typology and strategic responses. *Journal of International Business Studies,* 39**,** 428-453.
MCCABE, A., PARKER, R. & COX, S. 2016. The ceiling to coproduction in university–industry research collaboration. *Higher Education Research & Development,* 35**,** 560-574.

MESNY, A. & MAILHOT, C. 2007. The Difficult Search for Compromises in a Canadian Industry/University Research Partnership. *The Canadian Journal of Sociology / Cahiers canadiens de sociologie,* 32**,** 203-226.
MURRAY, F. & O'MAHONY, S. 2007. Exploring the foundations of cumulative innovation: Implications for organization science. *Organization Science,* 18**,** 1006-1021.
OLIVER, C. 1991. Strategic responses to institutional processes. *Academy of management review,* 16**,** 145-179.
PACHE, A.-C. & SANTOS, F. 2010. When worlds collide: The internal dynamics of organizational responses to conflicting institutional demands. *Academy of management review,* 35**,** 455-476.
PACHE, A.-C. & SANTOS, F. 2013. Inside the hybrid organization: Selective coupling as a response to competing institutional logics. *Academy of management journal,* 56**,** 972-1001.
PACHE, A.-C. & SANTOS, F. 2021. When worlds keep on colliding: Exploring the consequences of organizational responses to conflicting institutional demands. *Academy of Management Review*.
PERKMANN, M. 2017. How boundary organizations facilitate collaboration across diverse communities. *Managing knowledge integration across boundaries***,** 155-170.
PERKMANN, M., KING, Z. & PAVELIN, S. 2011a. Engaging excellence? Effects of faculty quality on university engagement with industry. *Research Policy,* 40**,** 539-552.
PERKMANN, M., MCKELVEY, M. & PHILLIPS, N. 2018. Protecting Scientists from Gordon Gekko: How Organizations Use Hybrid Spaces to Engage with Multiple Institutional Logics. *Organization Science,* 30**,** 298-318.
PERKMANN, M., NEELY, A. & WALSH, K. 2011b. How should firms evaluate success in university–industry alliances? A performance measurement system. *R&D Management,* 41**,** 202-216.
PERKMANN, M., TARTARI, V., MCKELVEY, M., AUTIO, E., BROSTRÖM, A., D'ESTE, P., FINI, R., GEUNA, A., GRIMALDI, R., HUGHES, A., KRABEL, S., KITSON, M., LLERENA, P., LISSONI, F., SALTER, A. & SOBRERO, M. 2013. Academic engagement and commercialisation: A review of the literature on university–industry relations. *Research Policy,* 42**,** 423-442.
PERKMANN, M. & WALSH, K. 2007. University–industry relationships and open innovation: Towards a research agenda. *International Journal of Management Reviews,* 9**,** 259-280.
PONOMARIOV, B. L. & BOARDMAN, P. C. 2010. Influencing scientists' collaboration and productivity patterns through new institutions: University research centers and scientific and technical human capital. *Research Policy,* 39**,** 613-624.
SAUERMANN, H. & STEPHAN, P. 2013. Conflicting logics? A multidimensional view of industrial and academic science. *Organization science,* 24**,** 889-909.
SCHILDT, H. & PERKMANN, M. 2017. Organizational settlements: Theorizing how organizations respond to institutional complexity. *Journal of Management Inquiry,* 26**,** 139-145.
SJÖÖ, K. & HELLSTRÖM, T. 2021. The two sides of the coin: joint project leader interaction in university‐industry collaboration projects. *R&D Management*.
SKUTE, I., ZALEWSKA-KUREK, K., HATAK, I. & DE WEERD-NEDERHOF, P. 2019. Mapping the field: a bibliometric analysis of the literature on university–industry collaborations. *The Journal of Technology Transfer,* 44**,** 916-947.
SMITH, W. K. & LEWIS, M. W. 2011. Toward a theory of paradox: A dynamic equilibrium model of organizing. *Academy of management Review,* 36**,** 381-403.
STEINMO, M. 2015. Collaboration for innovation: A case study on how social capital mitigates collaborative challenges in university–industry research alliances. *Industry and innovation,* 22**,** 597-624.
STEINMO, M. & RASMUSSEN, E. 2016. How firms collaborate with public research organizations: The evolution of proximity dimensions in successful innovation projects. *Journal of Business Research,* 69**,** 1250-1259.

STEINMO, M. & RASMUSSEN, E. 2018. The interplay of cognitive and relational social capital dimensions in university-industry collaboration: Overcoming the experience barrier. *Research Policy,* 47**,** 1964-1974.
SUDDABY, R. & GREENWOOD, R. 2005. Rhetorical strategies of legitimacy. *Administrative science quarterly,* 50**,** 35-67.
THUNE, T. & GULBRANDSEN, M. 2011. Institutionalization of university-industry interaction: an empirical study of the impact of formal structures on collaboration patterns. *Science and Public Policy,* 38**,** 99-107.
VAN FENEMA, P. C. & KEERS, B. M. 2018. Interorganizational performance management: A co-evolutionary model. *International Journal of Management Reviews,* 20**,** 772-799.
VAN FENEMA, P. C. & LOEBBECKE, C. 2014. Towards a framework for managing strategic tensions in dyadic interorganizational relationships. *Scandinavian Journal of Management,* 30**,** 516-524.
VEGA-JURADO, J., KASK, S. & MANJARRÉS-HENRIQUEZ, L. 2017. University industry links and product innovation: cooperate or contract? *Journal of technology management & innovation,* 12**,** 1-8.
YIN, R. K. 2014. *Case study research : design and methods,* Los Angeles, SAGE.

7.3. Research paper 3: Attaining jointly beneficial outcomes: How partner alignment influences the achievement of outcomes in open innovation with science-based partners

Attaining jointly beneficial outcomes: How partner alignment influences the achievement of outcomes in open innovation with science-based partners

Abstract

Science-based partnerships are an important way to organize for open innovation. To attain outcomes like innovations and high-quality research, science-based partnerships usually develop multiple short-term R&D projects in which partners interact and work together closely. However, partners often find it difficult to achieve these jointly beneficial outcomes. This study explores a science-based partnership and three of its R&D projects to gain multilevel insights into how partner alignment influences the achievement of outcomes. We find that partner alignment happens through structured coordination at the partnership level and through unstructured coordination at the project level. Our findings show that these forms of alignment are interrelated and influence each other. As such, our findings contribute to the literature on open innovation and coordination mechanisms by providing a multilevel view of the dynamic process of partner alignment and showing how it influences outcomes in partnerships. Our findings provide insights into why some open innovation projects fail while other projects succeed, and they have important managerial implications related to how partners in R&D projects should align to attain outcomes.

Keywords: Open innovation, R&D projects, Coordination mechanisms, Partner alignment

Introduction

Collaborations with external partners give firms access to external resources, reduce risk, and improve time-to-market when developing innovations (Faems et al., 2005, Markovic and Bagherzadeh, 2018). Therefore, many firms have opened up their innovation processes (Chesbrough, 2003), relying on external partners to improve their innovation performance (Dahlander and Gann, 2010) which is reflected in the growing number of interorganizational partnerships (Markovic et al., 2021).

Open innovation strategies center on purposeful knowledge flows across firms' and their external partners' organizational boundaries (Chesbrough and Bogers, 2014) during the different phases of innovation development (Chesbrough et al., 2006, Dahlander and Gann, 2010). Firms often use open innovation to find solutions to technical problems and to enhance their understanding of the technological possibilities or scientific knowledge needed to solve their problems. To this end, they often engage in science-based partnerships (Du et al., 2014). Firm partnerships with universities and research organizations (henceforth science-based partners) are beneficial for firms *and* science-based partners for several reasons. First, for science-based partners, partnering with industry may help them disseminate their novel scientific knowledge and capture value from this knowledge via spinouts, licensing, and patenting (Beck et al., 2020). Second, for firms, partnerships with science-based partners are a good way to test and refine technologies (Perkmann and Walsh, 2007, Du et al., 2014). Like interorganizational partnerships in general, science-based partnerships between science-based partners and firms are also growing in number (Ponomariov and Boardman, 2010).

However, prior studies have found mixed results on the success of open innovation and, more particularly, the success of science-based partnerships (Laursen and Salter, 2006). Partners in such constellations are known to have different institutional logics and conflicting goals (Sauermann and Stephan, 2013), which may impede collaboration and the attainment of outcomes (Ashraf et al., 2017). Recent literature reviews have also raised the point that open innovation failures have

received little attention (e.g., Bogers et al., 2017), rendering our ability to understand these mixed results limited as well. However, a plausible reason for these mixed findings is that studies on open innovation and science-based partnerships have typically focused exclusively on the firm level (Du et al., 2014, Barbosa et al., 2020b), disregarding what goes on at the project level. That is, much of the innovation activities and collaboration processes within science-based partnerships are organized in projects (Cassiman et al., 2010, Du et al., 2014), and as firms likely keep a portfolio of projects at any given time (Lee et al., 2019), firm-level results obtained via science-based partnerships may differ from the results at the project level of these partnerships (Vanhaverbeke et al., 2014, Gama et al., 2017, Kobarg et al., 2019). Hence, to understand firm-level performance in open innovation with science-based partners, a multilevel perspective that also accounts for how firms and science-based partners collaborate within such partnerships at the project level is needed (Vanhaverbeke et al., 2014, West and Bogers, 2017). Furthermore, to ensure effective and successful science-based partnerships, prior studies have argued that the collaboration process needs to be managed (Du et al., 2014) and have highlighted the need for more in-depth knowledge of how the collaboration process at the project level can be managed to achieve valuable outcomes (Bagherzadeh et al., 2019).

In this study, we draw on the coordination mechanisms literature (Claggett and Karahanna, 2018), which focuses on how partners coordinate their behavior with each other (Gulati et al., 2012). In doing so, we garner novel in-depth knowledge on how firms and their science-based partners can align with each other (Zacharias et al., 2020) and thereby manage the collaboration process to achieve valuable outcomes within projects and beyond (Randhawa et al., 2016, Castañer and Oliveira, 2020). In turn, we shed light on why some open innovation efforts fail while seemingly similar efforts are successful (Bogers et al., 2017). Hence, we ask the following research question: *How does partner alignment at the partnership and the project level influence jointly beneficial outcomes in science-based open innovation partnerships?*

We address this research question through a single qualitative embedded case study of one science-based partnership and three of its R&D projects. This science-based partnership is a suitable setting for studying how partner alignment between firms and science-based partners influences the achievement of jointly beneficial outcomes, because it allows for investigating both the partnership level and multiple projects.

Our findings show how partner alignment happens through coordination activities at multiple levels and make three key contributions to the open innovation literature. First, our study contributes an in-depth understanding of how formality and informality can be combined during a collaboration at multiple levels (Bagherzadeh et al., 2019). Second, our findings resolve prior mixed results related to the achievement of outcomes in science-based partnerships by explaining how partner alignment must happen at both the partnership and project levels through a distinct set of coordination activities to achieve jointly beneficial outcomes (Vanhaverbeke et al., 2014, West and Bogers, 2017). Third, our findings contribute important insights into how open innovation projects may fail due to the lack of specific partner alignment at the project level in science-based open innovation partnerships (Bogers et al., 2017). Furthermore, our study provides important managerial implications related to how partners in science-based partnerships should be aligned at both the partnership and project levels.

The rest of the paper is structured as follows: Section 2 introduces the theoretical framework; Section 3 outlines the methodological approach; Section 4 presents the findings; Section 5 provides the discussion; and Section 6 presents the conclusion, implications, and limitations of this study.

Open innovation

Open innovation can be understood as "a distributed innovation process based on purposively managed knowledge flows across organizational boundaries" (Chesbrough and Bogers, 2014, p. 17) and relates to how firms use external knowledge sources in their innovation processes (Dahlander and Gann, 2010). Purposeful knowledge flows across a firm's organizational boundaries can take three forms: inbound, outbound, and coupled knowledge flows (Chesbrough and Bogers, 2014). Inbound knowledge flows relate to how firms acquire knowledge from external knowledge sources to enhance their innovation processes (West and Bogers, 2014). Outbound knowledge flows relate to how firms transfer their internal knowledge and assets externally so other organizations can utilize this knowledge in their businesses (Dahlander and Gann, 2010). Coupled knowledge flows relate to how firms combine both inflows and outflows of knowledge with external partners so the partners can develop innovations together (Gassmann and Enkel, 2004).

There are several ways to harness these different types of knowledge flows, such as in- and out-licensing (Huizingh, 2011). One common channel to organize for inbound, outbound, or coupled knowledge flows is through interorganizational partnerships (Markovic et al., 2021). Interorganizational partnerships are known to give firms access to new knowledge and external resources while simultaneously reducing risks when developing innovations (Faems et al., 2005, Markovic and Bagherzadeh, 2018). However, benefiting from these open innovation mechanisms is not straightforward. Prior studies have recognized that to attain benefits from open innovation, collaborations and knowledge flows need to be managed (Chesbrough and Bogers, 2014, West and Bogers, 2014).

Managing open innovation in science-based partnerships

How to manage open innovation depends on who is collaborating with whom in interorganizational partnerships (Markovic et al., 2021). Open innovation may take

place among market-based partners only, such as suppliers and customers, in which case it enables firms to attain information about market needs and to identify technical problems (Du et al., 2014). However, open innovation may also take place with science-based partners, such as research organizations and universities, in which case it enables firms to access novel scientific knowledge as well as refine and test new technological solutions (Cohen et al., 2002, Perkmann and Walsh, 2007). Managing open innovation in science-based partnerships is different from, and perhaps even more demanding than, managing open innovation in market-based partnerships. One reason for this difference is that the knowledge shared between firms and science-based partners requires in-house expertise and absorptive capacity on part of the firms, more so than with other forms of open innovation. Therefore, firms typically opt for science-based open innovation only when they have such absorptive capacity (Lee et al., 2019).

Further complicating the management of open innovation with science-based partners is the conflicting nature of industry partners' and science-based partners' goals and corresponding logics (Sauermann and Stephan, 2013). In science-based partnerships, research organizations pursue particular objectives related to advancing science, applying their knowledge to solve socioeconomic problems, and/or seeking value capture from their knowledge to fund new research (e.g., Bentley et al., 2015, Werker and Ooms, 2020). The logic underlying and guiding their activities in research and development (R&D) is centered around the desire for academic freedom (Aghion et al., 2008). Firms in these partnerships, on the other hand, seek to gain new knowhow that they can apply immediately or in the near future to refine and test new technologies, solve pressing problems(e.g., Laursen and Salter, 2004, Perkmann et al., 2013), and eventually attain pecuniary benefits (Dahlander and Gann, 2010). The logic underlying and guiding firms' R&D activities is ultimately rooted in the desire to commercialize the derivatives of their R&D and innovation processes (Sauermann and Stephan, 2013, Vedel and Irwin, 2017). These differences in partners' goals and logics in science-based open innovation do not exist for open innovation among exclusively

market-based partners as both partners in the latter type of partnership have a vested interest in commercial gains. However, even in that setting, limited research on the contingencies of open innovation effects has stressed that factors like firms' strategic orientation may greatly impact the open innovation performance attained (Cheng and Huizingh, 2014).

Open innovation with science-based partners thus requires tailored governance modes to ensure successful collaboration between partners. Prior studies are not on the same page when it comes what these modes of governance should be. On the one hand, empirical evidence suggests a need to establish formal governance modes, such as contractual agreements, to ensure partners remain committed throughout a partnership (Cassiman et al., 2010). When these contracts are in place, partners closely interact and share knowledge at the project level (Bogers, 2011). On the other hand, strictly formal governance modes at the project level may hamper the collaboration process, as some research suggests that science-based partners feel their progress and productivity in such partnerships are hindered by them having to attend meetings and report on progress (Du et al., 2014, Barbosa et al., 2020a).

Aligning partners: Coordination mechanisms at different levels

Considering the pros and cons of formal governance of open innovation with science-based partners, we propose that such partnerships should be coordinated using more than just formal governance modes, instead using a variety of coordination mechanisms simultaneously (Barbosa et al., 2020b, Zacharias et al., 2020). Coordination mechanisms are the activities and tools used to manage uncertainty in collaborative activities (Argote, 1982) and mark a well-established concept within the management and organizational literature (Van de Ven et al., 1976, Mom et al., 2009). Coordination mechanisms have been studied in intra- and interorganizational contexts (Gulati et al., 2012, Oliveira and Lumineau, 2017) as well as in the specific context of open innovation and R&D projects (e.g., Barbosa et al., 2020b)

In the context of interorganizational partnerships, coordination mechanisms can be defined as "the deliberate and orderly alignment or adjustments of partners' actions to achieve jointly determined goals" (Gulati et al., 2012, p. 12). This definition seems fitting in the context of science-based open innovation partnerships and R&D projects as the firm and science-based partners must adjust and align their actions to achieve valuable outcomes (Barbosa et al., 2020b). According to prior studies, there are two types of coordination mechanisms: structured and unstructured activities (Claggett and Karahanna, 2018). Structured coordination activities are formal, predetermined, and established by a centralized management strategy (Argote, 1982, Andres and Zmud, 2002), whereas unstructured coordination activities are informal, ad hoc, and often determined by a decentralized management strategy (Van de Ven et al., 1976, Tsai, 2002).

In science-based partnerships, structured coordination mechanisms are often used at the partnership level (Barbosa et al., 2020b), where partners engage in formal and structured activities, such as establishing contracts, overall goals, and progress plans (Willem et al., 2006). At the project level, where partners focus on knowledge creation and innovation development, unstructured coordination mechanisms are more likely to ensure effective collaboration (Barbosa et al., 2020b). In particular, at this level, unstructured coordination mechanisms prevent structured activities from hindering progress and productivity within projects because they allow for unplanned meetings (Arenas and Ayuso, 2016), ad hoc resource allocation (Geringer and Hebert, 1989), and information generation and knowledge sharing (Claggett and Karahanna, 2018). Indeed, these types of unstructured activities are needed at the project level where knowledge and innovation development actually take place because these types of projects involve uncertain and complex processes (Moreno-Luzón and Begoña Lloria, 2008) and thus call for such flexibility and freedom.

Unstructured coordination in open innovation with science-based partners seems all the more important because it enables partners to mutually adjust and achieve partner alignment (Van de Ven et al., 1976, Moreno-Luzón and Begoña Lloria,

2008). This room for informal communication between partners (Barbosa et al., 2020b) and for unscripted adjustment of their actions toward each other (Dingsøyr et al., 2018) is important considering the conflicting goals and logics of these partners (Sauermann and Stephan, 2013). The presence of conflicting goals and logics may threaten partnership performance and, in the worst case, lead to the dissolution of a partnership (Ashraf et al., 2017). To manage their conflicting goals and logics, partners need to handle unforeseen demands (Caldwell et al., 2017) that could arise over time and require both parties to partake and engage in unplanned activities to overcome these challenges, something that often cannot be resolved through structured coordination activities, such as contract development (Caldwell et al., 2017).

Exploring how partners align and adjust toward each other through structured and unstructured coordination mechanisms at both the partnership and project levels in science-based partnerships is valuable as it contributes to understanding how partners can achieve mutually beneficial outcomes, such as novel scientific research, innovations, and technology development (Barbosa et al., 2020b, Zacharias et al., 2020). Furthermore, it can provide more in-depth understanding of how project partners combine both formality and informality throughout open innovation processes (Bagherzadeh et al., 2019).

Methodology

Research design, context, and case selection

For this study, we use a qualitative research design because the research question calls for in-depth insights into the open innovation process within a science-based partnership and its projects (Cunningham et al., 2017). More specifically, we use a single embedded case design (Eisenhardt, 1989, Yin, 2014) to contribute to theory development on how partner alignment may affect the attainment of outcomes and to better illuminate how partners align with each other during the collaboration process in the science-based partnership and its R&D projects (Baxter and Jack, 2008,

Yin, 2014). The case is a science-based partnership and three of its R&D projects in Norway. The partnership has a duration of eight years (2017-2024) and has approximately 40 partners, including firms and science-based partners. The partnership aims to contribute to long-term, world-class research and innovation development.

The selection of units (partnership and projects) in this study is based on a combination of theoretical sampling and maximum variation sampling (Yin, 2014). The case and units were selected for their potential theoretical relevance to contribute to the open innovation and coordination literature regarding partner alignment at the partnership and project levels (Barbosa et al., 2020b, Zacharias et al., 2020). At the partnership level, the units of analysis include researchers from both universities and research organizations employed as project area managers, an administrative employee, and the partnership manager. At the project level, the units of analysis include researchers and firm representatives that were working on the projects. The firms were from two different industries—process industry and the food industry—with different desired project outcomes, and they partook in projects that achieved different outcomes. In particular, one project attained outcomes desired both by the science-based partners and the firm partners, one project achieved valuable outcomes for the firm partners but only some of the outcomes the science-based partners had expected, and the last project ended abruptly without achieving any outcomes for any of the partners. The variation in industry, project focus, and outcome achievement enabled us to compare the projects from the point of view of our research question (Eisenhardt, 1989) (See Table 1 for an overview).

Table 1: Characteristics of the partners and the R&D projects

Characteristics of the partners involved in the innovation projects						
Project	R&D project	Firm partner	Firms' objective	Science-based partners	Science-based partners' objective	Project outcomes
Alpha	New process technology	Large process industry firm, with high R&D experience	Knowledge and concept development	University	Research, knowledge development, and education	Research articles and technological proof of concept
Beta	New technology system	Large food industry firm with high R&D experience,	Technology development and implementation	Research organization	Research and knowledge development	A few research articles and technology implementation
Delta	New technology system	Large, food industry firm with medium R&D experience*	Technology development and implementation	Research organization	Research and knowledge development	Project ended without outcomes

a) European Union's categories for firm sizes are used: large > 250, medium < 250, small < 50, and micro < 10 employees.
* The corporation has high levels of R&D experience; however, the division in our study can be categorized as having a medium level of experience.

Data collection

To obtain in-depth information about the partners' alignment and how partner alignment influenced the achievement of jointly beneficial outcomes at the partnership and project levels, the primary data came from 27 semi-structured interviews with firm representatives and science-based partners (Eisenhardt, 1989). The interviews were mainly conducted face to face, but some interviews with firm representatives in distant parts of Norway were conducted over the phone. The interviews typically lasted about 60 minutes but ranged from 40 minutes to 90 minutes, and they covered topics on the partnership, the project collaboration, and the achievement of outcomes. All the interviews were recorded and transcribed by the research team shortly after they were completed (Yin, 2014).

To increase our understanding of how the partnership and R&D projects were conducted, we supplemented the primary data with 14 additional interviews between 2017 and 2019 with firm partners who were not directly linked to the three projects studied. We also observed annual meetings and workshops in the partnership and

collected documents, such as the partnerships annual progress reports and summaries from the R&D projects. This additional information enabled us to increase internal validity and corroborate our findings from the 27 interviews (Yin, 2014) (See table 2).

Table 2: Overview of the data sources

Partnership level			
Partnership	**2017**	**2018**	**2019**
Partnership manager	1	1	
Research managers	5	5	1
Administrative employee			1
Sum of interviews:	6 interviews	6 interviews	2 interviews
Project level (collected 2018–2019)			
Projects	Alpha	Beta	Delta
Firm	1 Firm - 2 firm representatives	1 Firm - 1 firm representative	1 Firm - 3 firm representatives
Researchers	4 researchers	1 researcher*	2 researchers*
Sum interviews:	6 interviews	2 interviews	5 interviews
Secondary data sources: Interviews with 14 firm partners collected from 2017–2019, documents related to the R&D projects, annual progress reports, field notes, newsletters, observations of consortium meetings and workshops			

* The same researchers worked on both projects

To ensure the anonymity of our informants, we use various codes to refer to specific informants at the partnership level and in the different projects: We use the letters “PAM” to refer to project area managers, “AE” to refer to the administrative employee, and “PM” to refer to the partnership manager. For the projects, we use the letter “F” when the informant is a firm representative and “S” to refer to a science-based partner. In addition, we use letters “A,” “B,” and “D” to highlight which project the informant is part of. As such, a research partner from the Alpha project is written as “AS1,” while a firm representative from the Delta project is written as “DF1.”

Data analysis

We started the data-analysis process by reading and re-reading the interviews to get an overview of the data and understand the science-based open innovation partnership and the R&D projects within it. Next, we began inductively coding the partnership-level data inspired by the Gioia method (Gioia et al., 2013). Specifically, we first established empirical constructs related to how the partnership worked to align the firm and science-based partners. Once the empirical constructs were established, we grouped them into second-order codes and then collapsed the second-order codes into aggregated concepts (See Figure 1). Next, we followed a longitudinal process study approach (Ambos and Birkinshaw, 2010, Birkinshaw et al., 2017) whereby we developed an account of how partner alignment happened at the partnership level during two phases (establishment phase and operational phase). During this process, we focused on identifying in which phase the aggregated concepts were present.

Next, we inductively coded the project-level data in three steps (Gioia et al., 2013). First, we conducted open coding of each project to find empirical constructs related to how the partners aligned within the projects (Saldaña, 2015). During this process, we went back and forth between the empirical constructs and the raw data to ensure our codes represented the raw data. Second, we combined the first-order codes from the three projects and established the second-order themes. When we were sure about the second-order themes, we collapsed these into aggregated concepts. After we had established the aggregated concepts, we used the research question (*How does partner alignment at the partnership level and the project level influence jointly beneficial outcomes in science-based open innovation partnerships?)* and the theoretical framework presented in Section 2 to compare the aggregated concepts at the partnership and project levels to analyze how the partners aligned at both levels. Once we had identified partner alignment at the project level, we mapped it against the project outcomes to find out how partner alignment influenced the attainment of jointly beneficial outcomes at the project level. Figures 1 and 2 show the data structure at the partnership level and the project level, respectively.

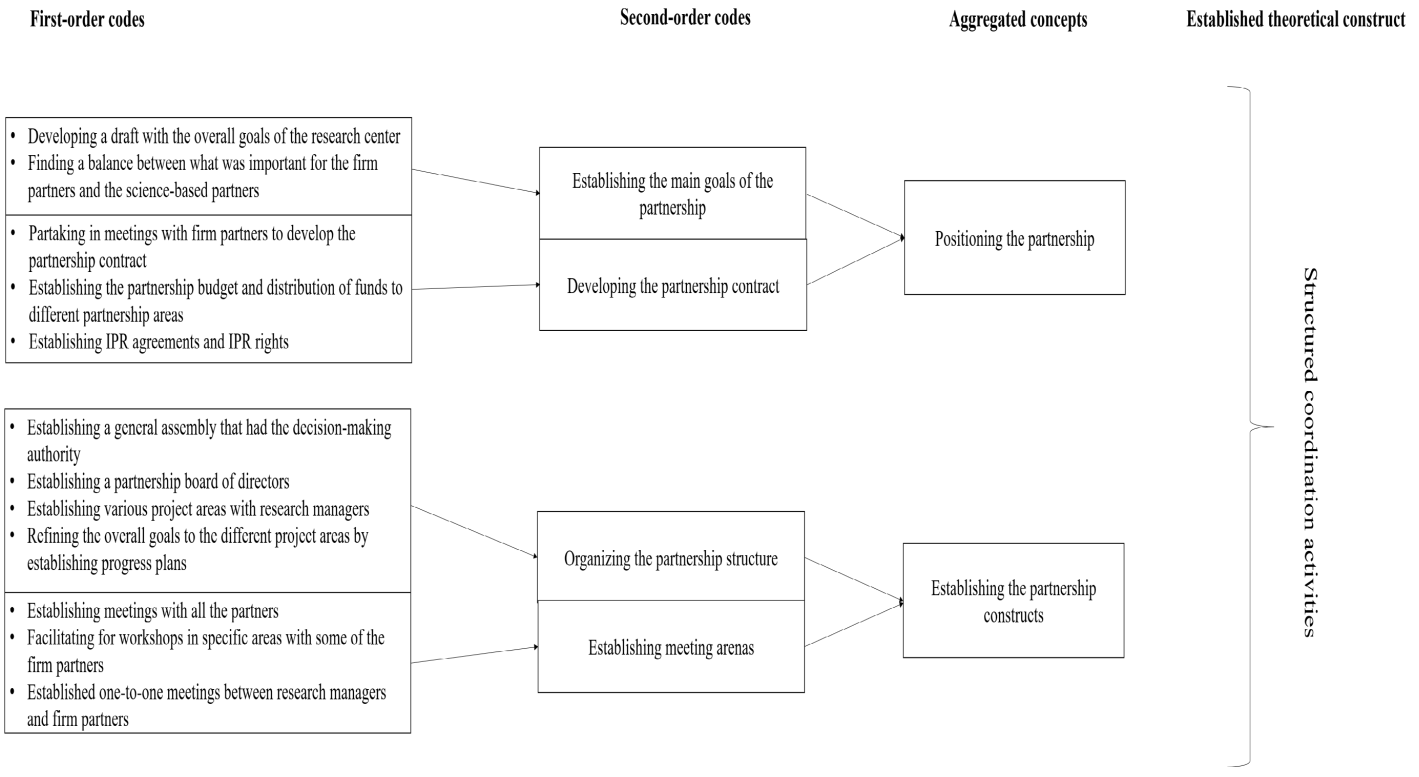


Figure 1: Partnership-level data structure

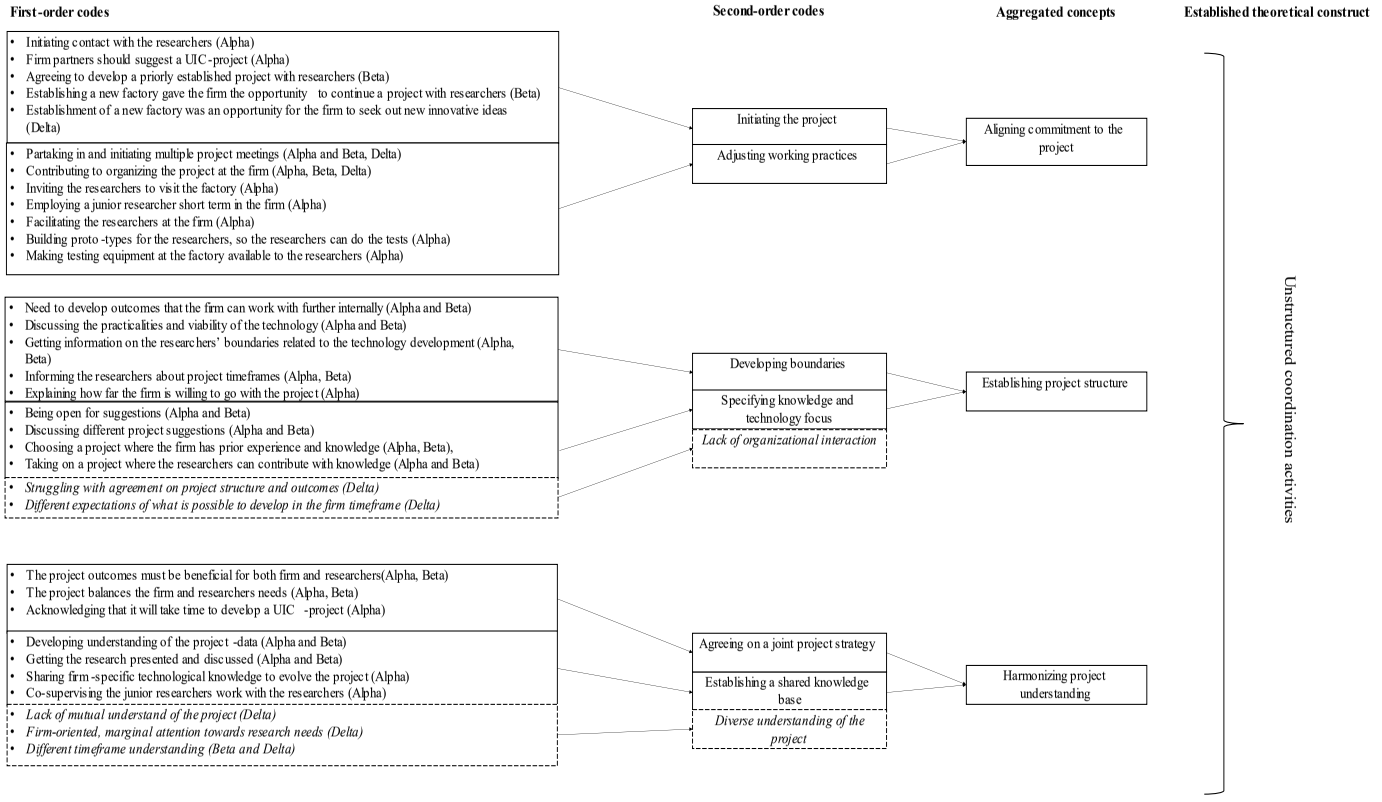


Figure 2: Project-level data structure

Findings

The findings are presented in two parts. First, we present how the partners aligned at the partnership level during two phases: the establishment phase and the operational phase. Second, we present how partner alignment developed over time at the project level within the three R&D projects during the operational phase.

Partner alignment at the partnership level

The partnership was formally initiated in 2015, when the science-based partners and firm partners began developing an application to the Norwegian Research Council to obtain funds. During this establishment phase, the partners engaged mainly in two activities: *establishing the main goals of the partnership* and *developing the partnership contract*. In turn, these activities enabled the partners to align and *to position the partnership* by formally agreeing to the direction of the partnership.

During the operational phase, the partners engaged in two specific activities: *organizing the partnership structures* and *establishing meeting arenas*, which in turn enabled the partners to *establish the partnership constructs*.

Establishment phase

During the establishment phase, the science-based partners developed a partnership draft that included the partners' goals, which was sent out to the firm partners with the purpose of *establishing the main goals of the partnership*, as one of the project area managers (PAM1) explained:

> First, we developed a draft that was sent to all the partners to get some feedback. Especially, the firm partners gave a lot of feedback, which we included [in the draft]. This was mainly in relation to the firm partners' expectations and their wish to contribute.

This process of collaborating on the partnership draft was meant to align the partners toward common goals. In turn, establishing common goals ensured that the firm and

research partners agreed on the focus of the partnership, as the partnership manager (PM) explained:

> I experienced the establishment phase as very good and that we matched what was important for the researchers and the firm partners—that the partnership as a whole can contribute to something big both for Norway and for the Norwegian firms.

At the same time, the science-based partners were also working on developing the partnership contract, as explained by the partnership manager (PM): "I have been involved in multiple meetings with the firm partners and participated in the establishment phase, where I had the responsibility to develop the partnership contract."

The contractual agreement included the partnership budget and how the funds would be distributed to the different project areas to ensure the partners would attain benefits from partaking. For example, one of the project area managers (PAM3) reported the following:

> It is a complicated budget: you have in-kind financial funds from the Research Council, from the firm partners, and from the research partners, and everything is supposed to be distributed to every activity [in the partnership] over all eight years and across all the partners.

The contract also included intellectual property rights (IPR) agreements and publishing rights, which were set in place to ensure that the partnership would not experience collaborative tensions related to the outcomes, as one of the project area managers (PAM1) explained: "We need to be careful not only to maintain our research integrity but, at the same time, to not quarrel with those who pay for a part of the research". These agreements were established at the partnership level and included routines for how to manage both publishing and innovation developments, as explained by one of the science-based partners (AA1): "We have multiple routines in place for how, legally, to manage IPR and things like that. Luckily, they are taken care of at the partnership level."

Operational phase

During the operational phase, the partners began organizing the partnership structures. These structures included a general assembly that had decision-making authority; a board of directors, which included about 10 representatives from both the science-based and firm partners and had operational responsibility for the partnership; and a manager who answered to the board.

Furthermore, the partnership established multiple project areas where the science-based partners were appointed as managers. These areas set the boundaries for the partnership, as one of the project area managers (PAM6) described: "We [the researchers] have different project area managers that we answer to. . .. Without them, the partnership would not have existed."

These structures were established to ensure that the partnership was operational and that all the partners were united on how the partnership should operate. For instance, one project area manager (PAM1) told us the following:

> In the first six months of the partnership, a lot of focus was on getting the partnership operational. Everything from making sure the contracts [were in order] to budget allocation between the partners. Also hiring. I think we hired about 20 PhD students for the partnership to establish summer researchers connected to the partnership [and] to get the activities up and running and a mutual focus within the different areas. Making sure that the partnership was embedded, not only within the researchers but for all the partners.

The partners also focused on adjusting the main goals to suit the various project areas by establishing progress plans. The managers at the various levels took time to ensure that the main goals of the partnership were in line with what the partners wanted and that the different areas could achieve these goals, as one of the project area managers explained (PAM4):

> We had a meeting with the different project area managers and project managers, where we focused on the project-level goals. We changed [the main goals] a bit, nothing radical, but specified them a bit. . .. [The main goals] were written more generally, and they needed to be specified over time at the project level, while at the partnership level, the [goals] stayed the same.

To ensure the partners had a mutual path to follow, the project area managers also created more specific progress plans to unify the partners on the future development of the partnership. For example, one of the project area managers (PAM4) told us, “We have a couple of meetings during each year related to planning and the development of progress plans for the years ahead. . .. It is important that the partnership manages to get the maximum of the available resources by being coordinated.”

Lastly, the partnership focused on establishing meeting arenas. These meeting arenas were established at various levels, including gatherings with all the partners, workshops with specific partners, and one-to-one meetings between project managers and firm partners. The aim of these meeting arenas was to develop relational links between the science-based partners and firm partners and to enable the partners to discuss possible opportunities and project ideas. As one of the project managers (PAM4) said, “I think that it is important to spend time on developing good meeting arenas at different levels and with different structures. . .. Good communication is absolutely essential to ensuring a good collaboration.”

Partner alignment at the project level

At the project level, our findings show that the partners in the three R&D projects aligned with each other through various unstructured coordination mechanisms. These unstructured coordination mechanisms were visible through activities the partners engage in, and include *aligning project commitment*, *establishing the project structure*, and *harmonizing project understanding*. Furthermore, we find that partner alignment through these activities affects the achievement of jointly beneficial outcomes. Our findings show that to achieve jointly beneficial outcomes, the partners needed to align with each other through all three coordination activities (Alpha project), while partner alignment through aligning project commitment and establishing the project structure resulted in achieving only

some outcomes (Beta project) and alignment through only aligning project commitment resulted in project failure (Delta project).

Aligning project commitment

The cases in our study show that partner alignment happened through *aligning project commitment*. The partners in our study engaged in this activity in a varying degree. While the firm partners in Alpha and Beta were highly committed to their projects, the firm partners in Delta were less committed to the specific project. Aligning project commitment was mainly attained by (1) *initiating the project* and (2) *adjusting internal work practices.*

Initiating the project

To ensure the partners got useful outcomes from the science-based partnership, the partners needed to be involved in projects, and the firm partners needed to initiate contact with the science-based partners. This contact was established through phone calls to specific science-based partners or meetings initiated by the firms, as stated by a firm representative (AF1): "We have to go to them [the researchers] and tell them that this is something we want to do." The firm representatives in Alpha contacted a science-based partners they knew before, who had knowledge the firm wanted, and suggested to collaborate to develop a project. One of the science-based partners detailed (AS1) the importance of such firm involvement: "If they [the firm] are not interested, then I would not want to do the project either. There are several other activities we could have done where there is a lot of engagement [from other firms]."

The firm in Beta had a different strategy. Prior to the establishment of the partnership, the firm and science-based partners in Beta collaborated on technology assessment project, and during this project the firm partners and the science-based partner discussed the possibility and agreed to evolve said project within the partnership. One of the science-based partners in the Beta project (BS1) explained, "I remember that at the kick-off at [the prior project], we said that if the partnership will

be established, then the prior project is going to be the pilot project to this one [the Beta project].” However, during the first year of the partnership, the firm decided to build a new factory, and this gave the firm an opportunity to actually test and implement new technologies, as explained by a firm representative (BF1): “It is kind of the background for why we entered the partnership. We wanted to study [this new technology], and the new factory became a perfect opportunity to test it.”. As such, taking the technology assessment project as a basis, the partners developed a project within the partnership to develop knowledge and assess technologies that could be implemented at the new factory.

Thus, while the project idea originated from a prior project collaboration, the new factory enabled the firm partners in Beta to seize the opportunity and contacted the science-based partners to materialize the idea into a new project focusing on testing, refining and implementing a technology into the firm.

The firm in the Delta project was also in the process of building a new factory and wanted to test new innovative ideas. Thus, the firm partners got in contact with a science-based partners the firm had collaborated with beforehand who suggested a new project group that could develop a project for them, as one of the science-based partners (DR1) explained: “The firm is a partner in the partnership, and one of the researchers [in the partnership] has a strong collaborative tie with the firm and has sold in the partnership through his prior relationships, . . . so we are going to work with them.” As such, the firm partner in Delta contacted a previously known researcher and suggested to establish a project that could contribute to the development of innovative technologies for the firm’s new factory. However, the science-based partners that became involved after the project was established, did not have prior collaborative experience with the firm. Thus, while the firm initiated the project through informal interaction with priorly known science-based partners, the partners that ended up collaborating on the project were unfamiliar with each other.

Adjusting internal work practices

Aligning project commitment also required the firm partners to adjust their work practices so they could partake in project development. In all three projects, the firm partners took time out of their usual work schedule and initiated and partook in meetings to establish the projects. For instance, a firm representative in Beta (BF1) noted, “We discussed back and forth in relation to the practical feasibility and some of the researchers’ project [suggestions].” The firm representatives in Delta also initiated and partook in project meetings; however, the meetings were often without specific agendas, which made it difficult for the science-based partners to organize the project, as one of the science-based partners (BS1) explained: “I was at some meetings and tried to specify what we should do, but there were never any proper specifications on what the firm actually wanted.” Thus, even though the firm initiated and partook in meetings, the firm and science-based partners struggled to find mutual ground.

Furthermore, our findings show that adjusting work practices also included other activities, which were particularly visible in the Alpha project. Here, the firm invited the science-based partners to their factory so the science-based partners could gain more in-depth knowledge of the firm’s processes. The firm also hired a junior researcher for a short period, so the junior researcher could get familiar with the firm’s production process. Furthermore, the firm used their internal resources to build testing equipment, so the science-based partners could run analysis internally in the firm, and they engaged some of the employees to contribute to and help the junior researcher. One of the science-based partners explained (AS1) how the firm adjusted its working practices: “The firm put its factory, the furnaces, the technicians, and the process engineers who are connected to that part of the process at our disposal. They have also taken good care of the junior researchers we have had there who worked at the firm.”

Establishing project structure

Our findings show that partner alignment also happened when the partners engaged in *establishing the project structure*. This activity included the partners' engagement in *developing boundaries* and *specifying the project's knowledge and technology focus*. Here, our findings also show that in the Delta project, the partners experienced a *lack of organizational interaction* and did not manage to establish the project structure, which in turn hampered partner alignment.

Developing boundaries

While all the partners in our cases had much contact with each other, through phone calls, emails and meeting establishments, the partners involved in Alpha and Beta used these communication links to share and generate information about the boundaries of their projects. For example, the firm partners in Alpha and Beta were forthcoming on what they wanted to achieve from these projects, as one of the firm representatives (AF1) in Alpha explained:

> [We] discussed a bit and concluded that we wanted to test out a technology since we had done some testing prior, same type [of technology] as we are doing now, but a bit different tests, which we have tried to do. We thought that, ok, now we can get more data [and knowledge] on this technology.

The firm representatives in Beta also engaged in discussion about the project outcomes and explained their situation to the science-based partners: "We [the firm] will not be designing or building this [technology] by ourselves. There must be a supplier that can develop the concept [proposed by the researchers] and ensure that it will work" (BF1). As such, the firm partners in Beta needed to assess technologies that could be developed and implemented in the firm's new factory. One of the science-based partners (BS1) described how the firm partners discussed the practicalities and viability of the proposed technologies: "During the project, we got feedback [from the firm representatives] where they explained that they do not want

this or that other technologies were more suitable, and then we discussed it and the potential for the different technologies."

The science-based partners in both the Alpha and Beta projects also explained their role and boundaries within the projects. In the Alpha project, the science-based partners were forthcoming with the firm partners about how they could contribute to the project and to the development of outcomes, as one of the science-based partners (AS1) explained:

> We can contribute on the general and fundamental tasks, but when it comes to projections, how the technology should look, 1 meter or 1.7 meters, and if it needs this or that type of metal, which has the same quality but different price, then this is not our area anymore.

In the Beta project, the science-based partners suggested performing tasks that were more focused toward commercialization and proposed doing take on tasks that were more in line with commercial projects, as one of the science-based partners (BS1) explained: "During the first year of the partnership, there was a tendency to promise too much to the firms in these types of projects." The researcher (BR1) elaborated, "These projects are not commercial projects, but they were partly mistaken for being commercial projects [in the beginning]."

The partners in Alpha and Beta also discussed their various timeframes and when they expected to get results. Alpha had a relatively long timeframe, and while it was important for them to get useful results and outcomes that could be developed down the line, they did not have a specific deadline:

> If you have a conscious attitude to think that, ok, this result is something that I have numbers on now, which allows me at the next crossroads to build a business case a little stronger so that the results can be further developed. That is the way we have tried to use these [types of projects]. (AF1)

The firm in Beta had a relatively short timeframe since the firm was building a factory and needed to get the project up and running as fast as possible. One of the science-based partners (BR1) explained the process with the firm:

> The firm said [to us], "We are building a new factory. It is going to be done in two years, so can you come up with some good ideas?" . . . Since they [the firm] decided internally on the factory, things needed to happen fast, and then, we have to deliver fast.

As such, the firm partners in both Alpha and Beta discussed the temporal boundaries for their projects even though these differed between the projects.

Another important aspect of developing project boundaries included discussions on project completion. The firm partners in Alpha were clear that when the firm got the results, the firm would finish up the project and focus on other tasks with the science-based partners. As one firm representative explained, "We have not planned to further develop [the project results] . . .. We are going to work on another project this summer" (AF1). The firm representative (AF1) also elaborated on the new project: "In collaboration with the [same] researchers, I think that it is important that we [the firm] are open to project suggestions from the researchers [regarding] what they want to focus on that we can engage in."

The partners in Beta also had discussions about project completion, as one of the firm representatives (BF1) explained:

> We have talked a bit [with the researchers] about whether they are interested in getting some data [from the implemented technology system], analyze it, see if there is some potential and challenge the researchers on that. However, as of now, we have just talked about it without defining anything concrete.

Hence, firm partners in both projects engaged in discussions related to the project completion and what they expected to do when their projects were done or further developed.

Specifying knowledge and technology focus

The partners in Alpha and Beta also focused on specifying the knowledge and technology focus of their projects. For instance, one of the firm representatives in Beta (BF1) said, "We worked toward an optimal energy solution, and during this time, [a specific technology] came up as a realistic suggestion." This situation was also seen in

the Alpha project, wherein the partners initiated meeting where they discussed different projects with different technological focuses, as one firm representative (AF1) explained: “During these discussions, we developed two hypotheses, one on preheating one of [the firm’s main production material] and one on preheating the secondary [production material].” The firm partners were also open to suggestions related to knowledge and technology, as one of the science-based partners (AR1) explained:

> We had a meeting with a firm representative [and told her] we wanted to try this and this, and she just said, “Yes, we can make that happen. Just adjust it a bit, and we will fix it.” The firm has a very “we fix” attitude. They want to partake and want to see how projects can develop.

During these discussions, the firm representatives in Alpha decided to choose a project for which they had prior experience and knowledge, as a firm representative (AF1) in Alpha explained: “[Based on the two project suggestions,] we found out through discussions that we wanted to test out [the first hypothesis] since we had done some tests prior related to what we are doing in this project and some other tests.” The science-based partners in Alpha also wanted to do a project to which they could contribute knowledge, as one the science-based partners (AS1) explained: “We wanted to do a project that is close to our research field, and then we have to go into processes where there are high temperatures and [specific materials].” Thus, the partners in both Alpha and Beta specified the technological and knowledge aspects of their projects based on the partners’ prior knowledge and interests.

Lack of organizational interaction

In contrast to the Alpha and Beta projects, the partners in Delta struggled with aligning the project structure and experienced a *lack of organizational interaction*. That is, they had minimal interaction to discuss the project boundaries and to specify the knowledge and technological focus of the project.

In the Delta project, although the firm representatives initiated meetings, phone calls and discussions, they often did not have specific agendas, so the science-based partners struggled to understand the project structure. For instance, one of the science-based partners (DS1) explained, “We were often contacted on short notice without getting very defined details on what the firm wanted to work on, and it became quite chaotic for us.”

Furthermore, the partners did not manage to agree on project outcomes or specify what the project would focus on, as one of the science-based partners explained (DS1): “[The firm] had some visions, but nothing concrete.” This lack of concreteness was also corroborated by a firm representative (DF1) partaking in these discussions: “Everything in the beginning was like overarching concepts.”

Moreover, the partners struggled with establishing temporal boundaries. Namely, the partners had different understanding of what the science-based partners could deliver within the timeframe established by the firm. One of the science-based partners (DR1) told us, “There was a mismatch between what [technological solutions] were proposed [to the firm]—what was actually industrially available and what was still under development.” The firm partners believed the science-based partners could not keep up with the firm’s expectations related to the project outcomes and timeframes: “We have seen it before: the schedule we have does not match with the time research and development takes” (DF1).

Harmonizing project understanding

The partners engagement in establishing the project structure contributed to aligning the partners by harmonizing their project understanding. Our findings show that harmonizing project understanding was enabled through two activities: *agreeing on a joint project strategy* and *establishing a shared knowledge base*. In turn, these activities enabled the achievement of jointly beneficial outcomes. The partners that struggled with a diverse understanding of the project did not manage to achieve mutually beneficial outcomes.

Agreeing on a joint project strategy

Initiating and engaging in meetings, phone calls and discussions where the partners disclosed the project boundaries enabled the partners of Alpha and Beta to agree on and establish a mutual understanding of a joint project strategy. In particular, the firm partners in Alpha understood that the project needed to generate outcomes that were interesting for the science-based partners as well: "The researchers must want [to do the project], and think, "Oh my, fun to do some tests in the industry" (AF1). It was also important for the firm that the outcomes were relevant for them: "We have challenged the researchers a bit to not only count the number of [academic outcomes] but actually be more specific on what type of products they actually develop in the partnership" (AF2). As such, the partners in the Alpha project agreed on establishing a project that benefitted both partners, as explained by a firm partner (AF1): "It is a matter of finding a project that fits within these [research and innovation] frames."

This harmony was also seen in the Beta project, in which the partners agreed on balancing the firm and science-based partners' needs in the project. For example, one firm partner (BF1) reported, "[The researchers] mainly want to study the most optimal solution, and it was our job to 'reality check' them." As such, the partners agreed on a balance between what the science-based partners wanted to do and what the firm partners wanted to achieve. Furthermore, the firm partners elaborated on how they found balance with the science-based partners' interests: "It was related to the frames of the project—how we can get the project outcomes as [efficient] as possible and also get an outline of a project to apply for government funding pretty quickly" (BF1).

Our findings also show that the discussions related to timeframes (see prior section) enabled the partners to develop shared understanding of the temporal boundaries of the project. The firm partners in Alpha acknowledged that it would take time to develop an R&D project: "You have to be open to the fact that it will take time to find those joint beneficial projects, to find that communication" (AF1). Hence, the firm partners understood that they needed to have temporal norms that suited both partners and decided that when the project was finished, the partners would establish

another project, as one of the science-based partners (AS1) noted: “I will send some junior researchers to the firm next summer, which is related to our new project.”

As such, while the partners in Beta and Alpha agreed on the project strategy concerning which type of outcomes the projects should yield, only the partners in Alpha established a mutual understanding related to the timeframes and the potential next phase of the collaboration, when the project had completed.

Establishing a shared knowledge base

The partners in Alpha and Beta also took time to develop a shared knowledge base. They worked together to develop an understanding of the project data, and the partners shared the ongoing results coming from the projects. As one science-based partner (AS1) in Alpha told us, “The firm employees have a lot of knowledge that is not necessarily published, that you cannot find in books, but that we can use when we write our reports and analyze our data.” To establish a shared knowledge base, the science-based partners also presented their research and discussed the projects as they worked on them, as one of the firm partners (BF1) in Beta explained: “It was very useful to discuss with the researchers how we could think even further ahead and how to build our factory.”

The firm in Alpha also shared firm-specific knowledge to evolve the project and contributed to the science-based partners’ understanding of the firm’s processes. For example, one of the science-based partners (AR1) described this knowledge sharing: “It’s no problem for me to call my contact persons in the firm or send them an email asking for some [information about firm processes].” A firm partner in Alpha also contributed by supervising a junior researcher working on the project, as the junior researcher (AR2) explained:

> [I had some] meetings with a [specific] firm employee and some others about what we wanted to find out, what they think might be interesting to focus on, and what is possible to implement. Because they know how long the different shifts lasts and how long we have to preheat the material.

As such, the firm and science-based partners engaged in and developed a shared knowledge base such that they could contribute to attaining mutually beneficial outcomes.

Diverse understanding of the project

The partners in the Delta project struggled with harmonizing the understanding of what the project was supposed to be, and the partners ended up having different visions and expectations for the project. For example, one of the science-based partners (DS1) noted the following:

> The initial idea for the new factory was supposed to be built as a standalone factory. However, that is not the situation today; the firm has turned completely around. From the partnership perspective, it has no consequences, but for us [the researchers involved in the project], it is a pity because we thought the project could have been done much more locally.

Thus, the science-based partners expected to contribute to a project in which they would be working on a standalone factory. However, the firm partners changed their mind during the project process and wanted to focus on a different technology, as one of the firm representatives (DF1) explained: "After a while, [during the project process,] we sat down and asked ourselves, 'What are we actually supposed to develop?' So, the project has changed a bit." The science-based partners felt that they and the firm struggled to find a mutual understanding of the R&D project, as one of the science-based partners (DS1) reported: "I think they are very operation oriented, . . . and they have little understanding of academia or academics."

In addition, the diverse understanding of the project was enabled by the firm and science-based partners' different understanding of the timeframe. As seen in the prior section, the firm partners in Beta were open to the possibility that the science-based partners would do follow-up research on the technology after the technology was implemented in the new factory; however, the science-based partners had the understanding that the project was finished as soon as they handed over the results

from the project. Indeed, one of the science-based partners (BS1) said, “The firm has sort of taken the results. [They] got the message that here is something they can do [in the new factory] and just went with it without us.”

The diverse understanding of the project hindered the partners in Beta from attaining all the outcomes they wanted. The science-based partners were only able to develop some research articles, but they did not have the opportunity to test the system they developed after implementation. As one of the science-based partners (BS1) explained, “[Evaluating the technological system after implementation] has larger academic value and interest, and the firm is not interested in that because that is not what they do.” The science-based partner (BS1) elaborated:

> For the firm and the suppliers [they hire], we will be another actor to take care of. We have told them that if we are going to follow up this project, we need equipment, which costs extra, so we would have disturbed their production process with research stuff.

In the Delta project, the different understanding of the timeframes was in large part related to the development of a new technology. The firm representatives though that the technology suggested by the science-based partners were commercialized, while the technology was still in the developmental phase. As a firm representative (DF1) explained, “The technology wasn’t commercialized yet.” The science-based partners also experienced this issue:

> The technology was promised as finished and ready for implementation. However, it was actually just an idea and a drawing on paper. I thought it was a large challenge, and I became quite anxious and told the [firm partner] that I cannot sit here and tell you that this technology is developed and that I can install it next year and that it will last for 10 years. (DR1)

In the Delta project, the lack of organizational interaction and diverse understanding of the project resulted in an abrupt ending to the project, where neither the firm nor science-based partners achieved outcomes. The Delta project ended with the science-based partners reporting a deviation to the partnerships progress plan, as one of the science-based partners (DR1) explained:

> If the firm partners change their focus or reject the project, the partnership still has their own bureaucracy that expects a nice memo, report, simulation, or something like that [to register as an outcome]. This [process] became a mismatch, so I said, "No, this doesn't work, so this has to be a deviation." It is not a negative thing, but we cannot finish the project [alone].

Discussion

Our findings illuminate how structured and unstructured coordination activities are used at the partnership and project levels in science-based open innovation to align partners. The findings offer in-depth insights into how science-based partnerships may be aligned to ensure the attainment of jointly beneficial outcomes in open innovation projects with science-based partners (Vanhaverbeke et al., 2014, West and Bogers, 2017). In Figure 3, we visualize these findings in a conceptual model that captures the interplay between partnership-level and project-level coordination activities in driving the eventual attainment of mutually beneficial outcomes from open innovation during different phases of an open innovation partnership. Next, we discuss how open innovation with science-based partners may be governed through structured and unstructured coordination activities to achieve jointly beneficial outcomes at multiple levels and over time.

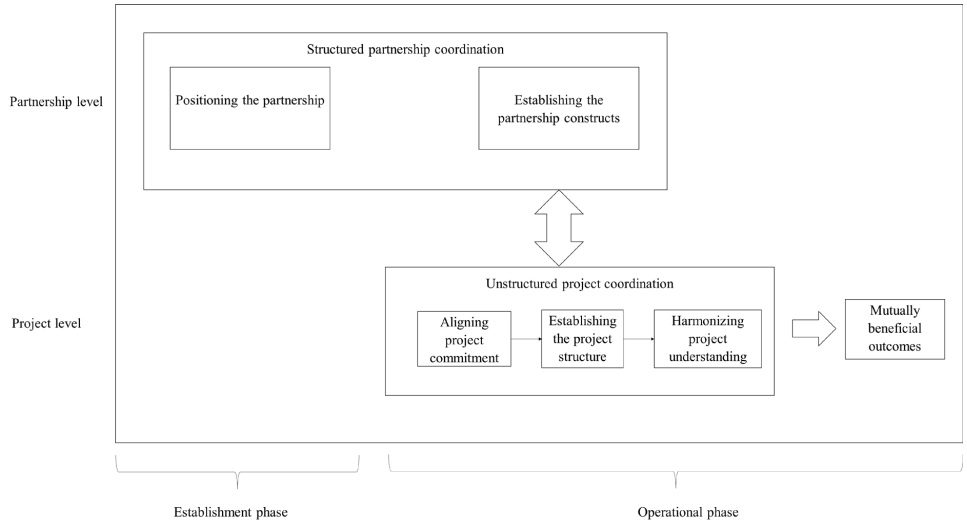


Figure 3: Alignment through coordination at multiple levels and the attainment of mutually beneficial outcomes

Partner alignment through coordination at different levels

Open innovation partnerships with science-based partners can yield positive outcomes for both firm and science-based partners in terms of high-quality research and innovation developments (Barbosa et al., 2020b, Zacharias et al., 2020). Attaining these mutually beneficial outcomes arguably depends on high partner alignment (Green et al., 2012). However, in accordance with prior studies, we suggest that the way partners align influences the attainment of these benefits (Zacharias et al., 2020). In other words, not only do partners need to align, but it also matters how they align.

Our findings show that partner alignment at the partnership level happens through establishing goals, developing contracts, organizing partnership structures, and establishing meeting arenas. These activities can be understood as structured coordination activities, and as such be included in structured coordination mechanisms (Claggett and Karahanna, 2018) because they enable partners to align with each other by formally positioning the partnership and establishing formal partnership constructs with a board of directors, centralized management, and predetermined strategies and

progress plans (Argote, 1982, Andres and Zmud, 2002). Establishing and engaging in these types of activities at the partnership level are not unprecedented (Cassiman et al., 2010). Thus, our study echoes prior literature by suggesting that at the partnership level, firms and science-based partners use structured coordination mechanisms to align (Barbosa et al., 2020b).

At the project level, our findings highlight that partners align themselves differently than they do at the partnership level and that partners use other coordination mechanisms (Barbosa et al., 2020b). We suggest that partners align themselves at the project level through three types of activities: aligning project commitment, establishing the project structure, and harmonizing project understanding. Moreover, our findings suggest that these are unstructured activities of alignment and can be understood as activities included in unstructured coordination mechanisms (Dingsøyr et al., 2018). The activities that we identified signify unstructured coordination mechanisms that enable mutual alignment through the informal adjustment of behavior, knowledge sharing, and information generation and the development of mutual understanding (Van de Ven et al., 1976, Moreno-Luzón and Begoña Lloria, 2008).

Interestingly, though, compared to prior studies, we suggest that unstructured coordination mechanisms are used to fulfill functions that are usually the domain of structured coordination. Examples of activities that we identified as unstructured but are normally structured include developing the project structure and agreeing on a joint project strategy (Willem et al., 2006). In our findings, these unstructured activities typically occurred informally at the project level. Hence, our findings shed new light on the nature of some coordination activities and their use (Claggett and Karahanna, 2018) as they suggest that the use of unstructured and informal coordination mechanisms may align partners on aspects that were previously understood to be coordinated through structure and formality.

A potential explanation for this alternate pattern is the nature of the partnership we examined and the multilevel perspective we used. Firstly, the

coordination literature is mostly rooted in firms and firm collaborations (Le Meunier-Fitzhugh and Massey, 2019, Lu et al., 2019). Instead, our study focuses on collaborations between firms and science-based partners, which means that the partners involved are institutionally different and have different ways of operating (Sauermann and Stephan, 2013). These characteristics impact how the partners experience different coordination activities (e.g., science-based partners are often frustrated by very formalized processes) (Du et al., 2014, Bogers et al., 2017). Second, the coordination framework is usually applied at only one level of analysis, which explains why prior studies often find that partners align through both sets of coordination mechanisms (Barbosa et al., 2020a). By doing a multilevel study, we suggest that the different coordination mechanisms are actually at play at different levels of a collaboration and that at the project level, partners need to align on aspects that are often handled formally but do so in an informal and unstructured way.

Partner alignment through coordination over time

Our study suggests that when various coordination activities are used over time, they influence each other and in turn influence the achievement of mutually beneficial outcomes (see Figure 3).

By studying partner alignment over time at the partnership level, we suggest that to ensure partner alignment through structured coordination activities, partners need to implement particular sets of activities at specific points of their collaborations. We suggest that at the outset of a partnership—that is, in the establishment phase—the partners should position the partnership. In later stages of the partnership, such as the operational phase, the partners need to establish the partnership constructs and the established constructs may need to be revised within the partnership (Cassiman et al., 2010). In turn, by establishing the partnership constructs, the partnership is able to engage in projects since aligning the partners at the partnership level through structured activities (e.g., contract development and the partnership structures)

facilitates close interaction and knowledge sharing between the partners at the project level (Bogers, 2011).

Thus, for our specific case, our findings show that because the partnership is aligned through structured coordination at the partnership level during the operational phase, the partners are able to collaborate on R&D projects, which in turn require coordination at the project level. At the project level, partner alignment happened through unstructured and informal coordination, both of which triggered and influenced each other. It is these unstructured activities at the project level that eventually seem decisive in whether projects succeed or fail to attain mutually beneficial outcomes. Simultaneously, our findings suggest that failing to align at the project level also influences the partners at the partnership level because project failure requires adjustments of progress plans at the partnership level over time.

Prior studies on coordination activities suggest that partner alignment through structured coordination often happens at the partnership level (Barbosa et al., 2020b), while the use of unstructured coordination activities enables partners to align with each other once they are actually collaborating—that is, working directly on knowledge and innovation development at the project level (Barbosa et al., 2020b). Unstructured coordination is necessary during direct such collaboration since innovation and knowledge development in science-based open innovation partnerships involve complex processes (Moreno-Luzón and Begoña Lloria, 2008). Several other studies show that task complexity is demanding on the management of open innovation (Ooms and Piepenbrink, 2020, Gurca et al., 2021), and our study sheds yet further light on the formality and informality that is needed to manage complex open innovation projects over time to achieve mutually beneficial outcomes for the partners involved.

Conclusions and implications

By studying partner alignment at multiple levels within one science-based open innovation partnership and three R&D projects, the aim of this study was to contribute in-depth insights into how partner alignment in open innovation partnerships with

science-based partners may help partners achieve jointly beneficial outcomes and why it fails to do so in some projects (Bagherzadeh et al., 2019, Barbosa et al., 2020b).

Due to the conflicting goals and institutional logics in science-based partnerships, we suggest that using different coordination activities at multiple levels of a partnership over time is especially important to achieve mutually beneficial outcomes and effective collaboration as only the right mix of these coordination activities enable partners to align with each other (Zacharias et al., 2020). We propose that the formality of a collaboration is often established at the partnership level through structured coordination activities, while informality is often present at the project level through the use of unstructured coordination activities. Hence, different kinds of coordination activities are at play simultaneously at different levels to achieve partner alignment, and the interplay of these activities and levels affects the attainment of jointly beneficial outcomes.

These findings are relevant for open innovation research in at least three ways. First, by studying partner alignment at multiple levels, this study contributes to the open innovation literature by providing a deeper understanding of how the partners within a partnership can combine both formality and informality at multiple levels of a collaboration (Bagherzadeh et al., 2019). Second, our findings put in perspective the mixed earlier findings obtained via firm-level analyses related to the achievement of outcomes in science-based partnerships (Laursen and Salter, 2006). We investigated science-based partnerships at multiple levels, so our study contributes to explaining these diverse results and offers insights into how partner alignment happens at both the partnership and project levels (Vanhaverbeke et al., 2014, West and Bogers, 2017). Lastly, this study offers important insights into factors associated with failure in open innovation projects (Bogers et al., 2017). Mainly, our findings show how a lack of organizational interaction and a diverse understanding of a project at the project level coincide with project failure, which in turn affects overall partnership success.

Furthermore, this study holds valuable lessons for the coordination literature. To date, the coordination literature has focused on how various modes of coordination

contribute to partner alignment and thereby help partners attain valuable outcomes (Fernandes et al., 2018, Barbosa et al., 2020b). However, the present study highlights that successful coordination at one level is contingent on the use of other coordination mechanisms at another level in a partnership. Hence, we show how the various modes of coordination influence other modes of coordination and the outcomes of partnerships. This marks a contribution to the coordination literature (Claggett and Karahanna, 2018) in terms of highlighting the interrelated processes of science-based partnership coordination and the interplay between different coordination modes used at multiple levels.

Managerial implications

With the findings from our study, all partners in science-based open innovation partnerships, whether firm or science-based partners, stand to gain relevant insights with respect to how they may manage these open innovation projects to achieve jointly beneficial outcomes. Our results clearly indicate that to meet the conflicting goals and align the conflicting logics of both types of partners in science-based open innovation, managing these projects as one would manage open innovation between market-based partners may impede the attainment of any desired outcomes. Contractual agreements and other formal coordination activities are needed at the outset at the partnership level. However, while those structured coordination activities might do the trick in the case of open innovation with market-based partners, they will not suffice in science-based open innovation (Vega-Jurado et al., 2017). Rather, managers should leave room in science-based partnerships for projects to coordinate using unstructured, informal, and ad hoc activities at the project level, particularly once a partnership reaches an operational phase. It is paramount for managers to also understand that, according to our findings, coordinating at only one level (either structured coordination at the partnership level or unstructured coordination at the project level) also provides no guarantee of attaining desired outcomes. Overall, coordinating science-based open innovation for success is a continuous effort (during

different phases) that requires different coordination mechanisms (structured and unstructured) and needs to happen at different levels within a partnership.

Limitations and future research

Case study research often has the limitation of lack of generalizability. While we did not intend on developing generalizable findings but rather aimed to contribute to theory building via an in-depth exploration of how partner alignment in open innovation with science-based partners influences the attainment of valuable outcomes, our findings are limited to the context in which they are set. When we then consider that open innovation in science can take numerous shapes and forms (i.e., ranging from academic startups and spinoffs to individual-level collaborative ties and even consulting assignments (e.g., Beck et al., 2020), we see it fit to recommend that future research seek to replicate our findings across different forms of science-based open innovation. Studying different types of science-based open innovation may allow researchers to further break down relevant contingencies (e.g., Bogers et al., 2017)

Furthermore, while our study shows how the different forms of partner alignment influence each other and in turn influence the attainment of outcomes, there is an opportunity to study these interrelationships in a more in-depth manner and over time. For example, our findings indicate that prior collaborative experience with science-based partners can contribute to alignment between partners project commitment. Thus, we encourage future studies to explore the role prior collaborative experience has on aligning the partners at the project level. Furthermore, we suggest that the use of a fuzzy-set qualitative comparative analysis (fs/QCA) method could shed light on further and more precise configurations of structured and unstructured coordination mechanisms that are combined at different levels of partnerships while simultaneously accounting for some of the aforementioned contingencies (Fiss, 2011).

References

AMBOS, T. C. & BIRKINSHAW, J. 2010. How do new ventures evolve? An inductive study of archetype changes in science-based ventures. *Organization Science,* 21**,** 1125-1140.

ANDRES, H. P. & ZMUD, R. W. 2002. A contingency approach to software project coordination. *Journal of Management Information Systems,* 18**,** 41-70.

ARENAS, D. & AYUSO, S. 2016. Unpacking transnational corporate responsibility: Coordination mechanisms and orientations. *Business Ethics: A European Review,* 25**,** 217-237.

ARGOTE, L. 1982. Input uncertainty and organizational coordination in hospital emergency units. *Administrative science quarterly***,** 420-434.

ASHRAF, N., AHMADSIMAB, A. & PINKSE, J. 2017. From Animosity to Affinity: The Interplay of Competing Logics and Interdependence in Cross-Sector Partnerships. *Journal of Management Studies,* 54**,** 793-822.

BAGHERZADEH, M., MARKOVIC, S. & BOGERS, M. 2019. Managing open innovation: A project-level perspective. *IEEE Transactions on Engineering Management,* 68**,** 301-316.

BARBOSA, A. P. F. P. L., SALERNO, M. S., NASCIMENTO, P. T. D. S., ALBALA, A., MARANZATO, F. P. & TAMOSCHUS, D. 2020a. Configurations of project management practices to enhance the performance of open innovation R&D projects. *International Journal of Project Management*.

BARBOSA, A. P. P. L., SALERNO, M. S., BRASIL, V. C. & NASCIMENTO, P. T. D. S. 2020b. Coordination Approaches to Foster Open Innovation R&D Projects Performance. *Journal of Engineering and Technology Management,* 58**,** 101603.

BAXTER, P. & JACK, S. 2008. Qualitative case study methodology: Study design and implementation for novice researchers. *The qualitative report,* 13**,** 544-559.

BECK, S., BERGENHOLTZ, C., BOGERS, M., BRASSEUR, T.-M., CONRADSEN, M. L., DI MARCO, D., DISTEL, A. P., DOBUSCH, L., DÖRLER, D. & EFFERT, A. 2020. The Open Innovation in Science research field: a collaborative conceptualisation approach. *Industry and Innovation***,** 1-50.

BENTLEY, P. J., GULBRANDSEN, M. & KYVIK, S. 2015. The relationship between basic and applied research in universities. *Higher Education,* 70**,** 689-709.

BIRKINSHAW, J., AMBOS, T. C. & BOUQUET, C. 2017. Boundary spanning activities of corporate HQ executives insights from a longitudinal study. *Journal of Management Studies,* 54**,** 422-454.

BOGERS, M. 2011. The open innovation paradox: knowledge sharing and protection in R&D collaborations. *European Journal of Innovation Management*.

BOGERS, M., ZOBEL, A.-K., AFUAH, A., ALMIRALL, E., BRUNSWICKER, S., DAHLANDER, L., FREDERIKSEN, L., GAWER, A., GRUBER, M. & HAEFLIGER, S. 2017. The open innovation research landscape: Established perspectives and emerging themes across different levels of analysis. *Industry and Innovation,* 24**,** 8-40.

CALDWELL, N. D., ROEHRICH, J. K. & GEORGE, G. 2017. Social value creation and relational coordination in public-private collaborations. *Journal of Management Studies,* 54**,** 906-928.

CASSIMAN, B., DI GUARDO, M. C. & VALENTINI, G. 2010. Organizing links with science: Cooperate or contract?. A project-level analysis. *Research Policy,* 39**,** 882-892.

CASTAÑER, X. & OLIVEIRA, N. 2020. Collaboration, coordination, and cooperation among organizations: Establishing the distinctive meanings of these terms through a systematic literature review. *Journal of Management,* 46**,** 965-1001.

CHENG, C. C. & HUIZINGH, E. K. 2014. When is open innovation beneficial? The role of strategic orientation. *Journal of product innovation management,* 31**,** 1235-1253.

CHESBROUGH, H. & BOGERS, M. 2014. Explicating open innovation: Clarifying an emerging paradigm for understanding innovation. *New Frontiers in Open Innovation. Oxford: Oxford University Press, Forthcoming***,** 3-28.

CHESBROUGH, H. W. 2003. *Open innovation : the new imperative for creating and profiting from technology,* Boston, Mass., Harvard Business School Press.

CHESBROUGH, H. W., VANHAVERBEKE, W. & WEST, J. 2006. *Open innovation : researching a new paradigm,* Oxford, Oxford University Press.
CLAGGETT, J. L. & KARAHANNA, E. 2018. Unpacking the structure of coordination mechanisms and the role of relational coordination in an era of digitally mediated work processes. *Academy of Management Review,* 43**,** 704-722.
COHEN, W. M., NELSON, R. R. & WALSH, J. P. 2002. Links and impacts: the influence of public research on industrial R&D. *Management science,* 48**,** 1-23.
CUNNINGHAM, J. A., MENTER, M. & YOUNG, C. 2017. A review of qualitative case methods trends and themes used in technology transfer research. *The Journal of Technology Transfer,* 42**,** 923-956.
DAHLANDER, L. & GANN, D. M. 2010. How open is innovation? *Research policy,* 39**,** 699-709.
DINGSØYR, T., MOE, N. B. & SEIM, E. A. 2018. Coordinating knowledge work in multiteam programs: findings from a large-scale agile development program. *Project Management Journal,* 49**,** 64-77.
DU, J., LETEN, B. & VANHAVERBEKE, W. 2014. Managing open innovation projects with science-based and market-based partners. *Research Policy,* 43**,** 828-840.
EISENHARDT, K. M. 1989. Building Theories from Case Study Research. *The Academy of Management Review,* 14**,** 532-550.
FAEMS, D., VAN LOOY, B. & DEBACKERE, K. 2005. Interorganizational collaboration and innovation: Toward a portfolio approach. *Journal of product innovation management,* 22**,** 238-250.
FERNANDES, A., SPRING, M. & TARAFDAR, M. 2018. Coordination in temporary organizations. *International Journal of Operations & Production Management*.
FISS, P. C. 2011. Building Better Causal Theories: A Fuzzy Set Approach to Typologies in Organization Research. *Academy of Management Journal,* 54**,** 393-420.
GAMA, F., SJÖDIN, D. R. & FRISHAMMAR, J. 2017. Managing interorganizational technology development: Project management practices for market‐and science‐based partnerships. *Creativity and Innovation Management,* 26**,** 115-127.
GASSMANN, O. & ENKEL, E. 2004. Towards a theory of open innovation: three core process archetypes.
GERINGER, J. M. & HEBERT, L. 1989. Control and performance of international joint ventures. *Journal of international business studies,* 20**,** 235-254.
GIOIA, D. A., CORLEY, K. G. & HAMILTON, A. L. 2013. Seeking qualitative rigor in inductive research: Notes on the Gioia methodology. *Organizational research methods,* 16**,** 15-31.
GREEN, K. W., WHITTEN, D. & INMAN, R. A. 2012. Aligning marketing strategies throughout the supply chain to enhance performance. *Industrial Marketing Management,* 41**,** 1008-1018.
GULATI, R., WOHLGEZOGEN, F. & ZHELYAZKOV, P. 2012. The two facets of collaboration: Cooperation and coordination in strategic alliances. *The Academy of Management Annals,* 6**,** 531-583.
GURCA, A., BAGHERZADEH, M., MARKOVIC, S. & KOPORCIC, N. 2021. Managing the challenges of business-to-business open innovation in complex projects: A multi-stage process model. *Industrial Marketing Management,* 94**,** 202-215.
HUIZINGH, E. K. R. E. 2011. Open innovation: State of the art and future perspectives. *Technovation,* 31**,** 2-9.
KOBARG, S., STUMPF-WOLLERSHEIM, J. & WELPE, I. M. 2019. More is not always better: Effects of collaboration breadth and depth on radical and incremental innovation performance at the project level. *Research Policy,* 48**,** 1-10.
LAURSEN, K. & SALTER, A. 2004. Searching high and low: what types of firms use universities as a source of innovation? *Research policy,* 33**,** 1201-1215.
LAURSEN, K. & SALTER, A. 2006. Open for innovation: the role of openness in explaining innovation performance among UK manufacturing firms. *Strategic management journal,* 27**,** 131-150.
LE MEUNIER-FITZHUGH, K. & MASSEY, G. R. 2019. Improving relationships between sales and marketing: the relative effectiveness of cross-functional coordination mechanisms. *Journal of Marketing Management,* 35**,** 1267-1290.

LEE, Y., FONG, E., BARNEY, J. B. & HAWK, A. 2019. Why do experts solve complex problems using open innovation? Evidence from the US pharmaceutical industry. *California Management Review,* 62**,** 144-166.
LU, L., MARÍN-SOLANO, J. & NAVAS, J. 2019. An analysis of efficiency of time-consistent coordination mechanisms in a model of supply chain management. *European journal of operational research,* 279**,** 211-224.
MARKOVIC, S. & BAGHERZADEH, M. 2018. How does breadth of external stakeholder co-creation influence innovation performance? Analyzing the mediating roles of knowledge sharing and product innovation. *Journal of Business Research,* 88**,** 173-186.
MARKOVIC, S., BAGHERZADEH, M., VANHAVERBEKE, W. & BOGERS, M. 2021. Managing business-to-business open innovation: A project-level approach. *Industrial Marketing Management,* 94**,** 159-163.
MOM, T. J., VAN DEN BOSCH, F. A. & VOLBERDA, H. W. 2009. Understanding variation in managers' ambidexterity: Investigating direct and interaction effects of formal structural and personal coordination mechanisms. *Organization Science,* 20**,** 812-828.
MORENO-LUZÓN, M. D. & BEGOÑA LLORIA, M. 2008. The Role of Non-structural and Informal Mechanisms of Integration and Coordination as Forces in Knowledge Creation. *British Journal of Management,* 19**,** 250-276.
OLIVEIRA, N. & LUMINEAU, F. 2017. How coordination trajectories influence the performance of interorganizational project networks. *Organization Science,* 28**,** 1029-1060.
OOMS, W. & PIEPENBRINK, R. 2020. Open Innovation for Wicked Problems: Using Proximity to Overcome Barriers. *California Management Review,* 63**,** 62-100.
PERKMANN, M., TARTARI, V., MCKELVEY, M., AUTIO, E., BROSTRÖM, A., D'ESTE, P., FINI, R., GEUNA, A., GRIMALDI, R., HUGHES, A., KRABEL, S., KITSON, M., LLERENA, P., LISSONI, F., SALTER, A. & SOBRERO, M. 2013. Academic engagement and commercialisation: A review of the literature on university–industry relations. *Research Policy,* 42**,** 423-442.
PERKMANN, M. & WALSH, K. 2007. University–industry relationships and open innovation: Towards a research agenda. *International Journal of Management Reviews,* 9**,** 259-280.
PONOMARIOV, B. L. & BOARDMAN, P. C. 2010. Influencing scientists' collaboration and productivity patterns through new institutions: University research centers and scientific and technical human capital. *Research Policy,* 39**,** 613-624.
RANDHAWA, K., WILDEN, R. & HOHBERGER, J. 2016. A bibliometric review of open innovation: Setting a research agenda. *Journal of Product Innovation Management,* 33**,** 750-772.
SALDAÑA, J. 2015. *The coding manual for qualitative researchers*, Sage.
SAUERMANN, H. & STEPHAN, P. 2013. Conflicting logics? A multidimensional view of industrial and academic science. *Organization science,* 24**,** 889-909.
TSAI, W. 2002. Social structure of "coopetition" within a multiunit organization: Coordination, competition, and intraorganizational knowledge sharing. *Organization science,* 13**,** 179-190.
VAN DE VEN, A. H., DELBECQ, A. L. & KOENIG JR, R. 1976. Determinants of coordination modes within organizations. *American sociological review***,** 322-338.
VANHAVERBEKE, W., DU, J., LETEN, B. & AALDERS, F. 2014. Exploring open innovation at the level of R&D projects. *New frontiers in open innovation.* Oxford University Press Oxford.
VEDEL, J. B. & IRWIN, A. 2017. 'This is what we got, what would you like?': Aligning and unaligning academic-industry relations. *Social Studies of Science,* 47**,** 417-438.
VEGA-JURADO, J., KASK, S. & MANJARRÉS-HENRIQUEZ, L. 2017. University industry links and product innovation: cooperate or contract? *Journal of technology management & innovation,* 12**,** 1-8.
WERKER, C. & OOMS, W. 2020. Substituting face-to-face contacts in academics' collaborations: modern communication tools, proximity, and brokerage. *Studies in Higher Education,* 45**,** 1431-1447.
WEST, J. & BOGERS, M. 2014. Leveraging External Sources of Innovation: A Review of Research on Open Innovation. *Journal of Product Innovation Management,* 31**,** 814-831.

WEST, J. & BOGERS, M. 2017. Open innovation: current status and research opportunities. *Innovation,* 19**,** 43-50.

WILLEM, A., BUELENS, M. & SCARBROUGH, H. 2006. The role of inter-unit coordination mechanisms in knowledge sharing: a case study of a British MNC. *Journal of Information Science,* 32**,** 539-561.

YIN, R. K. 2014. *Case study research : design and methods,* Los Angeles, SAGE.

ZACHARIAS, N. A., DALDERE, D. & WINTER, C. G. H. 2020. Variety is the spice of life: How much partner alignment is preferable in open innovation activities to enhance firms' adaptiveness and innovation success? *Journal of Business Research,* 117**,** 290-301.

7.4. Research paper 4: Overcoming conflicting goals in university-industry research centres: Integrating and attaining academic research and firm Innovation

Overcoming conflicting goals in university-industry research centres: Integrating and attaining academic research and firm Innovation

Abstract

Engaging with external partners adhering to different institutional logics can often be challenging, because the partners often have conflicting goals. Conflicting goals are typically present in institutionally complex collaborations aimed at generating outcomes adhering to different institutional logics. Thus, we study the process underlying the establishment and operation of six university-industry research centres and explore how the partners involved pursued both innovation and academic research goals. We found that during the initial phase of the collaborations, the goals adhering to the firm partners' commercial logics were not prioritized, and the research partners attained goals adhering to their academic logic. Over time, increasing pressure from the firm partners forced the research partners to develop new hybrid practices that incorporated the firm partners' goals. We offer a process model outlining the implementation of organizational solutions to deal with conflicting goals in university-industry research centres. We also contribute to the organizational goal literature by showing how to manage multiple and conflicting goals in research centres influenced by multiple institutional logics.

Keywords: Conflicting goals, Organizational goals, University-industry collaboration, institutional logics, research centres

Introduction

To develop scientific and technological knowledge, improve sustainability, and increase public health (Mair et al., 2015), organizations are looking outside their own boundaries to engage diverse actors, such as universities, governmental agencies, and society in general, as these actors can contribute with knowledge, resources, and opportunities that enhance firm competitiveness (Jay, 2013, Pache and Santos, 2013). These actors typically adhere to different institutional logics that provide different understandings of appropriate actions and behaviour (Thornton et al., 2012). However, accommodating different institutional logics can be challenging for organizations as they often entail conflicting demands (Battilana and Dorado, 2010), such as trade-offs between achieving firm profit and corporate social responsibility (Stevens et al., 2015, Markman et al., 2016), balancing the exploitation of existing assets and the exploration of new ideas (Billinger et al., 2020), and building competitiveness and sustainability simultaneously (Hermundsdottir and Aspelund, 2021).

To engage these different institutional logics, actors often enter into cross-sector partnerships such as public-private partnerships (Jay, 2013). A classic example of a cross-sector partnerships is university-industry research centre (Gulbrandsen et al., 2015). Activities in research centres are typically influenced and managed by various research organizations, universities and firms, adhering to different institutional logics and goals (Sauermann and Stephan, 2013, Perkmann et al., 2018). In particular, research organizations logics relates to the aim for academic novelty and publicly available knowledge developments (Aghion et al., 2008), while firms` logics relates to the aim for context-specific knowledge, technology, and innovation developments that can contribute to their innovative efforts and profitability (Abramovsky et al., 2009, Gilsing et al., 2011, Canhoto et al., 2016).

To adhere to each other's different logics, the partners in research centres often establish a set of multiple goals (Sauermann and Stephan, 2013, Perkmann et al., 2018), which can be facilitative (Kruglanski et al., 2002) and/or conflicting (Gaba and Greve, 2019). Establishing *facilitative* goals ensures that the achievement of one goal will

contribute to the achievement of other goals (Kruglanski et al., 2002). Establishing *conflicting* goals, on the other hand, often requires conflicting actions with separate processes (Gaba and Greve, 2019). Conflicting goals are more prominent when organizations deal with institutional complexity and are controlled by multiple partners with different institutional logics, such as in research centres (Wry et al., 2013, Perkmann et al., 2018).

However, there is limited knowledge on how organizations handle and attain conflicting goals in these spaces. Thus, increased knowledge on how partners attain multiple and conflicting goals in research centres is needed (Audia and Greve, 2021). In particular, it is unclear whether and how partners with different institutional logics prioritize conflicting goals (Gaba and Greve, 2019), and how these multiple goals are integrated into the collaboration process (Vedel, 2021). Thus, there is a need for clearer theoretical and managerial insights on organizational strategies to deal with partners' conflicting goals (Greve and Teh, 2018, Fini et al., 2019, Audia and Greve, 2021). Hence, this study explores the following research question: *How do partners in university-industry research centres establish and attain conflicting goals?*

To explore the dynamic process of attaining partners' multiple conflicting goals (Gaba and Greve, 2019), we conducted a longitudinal multiple case study of the establishment and operation of six university-industry research centres funded by the Norwegian scheme 'Centre of Environment-friendly Energy Research' from 2009 until 2017. This setting allowed us to follow the attention and practices of the partners engaging in these research centres as they worked to attain internationally leading academic research and contribute to innovation in industry.

Our findings reveal particular dynamics in how the partners managed the challenge of combining the conflicting goals of academic research and innovation in research centres. After the collaborations were established, goal attainment unfolded in two distinct phases. First, the collaborations acceded to goals and practices adhering to the academic logic, which involved attaining the research goals over the first four years. The neglect of the innovation goals created a growing pressure from the firm

partners that triggered a change in how the research centres operated. Hence, in the second phase, the collaborations accentuated the innovation goals, leading to increased use of hybrid goal practices over the last four years of the centres' operation.

These findings contribute to the literatures on organizational goals and university-industry research centres in several ways. First, we theorize on how organizations deal with conflicting goals by showing the sequential nature of two distinct goal-attainment strategies: research goal attainment and hybridizing (Perkmann et al., 2018). This theorizing challenges the common assumption that goals are dealt with either sequentially or simultaneously (Greve, 2008, Miron-Spektor and Beenen, 2015) and shows how and why goal attainment changes over time. Thus, our main contribution is a process model outlining the implementation of organizational solutions to deal with conflicting goals. In particular, we provide specific accounts of how goals adhering to different logics can be integrated in organizational practices over time and what triggers such hybridization of conflicting goals.

Second, we extend the university-industry collaboration literature by theorizing on how conflicting goals adhering to diverse logics can be managed in research centres over time. While the characteristics of different institutional logics and the conflicting goals in UICs are well documented (Steinmo, 2015, Estrada et al., 2016) there is limited understanding of how the partners in research centres manage and attain conflicting goals (Skute et al., 2019, Audia and Greve, 2021). We propose that the research partners create a priority order favouring the goals adhering to the academic logic while the firm partners can trigger research centres to change practices over time. This reasoning can potentially explain why prior collaboration experience is essential for successfully achieving both academic and innovation goals in these types of collaborations (Kavusan et al., 2016).

Our study also has important practical implications by showing how particular goal-attainment strategies can be used to manage conflicting goals throughout the collaboration process. We speculate that the research partners in a research centre are more open to incorporating goals adhering to different logics if they have first

succeeded with some of their own subgoals, but this change in behaviour depends on a triggering event. Hence, the firm partners should allow room for the research partners to pursue research partners' favoured goals but be aware that firms' favoured goals are not likely to be prioritized unless being triggered.

Theoretical framework

Engaging multiple actors and institutional logics in university-industry research centres

To sustain competitiveness, organizations often engage external actors to attain benefits, such as resources, knowledge, and technological know-how (Cohen et al., 2002, Laursen and Salter, 2004, Perkmann et al., 2013, Vega-Jurado et al., 2017). Engaging with external partners often happens through interorganizational collaborations, such as market-based partnerships (Du et al., 2014), public-private partnerships (Jay, 2013), or science-based partnerships (Du et al., 2014). However, in science-based and public-private partnerships (Jay, 2013, Du et al., 2014), the partners often adhere to different institutional logics (Mair et al., 2015), which can be defined as 'sets of core organizing principles associated with a specific societal domain and the related beliefs, practices, and arrangements' (Schildt and Perkmann, 2017, p. 140). Such organizing principles often include different goals, practices, identities, and norms (Friedland and Alford, 1991, Schildt and Perkmann, 2017) and can be challenging for organizations as these organizing principles often present conflicting demands and goals that organizations must manage (Pache and Santos, 2013).

This is especially the case in science-based partnership such as university-industry research centres (Lauvås and Steinmo, 2019), since the centres are influenced by both an academic logic and a commercial logic (Sauermann and Stephan, 2013). One the one hand, academic logics often include missions and goals focused on public knowledge development and publications (Murray, 2004, Perkmann et al., 2018). Moreover, researchers adhering to the academic logic often want to work based on

academic freedom, where they can explore research topics based on their own personal interests (Sauermann and Stephan, 2013) in a long-term perspective (Perkmann et al., 2011). On the other hand, commercial logics are oriented towards specific problems and solutions that can create economic rewards and provide financial returns (Murray, 2004, Sauermann and Stephan, 2013). Further, the working practices of those adhering to commercial logics are often hierarchically managed and coordinated (Sauermann and Stephan, 2013). Thus, in collaborations with researchers, firms often try to steer the researchers towards the firms' interests (Aghion et al., 2008).

When research and firm partners engage in these kinds of research centres, they often have some predetermined goals related to what they want to achieve through their participation (Bruneel et al., 2010, Ranganathan et al., 2018). Firms' goals are often related to specific knowledge, technology, and innovation developments, which can contribute to the firms' innovative efforts (Abramovsky et al., 2009, Gilsing et al., 2011, Canhoto et al., 2016). Research partners, on the other hand, often have goals related to achieving academic novelty and developing publicly available knowledge (Aghion et al., 2008, Perkmann et al., 2018).

Thus, when the partners engage in university-industry research centres, the university-industry research centres establish two overarching goals, which are influenced by the different institutional logics the partners embody (Perkmann et al., 2018), and often demand conflicting behaviour and actions from the partners involved (Greenwood et al., 2011). To attain these conflicting goals, university-industry research centres establish organizational structures that include a blended board of directors with members from both the firm and research partners, a specific budget, and a workforce mainly comprising researchers (Perkmann et al., 2018). These organizational structures are supposed to ensure that the research partners take on projects adhering to the firm partners' logics (Gulbrandsen et al., 2015) and that the firms and research organizations can share resources and capabilities and develop new knowledge to achieve both research and innovation goals (Boardman and Bozeman, 2007).

Furthermore, to ensure that the partners are committed to the collaboration and the overarching goals, the research centre often establish formal and informal governance mechanisms (Gretsch et al., 2020). Formal governance mechanisms include contractual agreements (Okamuro, 2007, Gulati et al., 2012), including external support and resource sharing (Okamuro, 2007). Informal governance mechanisms include informal communication and knowledge sharing between the partners, which are supposed to contribute to achieving successful collaboration and goals of research and innovation (Morandi, 2013, Gretsch et al., 2020).

However, how firm and research organizations manage to integrate these different goals into the collaboration process, is still scarcely investigated (Skute et al., 2019). Particularly, we still have limited knowledge related to how these multiple goals influence the interaction and collaboration between the partners involved in UICs (Fini et al., 2019). Thus, to gain in-sight into how firms and university partners collaborate to attain the overarching goals of research and innovation in research centers, we draw on organizational goal literature (Gagné, 2018), which can provide insights into how different parties or coalitions within an organization (i.e. research centres) attain conflicting goals (Gaba and Greve, 2019).

Attaining organizational goals

Organizational goal literature has studied organizational goals internally in firms and organizations (Greve and Teh, 2018). However, the implications stemming from this research stream can provide insights into how multiple goals are attended to in institutionally complex settings (i.e., research centres) (Greve and Teh, 2018, Gaba and Greve, 2019).

Organizational goals and goal setting are important to ensure that organization's employees and stakeholders pursue outcomes that are desirable for the organization, which can in turn ensure the survival of the organization (Cyert and March, 1963, Kotlar and De Massis, 2013, Linder and Foss, 2018). Organizational goals are often developed through a bargaining process within an organization and are often

based on and influenced by the organization's decision makers and dominant coalitions (Cyert and March, 1963). Nevertheless, these decision makers need broader agreement from other organizational members to ensure the organizational goals are pursued (Kotlar and De Massis, 2013), which means that the organization needs to establish goals that also satisfy other organizational members and stakeholders (Linder and Foss, 2018). Such agreement can be achieved by establishing additional goals such that some subordinate goals are developed to satisfy specific stakeholders and organizational members (Greve and Teh, 2018). Hence, organizations often establish and pursue multiple goals (Greve, 2008).

These multiple organizational goals can be both financial, such as profitability, market share, and sales (Greve, 2003b, Baum et al., 2005), and non-financial, such as social responsibility, trustful relationships, learning, innovation, and research (Zellweger et al., 2013, Miron-Spektor and Beenen, 2015), and they are influenced by organizations' characteristics, such as their industrial sector, size, governance type, and ownership, and by institutional pressure (Greve, 2003a, Greve and Teh, 2018, Kotlar et al., 2018).

The relationships between multiple goals influence how these goals are attended to, which tasks are executed, and how the goals are achieved (Unsworth et al., 2014). When an organization's goals are related through hierarchical levels, such as overarching goals and subgoals, the organization and its workforce often focus their attention on the subgoals since the attainment of subgoals will simultaneously contribute to the attainment of the overarching goals (Gagné, 2018). At the same time, an organization may also have multiple goals that are at the same hierarchical level, such as two or more overarching goals, which can be facilitative (Kruglanski et al., 2002) or conflicting (Gaba and Greve, 2019).

If an organization establishes multiple *facilitative* goals at the same hierarchical level, the goals will be related through activation links, and one goal will have a triggering effect on another goal (Unsworth et al., 2014). Thus, the achievement of one goal will contribute to the achievement of the other goal by activating actions towards

the second goal (Kruglanski et al., 2002). As such, the organization can pay sequential attention to the multiple goals, attending to one goal at a time and focusing on the next goal only when the former goal has been achieved (Greve, 2008), which ensures the attainment of several goals over time.

However, prior studies have also emphasized that to ensure sequential attention to goals, an organization must agree upon a priority order (Greve, 2008) by prioritizing which goal to pursue first (Cyert and March, 1963, Greve, 2008). The priority order of goal attainment can be decided by the main force within the organization (Greve, 2008) or based on the availability of resources (e.g. slack resources) (Sitkin et al., 2011). As such, the decision makers in the organization must agree on which goal to prioritize first (Gaba and Greve, 2019). However, when the goals require conflicting actions, agreement might be difficult to achieve (Gaba and Greve, 2019), which can complicate decision making and create conflicts within the organization (Cohen, 1984).

To ensure the attainment of *conflicting* goals, organizations might try to attain these goals simultaneously (Zellweger et al., 2013). However, simultaneous attainment is often resource demanding and costly (Zellweger et al., 2013, Obloj and Sengul, 2020) and can lead to coordination problems and challenges within organizations (Ethiraj and Levinthal, 2009). Thus, Gaba and Greve (2019) suggest that to achieve conflicting goals, organizations should pay attention to different goals over time, based on the organizations performance. When aiming for conflicting goals, organizations do not attain one goal after another, but rather change their attention to goals based on the organization's aspiration level for each goal. However, this approach to goal attainment does not account for how decision makers decide which goal to pursue first (Audia and Greve, 2021), which is especially important in institutionally complex organizations and collaborations that are influenced by different institutional logics (Wry et al., 2013) such as research centres (Lauvås and Steinmo, 2019).

As such, there is a need to further investigate how potentially conflicting goals are attained over time (Gaba and Greve, 2019) and how collaborations with various

partners subscribing to different institutional logics ensure the attainment of these multiple goals (Fini et al., 2019, Audia and Greve, 2021). Hence, to contribute in-depth insights into the attainment of conflicting goals in research centres, this study examines six university-industry research centres as the presence of multiple institutional logics and conflicting goals are especially prominent within these centres (Perkmann et al., 2018, Fini et al., 2019).

Methodology

Research context and design

To understand how the partners in research centres establish and attain the conflicting goals, we conducted a longitudinal multiple case study of six centres for environmental-friendly Research in Norway (Yin, 2014). Corresponding to research centres in other developed countries (Boardman and Gray, 2010), the centres were established with the aims of conducting fundamental academic research and contributing to innovation in industry. As such, these research centres are a suitable setting for studying the attainment of multiple conflicting goals in organizations with multiple institutional logics (Sauermann and Stephan, 2013)

The centres worked within energy-related fields, such as biofuels, offshore wind, solar, carbon dioxide storage, and zero emissions. They were operational from 2009 to 2017 and were funded by the firm partners (25%), university partners (25%), and the Research Council of Norway (50%), which, in total, gave each research centre an annual budget of approximately 3,5 million EUR. The research centres were hosted by research organizations, which played the centre manager role and employed the main workforce (Perkmann et al., 2018). The firm partners partook in the centres' boards of directors and contributed to project development. To preserve anonymity, we use pseudonyms when referring to these six centres.

The cases were selected based on theoretical sampling, with the purpose of building and extending emergent theory (Eisenhardt, 1989). As such, to build theory

on conflicting goal attainment in the context of UIC, we chose centres that had similar structures (e.g., management, goal and time horizon). However, the centres represent different technology areas, to provide contextual variety (Yin, 2014). Furthermore, since our objective was to study the process of goal attainment in research centres, we collected multiple cases, not for the purpose developing a variance theory but to ensure that our inductive data analysis was based on sufficient empirical evidence (Perkmann et al., 2018).

Data collection

We conducted 72 interviews between 2013 and 2019, each lasting about one hour on average, with 32 firm and research partners from the six university-industry research centres (See Table 1). As such, we interviewed 16 firm representatives which held positions such as R&D-mangers, senior-advisers, engineers and researchers, and 16 research partners. To ensure anonymity, we use codes to refer to specific informants in the different research centres: we use the prefix F when referring to a firm representative and U to designate a research partner. Furthermore, we use the letters A, B, G, D, E, and Z to show which research centre the informant participated in. As such, a firm partner from the Alpha research centre is written as FA1, while a research partner from Epsilon is written as UE1, and so on.

Insert Table 1 about here

Furthermore, we collected secondary data, such as the initial project descriptions for the research centres (grant applications) and the midway evaluation reports, and we observed multiple workshops and consortium meetings (see Table 1). The secondary data sources enabled us to undertake method triangulation (Yin, 2014). As such, the initial project descriptions were used in the inductive analysis to understand the initial establishment of goals in the research centres, while the midway evaluation reports and observations were used to enhance the internal validity of our

study (Yin, 2014), corroborating the findings from our analysis and minimizing the retrospective bias (Miller et al., 1997, Yin, 2014).

Data analysis

Our data-analysis process started with the authors reading and rereading the transcribed interviews and documents, discussing initial findings, and writing down narrative accounts of the collaboration processes in the research centres. This initial analysis was done to get an overview of the data and get an understanding of all the cases and how the firms and research partners worked within the research centres to attain and manage the conflicting goals. These narrative accounts provided insights into important themes and helped us identify some similar patterns across all our cases.

Next, we mapped the multiple goals present in the research centres and how the partners prioritized and understood these goals. After mapping the initial establishment of goals in each research centre, we began coding the data from each research centre, inspired by the Gioia method (Gioia et al., 2013). In this process, one of the authors used coding software (Nvivo12) and conducted open coding to identify the empirical constructs that emerged in the transcripts and the initial project descriptions (Saldaña, 2015). The open codes and the empirical constructs were discussed by all the authors and edited until the authors had a unison agreement. Since the analytical focus of our study was goal attainment, we looked for activities related to the attainment of goals and the situations that might explain why various activities were prioritized and conducted. Hence, we explored how the partners dealt with multiple and conflicting goals and the attainment of these goals. During this exercise, we went back and forth between the raw data and the codes to ensure the codes represented the partners' activities in their collaborations and accepted first-order codes only when the authors agreed that the first-order codes were present in several of the research centres.

Once we established and agreed on the first-order codes, we collapsed them into second-order themes and aggregate dimensions. During this process, we went

back and forth between the first-order and second-order codes and the aggregate dimensions to ensure that our analysis was true to the raw data and could simultaneously answer the research question. Figure 1 shows our data structure, where the first-order codes relate to each research centre, while the second-order themes and the aggregated dimension relates to all the centres.

Lastly, we identified in which phase the activities were present and built a processual goal-attainment model for research centres. As such, the analysis identified the specific organizational strategies the partners engaged in over time to ensure the attainment of multiple conflicting goals in their research centres.

Insert Figure 1 about here

Findings

Our findings revealed patterns in how the research organizations and firm partners in the six university-industry research centres attained the conflicting goals of academic research and industrial innovation over time. Our key findings show three phases, which influenced the establishment and attainment of the conflicting goals (see Figure 2). In the preformation phase of the research centres, the firm partners and research organizations established two overarching goals related to research and innovation, with the research organizations favouring the research goal and the firm partners favouring the innovation goal. In the first phase (Years 1–4) of the research centres, the research partners established activities based on academic practices and the measurement of academic subgoals, which the firm partners acceded to, leading to the attainment of research goals. The firm partners then accentuated their goals and practices in the second phase (Years 4–8), leading the research partners to adjust the established goal-attainment practices and modify their goal-attainment

measurements, which in turn led to the hybridization of goal-attainment practices in the research centres.

Insert Figure 2 about here

Preformation phase—Establishing conflicting goals

All the studied research centres established two overarching goals during the process of writing their applications for funding and setting up their operations. These goals combined both research and innovation (Boardman and Gray, 2010) based on explorative and radical improvements (Sitkin et al., 2011, Gulbrandsen et al., 2015). The following quote from the Gamma application illustrates the centre's research goal: 'Develop the Centre into a world class leading research community on [the technology] and support Norwegian industry to be in the international forefront'. The next quote illustrates the innovation goal in Delta: 'The goal is to develop knowhow, technology and solutions that will stimulate and enable industry to commercialize [a specific technology] and produce [energy at a suitable] cost in Norway as well as in other [specific] markets'.

While the firms and research partners agreed on the overall research and innovation goals in the research centres, the firm partners mainly focused on attaining the innovation goals. For example, one firm partner (FD1) explained, 'We would love to see that we got some technologies out of [participation in the research centre] that could reduce our [production] costs approximately 40 percent'. With some exceptions, the firm partners were also concerned about attaining the research goals, as illustrated in the following: 'My driving force is to get the research centre to deliver on what we originally decided upon. We have a contract that says something about what is the main reason for establishing this centre and what are the main deliverables' (FA2).

The research partners mainly focused on attaining the research goals. For example, one research partner (UE2) told us, 'One thing we looked forward to was to have the unique possibility to get financial resources to do long-term research, which

ensures that we can build knowledge that takes time'. However, we also found some exceptions of university partners that were also motivated to attend to the innovation goals, as indicated in the following: 'Personally, I'm not very concerned about publications. It is fun with publications, and I have a lot of them, but I am more concerned with results. Applied results' (UA2).

As the attainment of multiple and conflicting goals have scarcely been investigated (Fini et al., 2019), a closer analysis of the goal-attainment process is needed (Gaba and Greve, 2019). Thus, next, we explore how the partners in the university-industry research centres attained the conflicting goals of innovation and academic research over time.

First phase—Attaining research goals

Our findings indicate that during the first phase, there were two processes underpinning the research centres' efforts to bolster the research goals: establishing research practices and establishing measures for research-based subgoals. A third underpinning process in this phase relates to firm partners' acceding to the research goals and practices.

Establishing activities based on research practices

During the first phase of the research centres, the research partners *established research practices* to ensure the attainment of the research goals. As such, the research partners established research centre activities that aligned with the research partners' usual practices and in turn ensured attention on research development.

In the first phase, the research partners experienced challenges related to the firm partners' attention on the innovation goals, as exemplified in the following: 'The [firm's] overall goal is to get practical useful results. They don't have a lot of focus on publications at all' (UA3). Thus, the research partners took time to make sure the firm partners understood the necessity of conducting and publishing basic research in the research centres, as one of the researchers (UE4) explained:

> We have used a bit of time to develop a mutual understanding of how a research centre should operate, what the research centre can and can't do, how we [the researchers] can produce things, and how the research centre needs . . . to get the [research] results out to research forums.

Hence, the research partners took time to *establish research boundaries* in the research centres, which ensured the firm partners understood the need to prioritize the research goals.

Furthermore, to ensure the research goals were attained, the research partners *engaged research personnel to work with basic research* by hiring researchers and PhD students who could conduct fundamental research. For instance, one of the researchers (UA3) explained the following:

> [The research goals] can be met by increasing the number of PhD students, and we have about 25 to 30 of them—all the research centres have them. So, no matter what you do, you are guaranteed to reach [the research] goals; those you will always reach.

Along with hiring the PhD students, the research partners set up PhD projects in the research centres focused on the research partners' knowledge and research domains. For example, one firm partner (FD3) noted, 'When you have professors or researchers who are available [to supervise the PhDs], the professors and the researchers choose PhD projects that are within their own knowledge domains'. Thus, the research partners decided which projects they wanted to work with and which research areas they wanted to develop. As such, the research partners *worked individually with research projects of their own choice,* as explained by one of the firm partners (FG3): 'The firm partners have engaged in the development of goals and which areas are of interest, while the research partners have a lot of freedom to act between each goal revision'.

Hence, in the first phase, the research partners established academic practices in the research centres and focused their attention on practices that could enhance research outcomes.

Establishing research-based goal measurements

The research partners *used research-based key performance indicators (KPIs)* in the first phase of the research centres to keep track of the attainment of the research goals, which measured various activities and individuals in the research centres. For example, one of the firm partners (FB1) explained, '[The research centre] use KPIs that are suited for measuring academic achievement, focusing on publications, number of PhD students and post-docs'. These measurements contributed to keeping attention on the research goals in the research centres.

In some of the research centres, the research partners also *established broader innovation definitions*, which included basic research development, as explained by a research partner (UB3): 'We have a wide [innovation] definition. Some experience innovation as something that should be commercial, but it isn't. It means that someone has started to use it, so it can be an idea, an innovation, or doing things smarter in research'. Such definitions ensured that the research partners were able to be attain the research goal and *delivering long-term basic research,* even though they labelled it as attending to innovation goals.

In sum, during the first phase of the research centres, the research partners established academic goal measurements to ensure attention on the research goals and secure the attainment of research outcomes.

Acceding to research goals and practices

During the first phase, the firm partners *acceded to the research goals and practices*. We understand acceding to the research goals and practices to mean the firms' acceptance of the established practices because the firms did not challenge how the research partners worked to attain the research goals during the first phase.

Our findings suggests that in the beginning of the first phase, some of the firm partners *participated in developing the research boundaries* since they agreed that there was a need to establish academic practices, and they *accepted the research focus*

of the research centres, as explained by one of the firm (FA3) partners: 'I agree that we have to start with the small parts first, and basic research is very important there'.

In contrast, most of the firms acceded to the established practices in the beginning of the first phase by *being passive observers in the research activities*. Indeed, one firm partner (FB2) reported, 'We were a part of the research centre and got some updates, but that's it. We weren't actively engaged and didn't try to set any [research centre] agenda'. The research partners noted a similar experience, as indicated in the following quote: 'In the beginning of Epsilon, the researchers suggested [projects], and they often got some short comments on what the firm partners were interested in' (UE3). Thus, our findings suggest that during the first phase, the firm partners allowed the research partners to establish academic practices, ensuring attention towards the research goals.

However, many of the firm partners experienced a growing dissatisfaction with the development of the research centres, as one of them (FG2) explained: '[Gamma] presents a lot of fixed plans, projects, and locked things that we just have to deal with'. The firms also experienced that the research centres focused too much on the research goals and not enough on the innovation goals: '[Innovations] haven't been discussed a lot. I wasn't in the last meetings, and of course, something might have happened. [Innovations] might eventually come during this type of project, but there hasn't been a lot of focus [on innovations]' (FA2). Thus, our findings suggest that while the firm partners accepted research deliverables, they began to expect more attention on the innovation goals, as one of the firm partners (FD3) explained: 'We are committed to continuing this collaboration, but when these PhD students are finished, we want to decide what the next ones should spend their time on'.

Second phase—Hybridizing goal practices

In the second phase of the research centres, the firm partners started to accentuate their goals and practices into the research centres, leading the research partners to adjust their goal-attainment practices and modify the goal measurements.

In turn, these processes led to the hybridization of goal practices, which ensured the attainment of both research and innovation goals in the research centres.

Accentuating innovation goals

As mentioned in the prior section, during the first phase, many of the firm partners began to feel that the research centres' attention was too focused on attaining the research goals. As one of the firm partners (FB1) disclosed,

> We have a mutual goal with the university partners. There aren't any differences between what we want to achieve and what they want to achieve. However, it is the measurements. A researcher has a lot of knowledge and several goals that the academics count, the publications, right? High-quality publications. That's what you count. You do not count the implementation ability of a firm even though you say it is important, but that's not something you count [in the research centre].

To ensure that the innovation goals in the research centres got more attention, the firm partners began to accentuate the innovation goal in the research centres. We understand accentuating innovation goals as the firms' work in highlighting the need to focus more on the innovation goals of the research centres. Thus, the firms accentuated the firm goals by *stressing the need for more attention on the innovation goals* through the *use of formal feedback mechanisms*. Specifically, the firm partners used the Research Council of Norway's midway evaluations of the research centres' to highlight the need for more focus on the innovation goals, as one firm partner (FZ2) noted: 'We were open about what we meant [about the development of the research centre]'. Another firm partner (FB1) explained how they used the midway evaluation: '[The midway evaluation] made us highlight the firm partners' views so the administration and the board could understand [the firms' innovation needs]. It was good'. Thus, the use of formal feedback mechanisms allowed the firms to take an active role in the research centres and get more attention on the innovation goals.

Thus, over time, the firm partners became more active and worked to *accentuate the innovation goals* in the research centres.

Accentuating firm practices

The firms also became more involved in the research centres by accentuating firm practices. They accentuated firm practices by taking an active role within the research centres. The firms' active role is seen through their *engagement in the development of and adjustments to the research centres' annual plans.* For example, one of the firm partners (FB1) explained this role as follows: 'We schedule meetings and go through the work plan: what is important for us [the firms], what lies within the locked resources, and what lies within the frames of the available resources that we can focus on. This process has become very structured'.

During this phase, the firms also participated and *engaged in research centre activities and meeting areas* to ensure a more mutual focus on the research centres' goals, as one of the university partners (UG2) explained:

> We [the research centre] just had a meeting in the fall, and we suggested some activities – both the university partners and the firms. And the research centre partners have meetings where we present and discuss these suggestions, then we have one more session [with discussions] before we make it a [formal] suggestion for the work plans.

In some cases, the firm partners added their own internal research projects in the research centres, thus *merging firm projects with the research centres*. One of the university partners (UE2) illustrated how they included firm projects into the research centre:

> There were some early discussions with [new] partners about some projects, and these discussions continued in the research centre until the summer. It became a possibility to include the [new] partners and suggest an activity that the [new] partners were interested in. Then, it was accepted by the [research centre] board.

The firm partners' internal projects were used in the research centres to attain both the research goals and the innovation goals: '[The research centre] has merged [research questions] with the firms' field cases. Hence, we get information about [technological processes] that the firms have' (FA3).

Thus, during the second phase of the research centres, the firm partners were involved both in steering the research centres' agendas and goals and in engaging in activities and projects that the research partners had established. Further, in some research centres, the firms were able to incorporate their own internal projects into the research centres.

Adjusting goal-attainment practices

During the second phase, the research partners *adjusted the goal-attainment practices* in the research centres. The centres' *adaption of firm practices* was based on the feedback the research partners got from the firms: 'It was a suggestion [from the firms]. It was the midway evaluation, and the firms recommended this kind of change, which we have now implemented' (UA2). Another researcher (UE1) explained the need to adjust the practices to ensure continuous collaboration: 'We are being directed more towards the firms' primary areas after the midway evaluation because we see that the industry is fragile, and the academic community is fragile, so we have to keep being operational. We need to have people that can run fast enough'.

To ensure the attainment of the innovation goals, the research partners engaged the firms more heavily in developing the annual work plans, as one of the researchers (UZ1) explained:

> We are working with annual work plans. And in the process of development [of the work plans], we are focused on the firm partners, and we challenge the firm partners [to see] whether they have any projects that can be interesting for us to work with. For example, our pilot projects are very firm driven.

The research partners also *prioritized firm-oriented projects* and reduced projects that the firms deemed irrelevant to attaining the innovation goals. One university partner (UG1) explained this prioritization as follows:

> We had an internal process with the board and the firm partners and looked at how the research centre could be improved in relation to firm relevance—how it [the research centre] could contribute to the firms, and how we could make the

work more efficient by merging some projects. So, we reduced the number of projects from six to three.

During this phase, the research partners also began *working on applied short-term research projects*: 'What we have ended up doing, and it has been very intentional, is to develop activities in the centre that we believe are very relevant for the firms in relatively short time frames' (UE1). These short-term projects included more applied research, such as technology evaluations and design, as illustrated by a university partner (UB3) who worked on a project related to firm product design: 'It is basically related to design of [product] and things like that, so we are kind of a neutral partner and not a [product] supplier that could have done something similar'. However, even though the research centres began to work more on applied research projects, they continued to do the long-term projects established in the first phase. As such, the research centres *worked on both short-term and long-term projects* and tried to balance the work between these two types of projects, as one of the researchers (UB1) explained: 'Since we changed the way we plan the work, we try to have a balance between short-term and long-term projects for the partners versus projects that are more general and more fundamental'.

Modifying goal measurements

During the second phase, the research partners also *modified the goal measurements* to ensure the attainment of the innovation goals. We understand modifying the goal measurements as the research partners' work in using more innovation-oriented measurements to measure the attainment of the innovation goals. Hence, over time, to attain the innovation goals, the research partners began to *translate basic research results* into more innovation-oriented deliverables. As such, the research partners wrote up their basic research results with more emphasis on the implications for the firms, as explained by one of the researchers (UZ1):

> We have made a system where we send all summaries or popular science productions of the basic research articles to every partner. It is one of the things

> we have worked on to ensure that all the partners have access to our results. They get a one-pager with a figure, preferably where we state why it is important for the research centre, and everybody gets them.

Some of the research partners merged different basic research results into aggregated reports with explicit implications for the firms such that the basic research results were directly translated into the firms' processes. As one of the firm partners (FA1) explained, 'Some aggregated reports were made. We studied [an area] that had a large focus [in the research centre], which were collected and integrated into a report'.

During the second phase, the research partners also began to *use innovation-oriented measurements* to report potential innovations that were developed, internally in the research centres. They focused on mapping and developing these innovations, as illustrated by one of the researchers (UB3): 'We have made a system where we gather information about possible innovations, and we follow up on them. We have included them into the work plan, where it says what they are supposed to do and [where they] should be delivered'.

The research partners also intensified the attainment of the innovation goals by using the research centres' available resources (Sitkin et al., 2011) to establish specific innovation committees, which were run by the firm partners. The innovation committees were tasked with making the research results applicable for the firms, as one researcher (UA3) explained: 'We have our own committee for commercialization and industrialization and things like that, which consists of the firm partners, who have a lot of focus on confidentiality, guidelines for publishing, and how to ensure that the results are applicable'.

Our findings suggest that over time, most of the research centres' goal attainment was related to translating the research results using more innovation-oriented measurement. Hence, the research partners adjusted their goal-attainment measurements and focused more on innovation-oriented measurements, which enabled them to attend to the innovation goals more.

A model of conflicting goal-attainment strategies

Based on our findings, we developed a generalized model of how the partners in UICs work to attain multiple and conflicting goals over time (see Figure 3).

Insert Figure 3 about here

Initial goal establishment

Organizational behaviour theory emphasizes the importance of goal setting in organizations (Cyert and March, 1963) to ensure high performance and the unified pursuit of outcomes (Kotlar and De Massis, 2013, Linder and Foss, 2018). Our findings show that during the preformation phase of a research centre, the partners develop multiple goals adhering to their institutional logics (Gulbrandsen et al., 2015). Unsurprisingly, prior studies have shown that if the partners in a research centre do not see the value of the goals, they will most likely not partake in pursuing the associated outcomes (Perkmann et al., 2018) and will drop out from the collaboration (Gray et al., 2001, Thune and Gulbrandsen, 2014). Accordingly, this finding echo prior studies (Gulbrandsen et al., 2015, Perkmann et al., 2018) by showing that a first step in developing a research centre entails establishing two overarching goals: one goal oriented towards the academic institutional logic and one goal oriented towards the commercial logic.

Furthermore, prior studies on multiple goals have argued that research centres establish two overarching goals at the same hierarchical level (Gulbrandsen et al., 2015). Our findings echo these studies, showing that the partners establish two overarching goals: one overarching goal that the research partners are primarily concerned about attaining, which adheres to the academic logic, and one overarching goal that the firm partners are concerned with attaining, which adheres to the commercial logic. We suggest that these goals are established at the same hierarchical level to ensure commitment from both partners and continuous collaboration within these research centres.

As such, we suggest that in a research centre influenced by an academic logic and a commercial logic, there is a need to establish multiple goals aligned with the different institutional logics present. Furthermore, we argue that to ensure the survival of and commitment to the research centre, goal establishment needs to include multiple goals that are at the same hierarchical level. Thus, we propose the following:

> **Proposition 1:** It is more likely that firms and research organizations establish a research centre if they develop multiple goals at the same hierarchical level that are aligned with the institutional logics present.

Research attainment strategy

Based on our observations, the first step the research partners in a research centre take to attain the conflicting goals of research and innovation (Lauvås and Steinmo, 2019), which are established at the same hierarchical level, involves attaining the research goal and employing a research attainment strategy. On the one hand, attaining research goals and employing a research attainment strategy entail establishing activities and practices adhering to the research partners' academic logic. On the other hand, these activities involve establishing subgoal measurements that are suited to keeping track of the overarching goal adhering to the academic logic within the research centre.

Prior studies have emphasized that attaining multiple goals follows an established priority order (Greve, 2008). Our findings supplement these studies by showing that the research partners of a research centre *create* the priority order of the multiple conflicting goals by establishing activities and developing subgoal measurements adhering to the academic logic. As such, by employing a research attainment strategy, the research partners are able to sustain their usual work practices and, in a sense, protect the academic logic and the goal adhering to this logic (Perkmann et al., 2018). Hence, we argue that rather than having a specific goal order (Greve, 2008) within the research centre, the partners develop a specific practice that in turn creates the priority order of the conflicting goals.

Concomitantly, our findings show that the research partners develop subgoal measurements connected to the overarching goal adhering to the academic logic (Kruglanski et al., 2018). Prior research on organizational behaviour has shown that establishing subgoals and subgoal measurements often enhances the attainment of higher-level goals and amplifies the focal workforce's performance in attaining subgoals (Cohen, 1984). Furthermore, studies on multiple goal attainment (e.g., Gagné, 2018) have found that establishing goal measurements ensures a progress overview of the overarching goal-pursuit process within an organization. Our cases complement these findings by suggesting that the research partners in research centres establish subgoal measurements suited for the overarching goal adhering to the academic logic as a part of their goal-attainment strategy, which ensures that the research partners can keep track of their outcomes related to one of the overarching goals while simultaneously ensuring that the research centres keep the attention on the goal favoured by the research partners.

As such, we suggest that the research partners in a structural hybrid use a research attainment strategy to prioritize and keep attention on the goal adhering to the academic logic. In turn, this strategy leads to the attainment of one of the conflicting goals. Thus, we propose the following:

> **Proposition 2**: The research partners' use of a research attainment strategy in a research centre is likely to prioritize and keep attention on the goal adhering to the academic logic, thereby leading the research partners to attain the goal subscribing to the academic logic.

Furthermore, while the research partners in a research centre develop a priority order to deal with the conflicting goals and ensure attention on the goal adhering to the academic logic, our data suggest that this would not be possible without the firm partners' accedence to the established practices and measurements within the hybrid space. Greve and Teh (2018) showed that goal pursuit is dependent on mutual commitment and agreement over which goal to pursue and how. As such, our findings add nuance to prior research on organizational goals by showing that the firm partners

in a hybrid space can take on a more passive role and passively agree to the research attainment strategy implemented by the research partners, which prioritizes the goal adhering to the academic logic. As such, we suggest that the research partners' use of a research attainment strategy to ensure the attainment of the overarching research goal is only possible when the firm partners accede to the research partners' practices and overarching goal. Thus, we propose the following:

> **Proposition 3:** The research partners' use of research attainment strategy in a research centre is more likely when the firm partners accede to the proposed practices and overarching goal adhering to the academic logic.

Hybridizing goal attainment

During the second phase of a research centre, the research partners change their goal-attainment strategy from a research attainment strategy to a hybrid strategy, which relates to hybridizing goal attainment. Our findings show how the accentuation of firm practices and goals enables an adjustment in goal-attainment practices.

Attainment strategies for conflicting goals have previously been based on the organizations aspiration levels for goals (Gaba and Greve, 2019, Audia and Greve, 2021). Gaba and Greve (2019) found that when organizations have low aspiration levels for some goals, they shift their focus towards these goals and thus give sequential attention to conflicting goals (Greve, 2008). As such, our findings both contradict and complement these prior studies by showing that when the firm partners over time experienced that the goal adhering to the commercial logic is not prioritized by the research partners, they challenge the established research attainment strategy. The firm partners accentuate their own practices and goals to ensure a shift in attention within the research centre. Moreover, our findings show that this change in the firm partners' behaviour is triggered by an event within the research centre—namely, the possibility to give formal feedback to the research partners through the official midway evaluation led by the Research Council of Norway. Thus, the firm partners put pressure on the research partners, amplify their own practices, and

challenge the research partners' strategies and priorities (Besharov and Smith, 2014). Hence, we suggest that to ensure the attainment of the goal adhering to the commercial logic, the firm partners must accentuate their own practices within the research centre. Thus, we propose the following:

> **Proposition 4:** If the firm partners in a research centre accentuate their goal and practices while also challenging the established research attainment strategy implemented by the research partners, the goal adhering to the commercial logic is more likely to be attained.

As such, our findings show that because of pressure from the firm partners in the research centre, the research partners adjust and modify the established practices and goal measurements towards hybridized goal-attainment practices. Prior studies on research centres show that research centres often struggle with hybridizing practices to achieve goals of research and innovation (Gulbrandsen et al., 2015). However, in our study the research centres managed to hybridize the goal attainment practices through the adjustment of the practices and measurements that directly impeded the attainment of the goal adhering to the commercial logic. By hybridizing the established goal-attainment practices, the research partners develop a hybrid goal strategy that ensures the attainment of the overarching goal subscribing to the academic logic while simultaneously attaining the overarching goal adhering to the commercial logic.

Prior studies have argued that the simultaneous attainment of multiple goals in complex organizations is often resource demanding and may create decision-making problems since the workforce may need to be spatially differentiated (Ethiraj and Levinthal, 2009, Obloj and Sengul, 2020). However, our findings show that the research partners in a research centres adjust their goal-attainment practices in a way that maintains practices that ensure the attainment of the research partners' favoured goal (Perkmann et al., 2018) but also includes a bridging strategy that combines practices from each partner (Smets et al., 2015). The combination of practices ensures that the outcomes are valuable for both partners. As such, our findings show that the research partners' use of a hybrid strategy involves adjusting practices that are in direct conflict

with the firm partners but still allows for the attainment of the research partners' favoured goal (Perkmann et al., 2018). Combining practices allows the practices from the two logics to complement the outcomes and ensures the attainment of both conflicting goals (Smets et al., 2015).

Our findings are thus able to contrast and provide further insights into the findings of Gulbrandsen et al. (2015) who studied eight Norwegian research centres operating within a similar scheme as the centres of our study. Gulbrandsen et al. (2015) studied the centres three to four years after initiation and concluded that five centres showed limited signs of hybrid practices, while three showed signs emerging hybrid practices. A possible explanation for Gulbrandsen et al. (2015) limited signs of emerging hybrid practices, is the time lag that we observe before hybrid goal attainment is achieved in research centres. Hence, our longitudinal study provides insights into how hybrid goal attainment is achieved over time in research centres.

In sum, our study extends prior literature on UICs and research centres as we argue that the research partners' use of a hybrid goal strategy includes adjusting practices that are in conflict with the goals of the firm partners (Perkmann et al., 2018). In addition, our study extends prior literature on UICs by suggesting that the use of a hybrid goal strategy enables the integration of both goals of research and innovation, by combining practices (Vedel, 2021). Thus, we propose the following:

> **Proposition 5:** The use of a hybrid strategy within a research centre more likely enables the firm and research partners to attain multiple conflicting goals simultaneously.

Conclusion and implications

The aim of this study was to examine the dynamics underlying how the partners in research centres attain conflicting goals over time. By following the attention and practices of research organizations and firm partners as they worked to achieve conflicting goals, our study contributes to the literatures on organizational goals (Kotlar et al., 2018), and university-industry collaboration (de Wit-de Vries et al., 2018). More precisely, we contribute with an in-depth account of the dynamic process of attaining

multiple and conflicting goals in institutionally complex spaces (Audia and Greve, 2021), such as university-industry research centres (Fini et al., 2019)

Our empirical data stems from six university-industry research centres followed from their preformation phase throughout their entire eight-year lifespan. Our findings show how the research partners used different strategies during the two main phases of their collaborations to attain the conflicting goals of academic research and industrial innovation.

Our main findings are related to how the research partners dealt with the conflicting goals of research and innovation in the research centres. First, we found that the establishment of the centres involved a preformation phase, which led to the formulation of two goals at the same hierarchical level adhering to the research partners' academic logic and the other adhering to the firm partners' commercial logic (Gulbrandsen et al., 2015). Second, the research partners established practices that attended to the goal subscribing to the academic logic by creating a priority order for the conflicting goals during the first phase. The creation of a priority order was possible because the firm partners acceded to the research partners' strategy to attend to their favoured goal. However, the lack of attention to the goal adhering to the commercial logic created a growing tension within the research centre, which led to a triggering event that caused the research centre to change. Thus, during the second phase, the research partners adjusted the established practices, and the firm partners accentuated the goal adhering to the commercial logic, which led the research partners to hybridize their goal practices to include both goals.

Our main findings contribute to organizational goal theory (Kotlar et al., 2018) by demonstrating how institutionally complex collaborations manage conflicting goals adhering to different institutional logics and highlighting two distinct goal-attainment strategies: research attaining and hybridizing (Perkmann et al., 2018). While prior studies on organizational goal theory (Greve, 2008) have assumed that goals have a natural and clear priority order (Gaba and Greve, 2019) and that goals can be attained either sequentially or simultaneously (Greve, 2008, Miron-Spektor and Beenen, 2015),

our findings imply that the priority order of goals is not given and that the research partners in a research centre create the priority order through a bolstering strategy. Furthermore, our findings contribute to the literature on research centres by showing that hybrid goal strategies in research centres include a combination of practices and elements from the different institutional logics present to integrate the conflicting goals into the collaboration process (Vedel, 2021). Moreover, our study contributes to the university-industry collaboration literature (de Wit-de Vries et al., 2018) by showing how the multiple goals of research and innovation influences how firms and research organizations interact and collaborate over time (Fini et al., 2019).

In sum, our main contribution is a process model outlining the organizational solutions used to deal with and achieve conflicting goals in research centres, which combines and merges organizational goal theory (Audia and Greve, 2021) and university-industry collaboration literature (Perkmann and Walsh, 2007) focusing specifically on university-industry research centres (Boardman and Gray, 2010).

Implications

Our study has important implications for partners involved in research centres, particularly those characterized by conflicting goals, and policymakers that fund and support these types of collaborations.

While the research partners' use of a research attainment strategy during the first phase enabled to attain their favoured goals, the lack of focus on the firm partners' favoured goals created growing tensions within the hybrid spaces we explored. As such, our findings suggest that to maintain these types of collaborations and retain the possibility to attend to the research partners' favoured goals, at some point, the research partners need to focus their attention on the firm partners and the goals adhering to the commercial logic(s). We speculate that if the research partners had not changed their strategies during these collaborations, the research centre might have failed because of insufficient benefits for the firm partners involved (Perkmann et al., 2018).

Furthermore, we suggest that the research partners became more open to attending to the firm goals because they first succeeded with attaining the research goal, but the change in behaviour and strategy seemed to depend on a triggering event. As such, our findings suggest that the firm partners in a research centre should accept that the research partners need to pursue the goals adhering to the academic logic but should be aware that the goals adhering to the commercial logic(s) are unlikely to be prioritized unless they are triggered. Thus, we suggest that the firm partners need to take an active role within research centres to ensure the attainment of goals adhering to their commercial logic(s).

For policymakers, these findings indicate that research centres should include opportunities for the firm partners to give formal feedback to the research partners since the midway evaluations in our cases contributed to triggering the change in the goal-attainment strategy used to include innovation goals.

Limitations and future research

While we believe our study makes important contributions to both institutional theory and organizational goal theory, it is not without limitations.

First, while our study is built on six different university-industry research centres, the findings are still context dependent. Thus, future studies could explore other types of research centres to determine whether and how different partners subscribing to different logics attain conflicting goals.

Second, our reliance mainly on qualitative data to study the attainment of conflicting goals in research centres contributes to an in-depth understanding of goal-attainment strategies and processes but may need additional testing to ensure the generalizability of our findings. Thus, we developed propositions we hope can be tested quantitively to further develop the knowledge on goal-attainment strategies when dealing with conflicting goals.

Third, an additional aspect we think is worth exploring in future research is the triggering event that triggers the firm partners to accentuate their goals and practices

within a research centre. Since our study found that the triggering event had substantial implications for how the conflicting goals were attended to during the second phase, we can only speculate how the conflicting goals would be attained if the firm partners never got the opportunity to give formal feedback to the research partners in the research centres.

Tables and Figures

Figure 1: Overview of coding structure

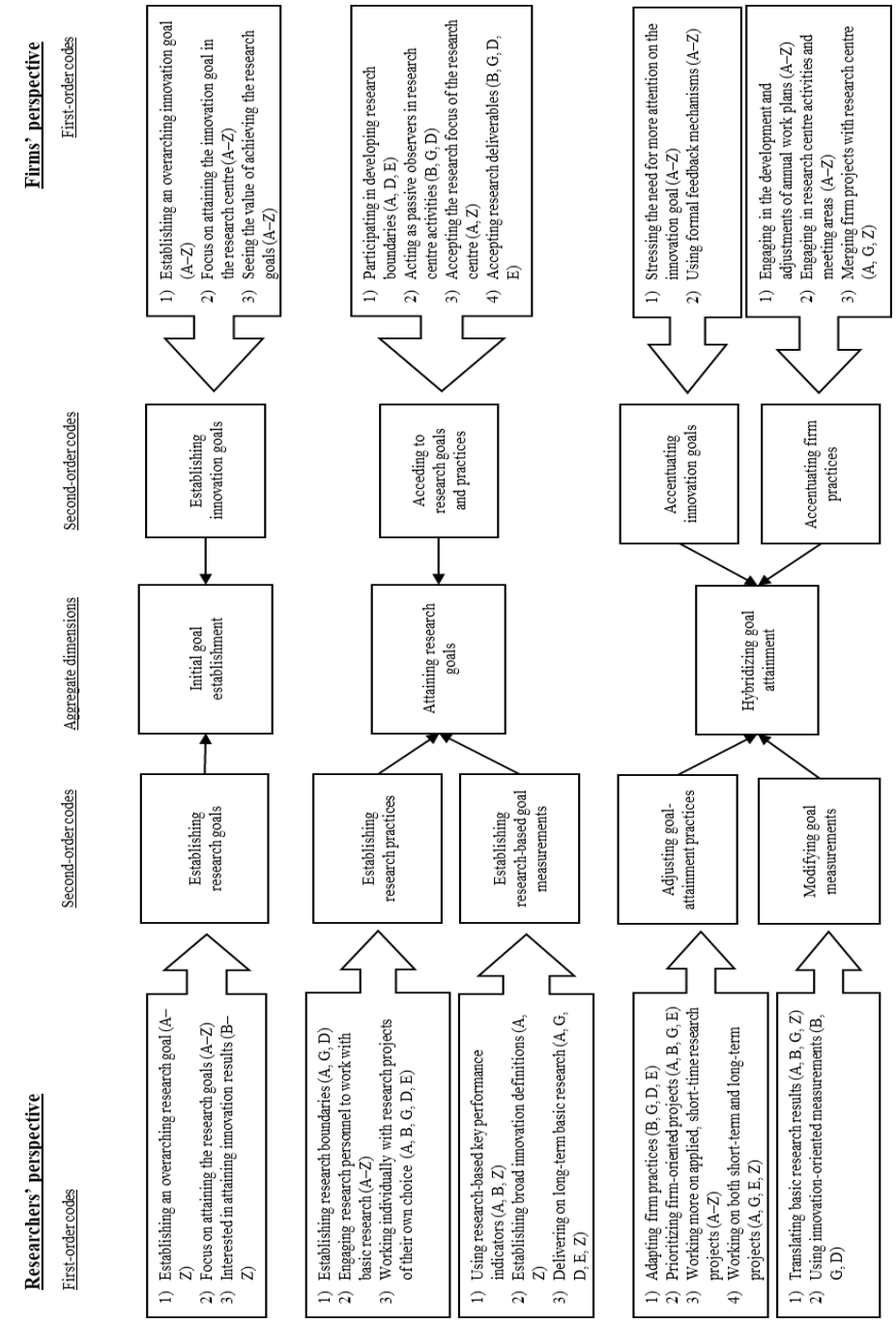


Figure 2: The process of hybridizing goal attainment practices in research centres

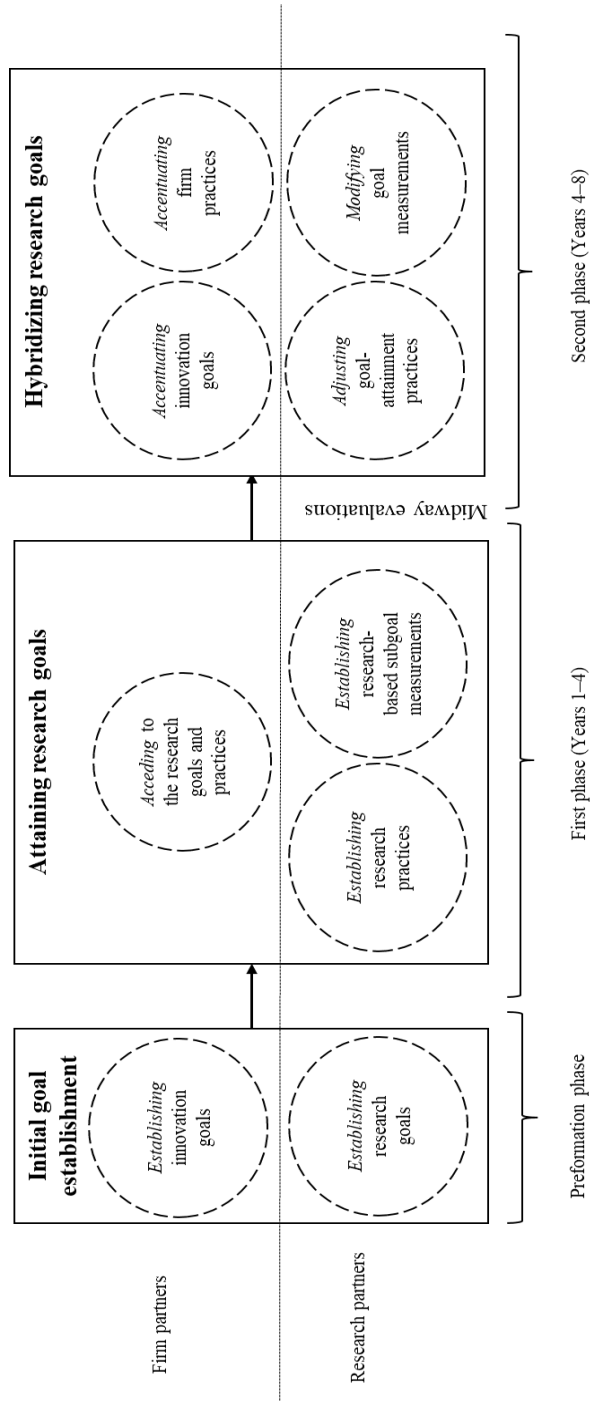
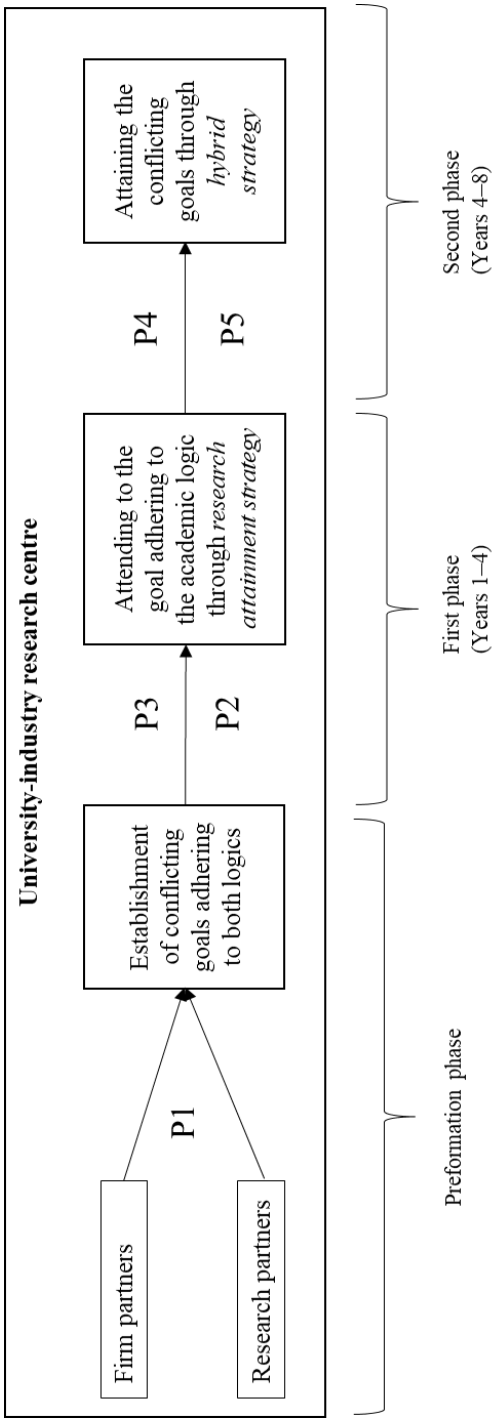


Figure 3: Goal attainment strategies for conflicting goals in university-industry research centres



References

ABRAMOVSKY, L., KREMP, E., LÓPEZ, A., SCHMIDT, T. & SIMPSON, H. 2009. Understanding co-operative innovative activity: evidence from four European countries. *Economics of Innovation and New Technology,* 18**,** 243-265.

AGHION, P., DEWATRIPONT, M. & STEIN, J. C. 2008. Academic freedom, private‐sector focus, and the process of innovation. *The RAND Journal of Economics,* 39**,** 617-635.

AUDIA, P. G. & GREVE, H. R. 2021. Organizational Learning from Performance Feedback: A Behavioral Perspective on Multiple Goals: A Multiple Goals Perspective. Cambridge: Cambridge University Press.

BATTILANA, J. & DORADO, S. 2010. Building sustainable hybrid organizations: The case of commercial microfinance organizations. *Academy of management Journal,* 53**,** 1419-1440.

BAUM, J. A., ROWLEY, T. J., SHIPILOV, A. V. & CHUANG, Y.-T. 2005. Dancing with strangers: Aspiration performance and the search for underwriting syndicate partners. *Administrative Science Quarterly,* 50**,** 536-575.

BESHAROV, M. L. & SMITH, W. K. 2014. Multiple institutional logics in organizations: Explaining their varied nature and implications. *Academy of management review,* 39**,** 364-381.

BILLINGER, S., SRIKANTH, K., STIEGLITZ, N. & SCHUMACHER, T. R. 2020. Exploration and exploitation in complex search tasks: How feedback influences whether and where human agents search. *Strategic Management Journal*.

BOARDMAN, C. & BOZEMAN, B. 2007. Role Strain in University Research Centers. *The Journal of Higher Education,* 78**,** 430-463.

BOARDMAN, C. & GRAY, D. 2010. The new science and engineering management: cooperative research centers as government policies, industry strategies, and organizations. *The Journal of Technology Transfer,* 35**,** 445-459.

BRUNEEL, J., D'ESTE, P. & SALTER, A. 2010. Investigating the factors that diminish the barriers to university–industry collaboration. *Research policy,* 39**,** 858-868.

CANHOTO, A. I., QUINTON, S., JACKSON, P. & DIBB, S. 2016. The co-production of value in digital, university–industry R&D collaborative projects. *Industrial Marketing Management,* 56**,** 86-96.

COHEN, M. D. 1984. Conflict and complexity: Goal diversity and organizational search effectiveness. *The American Political Science Review***,** 435-451.

COHEN, W. M., NELSON, R. R. & WALSH, J. P. 2002. Links and impacts: the influence of public research on industrial R&D. *Management science,* 48**,** 1-23.

CYERT, R. M. & MARCH, J. G. 1963. A behavioral theory of the firm. *Englewood Cliffs, NJ,* 2**,** 169-187.

DE WIT-DE VRIES, E., DOLFSMA, W. A., VAN DER WINDT, H. J. & GERKEMA, M. P. 2018. Knowledge transfer in university–industry research partnerships: a review. *The Journal of Technology Transfer*.

DU, J., LETEN, B. & VANHAVERBEKE, W. 2014. Managing open innovation projects with science-based and market-based partners. *Research Policy,* 43**,** 828-840.

EISENHARDT, K. M. 1989. Building Theories from Case Study Research. *The Academy of Management Review,* 14**,** 532-550.

ESTRADA, I., FAEMS, D., MARTIN CRUZ, N. & PEREZ SANTANA, P. 2016. The role of interpartner dissimilarities in Industry-University alliances: Insights from a comparative case study. *Research Policy,* 45**,** 2008-2022.

ETHIRAJ, S. K. & LEVINTHAL, D. 2009. Hoping for A to Z while rewarding only A: Complex organizations and multiple goals. *Organization Science,* 20**,** 4-21.

FINI, R., RASMUSSEN, E., WIKLUND, J. & WRIGHT, M. 2019. Theories from the lab: how research on science commercialization can contribute to management studies. *Journal of Management Studies,* 56**,** 865-894.

FRIEDLAND, R. & ALFORD, R. R. 1991. Bringing society back in: Symbols, practices, and institutional contradictions. *The new institutionalism in organizational analysis*, 232-263.
GABA, V. & GREVE, H. R. 2019. Safe or Profitable? The Pursuit of Conflicting Goals. *Organization Science*.
GAGNÉ, M. 2018. From Strategy to Action: Transforming Organizational Goals into Organizational Behavior. *International Journal of Management Reviews,* 20**,** 83-104.
GILSING, V., BEKKERS, R., FREITAS, I. M. B. & VAN DER STEEN, M. 2011. Differences in technology transfer between science-based and development-based industries: Transfer mechanisms and barriers. *Technovation,* 31**,** 638-647.
GIOIA, D. A., CORLEY, K. G. & HAMILTON, A. L. 2013. Seeking qualitative rigor in inductive research: Notes on the Gioia methodology. *Organizational research methods,* 16**,** 15-31.
GRAY, D. O., LINDBLAD, M. & RUDOLPH, J. 2001. Industry–university research centers: a multivariate analysis of member retention. *The Journal of Technology Transfer,* 26**,** 247-254.
GREENWOOD, R., RAYNARD, M., KODEIH, F., MICELOTTA, E. R. & LOUNSBURY, M. 2011. Institutional complexity and organizational responses. *Academy of Management annals,* 5**,** 317-371.
GRETSCH, O., TIETZE, F. & KOCK, A. 2020. Firms' intellectual property ownership aggressiveness in university–industry collaboration projects: Choosing the right governance mode. *Creativity and Innovation Management,* 29**,** 359-370.
GREVE, H. R. 2003a. A behavioral theory of R&D expenditures and innovations: Evidence from shipbuilding. *Academy of management journal,* 46**,** 685-702.
GREVE, H. R. 2003b. *Organizational learning from performance feedback: A behavioral perspective on innovation and change*, Cambridge University Press.
GREVE, H. R. 2008. A behavioral theory of firm growth: Sequential attention to size and performance goals. *Academy of Management Journal,* 51**,** 476-494.
GREVE, H. R. & TEH, D. 2018. Goal selection internally and externally: A behavioral theory of institutionalization. *International Journal of Management Reviews,* 20**,** S19-S38.
GULATI, R., WOHLGEZOGEN, F. & ZHELYAZKOV, P. 2012. The two facets of collaboration: Cooperation and coordination in strategic alliances. *The Academy of Management Annals,* 6**,** 531-583.
GULBRANDSEN, M., THUNE, T., BORLAUG, S. B. & HANSON, J. 2015. Emerging hybrid practices in public-private research centres. *Public Administration,* 93**,** 363-379.
HERMUNDSDOTTIR, F. & ASPELUND, A. 2021. Sustainability innovations and firm competitiveness: A review. *Journal of Cleaner Production,* 280**,** 124715.
JAY, J. 2013. Navigating paradox as a mechanism of change and innovation in hybrid organizations. *Academy of management journal,* 56**,** 137-159.
KAVUSAN, K., NOORDERHAVEN, N. G. & DUYSTERS, G. M. 2016. Knowledge acquisition and complementary specialization in alliances: The impact of technological overlap and alliance experience. *Research policy,* 45**,** 2153-2165.
KOTLAR, J. & DE MASSIS, A. 2013. Goal setting in family firms: Goal diversity, social interactions, and collective commitment to family‐centered goals. *Entrepreneurship Theory and Practice,* 37**,** 1263-1288.
KOTLAR, J., MASSIS, A., WRIGHT, M. & FRATTINI, F. 2018. Organizational Goals: Antecedents, Formation Processes and Implications for Firm Behavior and Performance. *International Journal of Management Reviews,* 20**,** 3-18.
KRUGLANSKI, A. W., SHAH, J. Y., FISHBACH, A. & FRIEDMAN, R. 2018. A theory of goal systems. *The Motivated Mind.* Routledge.
KRUGLANSKI, A. W., SHAH, J. Y., FISHBACH, A., FRIEDMAN, R., CHUN, W. & SLEETH-KEPPLER, D. 2002. A theory of goal systems. *Advances in experimental social psychology,* 34.
LAURSEN, K. & SALTER, A. 2004. Searching high and low: what types of firms use universities as a source of innovation? *Research policy,* 33**,** 1201-1215.
LAUVÅS, T. & STEINMO, M. 2019. The role of proximity dimensions and mutual commitment in shaping the performance of university-industry research centres. *Innovation*, 1-27.

LINDER, S. & FOSS, N. J. 2018. Microfoundations of organizational goals: a review and new directions for future research. *International Journal of Management Reviews,* 20**,** 39-62.
MAIR, J., MAYER, J. & LUTZ, E. 2015. Navigating institutional plurality: Organizational governance in hybrid organizations. *Organization Studies,* 36**,** 713-739.
MARKMAN, G. D., RUSSO, M., LUMPKIN, G., JENNINGS, P. D. & MAIR, J. 2016. Entrepreneurship as a platform for pursuing multiple goals: A special issue on sustainability, ethics, and entrepreneurship. *Journal of Management Studies,* 53**,** 673-694.
MILLER, C. C., CARDINAL, L. B. & GLICK, W. H. 1997. Retrospective reports in organizational research: A reexamination of recent evidence. *Academy of management journal,* 40**,** 189-204.
MIRON-SPEKTOR, E. & BEENEN, G. 2015. Motivating creativity: The effects of sequential and simultaneous learning and performance achievement goals on product novelty and usefulness. *Organizational Behavior and Human Decision Processes,* 127**,** 53-65.
MORANDI, V. 2013. The management of industry–university joint research projects: how do partners coordinate and control R&D activities? *The Journal of Technology Transfer,* 38**,** 69-92.
MURRAY, F. 2004. The role of academic inventors in entrepreneurial firms: sharing the laboratory life. *Research Policy,* 33**,** 643-659.
OBLOJ, T. & SENGUL, M. 2020. What Do Multiple Objectives Really Mean For Performance? Empirical Evidence From the French Manufacturing Sector. *Strategic Management Journal*.
OKAMURO, H. 2007. Determinants of successful R&D cooperation in Japanese small businesses: The impact of organizational and contractual characteristics. *Research Policy,* 36**,** 1529-1544.
PACHE, A.-C. & SANTOS, F. 2013. Inside the hybrid organization: Selective coupling as a response to competing institutional logics. *Academy of management journal,* 56**,** 972-1001.
PERKMANN, M., MCKELVEY, M. & PHILLIPS, N. 2018. Protecting Scientists from Gordon Gekko: How Organizations Use Hybrid Spaces to Engage with Multiple Institutional Logics. *Organization Science,* 30**,** 298-318.
PERKMANN, M., TARTARI, V., MCKELVEY, M., AUTIO, E., BROSTRÖM, A., D'ESTE, P., FINI, R., GEUNA, A., GRIMALDI, R., HUGHES, A., KRABEL, S., KITSON, M., LLERENA, P., LISSONI, F., SALTER, A. & SOBRERO, M. 2013. Academic engagement and commercialisation: A review of the literature on university–industry relations. *Research Policy,* 42**,** 423-442.
PERKMANN, M. & WALSH, K. 2007. University–industry relationships and open innovation: Towards a research agenda. *International Journal of Management Reviews,* 9**,** 259-280.
RANGANATHAN, R., GHOSH, A. & ROSENKOPF, L. 2018. Competition–cooperation interplay during multifirm technology coordination: The effect of firm heterogeneity on conflict and consensus in a technology standards organization. *Strategic Management Journal,* 39**,** 3193-3221.
SALDAÑA, J. 2015. *The coding manual for qualitative researchers*, Sage.
SAUERMANN, H. & STEPHAN, P. 2013. Conflicting logics? A multidimensional view of industrial and academic science. *Organization science,* 24**,** 889-909.
SCHILDT, H. & PERKMANN, M. 2017. Organizational settlements: Theorizing how organizations respond to institutional complexity. *Journal of Management Inquiry,* 26**,** 139-145.
SITKIN, S. B., SEE, K. E., MILLER, C. C., LAWLESS, M. W. & CARTON, A. M. 2011. The Paradox of Stretch Goals: Organizations in Pursuit of the Seemingly Impossible. *Academy of Management Review,* 36**,** 544-566.
SKUTE, I., ZALEWSKA-KUREK, K., HATAK, I. & DE WEERD-NEDERHOF, P. 2019. Mapping the field: a bibliometric analysis of the literature on university–industry collaborations. *The Journal of Technology Transfer,* 44**,** 916-947.
SMETS, M., JARZABKOWSKI, P., BURKE, G. T. & SPEE, P. 2015. Reinsurance trading in Lloyd's of London: Balancing conflicting-yet-complementary logics in practice. *Academy of management journal,* 58**,** 932-970.
STEINMO, M. 2015. Collaboration for innovation: A case study on how social capital mitigates collaborative challenges in university–industry research alliances. *Industry and innovation,* 22**,** 597-624.

STEVENS, R., MORAY, N., BRUNEEL, J. & CLARYSSE, B. 2015. Attention allocation to multiple goals: The case of for-profit social enterprises. *Strategic Management Journal,* 36**,** 1006-1016.

THORNTON, P. H., OCASIO, W. & LOUNSBURY, M. 2012. *The Institutional Logics Perspective: A New Approach to Culture, Structure and Process,* Oxford, Oxford University Press.

THUNE, T. & GULBRANDSEN, M. 2014. Dynamics of collaboration in university–industry partnerships: do initial conditions explain development patterns? *The Journal of Technology Transfer,* 39**,** 977-993.

UNSWORTH, K., YEO, G. & BECK, J. 2014. Multiple goals: A review and derivation of general principles. *Journal of Organizational Behavior,* 35**,** 1064-1078.

VEDEL, J. B. 2021. Balancing Conflicting Goals in Interorganizational Collaborations in the Pharmaceutical Industry: A Contractual Dynamics View. *European Management Review,* 18**,** 71-83.

VEGA-JURADO, J., KASK, S. & MANJARRÉS-HENRIQUEZ, L. 2017. University industry links and product innovation: cooperate or contract? *Journal of technology management & innovation,* 12**,** 1-8.

WRY, T., COBB, J. A. & ALDRICH, H. E. 2013. More than a metaphor: Assessing the historical legacy of resource dependence and its contemporary promise as a theory of environmental complexity. *Academy of Management annals,* 7**,** 441-488.

YIN, R. K. 2014. *Case study research : design and methods,* Los Angeles, SAGE.

ZELLWEGER, T. M., NASON, R. S., NORDQVIST, M. & BRUSH, C. G. 2013. Why do family firms strive for nonfinancial goals? An organizational identity perspective. *Entrepreneurship Theory and practice,* 37**,** 229-248.

Utgitt i ph.d. serie ved Handelshøgskolen:

Nr. 1 – 2003 Lars Øystein Widding
Bygging av kunnskapsreservoarer i teknologibaserte nyetableringer

Nr. 2 – 2005 Pawan Adhikari
Government Accounting in Nepal: Tracing the Past and the Present

Nr. 3 – 2005 Tor Korneliussen
The Relationship between Initation, Barriers, Product Quality and Internationalization

Nr. 4 – 2005 Bjørn Willy Åmo
Employee innovation behavior

Nr. 5 – 2005 Odd Birger Hansen
Regnskap og entreprenørskap. En fortolkende studie av hvordan to entreprenører bruker regnskap

Nr. 6 – 2006 Espen John Isaksen
Early Business Performance
- Initial factors effecting new business outcomes

Nr. 7 – 2006 Konstantin Timoshenko
Russian Government Accounting:
Changes at the Central level and at a University

Nr. 8 – 2006 Einar Rasmussen
Facilitating university spin-off ventures
-an entrepreneurship process perspective

Nr. 9 – 2007 Gry Agnete Alsos
Portfolio Entrepreneurship - general and farm contexts

Nr. 10 – 2007 Elsa Solstad
Tre sykehus - to verdener - en fusjon.
En studie av reorganisering i et helseforetak

Nr. 11 – 2007 Levi Gårseth-Nesbakk
Experimentation with accrual accounting at the central government level in Norway - how a global phenomenon becomes a local practice

Nr. 12 – 2007 Tatiana Iakovleva
Factors Associated with new venture performance:
The context of St. Petersburg

Nr. 13 – 2007 Einar Lier Madsen
Utvikling av dynamiske kapabiliteter i små og mellomstore bedrifter

Nr. 14 – 2008 Anne Haugen Gausdal
'Network Reflection' – a road to regional learning, trust and innovation

Nr. 15 – 2008 Lars Rønning
Social capital in farm-based entrepreneurship and rural development

Nr. 16 – 2008 Terje Andreas Mathisen
Public Passenger Transport in Norway – Regulation, Operators' Cost Structure and Passengers' Travel Costs

Nr. 17 – 2008 Evgueni Vinogradov
Immigrant Entrepreneurship in Norway

Nr. 18 – 2008 Elin Oftedal
Legitimacy of Creative Destruction

Nr. 19 – 2009 Frode Kjærland
Valuation of Generation Assets – a Real Option Approach

Nr. 20 – 2009 Tatiana Maximova-Mentzoni
Marketization of the Russian University: Origins, Features and Outcomes

Nr. 21– 2009 Hugo Skålsvik
Studies of Market led Processes influencing Service Performance:
-Case Studies on the Norwegian Coastal Voyage

Nr. 22– 2009 Svein Oskar Lauvsnes
Determinants of a shifting effective demand equilibrium.
An explorative investigation of the interaction between
psychological, financial and real factors

Nr. 23– 2010 Frode Fjelldal-Soelberg
Entreprenøriell markedsføring. En studie av entreprenørskap og markedsføring som overlappende fenomen

Nr. 24– 2010 Heidi Rapp Nilsen
From Weak to Strong Sustainable Development
An analysis of Norwegian economic policy tools in mitigating climate change

Nr. 25– 2010 Gowindage Chamara Jayanath Kuruppu
Development of Central Government Accounting in Sri Lanka:
Three perspectives on the accounting changes

Nr. 26– 2010 Marina Z. Solesvik
Interfirm collaboration: The context of shipbuilding.

Nr. 27– 2010 Jan Terje Henriksen
Planning, Action and Outcome
- Evaluation of the Norwegian Petroleum System:
A Structuration Approach to Ripple Effect Studies

Nr. 28– 2010 May Kristin Vespestad
Empowered by Natures – Nature-based High North Tourism Experiences in an International Context

Nr. 29– 2011 Andrei Mineev
How has the petroleum supply industry developed in The Russian Barents Sea Region? Institutional and managerial aspects

Nr. 30– 2011 Jorunn Grande
Entrepreneurship in small rural firms - the case of agriculture

Nr. 31– 2011 Thomas Johansen
Paradigms in Environmental Management Research:
Outline of an Ecosophical-Hermeneutic Alternative

Nr. 32– 2011 Elena Dybtsyna
Accountant in Russia: changing times, changing roles.

Nr. 33– 2012 Harald Fardal
Information Systems Strategy in Practice
A Social Process Perspective

Nr. 34– 2012 Kristin Haugland Smith
Hva er bedrifters samfunnsansvar?
- En empirisk tilnærming av bedrifters ansvar overfor samfunnet

Nr. 35– 2012 Are Branstad
The management of entrepreneurship support
– Organisation and learning in corporate incubation, technology transfer and venture capital

Nr. 36– 2012 Victoria Konovalenko
A “coordination kaleidoscope”:
The role of a “Corporate University” as a coordinator of knowledge flows in a Russian transnational corporation

Nr. 37– 2012 Thor-Erik Sandberg Hanssen
Essays in Transport Economics with application to Transport Policy

Nr. 38– 2013 Are Severin Ingulfsvann
Verdiforskyvning i friluftslivet i lys av økologisk økonomi

Nr. 39– 2013 Natalia Andreassen
Sustainability Reporting in a Large Russian Oil Corporation.
Production Safety Issues

Nr. 40– 2013 Elena Panteleeva
Contemporary Management Accounting Practices in Russia:
The Case of a Subsidiary in a Russian Oil Company

Nr. 41– 2013 Thusitha S.L.W.Gunawardana
Impact of Power Sources on Channel Members' Performance

Nr. 42– 2013 Nadezda Nazarova
Mastering Nature and Managing Frictions: Institutional Work and Supply Chain Management in the High North

Nr. 43– 2013 Inge Hermanrud
Managed Networks of Competence in Distributed Organizations
- The role of ICT and Identity Construction in Knowledge Sharing

Nr. 44– 2013 Kari Djupdal
Sustainable entrepreneurship:
outcomes associated with an environmental certification resource

Nr. 45– 2013 Imtiaz Badshah
Federal government accounting in The Islamic Republic of Pakistan

Nr. 46– 2014 Muhammad Arif
Inter-organizational Exchange Relationships
– Exchange Relationships between Local Service Suppliers and Tour Operators in the Tourism Distribution Channel

Nr. 47– 2014 Wondwesen Tafesse
The Marketing Functions of the Trade Show System

Nr. 48– 2014 Fritz J. Nilssen
Erfaringsutveksling som grunnlag for mestring og livskvalitet
Diagnoseoverskridende samtalegrupper for familier med barn som har nedsatt funksjonsevne og eller kronisk sykdom.

Nr. 49– 2014 Ingebjørg Vestrum
The Resource Mobilisation Process of Community Ventures
-The Case of Cultural Events in Rural Communities

Nr. 50– 2014 Ragnhild Johnson
The Practice of Project Management
- A qualitative analysis of complex project-based organizations

Nr. 51– 2014 Ann Heidi Hansen
Memorable moments
Consumer immersion in nature-based tourist experiences

Nr. 52– 2014 June Borge Doornich
Entry modes and organizational learning during internationalization
An analysis of Norwegian supply companies' entering and expanding in the Russian oil and gas sector

Nr. 53– 2014 Kjersti Karijord Smørvik
Opplevelsesskaping i dynamiske opplevelsesrom:
En studie av turisters opplevelser på Hurtigruten

Nr. 54– 2015 Marianne Terese Steinmo
How Firms use University-Industry Collaboration to Innovate:
The role and Development of Social Capital and Proximity Dimensions

Nr. 55– 2015 Eva J.B. Jørgensen
Border Firms: Norway and Russia

Nr. 56– 2015 Krister Salamonsen
Exogenous Shocks as Drivers of Growth in Peripheral Regions.
- A Multilevel Approach to Regional Development

Nr. 57– 2015 Hindertje Hoarau Heemstra
Practicing open innovation in experience-based tourism:
the roles of knowledge, values and reflexivity

Nr. 58– 2015 Elena Zhurova
Environmental Performance Reporting of Russian Oil and Gas Companies

Nr. 59– 2016 Siri Jakobsen
Environmental innovation cooperation:
The development of cooperative relationships between Norwegian firms

Nr. 60– 2016 Antonina Tsvetkova
Supply Chain Management in the Russian Arctic:
An institutional perspective

Nr. 61– 2017 Kjersti Granås Bardal
Impact of Adverse Weather on Road Transport:
Implications for Cost-Benefit Analysis

Nr. 62– 2017 Kristian Støre
Methodological contributions and applications in real options analysis

Nr. 63– 2017 Thomas André Lauvås
The dynamics of university-industry collaboration:
A longitudinal case study of research centers

Nr. 64– 2017 Sølvi Solvoll
Development of effectual and casual behaviors:
Exploring new venture creation in the tourism industry

Nr. 65– 2017 Evgenii Aleksandrov
The changing role of accounting from reformees' perspective:
A study of public sector reforms in Russia

Nr. 66– 2017 Igor Khodachek
Budget, Strategy and Accounting.
Managing institutional change in Russia's governments

Nr. 67– 2018 Vivi Marie Lademoe Storsletten
Quality as flourishing
A study of quality based upon leadership in kindergartens with implications for Ecological Economics

Nr. 68– 2018 Olga Iermolenko
The human side of accounting:
The bonds between human agency and management accounting practices' changes in the transitional economy

Nr. 69– 2018 Karin Wigger
Mobilization of Collective Resources for Entrepreneurship:
Case Studies in Nordic Peripheries

Nr. 70 – 2018 Andreas Mikkelsen
Trading fast and slow: algorithmic trading in the Nordic region

Nr. 71 – 2018 Asbjørn Veidal
Strategic entrepreneurship in farm businesses

Nr. 72 – 2018 Are Jensen
Early imprints in and on new technology-based firms

Nr. 73 – 2018 Marianne Arntzen-Nordqvist
The financing process of new technology-based firms
- The entrepreneur's perspective

Nr. 74 – 2019 Irina Nikolskaja Roddvik
Deprivation of control: A driving force to gain influence during the internationalization process of MNC

Nr. 75 – 2019 Petter Gullmark
Unraveling the Building Blocks of Local Government Organizations' Innovativeness: Insights from a Dynamic Capabilities Perspective

Nr. 76 – 2019 Hanne Stokvik
Knowledge for Innovation

Nr. 77 – 2019 Anastasiya Henk
Between the Devil and the Deep Blue Sea: Managing Business Processes in Turbulent Environments

Nr. 78 – 2019 Tadeu Fernando Nogueira
Entrepreneurial Learning: An Exploration of the Learning of New Venture Founders

Nr. 79 – 2020 Veronika Vakulenko
Public Sector Reforms in Ukraine: Roles Played by Global and Local Agents in Implementing Converging and Diverging Changes

Nr. 80 – 2020 Lars Hovdan Molden
Adapting to Change - On the Mechanisms of Dynamic Capabilities

Nr. 81 – 2020 Sudip Kranti Tiwari
Navigating International Entrepreneurship in a Developing Economy Context: Lessons from Nepal

Nr. 82 – 2020 Vu Le Tran
Expected Returns: An Empirical Asset Pricing Study

Nr. 83 – 2020 Marit Breivik-Meyer
It takes two to tango:
The role of incubators in the early development of start-ups

Nr. 84 – 2021 Per Ivar Seljeseth
Assessing Outcomes from Business-to-Business Selling

Nr. 85 – 2021 Amsale Kassahun Temesgen
Human Wellbeing and Local-level Sustainability

Nr. 86 – 2021 Ensieh Roud
The Role of Joint Training in Inter-organizational Collaboration in Emergency Management

Nr. 87 – 2021 Menghan Yuan
Climate Change and Economic Growth: An Empirical Study of Economic Impacts of Climate Change

Nr. 88 – 2021 Saiful Hasan
Electric Vehicle Adoption: Empirical Analyses

Nr. 89 – 2021 Managing multiple goals in university-industry collaboration
Irina Nikolayevna Isaeva

A key challenge in university-industry collaborations is the partners' multiple and potentially conflicting goals. This multiplicity of goals can in worst case hamper the collaboration, because the establishment of goals often determines which actions are undertaken. Firms and university partners may disagree on the course of actions to achieve these various goals. Therefore, firms and university partners need to find a way to manage these different and potentially conflicting goals. In this thesis, I explore this issue by asking the following research question: How do multiple goals influence university–industry collaboration processes?

The research question is explored through a qualitative case study approach of seven research centers, which aimed to develop high-quality research and innovation in fields such as bioenergy, solar energy, hydropower, and zero-emission energy systems. By drawing on theoretical frameworks such as coordination mechanisms, strategic responses and goal attainment strategies, this thesis elucidates how firms and university partners can manage and attain goals at the project, firm and research center level.

The main contribution of this thesis is the increased understanding of how multiple goals influence university-industry collaborations at multiple levels. Based on four independent articles, I suggest that management of goals in university-industry collaborations requires both formal and informal coordination, and specific firm strategies to mitigate goal conflict. Moreover, this thesis suggest that the attainment of multiple and conflicting goals can happen through partner alignment at the project level, and a hybrid goal attainment strategy at the research center level. The findings in this thesis suggest important implications, for firms, university partners and policy makers involved in the establishment of research centers.

NORD University

ISBN: 978-82-92893-79-1
ISSN: 2464-4331
Trykk: Trykkeriet, Nord universitet
www.nord.no