

Soaking up Knowledge

A Multi-Level Analysis and  
Conceptualization of  
Absorptive Capacity



# Soaking up Knowledge

A Multi-Level Analysis and  
Conceptualization of  
Absorptive Capacity

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Soaking up Knowledge: A Multi-Level Analysis and Conceptualization  
of Absorptive Capacity

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*To  
Everyone who is thirsty for knowledge*



# Foreword

This volume is the result of a research project carried out at the Department of Management and Organization at the Stockholm School of Economics (SSE).

This volume is submitted as a doctor's thesis at SSE. In keeping with the policies of SSE, the author has been entirely free to conduct and present his research in the manner of his choosing as an expression of his own ideas.

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*Norrköping, December 2, 2015*

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# Chapter 1

## Introduction

Man is essentially ignorant, and becomes learned  
through acquiring knowledge.

Ibn Khaldun

Acquire new knowledge whilst thinking over the  
old, and you may become a teacher of others.

Confucius

I have 12 years' experience working for a multinational company, and have spent the last five years as an advisor for knowledge-transfer projects within the same multinational. Over that time, I have followed several knowledge-transfer projects that achieved variable results, and observed that success depended largely on the recipient's ability to take on new knowledge. Some recipient teams were good at absorbing new knowledge, while others found it hugely difficult, leading to disastrous outcomes. The question is, why?

Before starting my PhD program, I observed two knowledge-transfer projects in detail. Both took place in the same firm, and focused on the transfer of design and manufacturing for two products from the same portfolio. The complexity of the technology to be transferred was comparable

for both projects, as was the seniority of the teams involved. But they achieved sharply divergent results in terms of the absorption of new knowledge. One project went very well, staying within its schedule and budget and facing a relatively small number of obstacles. The second was a disaster, with numerous difficulties, 11 months' delay (based on a 24-month schedule) and a budget overrun of 100% (amounting to approximately €8m).

A team having difficulties to absorb knowledge



I noted a number of major differences between the two recipient project teams. The less successful team had a hard time knowing what knowledge was important, and which parts of the wave of incoming knowledge they *had* to learn. They spent a lot of time on things that later proved to be completely irrelevant, and they ended up confused and paralyzed for long periods, which obviously led to frustration. Finally, they got themselves organized, and found the way forward to acquire new knowledge. Even then, however, they struggled to bring all the necessary engineering disciplines in order to consolidate the final product, making many failed attempts to incorporate the solutions from all the engineers involved. Each engineer could deal with new knowledge on their own, but when it came to bringing it all together, things just did not work out. For the successful team it was the opposite case. The successful team quickly understood what they should learn and which knowledge to focus on. Further the integration of knowledge went very smooth and the team understood how to consolidate new solutions from engineers.

Considering these two projects, I asked myself: Why did one team do so well, and the other so badly? Why should two different project teams in the same firm show such variation in how they absorbed new knowledge? When I joined the PhD program at the Stockholm School of Economics, I resolved to find answers to these questions.

A team that knows how to soak up knowledge



## The issues of knowledge transfer

I began my search in the scholarly literature on knowledge transfer. Previous literature has researched the role of inter-organizational dynamics, identifying power asymmetry, trust, the risk of transferring knowledge, organizational structure, and social ties as key factors (Argote, 2012; Easterby - Smith, Lyles, & Tsang, 2008). Other scholars have examined the impact of the nature of knowledge: its degree of tacitness, ambiguity, and complexity (Kogut & Zander, 1992; Szulanski, 1996). Lastly, the characteristics of sender and recipient also have an influence, with the motivation and ability to share on one hand, and the motivation to receive on the other, playing important roles (Argote, McEvily, & Reagans, 2003). However, the single largest factor influencing knowledge transfer is the recipient's ability to absorb knowledge, defined in the literature as "absorptive capacity." This theoretical concept was originally developed and defined by Cohen and Levinthal (1990) as the ability to recognize the value of new information, assimilate it, and apply it to commercial ends.

## The role of absorptive capacity in knowledge transfer

My review of the literature quickly confirmed my observation that the recipients of new knowledge, and their absorptive capacity, are very significant for knowledge-transfer outcomes (Gupta & Govindarajan, 2000; Szulanski, 1996; Tsai, 2001). The recipient's degree of absorptive capacity determines the inflow of new knowledge to their organization, and also dictates its ability to retain stored knowledge (Argote, 1999; Van Wijk, Jansen, & Lyles, 2008). This was encouraging, but I wanted to know why the ability to absorb new knowledge varied between two similar teams in the same firm. It seemed that most literature dealt with absorptive capacity on the organizational level, taking firms as the primary unit of analysis and using firm-level indicators as the main proxies for measurement. However, they could not explain what drives variations between teams' and units' absorptive capacity within the same organization (Volberda, Foss, & Lyles, 2010).

My aim in this thesis is twofold. First, I aim to provide a better understanding of why absorptive capacity is high or low, and why it rises or falls. Second, I aim to find out what managers can do to enhance absorptive capacity in order to ensure successful technology transfer.

## Research gaps and research questions

Absorptive capacity is defined by Cohen & Levinthal (1990) as the ability to recognize, assimilate, and exploit new knowledge. Considering these three dimensions, it is clear that absorptive capacity is not merely about imitating or replicating knowledge, but rather about combining new and existing knowledge to develop new products and services. Absorptive capacity has been shown to have a tremendous effect on firms' success with organizational knowledge transfer, the efficiency of organizational learning, and the innovative performance of firms (Argote et al., 2003; Cockburn & Henderson, 1998; Lane, Koka, & Pathak, 2006; Lane & Lubatkin, 1998; Lyles & Salk, 1996; Szulanski, 1996; Tsai, 2001). Furthermore, because knowledge is indispensable for organizational survival and performance, the ability to continuously renew and develop knowledge-based assets is a central concern and goal for firms. In this regard, absorptive capacity stands out as the capability for continuous innovation and external organizational learning. Since Cohen & Levinthal (1990) coined the term, there has been sustained scholarly interest in absorptive capacity in strategy and organization research (Lewin, Massini, & Peeters, 2011; Volberda et al., 2010).

Let us return to the two knowledge-transfer projects presented above, and their wildly divergent results. Does the literature explain what is going on when a team absorbs knowledge? Is the examination of absorptive capacity at the organizational level useful in explaining and measuring the same phenomenon in teams at the meso level? It seems to me that existing research and definitions have limited value in this endeavor, and need to be enhanced or developed in order to explain and predict teams' ability to absorb and exploit new knowledge (Argote, 1999; Easterby-Smith & Lyles, 2011).

This gap in the literature is somewhat surprising, as activities related to knowledge transfer and development are regularly performed in teams, and teams play such an important role in contemporary firms. The nature of knowledge absorption and development has undergone substantial changes during the last couple of decades. Teams, at the meso level, have taken on a more central and significant role in firms' knowledge-related activities; most social processes related to learning, creativity, product development, and innovation take place in smaller collectives at the meso level (Argote, 2012; Edmondson, 2002), small groups (e.g., Harvey & Kou, 2013), multidisciplinary teams (e.g., Mathieu, Maynard, Rapp, & Gilson, 2008; Van Der Vegt & Bunderson, 2005), and creative projects (e.g., Obstfeld, 2012) that are often bound by temporal frontiers (c.f., Lundin & Söderholm, 1995)

Past absorptive capacity research has failed to consider the unique properties that differentiate teams from organizations, or departments within organizations, when it comes to learning and innovation (Crossan, Lane, & White, 1999), which is why insights gained from macro-level investigations tell us so little about absorptive capacity at the meso level. The unique characteristics of team contexts are relevant and worthy of attention, as they define the mechanisms through which individuals' absorptive capacities are synthesized or aggregated to form collective absorptive capacity (Cohen & Levinthal, 1990; Lane et al., 2006). Hence, the first specific research question I aim to study is: 1) *How does absorptive capacity develop in teams?*

The second limitation of the literature is the lack of studies at the micro and meso levels on the antecedents of individuals' and teams' absorptive capacity. Scholars have argued that a firm's absorptive capacity depends on previous knowledge endowments and R&D investments, but there are many other factors beyond these that affect the absorptive capacity of an organization – such as organizational structures and processes, managerial decisions, and HR management (Cohen & Levinthal, 1990; Volberda et al., 2010). There have been number of important studies of the antecedents of organizational absorptive capacity (Jansen, Van Den Bosch, & Volberda, 2005; Murovec & Prodan, 2009; Van Den Bosch, Volberda, & De Boer, 1999). However, this research has largely neglected the importance of or-

ganizational, individual, and managerial antecedents of absorptive capacity at the meso and micro levels.

In their seminal article, Cohen & Levinthal (1990) emphasized the importance of team absorptive capacity for the development of organizational absorptive capacity, emphasizing the need to understand what affects a team's absorptive capacity. As mentioned above, activities such as knowledge transfer and product development, where absorptive capacity looms large, occur in meso-level team contexts, making it crucial to find out what affects the development of absorptive capacity in teams.

Teams are not simply smaller replicas of larger collectives. As shown by Argote & Miron-Spektor (2011), permanent organizations represent the latent context (i.e., by providing tools, resources, or tasks) for knowledge creation and learning, whereas teams epitomize the active context (i.e., where tasks are performed by means of action and interaction between individuals) of new knowledge acquisition and development. Hence, the antecedents of organizational absorptive capacity may be different from those of team-level absorptive capacity. In order to understand the development of absorptive capacity in teams, we need to know what influences a team's level of absorptive capacity in the meso-level context, as antecedents of teams' absorptive capacity may be found at the micro, meso, and macro levels (Backmann, Hoegl, & Cordery, 2015; Volberda et al., 2010). Against this background, I aim to explore my second specific research question: 2) *What determines a team's level of absorptive capacity, i.e. what are the antecedents of team absorptive capacity?*

In their original article, Cohen & Levinthal (1990) furthermore remark that the development of organizational absorptive capacity is a function of the development of individuals' absorptive capacities at the micro level of the organization. Using different proxies to measure an organization's absorptive capacity doesn't measure how the absorptive capacity of its individuals is developed; it might be driven by individual, managerial, or organizational factors (Lane et al., 2006; Lewin et al., 2011; Volberda et al., 2010). Considering the observation made by Cohen & Levinthal (1990) that individuals' absorptive capacity is the cornerstone of organizational absorptive capacity, it is important to understand what drives and determines the absorptive capacity of individuals within an organization. Despite the cen-

tral and fundamental role of individual absorptive capacity, we still lack systematic research on the micro-foundations of absorptive capacity and the antecedents of individuals' absorptive capacity. Based on this, I aim to study my third specific research question: 3) *What determines an individual's level of absorptive capacity, i.e. what are the antecedents of individual absorptive capacity?*

In conclusion, despite intense academic interest in absorptive capacity due to its practical importance and relevance, we still lack a systematic multi-level investigation of the concept. As noted, Cohen & Levinthal (1990) argue that individuals represent the building blocks of absorptive capacity. Yet they also note that a "firm's absorptive capacity is not, however, simply the sum of the absorptive capacities of its employees, and it is therefore useful to consider what aspects of absorptive capacity are distinctly organizational" (p.131). Thus, absorptive capacity should be considered as both an individual and a collective phenomenon. Individuals' absorptive capacity at the micro level somehow aggregates to organizational absorptive capacity at the macro level through departments' and teams' absorptive capacity at the meso level. However, past research has rarely acknowledged this, beyond a handful of theoretical studies pointing out the need to study absorptive capacity at multiple levels of analysis (Lewin et al., 2011; Volberda et al., 2010). This is especially problematic because it obscures how much of an organization's ability to absorb new knowledge comes from its individual members, and how much comes from its own systems and levers. Hence, I aim to study a fourth specific question: 4) *What mechanisms facilitate the aggregation of individuals' absorptive capacity to the organizational level?*

## Structure of the thesis

My thesis comprises five individual papers. Each one provides specific contributions, and they combine to provide a complementary perspective that will enhance our understanding and knowledge of absorptive capacity. Table 1 summarizes the five papers, including their focus and methodological approach.

Before summarizing each of the five papers in Chapter 4, I will provide a theoretical background and thesis objectives in Chapter 2, followed by a description of the research design and research process in Chapter 3. In

Chapter 5, I will discuss and analyse my findings, including a discussion of the implications and main limitations of my research. The chapter will be concluded by a brief discussion of directions for future research. In the last chapter, I present the broader conclusions of my research. The full texts of the five papers can be found in Appendix 1.

Table 1: Overview of papers included in this thesis

Paper	Methodological approach	Focus	Publication stage
Paper 1 Antecedents of Absorptive Capacity in Knowledge transfer Projects: What affects the absorptive capacity of the recipient team?	Single case study	Addresses my second research question by investigating the managerial and project organizational antecedents of the recipient team's absorptive capacity	Second round of reviews in <i>International Journal of Innovation Management</i>
Paper 2 Dispositional and Contextual Antecedents of Individual-level Absorptive Capacity	Statistical analysis of survey-based data	Addresses my third research question by investigating how dispositional (i.e., "who you are") and contextual (i.e., "where you are") antecedents facilitate motivation for effective implementation of routines for building up absorptive capacity	First round of reviews in <i>Journal of Management</i>
Paper 3 Towards an Interactionist Perspective on Absorptive Capacity: A multi-level investigation	Statistical analysis of survey-based data	Addresses my third and fourth research questions by investigating the role of individual-level personality characteristics and group-level transactive memory systems on the development of absorptive capacity	First round of reviews in <i>Organization Science</i>
Paper 4 Unpacking Absorptive Capacity: The relevance of teams as a meso-level context	Conceptual	Addresses my first research question by re-conceptualizing the absorptive capacity of teams and defining new dimensions for adequate assessment of teams' absorptive capacity	Second round of reviews in <i>Academy of Management Review</i>
Paper 5 Managing Knowledge Transfer: Enhancing the absorptive capacity of the recipient	Multiple case study	Addresses my second research question by identifying managerial practices that enhance the absorptive capacity of teams	Third round of reviews in <i>Research Technology Management Journal</i>



# Chapter 2

## Theoretical background

This chapter is organized as follows. First, I will present a definition of absorptive capacity and its two subsequent major redefinitions. Considering that the ability to absorb *knowledge* is the definition of absorptive capacity, I will, in the second section, set out the definition of knowledge used in this thesis. The last section of this chapter outlines my thesis objectives, along with a review of the literature on absorptive capacity as it relates to the general aim of the thesis.

### Definition of absorptive capacity

In their renowned articles, Cohen & Levinthal (1989, 1990) define absorptive capacity as the ability to recognize, assimilate, and utilize knowledge from the environment. These dimensions suggest that absorptive capacity is not merely the ability to imitate other products and technological solutions, but also to *combine* new and existing knowledge in developing new products and services. Thus, absorptive capacity is not about learning by doing, where the firm gets better at what it already does, but about innovating, and generating new knowledge. Therefore it is important for a firm to invest in absorptive capacity, since this can complement, enhance, and re-focus its knowledge base (Cohen & Levinthal, 1990).

Building on this foundation, and their comprehensive literature review, Zahra & George (2002) introduce an extended conceptualization of absorptive capacity (potential vs. realized) and operationalize the construct along

four primary capabilities/dimensions: (1) acquisition (identifying and acquiring external knowledge that is valuable for current operations); (2) assimilation (interpreting and understanding new knowledge); (3) transformation (developing and refining assimilated knowledge to facilitate its combination with existing knowledge); and (4) exploitation (integrating acquired and transformed knowledge into operations). While acquisition and assimilation are argued to constitute the potential absorptive capacity of an organization, transformation and exploitation represent its realized absorptive capacity.

Todorova & Durisin (2007) elaborate the concept further by reinstating the precursory dimension of recognizing the value of new knowledge, and arguing that assimilation and transformation are either/or alternatives rather than sequential stages. However, most empirical studies lean towards the dimensions proposed by Zahra & George (2002) or adhere to the original three-dimension definition by Cohen & Levinthal (1990). Since their conceptualization of absorptive capacity is theoretically well-grounded, empirically validated by subsequent research, and covers a wider range of capabilities associated with knowledge absorption and utilization, Zahra & George's (2002) model is widely accepted in the current absorptive capacity literature. Moreover, Dasgupt & D'Souza (2013) have recently argued that the view developed by Zahra & George is the most appropriate conceptualization of the construct. Therefore I have decided to rely on Zahra & George's (2002) four-dimensional definition of absorptive capacity throughout my work.

## Definition of knowledge

As my study is concerned with the absorption of knowledge, it is important to define knowledge and its dimensions, for the sake of clarity. There have been many attempts to define knowledge, and I do not intend to join the battle in that arena by proposing my own. One common definition of knowledge, originating from Plato, is "*justified true belief*." However, there have been many extended critical discussions of the practical problems with this definition – i.e. what makes justified beliefs justified, and whether justification is internal or external.

A more pragmatic definition is given in Nonaka & Takeuchi (1995), where the authors define knowledge as a dynamic process of *“justifying personal belief toward the ‘truth.’”* This means that knowledge is changing all the time, and what we know today may not be the same as what we will know tomorrow. The vagueness implicit in this definition is not surprising, given that knowledge is a deeply philosophized and debated concept. To address this, Nonaka, Toyama, & Konno (2000) further specify certain characteristics of knowledge. First, it is socially situated and context-specific. Thus, the meaning/value of knowledge depends on social interaction patterns among individuals and organizations, and it is this context-specificity that differentiates knowledge from mere information. Second, knowledge is human, for it is developed, shared, and possessed by individuals. It stands to reason that knowledge is subjective and relational, since each individual might develop different types of knowledge about the same phenomenon, depending on their perceptions and relational context.

These attributes can be applied to almost any kind of knowledge. However, there are different types of knowledge that have been extensively discussed in past research and, therefore, merit further attention. In the following sections I will explore two specific categorizations of knowledge.

### Explicit and tacit knowledge

In previous literature on innovation and technology transfer, knowledge has been classified into tacit and explicit (see e.g., Hedlund, 1994; Nonaka & Takeuchi, 1995; Winter, 1998; Zander & Kogut, 1995). Explicit knowledge is easier to document and codify; it can be embodied in concrete artifacts such as drawings, manuals, scientific formulae etc. Tacit knowledge, on the other hand, is embedded in practice, skills, emotions, and human interactions, and is heavily imbued with direct experience (Polanyi, 1958, 1967). Even though Western (positivistic) epistemology is often biased towards treating knowledge as an explicit entity (Cook & Brown, 1999), it is becoming more and more of a truism that the two types of knowledge are interrelated and mutually complementary, and therefore cannot be separated (Tsoukas, 1996). Based on this, scholars have put a great deal of thought into whether and how tacit knowledge can be converted to explicit

knowledge (Nonaka, 1994). While some earlier theorists have gone so far as to suggest that tacit knowledge can *never* be fully converted to explicit knowledge (Polanyi, 1967), later studies have probed multiple processes through which tacit and explicit knowledge can be combined (Nonaka & Von Krogh, 2009; Ribeiro & Collins, 2007).

It is not my purpose here to reconcile these different and sometimes conflicting views on the divide between tacit and explicit knowledge, but it is important to clarify that I will adopt an integrative view. Thus, in this thesis, I consider absorptive capacity as a critical bundle of capabilities required to absorb both explicit and tacit knowledge (Kogut & Zander, 1992).

### Individual and organizational knowledge

Discussion is ongoing on the question of whether knowledge is possessed by individuals or by collectives such as teams, groups, and other organizational forms. Some researchers have argued that knowledge can only be possessed by people, and that organizations cannot learn. Others have claimed that knowledge can also exist in organizations in the form of processes, structures, and routines (Cook & Brown, 1999; March, 1991; Spender, 1996). The knowledge-based view of the firm suggests that knowledge resides in both individuals and organizations, and that organizations facilitate what individuals within the organization learn, which actions they take, and which norms and values they share (Kogut & Zander, 1996). Thus, organizations provide a platform that lets individuals do and learn things they couldn't have done alone (Grant, 1996; Kogut & Zander, 1992; Spender, 1996).

The tacit/explicit distinction applies to both individual and organizational knowledge. Explicit knowledge exists at both of these levels in the form of documents, blueprints, or process descriptions. Tacit knowledge at the individual level refers to personalized and subjective “know-how,” while the tacit knowledge of an organization refers to norms and values shared among individuals, which collectively constitute the idiosyncratic and unique knowledge of the organization.

Based on this, I adopt the view that organizations are social communities (i.e., formally defined collectives with shared values, jargon, ways of making sense of world, etc.) in which individuals' knowledge and social expertise are transformed into economically useful products and services by the application of a set of higher-order organizing principles such as formal and informal rules, regulations, norms, values, and routines. Firms exist because they provide a social community of voluntary action structured by organizing principles that are not reducible to individuals (Kogut & Zander, 1992). Thus, I do not take sides in the debate over whether knowledge is an individual or collective phenomenon; instead, I occupy the middle ground by arguing that knowledge can and should be studied at both levels of analysis.

## Literature review and thesis objectives

The aim of this literature review is to select themes and topics in the absorptive capacity literature relevant to the general aim of my thesis. I also specify the inclusion and exclusion criteria that were used to select articles for deeper analysis (Randolph, 2009).

I used Web of Science to search the literature for keywords based on absorptive capacity and abstract content in accordance with the aim of the review. My selection criteria were: 1) focus on the antecedents of absorptive capacity; 2) focus on meso-level studies of absorptive capacity; 3) focus on the micro-foundations of absorptive capacity; 4) focus on multilevel investigations of absorptive capacity; and 5) substantial contributions to the field of absorptive capacity (evaluated by the number of citations and the impact factor of the journal). Based on the "snowball" approach, I assessed papers that cite the papers I selected, using the Google Scholar search engine.

I completed my active literature review during autumn 2014. However, following the AOM conference in August 2015, and suggestions from research colleagues, I included a number of articles published after autumn 2014 in my work.

## Conceptual development of absorptive capacity

Cohen & Levinthal (1989, 1990) introduced the concept of absorptive capacity as the “ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends” (1990, p.128). They also emphasized that absorptive capacity is a multilevel concept of which individuals and groups/teams are fundamental elements. Furthermore, the authors strongly linked R&D investments and previous knowledge stock to the development of a firm’s absorptive capacity. They also argued that firms’ learning and innovation are enabled by their absorptive capacity. Through learning and innovation, a firm adds new knowledge to its knowledge stock, which in turn improves its absorptive capacity (Cohen & Levinthal, 1990).

Since Cohen & Levinthal (1990), there have been several revisions and reconceptualizations of the concept. One of the earliest attempts came from Lane & Lubatkin (1998), who claim that absorptive capacity is a dyadic construct. In particular, they argue that absorptive capacity depends on the knowledge of both sender (i.e., teacher) and recipient (i.e., student) organizations. The authors argue, and empirically verify, that R&D intensity per se would be insufficient to explain interorganizational learning; instead, the relative characteristics of the two organizations should be used as a basis for understanding absorptive capacity and its role in organizational learning. This dyadic focus is also the key point of departure for later studies that look at the dual effects of absorptive capacity and disseminative capacity, and propose that the effectiveness of organizational learning depends not only on recipient unit but also on sender unit (Minbaeva & Michailova, 2004).

The first major reconceptualization of absorptive capacity was carried out by Zahra & George (2002), who built upon the three dimensions introduced by Cohen & Levinthal (1990) by proposing a four-dimensional concept comprising the *acquisition*, *assimilation*, *transformation*, and *exploitation* of external knowledge. Furthermore, they categorized the first two dimensions as constituting organizational *potential* absorptive capacity, while the last two constitute organizational *realized* absorptive capacity. Potential absorptive

capacity is about sensing and identifying new knowledge that will be useful for the firm, while realized absorptive capacity is about leveraging assimilated knowledge into commercial benefits and advantages for the firm. Zahra & George (2002) claimed that firms need to balance potential and realized absorptive capacity in order to be competitive in the market. Thus, absorptive capacity determines not only the *amount* of knowledge transferred, but also the *effective outcomes* of the knowledge-transfer processes. In their model, Zahra & George (2002) identify a set of organizational processes and routines (e.g., activation triggers, social integration mechanisms, and regimes of appropriation) that would help firms gain competitive advantage, not only through acquiring new knowledge, but also by efficiently applying it to commercial ends.

A second noteworthy reconceptualization of absorptive capacity was introduced by Lane et al. (2006), who concluded that research on absorptive capacity has led to the reification of the concept, as a result of which research on the topic has been coasting. Therefore the authors build on the original conceptualization proposed by Cohen & Levinthal (1990) to introduce three modes of learning that enrich absorptive capacity. The authors claim that through *exploratory learning*, firms sense and comprehend valuable new knowledge that will potentially yield commercial benefits for the firm. Once the knowledge is recognized with *transformative learning*, it can be assimilated into the firm. The third sequence, *exploitative learning*, allows the firm to process knowledge into benefits for the firm.

Todorova & Durisin (2007) offer another important reconceptualization, which further refines the model introduced by Zahra & George (2002) by reintroducing the recognition dimension from the original definition by Cohen & Levinthal (1990). They also claim that the assimilation and transformation dimensions are alternatives rather than sequential steps. They further develop a dynamic model of absorptive capacity by repositioning the role of social-integration mechanisms and power relationships, and proposing the inclusion of feedback loops in the model.

Lewin et al. (2011) present a model that builds on the work by Lewin & Massini (2003), where the concept of absorptive capacity is broken down into two rudiments representing *internal* and *external* absorptive capacity. Internal absorptive capacity is the capability to explore knowledge within

the firm, and is about the management of variation, selection, and replication as described in evolutionary economics (Nelson & Winter, 1982). External absorptive capacity is the capability to explore knowledge outside the firm, and is about managing the recognition and assimilation of external knowledge into the firm. In addition to the internal/external model of absorptive capacity, Lewin et al. (2011) introduce metaroutines (i.e., a bundle of specific operational routines and/or standard operating procedures) as underlying these two components of absorptive capacity. Marabelli & Newell (2014) recognized that the existing literature on absorptive capacity is primarily based on the assumption that knowledge is possessed by individuals and transferable, and that it neglects the idea that knowledge is dynamic and created in and through action. Therefore they claim that absorptive capacity should be viewed from the perspectives of both *possession* and *action*. Moreover they introduce knowledge and power relationships into the model. Based on the four-dimensional model proposed by Zahra & George (2002), Marabelli & Newell (2014) present these four dimensions as interacting with each other, rather stages in a linear process moving from potential to realized absorptive capacity.

In sum, my reading of the existing absorptive capacity literature reveals certain patterns, which have helped me identify areas where past studies have neglected key issues. Firstly, all conceptualizations of absorptive capacity introduced after the seminal work of Cohen & Levinthal (1990) point to the multidimensional nature of the concept (Lane et al., 2006; Lewin et al., 2011; Todorova & Durisin, 2007; Zahra & George, 2002). This suggests that it would be erroneous to think of absorptive capacity as a unidimensional capability that could be perfectly measured with simplistic proxies such as R&D investments and/or patent portfolio.

Furthermore, past research has shown that there are inherent tradeoffs between different functions/dimensions of absorptive capacity. For instance, Zahra & George (2002) show that potential and realized absorptive capacity might require different types of action, and it is not an easy task for organizations to sustain the balanced development of these two sub-components of absorptive capacity at the same time. This is echoed by Todorova & Durisin (2007), whose framework suggests that organizations need to choose between assimilating new knowledge by altering existing

routines and transforming new knowledge so that it can be adjusted and attuned with their existing knowledge base. Similar tensions can also be found in the reasoning of Lewin et al. (2011), whose internal and external absorptive capacity model implies that firms need to allocate their limited resources across these two different learning modes.

All in all, it is clear that different dimensions of absorptive capacity entail different actions, and that organizations need to adopt different (and sometimes conflicting) strategies and routes to develop these different dimensions simultaneously.

Another visible pattern in the existing literature is the focus on the organizational level. Virtually all conceptualizations of absorptive capacity regard it as an organizational phenomenon, with almost no systematic attention paid to the nature and content of absorptive capacity at lower levels of analysis (Marabelli & Newell, 2014; Minbaeva, Pedersen, Björkman, Fey, & Park, 2014; Volberda et al., 2010).

In other words, we need a better understanding of absorptive capacity and its development at the meso (e.g., teams, groups) and micro (e.g., individual) levels of analysis. In addition, extant empirical literature is quite limited when it comes to following up conceptual advances. To be more specific, we still have limited understanding when it comes to the micro-level antecedents of different absorptive capacity dimensions, and the factors moderating the relationship between different absorptive capacity dimensions. In the next section, I shall illustrate these empirical research gaps in more detail.

## Empirical studies of absorptive capacity

Most empirical studies that contribute to the concept of absorptive capacity follow in the footsteps of Cohen & Levinthal (1990), where the main argument is that the extent of absorptive capacity is primarily a function of a cumulative learning process in which organizations' ability to absorb new knowledge stems from their prior related knowledge and R&D investments.

Accordingly, subsequent research has verified the role and relevance of existing knowledge stock in new-knowledge acquisition and absorption

(e.g., Ben-Menahem, Kwee, Volberda, & Van Den Bosch, 2013; Lane & Lubatkin, 1998; Mowery, Oxley, & Silverman, 1996; Tsai, 2001). To that end, most of these studies use firms' cumulative R&D spending (e.g., Schildt, Keil, & Maula, 2012; Tsai, 2001), size of patent portfolio (e.g., Ahuja & Katila, 2001; Mowery et al., 1996), or actions and practices as defined by organizational routines (e.g., Flatten, Engelen, Zahra, & Brettel, 2011; Jansen et al., 2005) when defining and measuring absorptive capacity. This approach is predicated on the "cumulativeness feature," and the assumption that firms with a larger and richer endowment of knowledge resources have developed appropriate routines and processes that facilitate the acquisition and the use of new knowledge from external sources, thus resulting in higher levels of absorptive capacity (Mowery et al., 1996; Rao & Drazin, 2002). And although they use different proxies, these studies have exclusively studied absorptive capacity at the organizational level.

Moreover, the majority of empirical studies have concentrated on the competitive advantages and benefits of absorptive capacity. These studies have demonstrated the crucial and central role that absorptive capacity plays in firms by presenting results indicating that it positively influences innovation, organizational learning, firm adaptation, and knowledge transfer (Argote et al., 2003; Autio, Sapienza, & Almeida, 2000; Feinberg & Gupta, 2004; Gebauer, Worch, & Truffer, 2012; Volberda et al., 2010) as well as stressing the importance of absorptive capacity for firms' financial performance (Kostopoulos, Papalexandris, Papachroni, & Ioannou, 2011; Lane et al., 2006; Tsai, 2001).

Considering the benefits that absorptive capacity brings to a firm, a number of studies have researched antecedents of organizational absorptive capacity. Van Den Bosch et al. (1999) reveal that matrix organizational forms and coordination capabilities have a positive impact on absorptive capacity. Conversely, functional forms and systematization capabilities were found to have a negative impact. Extending the findings of Van Den Bosch et al. (1999), Fosfuri & Tribó (2008) identified R&D cooperation, external knowledge acquisition, and experience with knowledge search as other important antecedents of organizational absorptive capacity. Schmidt (2010) found that the development of absorptive capacity is a path-dependent process, and that organizations can increase their ability to utilize external

knowledge by encouraging their employees to take part in innovative projects. Murovec & Prodan (2009) showed that internal R&D, training of personnel, innovation co-operation, and a positive attitude toward change are the most important antecedents of organizational absorptive capacity. Using qualitative case evidence, Hotho, Becker - Ritterspach, & Saka - Helmhout (2012) showed that social interaction enhances organizational absorptive capacity.

Jansen et al. (2005), who build on the conceptualization of absorptive capacity by Zahra & George (2002), use the multi-dimensional characteristics of absorptive capacity to analyze the differing effects of combinative capabilities on different dimensions of absorptive capacity. Their empirical results suggest that coordination mechanisms such as cross-functional interfaces and job rotation are positively linked to potential absorptive capacity, while systematization practices (e.g., formalization) as well as socialization practices (e.g., connectedness) enhance realized absorptive capacity. This study shows that some antecedents have simultaneous but opposite effects on potential and realized absorptive capacity. The lack of attention paid to the relationship between organizational antecedents and the distinct dimensions of absorptive capacity is noteworthy, given that different organizational antecedents may affect different dimensions of absorptive capacity in different ways, raising challenges in terms of managing these dimensions separately.

Without a doubt, the studies cited above have made valuable contributions. However, extant empirical literature on absorptive capacity has under-explored several key questions. First of all, despite a growing trend towards considering absorptive capacity as a multidimensional construct, precious few studies have yet examined different dimensions of absorptive capacity separately. This is particularly problematic when we consider the inherent tradeoffs between absorptive capacity dimensions, as proposed by conceptual papers surveyed in the previous section (Lewin et al., 2011; Marabelli & Newell, 2014). Furthermore, the common denominator of the aforementioned studies is that they all focus on organizational-level absorptive capacity and its development. As a result, our current understanding of absorptive capacity development at meso (e.g. teams and groups) and micro level (individuals) is severely limited (Minbaeva et al., 2014). Further-

more, work on the micro-foundations of absorptive capacity is still dwarfed by the overwhelming attention paid to the macro/organizational level. In view of these shortcomings, in the next section I will present a micro-meso-macro framework explaining the cornerstones of absorptive capacity at different levels of the organization.<sup>1</sup>

Table 2: Overview of empirical studies on absorptive capacity

Authors (year)	Organizational Field	Method	Key findings related to absorptive capacity	Level of analysis
Jansen et al. (2005)	Combinative capabilities	Survey of 769 organizational sub-units	Combinative capabilities as organizational antecedents of absorptive capacity	Sub-unit (organizational)
Tsai (2001)	Innovation	Survey of 24 business units in a petrochemical company and 36 business units in a food-manufacturing company	Interaction between unit's network position and unit's absorptive capacity is positively related to unit's innovation ability	Organizational
Van den Bosch et al. (1999)	Coevolution of absorptive capacity	Two-case study	Organizational forms as determinant of organizational absorptive capacity	Organizational
Oltra & Floor (2003)	Innovation	Survey from 91 Spanish firms from the ceramic tile industry	Absorptive capacity, presented as systematic R&D activity, is positively related to innovation output	Organizational

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<sup>1</sup> For an overview, please see Table 2, where I present article summaries confirming that most studies focus on the organizational level.

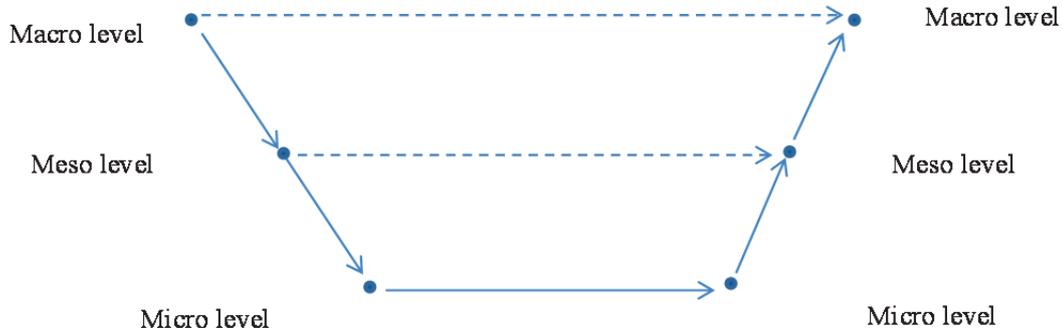
Fosfuri & Tribo (2008)	Innovation	Survey of 2464 innovative Spanish firms	R&D cooperation, external knowledge acquisition, and experience with knowledge search are key antecedents of a firm's potential absorptive capacity. Potential absorptive capacity is a source of competitive advantage in innovation	Organizational
Lane, Lyles and Salk (2001)	Learning	Survey of 78 IJVs in Hungary	Two components of absorptive capacity (acquisition and assimilation) are positively related to knowledge learned from the parent company	Organizational
Szulanski (1996)	Knowledge transfer	271 observations from 122 best-practice transfers	Absorptive capacity has a positive impact on best-practice transfer	Organizational
Lane & Lubatkin (1998)	Learning and knowledge transfer	Survey of 85 pharmaceutical-biotechnology R&D alliances	Relative absorptive capacity is positive for inter-organizational learning	Organizational-dyadic
Kostoupolos et al. 2011	Innovation	Survey of 461 Greek enterprises	Absorptive capacity directly and indirectly influences innovation and financial performance in different timespans	Organizational
Lewin et al. (2011)	Innovation	Theoretical	Internal vs. external absorptive capacity	Organizational and individual
Gupta & Govindarajan (2000)	Knowledge transfer	Survey of 375 subsidiaries within 75 multinationals in USA, Europe, and Japan	Amount and quality of knowledge inflow to subsidiary is affected by absorptive capacity	Organizational

Argote (1999)	Knowledge retention and transfer	Survey from hotel chain	Absorptive capacity is positively related to knowledge retention	Team
Minabevea et al. (2003)	Knowledge transfer	Survey of 169 multinational subsidiaries active in USA, Russia, and Finland	Conceptualization of absorptive capacity as combination of motivation and ability, where both are necessary for successful knowledge transfer	Organizational
Löwik (2013)	Innovation	Survey of 147 employees	Prior knowledge, bisociative cognitive style, and network diversity as determinants of individual absorptive capacity	Individual

## A micro-meso-macro framework of absorptive capacity – the micro-foundations of absorptive capacity

Coleman's (1990) framework on micro-macro levels in social science explains the importance of the multilevel cornerstones of organizational constructs. It also shows us that higher-level (macro-level) routines are built of the actions and interactions of actors at the lower level (micro level). In this framework, "macro" does not denote "organizational," and nor does "micro" mean "individual" – but it does propose higher and lower levels of analysis. In the present thesis, "macro" refers to the organizational level, "meso" to the team and group level, and "micro" to the individual level. Even though studies of micro-foundations typically refer to the factors that dictate action by individuals to build organizational routines and capabilities, and the interactions between such factors (Felin & Foss, 2005; Foss, 2011), we need to pay attention to the links and mechanisms between the various meso levels in the organization that lie between the individual and organizational levels of analysis (Coleman, 1990; Gupta, Tesluk, & Taylor, 2007; Minbaeva et al., 2014). However, the multilevel mereology involves not only links between levels, but also links within them, which affect how macro-level capabilities and routines are built and shaped (Abell, Felin, & Foss, 2007; Minbaeva et al., 2014) (see Figure 1).

Figure 1: The Micro-Meso-Macro model of social science



Adopted from Minbaeva et al., 2014

Based on the above discussion, we can see that macro-level absorptive capacity is created from organizational mechanisms and interactions between actors' absorptive capacity at the micro level, and emerges through meso-level absorptive capacity. This is in accordance with Cohen & Levinthal (1990: 131): "A firm's absorptive capacity is not; however, simply the sum of the absorptive capacities of its employees, and it is therefore useful to consider what aspects of absorptive capacity are distinctly organizational." Furthermore, the authors claim that the absorptive capacity of an organization depends on the interaction between and within sub-units and among its individuals, which makes absorptive capacity a multilevel construct that builds up from individuals' absorptive capacity through different levels in the organization to organizational absorptive capacity. The micro-foundations of absorptive capacity, which include multilevel factors, links, and mechanisms, help individuals' absorptive capacity to accrue through different meso-level groups and units within the organization, ultimately creating absorptive capacity at the organizational level.

The multilevel model in Figure 1 suggests that there are two main types of micro-foundation for absorptive capacity. First, the arrow within the micro level characterizes individuals who are acting and interacting with each other. Organizational absorptive capacity is rooted in the knowledge of its

individuals (Cohen & Levinthal, 1990); they are the primary source of knowledge, and their prior knowledge and experience ultimately determine organizational absorptive capacity. Interactions between individuals facilitate the transfer of knowledge between them, which enhances innovation and knowledge creation (Argote, 2012; Easterby-Smith & Lyles, 2011). Moreover, the cognitive predispositions of individuals determine their ability to combine new and existing knowledge, which in turn determines the level of their absorptive capacity (Cohen & Levinthal, 1990). Hence, individuals' characteristics, backgrounds, motivations, and behaviors play a significant role in determining organizational absorptive capacity. The arrow within the meso level signifies interaction within and between departments and teams. This includes the actions of individuals who function as boundary spanners between sub-units at the meso level, which will affect knowledge transfer and exchange across the organization (Volberda et al., 2010). Development of absorptive capacity at the meso level will also depend on the structure, size, and management of sub-units, as well as the cooperation between them. Hence, these factors also play an important part in determining organizational absorptive capacity.

Second, the arrows that link the three levels denote organizational structures and mechanisms that affect the speed and direction of the aggregation of individuals' absorptive capacity to meso and macro level. As mentioned above, macro-level absorptive capacity is not the sum of actors' absorptive capacity at the micro level; organizational factors play a part too. Individuals' specialized knowledge needs to be integrated with others' through communication and coordination structures provided by the organization (Easterby-Smith & Lyles, 2011). Some organizational factors will draw individuals' absorptive capacity directly into organizational absorptive capacity, depending on the size and the structure of the organization. Other organizational factors will affect the same transition via different meso-level groups within the organization, such as departments and teams. On the other hand, there are also organizational factors affecting individuals' absorptive capacity that will also indirectly affect organizational absorptive capacity (Cohen & Levinthal, 1990; Marabelli & Newell, 2014). Hence, organizational structures and models play a significant role in the build-up of organizational absorptive capacity.

As I mentioned in the previous section, earlier research has focused on the macro level, and we lack multilevel and micro-foundational research on absorptive capacity. In the following sections, I will explain how my research objectives have been formulated, how they are intended to address limitations in the existing literature, and how I aim to contribute to research by filling these research gaps.<sup>2</sup>

## Research objectives

### The development of absorptive capacity in teams in the meso-level context

Absorptive capacity is a multilevel construct and should be studied accordingly. Cohen & Levinthal (1990: 128) stated that “outside sources of knowledge are often critical to the innovation process, whatever the organizational level at which the innovating unit is defined.” This underscores the importance of understanding absorptive capacity not only at the macro/organizational-level, but also at the meso- (i.e., team/department) and micro- (i.e., individual) levels of analysis. This point is echoed by Lane et al. (2006), who discuss how some elements of absorptive capacity are encountered by individuals and some by organizations. Sun & Anderson (2010) also remark on the importance of a multilevel approach with their claim that the acquisition phase is related to individuals, while assimilation and transformation are enabled by the team level. The exploitation phase is associated with the institutionalization of knowledge at the organizational level.

Moreover, it is evident that teams in the meso-level context are taking on a more central and significant role in the knowledge activities of corporations. This makes the narrow focus on the organizational level rather problematic, as a majority of social processes related to learning, creativity, product development, and innovation take place in smaller collectives (Ar-

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<sup>2</sup> Regarding the link between meso and macro level in the Micro-Meso-Macro level model, I do not propose to carry out research into the mechanisms that link the meso to the macro level, but only those linking the micro and meso levels.

gote, 1999; Edmondson, 2002), such as small groups (e.g., Harvey & Kou, 2013), multidisciplinary teams (e.g., Mathieu et al., 2008; Van Der Vegt & Bunderson, 2005), and creative projects (e.g., Obstfeld, 2012) that are often bound by temporal frontiers (c.f., Lundin & Söderholm, 1995).

Therefore, the unique characteristics of teams in the meso-level context are relevant and worthy of attention, as they define the mechanisms through which individuals' absorptive capacity is aggregated into collective absorptive capacity (Cohen & Levinthal, 1990; Lane et al., 2006). Despite calls made in previous literature reviews (Marabelli & Newell, 2014; Volberda et al., 2010), past absorptive-capacity research has rarely taken teams as the focal unit or context of study, and has therefore neglected the nature and development of absorptive capacity in teams by considering their unique properties. Considering this, and the general aim of my thesis:

**My first objective** is to contribute new knowledge on how absorptive capacity develops in teams.

### Antecedents of teams' absorptive capacity

In view of the importance of absorptive capacity for firms, and the fact that absorptive capacity is a multilevel construct, scholars have remarked that it is important to understand what drives and determines the development of absorptive capacity at different levels in the organization (Cohen & Levinthal, 1990; Marabelli & Newell, 2014). Several studies have examined the antecedents of organizational absorptive capacity at the macro level (e.g., Fosfuri & Tribó, 2008; Murovec & Prodan, 2009; Van Den Bosch et al., 1999). However, actions related to the acquisition and development of knowledge, where absorptive capacity plays a key role, mainly occur in teams at the meso level (Argote, 2012; Edmondson, 1999).

Teams are not simply smaller replicas of larger collectives; certain characteristics differentiate them from firms when it comes to organizational learning and innovation (Crossan et al., 1999). As shown by Argote & Miron-Spektor (2011), permanent organizations represent the *latent* context (i.e., by providing tools, resources, tasks) for knowledge creation and learning, whereas teams epitomize the active context (i.e., where tasks are per-

formed by means of action and interaction between individuals) of new knowledge acquisition/development. Hence, the antecedents of organizational absorptive capacity are not necessarily the same as for teams' absorptive capacity, and therefore we need to understand what affects and determines the development of absorptive capacity in teams. One noteworthy study of the antecedents of potential absorptive capacity is by (Backmann et al., 2015), which shows that potential absorptive capacity is positively affected by partners' work-style similarity, and that it displays an inverted U-shape relationship with partners' knowledge complementarity. Hence we need further research that will help us to understand what determines teams' absorptive capacity, and answer the calls made in recent review articles (Marabelli & Newell, 2014; Volberda et al., 2010). Considering this, and the general aim of my thesis:

**My second objective** is to explore what determines the level of absorptive capacity of a team, and what the antecedents of teams' absorptive capacity are.

### Antecedents of individuals' absorptive capacity

Individuals' absorptive capacity is a big piece of the puzzle of organizational absorptive capacity (Lewin et al., 2011; Volberda et al., 2010). Cohen & Levinthal (1990) emphasize that an organization's absorptive capacity will depend on the absorptive capacity of its individuals. Furthermore, they note that individuals' problem-solving and creativity will affect the creation of new knowledge, and improve organizational absorptive capacity. People's ability to create and process knowledge will be determined by their individual characteristics (Cohen & Levinthal, 1990). Hence, individuals are primary building blocks in the organization in terms of knowledge creation and learning, which underlines the importance of their absorptive capacity (Lewin et al., 2011; Marabelli & Newell, 2014).

Considering the importance of individuals' absorptive capacity, it is important to know what affects and facilitates it. Previous theoretical papers have emphasized the importance of prior knowledge and experience (Cohen & Levinthal, 1990; Lane et al., 2006) as well as cognitive models and

social networks (Todorova & Durisin, 2007; Zahra & George, 2002) as antecedents of individual absorptive capacity. Despite this focus, we still lack systematic research on the antecedents of individuals' absorptive capacity and what facilitates its development. Considering this, and the general aim of my thesis:

**My third objective** is to explore what determines the level of absorptive capacity of an individual, and what the antecedents of individuals' absorptive capacity are.

### Mechanisms and links that help organizational absorptive capacity arise from individuals' absorptive capacity

Cohen & Levinthal (1990) stated that organizational absorptive capacity is more than the sum of its individuals' absorptive capacity, and that organizational absorptive capacity consists of the mosaic of individuals' absorptive capacities and the links between them. However, the authors do not explain what mechanisms are needed for an organization's absorptive capacity to arise from the absorptive capacity of its individuals. In order to build organizational absorptive capacity, individuals need to interact and transfer knowledge between each other (Grant, 1996; Kogut & Zander, 1992; Marabelli & Newell, 2014). Cohen & Levinthal (1990) also emphasized the importance of groups' absorptive capacity, where individuals' absorptive capacities converge to form organizational absorptive capacity through organizational structures and processes. In accordance with the Micro-Meso-Macro framework of absorptive capacity presented above, it is important to pay attention to the meso-level context, where individuals' absorptive capacities first converge before they rise and coalesce into organizational absorptive capacity at the macro level.

If we want to manage the development of organizational absorptive capacity, we need to understand which mechanisms and factors help organizational or departmental absorptive capacity arise from individuals' absorptive capacity. So it is surprising that we still lack any systematic multi-level investigation teasing out those parts of an organization's absorptive capacity that flow purely from its individuals from those that originate from

its own mechanisms and levers. In addition, a number of theoretical articles call for multilevel investigations (Marabelli & Newell, 2014; Volberda et al., 2010), indicating a lack of studies that provide insights into the mechanisms that facilitate the synthesis of individuals' absorptive capacity into organizational absorptive capacity (Lewin et al., 2011). Considering this, and the general aim of my thesis:

**My fourth objective** is to explore what mechanisms facilitate the aggregation of individuals' absorptive capacity to the organizational level.

# Chapter 3

## Research design and research process

In this chapter, I present my research design and research process, in chronological order, including the choices I have made and the methodologies I have used. I will not dive into details of each methodology, because each of my five articles (see Appendix 1) includes detailed descriptions. However, I will describe the environment in which I carried out my research, collected data, and developed my thoughts during the journey.

### Research design

Research design “deals with a logical problem and not with a logistical problem” (Yin, 1989: 29). With this in mind, and in order to obtain evidence relevant to my research questions and objectives, I first decided to explore a case study that would give me the opportunity to explore the focal phenomena in more depth (particularly in relation to my first two objectives). Regarding my second objective, I also decided to obtain testimony in a multi-case study. For my latter two objectives, I decided to collect evidence in a subsidiary of a large European multinational where I could obtain data at multiple levels: among employees (at the micro level) and also in the departments to which they belonged (at the meso level).

The next step was to decide on the appropriate research method for collecting and analyzing my data. In organization and management re-

search, qualitative methods are used to gain deeper understanding of phenomena and provide the tools to explore and decode the meanings that individuals or groups attribute to situations related to the phenomena under study. The data is most often collected in participants' own workplace settings by asking open-ended and emergent questions. The analysis of the data is based upon the researcher's interpretations of its meaning (Creswell & Clark, 2007; Eisenhardt, 1989; Yin, 2014). The quantitative research method, on the other hand, uses narrow questions and large-scale data to test objective theories by examining the relationships among variables. The variables are operationalized and converted into instruments that can be analyzed with mathematical and statistical tools, providing generalizable findings (Babbie & Babbie, 1990; Neuman, 2005).

### Multi-method approach

In accordance with my research design, I have used a multi-method approach, combining both qualitative and quantitative methods in tandem. This lends more strength to the thesis than if either method were to be used on its own (Creswell & Clark, 2007). For the case study design and multi-case study design, I applied the qualitative research method to collect the data with the aim of exploring the under-researched topic of team absorptive capacity in the meso-level context. For the research design in the multinational corporation subsidiary, its employees, and their departments, I applied the quantitative research method, collecting extensive survey data so I could generalize my findings. The multi-method approach was useful, because neither method on its own was adequate to achieve my all research objectives and answer my research questions. Moreover, it allowed me to gain from strengths from the both methods applied in the thesis (Creswell, 2013; Jick, 1979).

In the rest of this chapter, I will present my research process chronologically (see Figure 2), explain how my ideas have developed over the time, and outline the methodologies I used and how they affected my research process. An overview of methodologies used in my papers is presented in Table 3.

Figure 2: Timeframe of the research process

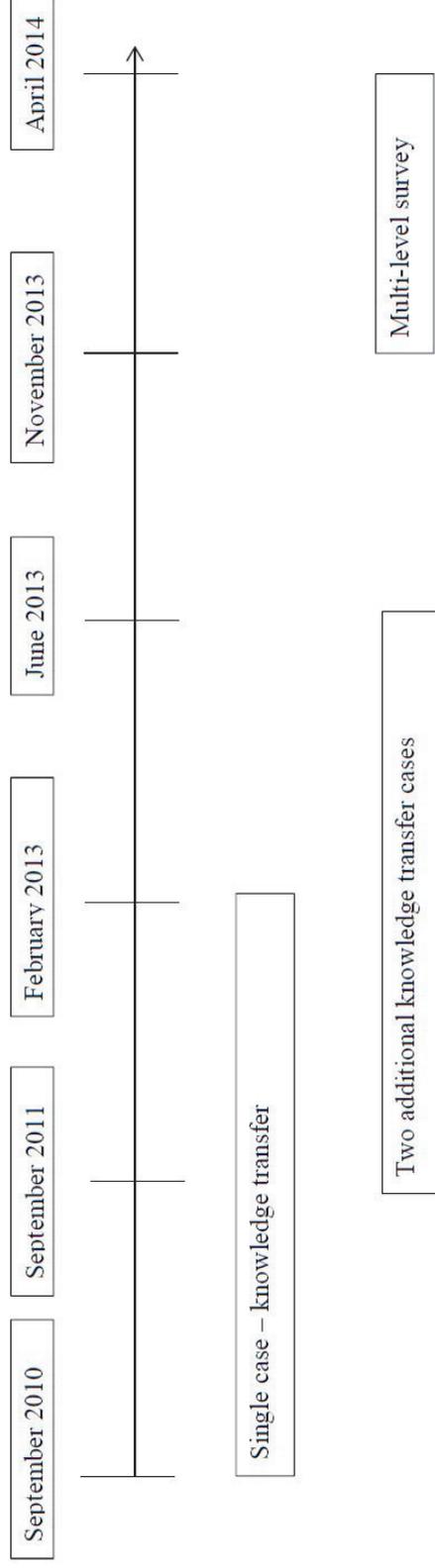


Table 3: Objectives and methodological approaches for the five different studies

Paper	Relevant research objective	Specific objective	Design and method
Paper 1. Antecedents of absorptive capacity in knowledge transfer projects: What affects the absorptive capacity of the recipient team?	2 <sup>nd</sup> : explore antecedents of team absorptive capacity	To study the effect of project managerial and organizational factors on the recipient team's absorptive capacity	Case study design. Qualitative research method
Paper 2. Dispositional and contextual antecedents of individual-level absorptive capacity	3 <sup>rd</sup> : explore antecedents of individual absorptive capacity	To study empirically how personal characteristics affect individuals' absorptive capacity	Micro and meso subsidiary design. Quantitative research method
Paper 3. Towards an interactionist perspective on absorptive capacity: A multi-level investigation	3 <sup>rd</sup> and 4 <sup>th</sup> : explore the mechanisms and links that help an organization's absorptive capacity arise from its individuals' absorptive capacity and dispositional factors affecting individuals' absorptive capacity	To study empirically how transactive memory systems facilitate the elevation of individuals' absorptive capacity into department's absorptive capacity	Micro and meso subsidiary design. Quantitative research method
Paper 4: Unpacking Absorptive Capacity: Relevance of Teams as a Meso-level Context	1 <sup>st</sup> : explore how absorptive capacity develops in teams	To develop the definition of team absorptive capacity with four new dimensions	Conceptual: provides definition of team-level absorptive capacity including four new dimensions
Paper 5: Managing Technology Transfer: Enhancing the Absorptive Capacity of the Recipient	2 <sup>nd</sup> : explore antecedents of team absorptive capacity	To provide managerial recommendations on enhancing the recipient team's absorptive capacity	Multiple case study design. Qualitative research method

## Power Gen

I have been employed by Power Gen AB (a pseudonym), a subsidiary of a large European multinational corporation, for the last 12 years. In September 2010, I took up the position of advisor for knowledge transfer projects within Power Gen AB, and at the same time I started my PhD program at Stockholm School of Economics. Power Gen is high-tech company operating in the energy, health, building, and industrial sectors. A global player with offices in 190 countries that employs approximately 400,000 people, it operates as a manufacturer of business-to-business products and provides engineering services to industrial customers.

### “Insider” researcher in Power Gen AB

During my 12 years’ employment I have held several different positions at Power Gen AB, including electrical project lead engineer and project manager for the execution of contracts. My background in the company and experience in the industrial environment has helped to me to understand both the context and content of absorptive capacity. My familiarity with the company and its environment has also helped me understand the terminology used among employees, so I can appreciate the nuances of the phenomena under investigation. Being an insider researcher also has its downsides, such as preserving distance and objectivity during the collection and analysis of data.

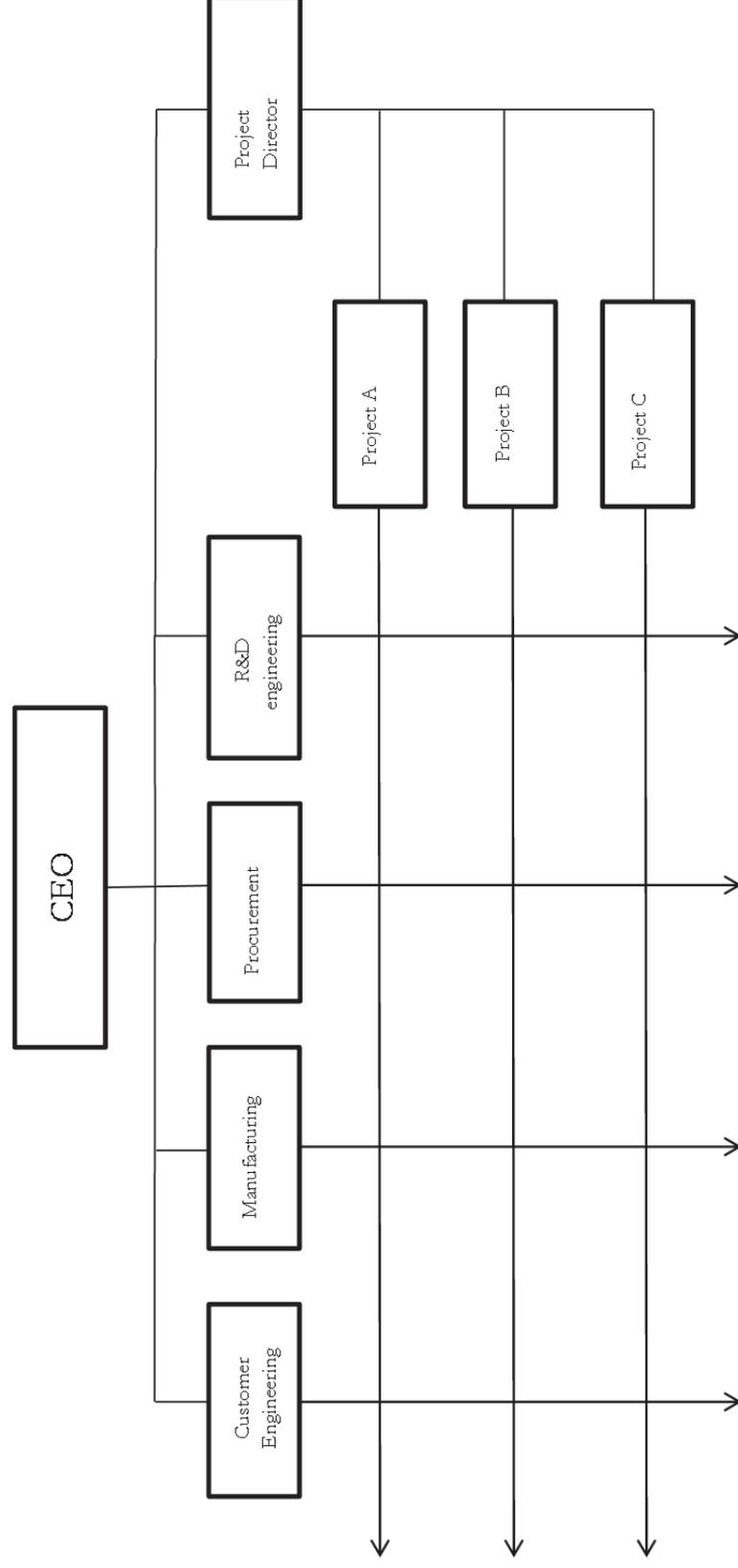
When I started my PhD program, I spent every second week for the first three and a half years in Power Gen AB, and the rest of my time at the Stockholm School of Economics. During this period I combined my work as a researcher at SSE with my role as an advisor on knowledge and competence transfer projects in Power Gen. While at Power Gen I was collecting data, and in order to maintain objectivity I controlled for each observation I made by interviewing the project team members and managers involved. This helped me avoid bias when collecting and analyzing data. Doing research on my colleagues wasn’t an easy task, and I was strict about triangulating the collected data in order to prevent bias. Moreover, I spent eight

months at Stanford University and Berkeley, where I could get some distance from Power Gen and its people and analyze the data objectively. Working in the research team, and writing articles with co-authors who are “outsiders” to Power Gen, also helped me to avoid the biases that might have arisen had I worked alone.

## Study of a recipient team's absorptive capacity in Power Gen AB: single case study

In order to pursue my aim of understanding why different teams in the same firm perform differently when absorbing knowledge, I decided to study teams' absorptive capacity longitudinally, in a knowledge transfer project where I would have full access to project details and the opportunity to dig into the nuances and richness of the phenomena. I wanted to gain a deeper and more precise understanding of how teams' absorptive capacity is developed in the meso-level context, what affects its development, and how it is related to organizational absorptive capacity – therefore, I was primarily trying to achieve my first two research objectives. The knowledge transfer project occurred between two subsidiaries in Power Gen, and the recipient of new knowledge was a team in Power Gen AB. Figure 3 shows the organizational structure of Power Gen AB and the connections between teams and the permanent organization.

Figure 3: Matrix organizational chart of Power Gen AB



Since absorptive capacity at the meso level has historically been under-researched, the qualitative method was appropriate. My reasons for choosing this case in particular were twofold. First, the recipient team was situated in Power Gen AB, which is a hi-tech company comprising a wide range of engineering disciplines and functions, making it a representative firm for studying absorptive capacity in a context where activities are knowledge-intensive (Cohen & Levinthal, 1990). Second, this project was suitable for studying the recipient team's absorptive capacity, which is crucial for the outcome of knowledge transfer (Szulanski, 1996; Tsai, 2001). Furthermore, when trying to gain a deeper understanding of a construct, it is important to have full access to the representative case. As an employee of Power Gen AB I was granted full access to the data, project meetings, and employees involved, which provided many important details and insights (Eisenhardt, 1989; Yin, 2014). Moreover, as Siggelkow (2007) argued, the use of a case study allows readers to see a practical example of the theoretical constructs identified by existing research and their relationships, and to understand how the conceptual arguments might be applied to other empirical settings. The selected case study in Power Gen was “special” ; that is, it could provide empirical insights from the recipient team that was primarily tasked with receiving transferred knowledge (Easterby - Smith et al., 2008; Szulanski, 1996).

The goal of the project was to transfer knowledge on the engineering of industrial products, and the manufacturing of their auxiliaries, between two subsidiaries located in two European countries. For 30 months, I spent every second week with the recipient project team in Power Gen AB, enjoying full access to project meetings, the project room, and project documentation, as well as unlimited time for formal and informal interviews.

The recipient project team had 30 members in total and was divided into six sub-project teams, each consisting of 3–10 members and led by a sub-project manager reporting to the head project manager. This division was made according to discipline: there were sub-project teams for electrical and control engineering, mechanical engineering, engineering tools, package manufacturing, procurement, and logistics and processes. The mechanical and electrical and control sub-teams were the largest, and the most central to the transfer process. The mechanical team included a fluid engi-

neer, a ventilation engineer, two pipe designers, two drawing designers, a firefighting engineer, a gas turbine housing engineer, and a mechanical project lead engineer. The electrical and control team consisted of an electrical designer, a drawing designer, an assembly designer, two control system engineers, and an electrical lead engineer.

The industrial product designs to be adopted comprised 20 different auxiliary systems, each one involving different engineering disciplines. The recipient team was supposed to understand and learn how to design and package all the systems, and incorporate each one in the final product to be delivered to the customer. The price for the final product was around €7m, and it took 12 months in the factory to produce and assemble it before it was delivered to an installation site.

The concrete outcome of this study was the inductive identification of the links between project managerial and organizational factors and the recipient team's absorptive capacity. This study constitutes the first paper in this thesis and fulfills my second thesis objective (see Table 3).

Following the recipient team and their approaches to receiving new knowledge helped me understand which variables I should study with large-sample surveys with the quantitative method. This blend of qualitative and quantitative methods strengthened my thesis by combining the best of both methods (Creswell, 2013). Lastly, it also provided inputs for mechanisms and variables for the multilevel study of absorptive capacity that aimed to explain the links between the micro and meso levels. I saw that individuals joining the recipient team all brought different abilities to absorb and handle new knowledge, and I developed insights into what might affect their ability. Moreover, I understood that while the organization might build up its absorptive capacity through individuals, departments, structures, and procedures, absorptive capacity is *performed* in multifunctional teams. These two observations helped build a foundation for my second and third papers, which I will further elaborate in the next section.

## Survey in Power Gen AB

Insights gained from the single case study in Power Gen AB showed me that the absorptive capacity of individuals joining a team tasked with ab-

sorbing knowledge is crucial for the team's absorptive capacity. Furthermore, I understood that personal characteristics, behavior, and background dictated the level of team members' absorptive capacity. Combining those insights with a thorough literature review, I ended up testing three different factors as antecedents of individual absorptive capacity: personal traits ("who you are"), personal education and experience ("what you've done"), and the individual's environment ("where you are"). I decided to collect data on these factors through a survey, and to develop and test theoretical hypotheses in regards to the antecedents of individual absorptive capacity (Pinsonneault & Kraemer, 1993). The development and testing of these hypotheses formed the basis for my second paper, and fulfilled my third research objective (see Table 3).

Based on my observation that an organization's absorptive capacity is built through its individuals, departments, structures, and procedures, and a thorough review of the literature, I decided to test how transactive memory systems as a mechanism helped individuals' absorptive capacities crystallize into departmental absorptive capacity at the meso level. Considering that, I decided to collect data through a survey, and develop and test hypotheses about the role of transactive memory systems in building organizational absorptive capacity. The development and testing of the hypotheses was the basis for my third paper and fulfilled my fourth research objective (see Table 3).

Since I intended to carry out confirmatory research by testing theoretical hypotheses in both Papers 2 and 3, it was appropriate to collect large-sample data through a survey (Harrigan, 1983). The survey was developed and distributed in Power Gen AB. Data collection was carried out on multiple levels by using two sets of questionnaires during autumn 2013 and spring 2014. The first form was given to managers of departments/working units who we selectively targeted for this study ( $n=126$ ) and contained questions concerning group-level variables in our models. The second form was distributed to individuals to collect data for individual-level constructs in our model, and was answered by 648 individuals. In total, the questionnaires were handed out to 1400 employees. I was able to collect data on several levels since I had access to internal employee lists and a list of all

internal departments. For more detailed descriptions, please see Papers 2 and 3.

## Conceptual addition to absorptive capacity

The next stage of my journey was to extend the conceptualization of absorptive capacity. As noted in Chapter 2, the literature has neglected the team level, and existing definitions and research cannot explain how absorptive capacity at the team level is developed and related to organizational absorptive capacity.

Following the knowledge transfer project and the recipient team gave me some insights into what was different about the team's absorptive capacity compared to the existing definition of organizational absorptive capacity. Initially, I was thinking about these issues retrospectively. However, one year into my PhD program, I got involved with two more knowledge-transfer projects where I could follow recipient teams. In addition, I held extensive discussions with project team members, including project managers from the R&D division. Building on my previous findings, experience, and extensive discussions with my co-authors, I crafted a framework to conceptualize team absorptive capacity. This process led to my fourth paper, which fulfilled my first research objective (see Table 3).

However, it is important to note that before I had ordered my thoughts and understood that team absorptive capacity needed a different definition, I had used the existing one (aimed at organizations) in two of my studies. Papers 1 and 5 use the definition of absorptive capacity conceptualized by Zahra & George (2002) to measure teams' absorptive capacity, which contradicts the claim I make in my fourth paper. While this inconsistency is not ideal, it does illustrate how my understanding of absorptive capacity has grown and developed over the course of my journey.

## Contribution for managers – multiple case study

The last output of my thesis is my fifth paper. In view of my industry experience and my executive PhD position, I decided to write a paper oriented

towards practical implications for managers. To support my recommendations, I based my study on the three knowledge transfer projects where I had followed recipient teams and studied their absorptive capacity. Case selection was made on the basis that recipient teams were involved in knowledge transfer projects with the task of absorbing knowledge, so I could study the absorptive capacity of the recipient teams. Using multiple case studies allowed me to draw specific conclusions on what managers should and shouldn't do when executing knowledge transfer projects in terms of enhancing the recipient team's absorptive capacity. These conclusions and recommendations are the basis for my fifth paper, which fulfilled my second research objective (see Table 3).

## Benefits and limitations of methodologies employed

In accordance with the general aim and objectives of my thesis, it was appropriate to use multiple methodologies for the five studies, as explained at the beginning of this chapter. I wanted to dig deep into the phenomenon of absorptive capacity, through a single case study; but I also wanted to be able to generalize my results through quantitative study by collecting survey data. Using several methodologies has enriched my thesis and has given me a more complete understanding and knowledge of absorptive capacity. The methodological strength of my thesis is the parallel combination of qualitative and quantitative methods, which allowed me first to explore under-researched phenomena with open-ended and emerging questions, then move to a quantitative research approach with large-scale data that could be statistically analyzed and the findings generalized (Jick, 1979; Neuman, 2005).

Another major benefit is my role as "insider researcher." With my experience and background in Power Gen, I had a major advantage when it came to terminology and culture used in the company that could provide a better understanding about absorptive capacity in the given environment and context. In addition, my knowledge of Power Gen and its employee networks enriched my research through a deeper understanding of nuances

of interaction between engineers. Finally, having a large network of contacts in Power Gen enabled me to collect multi-level data, which has often proved a difficult task in management and organization research (Minbaeva et al., 2014).

However, my approach also has its limitations. First, regarding the single and multiple case studies, there was a significant risk that I could be biased because of my history and position in Power Gen, and my personal contacts with employees involved in the projects. I was aware of this issue throughout, and strived to maintain an objective role while doing research by triangulating collected data. Cooperation with co-authors who are outsiders to Power Gen AB also helped me avoid biases that would have affected me if I had worked alone. Moreover, as mentioned before, I spent eight months in the USA, allowing me to put some distance between myself and the projects, and analyze the data objectively. On the other hand, my relation to Power Gen and personal contact with employees enabled me to get “under the skin” of the organization, and uncover insights that were crucial for my research and findings.

Second, in the survey, the measures for group-level absorptive capacity were all based on single responses from each unit of analysis. Thus, even though we used departmental managers as informed respondents to measure group-level constructs, our data was not exempt from the usual biases associated with using single responses. Furthermore, the model and analyses are static in nature because of the cross-sectional nature of our data. Future research can address this by adopting longitudinal designs based on data collected at multiple points in time.



# Chapter 4

## Summaries of the five papers

In this chapter I briefly present the five papers that constitute my thesis. Full editions as submitted to journals can be found in the Appendix.

Paper 1: Antecedents of absorptive capacity in knowledge transfer projects: What affects the absorptive capacity of the recipient project team?

### **About this paper**

This paper identifies a number of factors related to project management and organization that have significant influence on the absorptive capacity of the recipient team involved in knowledge transfer projects. This paper responds to my second thesis objective and was co-authored with Mattia Bianchi. It is currently under second round review at the *International Journal of Innovation Management*.

### **Summary**

Many companies are finding that planning and executing effective knowledge transfer with external organizations is increasingly important. The benefits of successful knowledge transfer include reduced costs and risks in research and development (R&D), enhanced proficiency and speed

in new product development, leverage of multidisciplinary technologies, and know-how that can facilitate flexible manufacturing strategies. The key factor for success in knowledge transfer is the recipient's absorptive capacity (Argote et al., 2003; Lane & Lubatkin, 1998; Lyles & Salk, 1996; Park & Kang, 2009; Szulanski, 1996; Tsai, 2001). Previous research has mostly studied absorptive capacity at the organizational level, with a focus on the benefits and advantages absorptive capacity affords to firms as a whole, without fully exploring how firms can improve their absorptive capacities, particularly on the project level (Lewin et al., 2011; Volberda et al., 2010).

This paper's empirical analysis and findings are based on a single-case-study methodology. Taking an inductive approach, we identify links between our research objectives and findings derived from the data, and ensure that these links are transparent and defensible (Corbin & Strauss, 2008; Thomas, 2006). As Siggelkow (2007) argued, this use of a case study allows readers to see a practical example of the theoretical constructs identified by existing research and their relationships, and to understand how the conceptual arguments might be applied to other empirical settings. In order to facilitate the goal of the paper, the selected case study must be "special"; that is, it must provide empirical insights that other cases would not (Siggelkow, 2007). Accordingly, we have carefully selected a knowledge transfer project in which the recipient team's absorptive capacity was crucial for success (Szulanski, 2000). We analyzed the interview responses, observations, and project documentation that related to each antecedent of team-level absorptive capacity; in the process, we coded keywords relevant to the specific practice (Yin, 2014).

This paper's main contribution is to provide results that shed new light on absorptive capacity at the project level, and a set of research propositions that represent a promising starting point for future confirmatory research. Our findings show that factors such as project-team structure, steering committees, project planning, and decentralized leadership are key antecedents to the development of the recipient project team's absorptive capacity. According to our empirical evidence, different practices affect potential and realized absorptive capacity in varying ways. These results point to the sharply contrasting nature of these two dimensions, and the consequent need for different managerial systems at different times during pro-

ject execution. Moreover, this paper also contributes by showing how absorptive capacity is developed in project teams, adding new insights to the ongoing discussion of how an organization's absorptive capacity is related to the absorptive capacities of its component segments, i.e. teams (Argote, 2012; Marabelli & Newell, 2014). Findings from this paper provide a starting point for future research on the absorptive capacity of teams, considering the importance of well-defined project teams in the execution of knowledge transfer activities.

## Paper 2: Dispositional and Contextual Antecedents of Individual-level Absorptive Capacity

### **About this paper**

This paper examines and investigates whether and how individuals' personality characteristics and cognitive style influence their work related motivation and, eventually, shape their absorptive capacity. Moreover, it investigates how contextual factors moderate the link between individuals' work motivation and ability and their absorptive capacity. This paper addresses my third research objective. The paper was co-authored with Emre Yildiz, Anders Richtnér, Udo Zander, and Sergey Morgulis-Yakushev, and is currently under first round review at the *Journal of Management*.

### **Summary**

Due to the indispensability of knowledge for organizational survival and performance, the ability to continuously renew and develop knowledge-based assets is a central concern and goal for firms. In this regard, absorptive capacity stands out as the capability for continuous innovation and external organizational learning. In their original article, Cohen & Levinthal (1990) remark that the development of organizational absorptive capacity is a function of the development of individual members' absorptive capacity. Despite the central and foundational role of individual-level absorptive capacity, the overwhelming majority of past research has conceptually and

empirically treated absorptive capacity at the organizational level of analysis, leading to a dearth of research on the micro-foundations and individual-level antecedents of absorptive capacity (Lane et al., 2006; Marabelli & Newell, 2014).

This study is based on survey data among 1400 individuals in Power Gen AB. Structural Equation Modeling (SEM) was used to model and quantify the associations between the constructs and their predictors.

Considering the gap in the literature, the main contribution of this paper is the direct examination of individual-level absorptive capacity. In this regard, we fully concur with Minbaeva et al. (2014), who draw attention to the behavioral underpinnings of absorptive capacity and lay special emphasis on the role played by intensity of effort in the development of absorptive capacity in organizations. A key contribution of this research is to examine absorptive capacity at the individual level within a knowledge-based logic, which is based on the empirical support of the two sets of theoretical arguments.

First, motivation plays a key role in individuals' ability to recognize, assimilate, and exploit new knowledge. Our findings suggest that organizations need to recognize how to both intrinsically and extrinsically motivate their employees, as failure to do so will have negative consequences for individual-level absorptive capacity. Our distinction between different types of motivation and our finding that such types are determined by different dispositional traits can shed light on specific incentive mechanisms, human resource management practices, and recruiting policies, depending on the relative importance of potential and realized absorptive capacity to a position. Second, the paper shows that contextual factors are important for the facilitation of potential and realized absorptive capacity, and that leadership matters: managers need to provide adequate leadership to strengthen the links between individuals' motivation and their absorptive capacity. Third, most surprising findings in this paper are that individuals' ability has no direct effect on potential nor realized absorptive capacity. However, we found that ability is positively related to realized absorptive capacity when individuals have leaders who intellectually stimulate and support innovative behavior.

## Paper 3: Towards an Interactionist Perspective on Absorptive Capacity: A Multi-level Investigation

### About this paper

This paper provides a multilevel investigation of how personal attributes and individual cognitive styles affect individuals' absorptive capacity, and how transactive memory systems as a social-psychological variable determine the extent to which individual-level absorptive capacity can be translated into collective absorptive capacity. This paper addresses my third and fourth research objectives. It was co-authored with Emre Yildiz, Anders Richtnér, and Udo Zander, and is currently under first round review at *Organization Science*.

### Summary

Absorptive capacity has been identified as one of the key dynamic capabilities required for achieving continuous learning and developing organizational knowledge (Cohen & Levinthal, 1994). In their original article, Cohen & Levinthal (1990) argue that organizations can build their absorptive capacity through their individual members. Thus, individuals represent the building blocks of absorptive capacity. Cohen & Levinthal (1990) further note that “[a] firm’s absorptive capacity is not, however, simply the sum of the absorptive capacities of its employees, and it is therefore useful to consider what aspects of absorptive capacity are distinctly organizational” (p.131). Except for a handful of theoretical studies pointing to the need to study absorptive capacity at multiple levels of analysis (Lewin et al., 2011; Volberda et al., 2010), empirical multi-level studies on absorptive capacity are scarce.

This study is based on survey data among 1400 individuals in Power Gen AB. Structural Equation Modeling (SEM) was used to model and quantify the associations between the constructs and their predictors in the multi-level setting.

In view of the identified research gap, this paper’s main contribution is to illuminate the mechanisms that synthesize individuals’ absorptive capacity into collective absorptive capacity. By adopting an interactionist perspec-

tive, the paper highlights the interactions between contextual and individual factors that might help or hinder the development of individual-level absorptive capacity and its relation to collective absorptive capacity. In other words, based on the premise that absorptive capacity is both an individual and organizational phenomenon, and that collective absorptive capacity is more than the sum of individuals' absorptive capacities, the paper contributes findings on which parts of collective absorptive capacity can be considered organizational, and which purely individual.

Another important contribution is the paper's results on how certain personality traits and cognitive styles affect individuals' potential and realized absorptive capacity. The paper also responds to calls made in previous theoretical studies emphasizing the need to understand the mechanisms and links that make an organization's absorptive capacity arise from its individuals' absorptive capacity. Findings from this paper on dispositional factors as antecedents of absorptive capacity complement existing research on dispositional factors as determinants of creativity, where absorptive capacity has an important role (Oldham & Cummings, 1996; Shalley, Zhou, & Oldham, 2004).

## Paper 4: Unpacking Absorptive Capacity: Relevance of Teams as a Meso-level Context

### **About this paper**

This paper sheds new light on the theoretical concept of absorptive capacity by unpacking the previous conceptualizations by Zahra & George (2002) and Todorova & Durisin (2007) and introducing a new conceptualization of absorptive capacity that is particularly relevant for teams. This paper answers my first research objective, and was co-authored with Emre Yildiz, Anders Richtnér, and Udo Zander. It is currently under second round review at the *Academy of Management Review*.

### **Summary**

To absorb, develop, and transfer knowledge, contemporary firms regularly use teams. Teams have certain attributes and characteristics that differenti-

ate them from firms. Understanding these differentiating factors highlights the need for identifying and defining the lower-order capabilities that constitute the meso-level foundations of absorptive capacity. This is especially important given that the creation, transfer, and utilization of knowledge is often done in and by teams (Argote, 1999; Edmondson, 2002). In this sense, we can regard teams as the primary means by which organizations develop and understand new technologies, ideas, and practices. In other words, teams are the main tools of directed learning process where the vision or “projected end state” is already specified. Thus teams represent an active context of learning where activities and interactions associated with new-knowledge acquisition and/or development are performed and executed (Argote & Miron-Spektor, 2011). The role, importance, and idiosyncratic characteristics of teams provide a valuable opportunity to analyze the concept of absorptive capacity at the team level, and thereby increase both our understanding of the phenomenon and the usefulness of the concept. Despite the massive volume of research, continued empirical interest, and conceptual refinements on absorptive capacity, the exclusive focus on the organizational level has resulted in a dearth of systematic attention paid to its multilevel nature. This is quite surprising, given that Cohen & Levinthal (1990: 128) note that “outside sources of knowledge are often critical to the innovation process, whatever the organizational level at which the innovating unit is defined.”

In view of this, the paper makes three contributions to the absorptive capacity literature. First of all, compared to traditional organizational forms, teams provide a unique context for studying absorptive capacity in practice and question the taken-for-granted assumptions made by earlier studies. Thus, our focus on teams and team-level absorptive capacity dimensions explicitly challenges assumptions in the extant absorptive capacity literature, and offers an important theoretical development by providing a meso-level conceptualization of absorptive capacity that is better suited to the unique context of teams.

Second, by focusing on teams, this paper provides a better understanding of human and group level issues, and probes the micro and meso processes through which absorptive capacity and knowledge management are handled. By paying attention to lower levels of analysis, we examine the

multi-level nature of absorptive capacity, which has been neglected by previous studies (Volberda et al., 2010).

Third, we present a new approach to conceptualizing absorptive capacity in the active learning context of teams, which are habitually used for new-knowledge development and transfer. In this way, theorizing on absorptive capacity can capture and become better attuned to real-world practice, where teams are taking on an ever-more central and significant role in knowledge development, transfer, and absorption. We extend extant literature by “unpacking” absorptive capacity and enquiring into the specific dimensions of lower-level capabilities that form the basis for the higher-order dimensions identified in previous studies.

## Paper 5: Knowledge Transfer: Boosting Absorptive Capacity of the Recipient

### **About this paper**

This single-author paper focuses on providing managerial recommendations on how to enhance the absorptive capacity of the recipient team in knowledge transfer projects. It answers my second thesis objective and is currently under third round review at the *Research Technology Management Journal*.

### **Summary**

In constantly changing markets, the transfer of technology has been, and remains, essential to firms’ survival (Argote, 2012; Kogut & Zander, 1992). Technology transfer occurs in several activities such as licensing, open innovation, and – in the case of multinational corporations – the deliberate transfer of technological and organizational knowledge to subsidiaries (Bianchi, Chiaroni, Chiesa, & Frattini, 2011; Chesbrough, 2003; Zander & Kogut, 1995). Successful technology transfer brings many benefits to firms, such as reduced production and R&D costs, increased innovation efficiency, and increased sales revenues (Easterby - Smith et al., 2008; Van Wijk et al., 2008). Research has shown that the most significant factor affecting the outcome of knowledge transfer is the recipient team’s absorp-

tive capacity. Therefore, from a managerial perspective, it is important to know which practices and actions enhance absorptive capacity when managing the recipient team, and which ones impede it.

The findings in this paper are supported by a multiple case study method wherein I longitudinally follow three strategically pivotal knowledge transfer projects in Power Gen. This allowed me to track the acquisition of knowledge as it unfolded, providing direct insight into the managerial changes implemented and their outcomes (Yin, 2014). The findings from one case were cross-checked against the others, and my findings were discussed and validated in several workshops with Power Gen's managers, project managers, and sub-project managers.

Considering the importance of recipients' absorptive capacity in knowledge transfer projects, the main contribution of this paper is a framework providing managerial recommendations divided into the four stages of the knowledge transfer model, the model defined by Szulanski (1996). The paper shows that, since the knowledge transfer process transcends multiple organizational levels, success depends on effective coordination between managers working at different hierarchical levels.

The results show also that the project manager plays the crucial role during implementation and ramp-up stages. This means that senior management needs to pay extra attention to the selection of project managers, by specifying the skills and merits the role requires. The selection criteria and procedure should be based on the particular nature of the technology being transferred, as well as on the characteristics of the team and the type/extent of resources available therein.

The framework proposed in this paper provides lessons learned for project managers in terms of taking on different roles and following different practices throughout the stages of a project. Moreover, my framework also offers guidelines and recommendations for line departments' managers on how to prepare for and facilitate the diffusion of new technology across the organization.



# Chapter 5

## Findings and implications for theory and practice

Alongside the general question I posed at the outset – why a firm with a certain level of absorptive capacity achieved such divergent results in absorbing new knowledge with two different teams involved – I posted four specific research questions. In this chapter, I present findings, theoretical contributions, and managerial implications from this thesis in relation to each of research questions posted. Table 4 shows which papers contribute to each question.

Table 4: Contribution made by each paper to the four research questions

	Research Question 1	Research Question 2	Research Question 3	Research Question 4
Paper 1		•		
Paper 2			•	
Paper 3			•	•
Paper 4	•			
Paper 5		•		

## Research question 1: How does absorptive capacity develop in teams?

### Findings

This thesis answers this question by unpacking the previous conceptualization developed by Todorova & Durisin (2007). Unlike this study, and others that its authors build on (e.g., Zahra & George, 2002), I have not focused on the macro level of firms and organizations. Instead, I focus on the meso level and examine what kinds of capabilities constitute absorptive capacity at the team level. Inspired by the increasing use and importance of teams in the contemporary business environment, I argue that taking the team-level perspective is important because most knowledge development and transfer activities occur in teams (Argote, 1999; Edmondson, 1999). In an effort to unravel the meso-level foundations of absorptive capacity, I unpack the dimensions of acquisition, assimilation, and transformation as developed in past research (Todorova & Durisin, 2007; Zahra & George, 2002). Accordingly, I introduce four new dimensions of team absorptive capacity relevant for team activities in regard to knowledge development and transfer: identification, improvisation, harmonization, and consummation. These findings are provided in Paper 4: *Unpacking Absorptive Capacity: Relevance of Teams as a Meso-level Context*. See Table 4.

Table 5: Findings relevant to Research Question 1

	Research Question 1: How does absorptive capacity develop in teams?
Paper 4	Conceptualization of team absorptive capacity with the introduction of four new dimensions: identification, improvisation, harmonization, and consummation

## Theoretical implications

Past research has repeatedly stressed that prior accumulated knowledge is a crucial antecedent of absorptive capacity. However, we still know little about knowledge stocks and flows in the organization, as pointed out in recent literature reviews (Marabelli & Newell, 2014; Volberda et al., 2010). In this thesis, I argue that teams play a key role in these flows, given that they both benefit from existing stocks of organizational knowledge, and contribute to future stocks. Focusing on the meso-level active context (i.e., teams), where effectuation of absorptive capacity takes place, I argue that team-level absorptive capacity is better characterized by dimensions other than those manifested in the macro-level latent context (i.e., organizations). However, this does not mean that team-level absorptive capacity is completely unconnected to organizational-level dimensions of absorptive capacity. On the contrary, I argue that the latent and active contexts of absorptive capacity are strongly interlinked. I dig into three dimensions of organizational absorptive capacity (i.e., acquisition, assimilation, and transformation) and explain through which team-level capabilities these three dimensions are “performed” in action. The links between these levels and contexts consist of managerial actions, organizational routines, and mechanisms acting in both directions. This suggests that the two contexts do not operate in isolation, but rather complement each other.

Orienting towards team-level absorptive capacity makes some of the implicit assumptions of past research more salient. In particular, by looking at the active learning context of teams, we can explore the specific skills and capabilities required to manage (a) the availability and usability of existing firm-level knowledge stocks; (b) the coherence of new external knowledge; (c) the role of time and resource constraints; and (d) the packaging and customization of newly absorbed/developed knowledge.

Past studies have not explicitly dealt with these issues due to their focus on absorptive capacity at the organizational level. Thus, an added benefit of zeroing in on the team level, over and above its significant empirical relevance, is the problematization of key factors and assumptions that deserve more direct attention. The new conceptualization of absorptive capacity at the team level and its unique dimensions addresses the issue of where and

how absorptive capacity should be studied and eventually measured. Accordingly, the paper enriches our understanding and has the potential to improve future research by elaborating the lower-level capabilities upon which higher-level capabilities are built.

Using the new dimensions introduced in this paper, future empirical research on team-level absorptive capacity could study and measure this construct at the meso level of analysis, where I argue that absorptive capacity is becoming both more relevant and more readily observable. Moreover, the paper enriches the multilevel nature of absorptive capacity by complementing extant macro-level frameworks with a meso-level focus. Even though the paper does not delve into the linkages across these different levels of analysis, it identifies such an exercise as fruitful and essential for future studies.

### Managerial implications

Previously, it was known that it was important to invest in R&D in order to maintain a certain level of organizational absorptive capacity. The new definition of team absorptive capacity shows that managers need to pay attention to each team separately, and manage the development of dimensions that support the absorptive capacity of each one. Moreover, senior management should understand what supports the development of teams' absorptive capacity dimensions, and invest accordingly – as opposed to investing in R&D activities more generally and assuming that absorptive capacity will flourish as a result. Defining new dimensions and specifying what constitutes them makes it easier for team managers to lead and manage teams in order to facilitate development of the dimensions for more effective knowledge absorption and development.

Focusing on the meso level and unpacking the acquisition, assimilation, and transformation dimensions of organizational absorptive capacity helps managers make clearer distinctions between these three stages and direct their attention accordingly, with the ultimate aim of using new knowledge for commercial ends. It illustrates that one team should deal with future technology, another should absorb the new knowledge once it is identified and package it for execution, before a final team takes over and consoli-

dates on the work of the previous teams. It also highlights the need to manage interfaces between these teams effectively.

## Research question 2: What determines the level of absorptive capacity of a team, i.e. what are the antecedents of team absorptive capacity?

### Findings

This thesis sheds new light on absorptive capacity at the team level, and provides a set of propositions about the antecedents of the recipient team's absorptive capacity in knowledge transfer projects. The findings reveal that project team structure and team members' involvement in decision-making are positively related to the potential absorptive capacity of the recipient team. The findings also show that the establishment of a steering committee is positively related to both potential and realized absorptive capacity, but with a higher positive influence on the potential absorptive capacity of the recipient team. Stricter planning is positively related to the realized absorptive capacity of the team, but negatively to potential absorptive capacity. Furthermore, team members' involvement in the decision-making process has a negative impact on realized absorptive capacity. These findings are provided in Paper 1 (*Antecedents of absorptive capacity in knowledge transfer projects: What affects the absorptive capacity of the recipient project team?*).

Furthermore, through Paper 5 (*Managing knowledge transfer: Enhancing the absorptive capacity of the recipient*), this thesis contributes a set of managerial recommendations that will boost the absorptive capacity of the recipient team. The recommendations are divided into four stages – initiation, implementation, ramp-up, and integration – that constitute the knowledge transfer process originally defined by Szulanski (1996). Building on the work of Szulanski (1996), the paper suggests that upper management, during the initiation stage, should (a) pay particular attention to convincing employees in the recipient organization that new knowledge is beneficial for them; (b) stick to recommended criteria when choosing a project man-

ager for the recipient team; (c) establish a multifunctional steering committee; and (d) separate the recipient team from the rest of the organization.

During the implementation stage, the project manager needs to (a) optimize criteria for the selection of team members; (b) organize four- to six-week visits to the sender's facilities; (c) begin developing an instruction book that will be used during the integration stage; (d) implement loose planning at the beginning of the implementation stage and stricter planning later on; and (e) ensure the systematic incorporation of new knowledge.

In the ramp-up stage, the project manager should (a) introduce feedback loops and weekly lessons learned; (b) continue to develop the instruction book; (c) impose stricter planning; and (d) clone the project team with new members from the organization. In the final stage, integration, it is important to (a) continue cloning teams to speed the diffusion of new knowledge through the organization; (b) identify chief engineers for different engineering disciplines in regards to new technology; (c) organize seminars where new knowledge will be presented and discussed; and (d) create a physical space for the informal exchange of new knowledge.

Table 6: Findings relevant to Research Question 2

	Research Question 2: What determines the level of absorptive capacity of a team, i.e. what are the antecedents of teams' absorptive capacity?
Paper 1	Project team structure is positively related to the potential absorptive capacity of the recipient team
	Team members' involvement in decision-making is positively related to the potential absorptive capacity of the recipient team, but has a negative impact on realized absorptive capacity
	The establishment of a steering committee is positively related to both potential and realized absorptive capacity, but with a higher positive influence on the potential absorptive capacity of the recipient team
	Stricter planning is positively related to realized absorptive capacity, but negatively related to potential absorptive capacity
Paper 5	During the initiation stage of knowledge transfer, the following are important for the absorptive capacity of the recipient team: Convince employees in the recipient organization that new knowledge is beneficial for them Choose the right project manager for the recipient team Establish a multifunctional steering committee Separate the recipient team from the rest of the organization
	During the implementation stage of knowledge transfer, the following are important for the absorptive capacity of the recipient team: Selection of team members Four- to six-week-long visits to the sender's facilities Begin developing an instruction book Loose planning in the beginning, and stricter planning in the later phases of the implementation stage Systematic incorporation of new knowledge
	During the ramp-up stage of knowledge transfer, the following are important for the absorptive capacity of the recipient team: Introduce feedback loop and weekly lessons learned Continue with the development of the instruction book Make planning stricter Clone the project team with new members from the recipient organization
	During the integration stage of knowledge transfer, the following are important for the absorptive capacity of the recipient team: Continue cloning teams for faster spread of new knowledge in the organization Identify chief engineers for different engineering disciplines in regards to new technology Organize seminars where new knowledge will be presented and discussed Create a physical space for the informal exchange of new knowledge.

### Theoretical implications

This paper clearly shows that different practices affect the potential and realized absorptive capacity of a team in varying ways. Moreover, these findings respond to calls from previous review articles that explicitly emphasize the importance of understanding the microfoundations of absorptive capacity and the antecedents of absorptive capacity at different levels in the organization – particularly meso-level antecedents (Lane et al., 2006; Lewin et al., 2011). Responding to these calls, the findings particularly explain the link between project management and organization with team absorptive capacity by providing evidence for how certain managerial actions affect the project team's absorptive capacity.

Furthermore, these results point to the sharply contrasting nature of potential absorptive capacity vis-à-vis realized absorptive capacity, and the consequent need for different managerial systems at different times during the team's knowledge absorption. From this point of view, absorptive capacity may resemble the multidimensional concept of ambidexterity, which is achieved by balancing exploration and exploitation. Consistent with the structural view of ambidexterity put forward by Raisch, Birkinshaw, Probst, & Tushman (2009), we argue that dual structures and management styles – one focused on the recognition and assimilation of external knowledge, the other on its transformation and exploitation – may be beneficial for the overall development of absorptive capacity.

### Managerial implications

The suggestions for improving the absorption of new technological knowledge from external units should be treated as prompts for identifying the solutions that are right for managers' own organizations, rather than best practices or blueprints for success. In particular, the findings show that a one-size-fits-all approach to knowledge transfer project management should be avoided. Moreover, the findings provide a toolbox for project managers of the recipient team involved in knowledge transfer projects that will enhance the efficiency and quality of the absorption of new knowledge.

They propose both direct team-managing actions and also organizational suggestions that will facilitate knowledge absorption.

Even though my empirical focus regarding these findings is on technology transfer between different subsidiaries within the same multinational corporation, my findings could be generalized beyond this intra-organizational locus. Past research has shown that absorptive capacity is an important prerequisite for other forms/mechanisms of innovation (Fosfuri & Tribó, 2008; Tsai, 2001). For example, the recommendations for enhancing a team's absorptive capacity presented in this thesis could also be applied in open innovation systems, where individual managers could play a boundary-spanning role and bridge diverse components of innovation dispersed throughout a differentiated network. The managerial practices presented are even highly relevant for out-licensing activities, since they could facilitate effective commercialization of technology by supporting licensees who are about to absorb and apply new technology.

### Research question 3: What determines an individual's level of absorptive capacity, i.e. what are the antecedents of individual absorptive capacity?

#### Findings

My findings show that intrinsic motivation is positively related to potential absorptive capacity, and that this effect is strengthened when individuals are given high decision-making autonomy. This suggests that it is important not only to ensure that individuals have intrinsic motivation for exploring new and novel solutions, but also to give them a suitable working environment by letting them take their own initiatives and use personal discretion at work. In addition to the role of context, I also found that intrinsic motivation is determined by two key dispositional traits: it is higher for individuals who have strong learning orientation and creative self-efficacy.

I also theorized extrinsic motivation to be positively related to realized absorptive capacity, but the empirical results did not confirm this proposi-

tion. However, and interestingly, leaders' intellectual stimulation is found to be a significant moderator of the link between extrinsic motivation and realized absorptive capacity. Thus, the findings indicate that extrinsic motivation is conducive to realized absorptive capacity only when it is accompanied by stimulating leadership. I also found that individuals' approach and avoidance orientation are significant determinants of their extrinsic work motivation. Moreover the ability has a significant and positive effect on both potential and realized absorptive capacity. These findings are provided in Paper 2 (*Dispositional and contextual antecedents of individual-level absorptive capacity*).

Additional findings in this thesis show that extraversion and openness to experience are two important personality traits that have a positive bearing on individual-level potential and realized absorptive capacity, respectively. I further show that those individuals who have stronger need for cognition are more likely to score high on potential absorptive capacity, while individuals with higher social/emotional intelligence are more likely to score on realized absorptive capacity. These findings are presented in Paper 3 (*Towards an interactionist perspective on absorptive capacity: A multi-level investigation*).

Table 7: Findings relevant to Research Question 3

	Research Question 3: What determines an individual's level of absorptive capacity, i.e. what are the antecedents of individuals' absorptive capacity?
Paper 2	Intrinsic motivation is positively related to potential absorptive capacity, and the link is strengthened when individuals are given high decision-making autonomy
	Intrinsic motivation is higher for individuals who have strong learning orientation and creative self-efficacy
	Neither ability and nor extrinsic motivation has direct effect on realized absorptive capacity.
	Leaders' intellectual stimulation is found to be a significant moderator of the link between extrinsic motivation and realized absorptive capacity as well as of the link between ability and realized absorptive capacity.
	Individuals' approach and avoidance orientation are significant determinants of their extrinsic work motivation.
Paper 3	Individuals who have a stronger need for cognition are more likely to score highly on potential absorptive capacity
	Individuals with higher social/emotional intelligence are more likely to score highly on realized absorptive capacity
	Extraversion is an important personality trait that has a positive bearing on individual-level potential absorptive capacity
	Openness to experience is an important personality trait that has a positive bearing on individual-level realized absorptive capacity

### Theoretical implications

The distinction between different types of motivation, and the finding that different types of motivation are determined by different dispositional traits, can shed light on specific incentive mechanisms, human resource management practices, and recruiting policies, depending on the relative importance of potential and realized absorptive capacity to a particular position. Another contribution of this research is to theorize and show that organizational members vary in their ability to learn due to personal characteristics and cognitive style.

First, organizational members with a stronger learning orientation and creative self-efficacy tend to have a higher intrinsic motivation, which is consistent with previous findings (Dewett, 2007; Zhang & Bartol, 2010).

Second, I take an important step towards explaining the foundations of realized absorptive capacity at the individual level by examining the personality characteristics of the members in the organization. Even though the positive effect of approach and avoidance orientation on extrinsic motivation has been reported in past studies (e.g., Lee, McInerney, Liem, & Ortiga, 2010) and is echoed here, the findings suggest that simply having extrinsically motivated individuals would not necessarily lead to higher realized absorptive capacity. Instead, I show that leadership matters, and my findings confirm that extrinsic motivation can increase realized absorptive capacity only if leaders support and intellectually stimulate their subordinates. The findings respond to the calls made in review papers for more research into the development of micro-level absorptive capacity, and especially the antecedents of individuals' absorptive capacity (Marabelli & Newell, 2014; Minbaeva et al., 2014).

### Managerial implications

These findings offer a number of managerial implications. First, managers need to recognize motivation as a key driver for individual members to recognize, assimilate, and exploit new knowledge. Acknowledging this, managers can work towards providing more mental stimulation for their team members, as well as giving them the autonomy to find their own ways to create knowledge. Second, managers can also provide training programs that can help members to develop specific goal orientations that are linked with different dimensions of absorptive capacity.

Regarding human resource management, the findings suggest which personal characteristics are important for different absorptive capacity dimensions, which is useful during the recruitment phase for different positions where one type of absorptive capacity is more important than the other. This is also helpful for managers who are managing departments, allowing them to assign employees with different personal characteristics to

the right tasks, depending of the nature of the task in relation to the required dimensions of absorptive capacity.

## Research question 4: What mechanisms facilitate the aggregation of individuals' absorptive capacity to the organizational level?

### Findings

My findings show that aggregated individual-level potential absorptive capacity has a positive effect on group-level potential absorptive capacity, and that this effect becomes even stronger when transactive memory systems concerning specialization and coordination are in place. Furthermore, findings show that aggregated individual-level realized absorptive capacity is positively associated with group-level realized absorptive capacity, and this effect is positively moderated by the coordination and credibility dimensions of transactive memory systems. These findings are provided in Paper 3 (*Towards an interactionist perspective on absorptive capacity: A multi-level investigation*).

Table 8: Findings relevant to Research Question 4

	Research question 4: What mechanisms facilitate the aggregation of individuals' absorptive capacity to the organizational level?
Paper 3	Aggregated individual-level potential absorptive capacity has a positive effect on group-level potential absorptive capacity, and this effect becomes even stronger when transactive memory systems concerning specialization and coordination are in place
	Aggregated individual-level realized absorptive capacity is positively associated with group-level realized absorptive capacity, and this effect is positively moderated by coordination and credibility dimensions of transactive memory systems

## Theoretical implications

These findings show that collective-level absorptive capacity is greater than the sum of the absorptive capacities of individuals belonging to the collective. This is in accordance with the statement made by Cohen & Levinthal (1990). In particular, the multi-level model and analyses show that transactive memory systems are an important contextual factor for effectively leveling individual-level absorptive capacity up to group-level absorptive capacity.

More specifically, the findings show there are important moderating variables in the form of specialization, coordination, and credibility, which firms need to consider as they aim to translate the absorptive capacity of individual employees to the collective (i.e. group) level. We demonstrate that firms can leverage individuals' potential absorptive capacity to a collective level by considering how they work with specialization, but also how this is coordinated within the firm. Credibility is related to how far members can trust and rely on each other's knowledge, which other studies have shown to be a precondition if knowledge is to be integrated (Brattström & Richtnér, 2014).

Considering the reflections of Minbaeva et al.(2014), where the authors emphasize the importance of multi-level research logic, these findings contribute to our understanding of how absorptive capacity travels from micro to meso level, where individuals' actions are bound to actions by other individuals who take their actions into account. The findings respond to calls made in recent review papers that emphasize the importance of multi-level research on absorptive capacity (Lewin et al., 2011; Volberda et al., 2010).

## Managerial implications

The findings offer three implications for practice. First, every company concerned with innovation needs to acknowledge that the whole is greater than the sum of the parts – i.e. knowledge residing within individuals has little value in comparison to its value when combined. Second, companies that are serious about generating innovation should communicate and appreciate individuals with an open attitude, as this will lead to employees

capturing, creating, and sharing their knowledge. Third, companies should not be afraid of creating deeply specialized knowledge, as long as this knowledge is shared with others in the organization – i.e. instead of isolated “islands,” there is a network of “bridges” and “paths” connecting them. To that end, a key task for organizations is to cultivate a sense of trust, and a work environment where each individual member knows whose expertise and knowledge to rely on when dealing with new external knowledge.

## Limitations and future research

In this section I will outline the general limitations of my thesis and possible avenues for future research.

First, the results based on single- and multiple-case methodologies cannot be generalized. They could only be analytically extended to other firms of comparable size operating in manufacturing industries, which have designed and operated project-management systems to transfer knowledge across units. In such companies, we could expect an analogous role for absorptive capacity in enhancing project outcomes, and for project-management practices in developing the two dimensions of absorptive capacity. Future research should aim to enrich the propositions proposed in this paper through the analysis of representative cases in different contexts, and to validate the relationships suggested through large-scale empirical analyses.

Another interesting avenue for future research would be to explore where absorptive capacity originates, how it evolves, and where it finally resides. We usually assume that knowledge is neatly packaged and promptly dispatched to the recipient team. But what if the holders and senders of knowledge are not motivated to share their knowledge with the recipient – as is most often the case in practice? How does that affect the recipient’s absorptive capacity? Future research should study the development of teams’ absorptive capacity when knowledge needs to be “extracted” from the senders.

Second, in the survey conducted within Power Gen AB, the measures for group-level absorptive capacity are all based on single responses from each unit of analysis. Thus, even though I used departmental managers as

informed respondents to measure group-level constructs, the data is not exempt from the usual biases associated with using single responses. Furthermore, the model and analyses are static in nature because of the cross-sectional nature of our data. Future research can address this by adopting longitudinal designs based on data collected at multiple points in time. Lastly, in an effort to develop a parsimonious model and framework, I did not take all possible personality, cognitive, and social psychological factors into consideration. Subsequent studies can delve deeper into each of these blocks by looking at a wider set of personality variables (e.g., the full Big Five inventory) or a larger set of contextual moderators that could affect the link between individual- and group-level absorptive capacity.

Third, my new conceptualization of absorptive capacity at the team level and its unique dimensions addresses the issue of where and how absorptive capacity should be studied and eventually measured. Using the new dimensions introduced in this thesis, future empirical research on team-level absorptive capacity could study and measure this construct at the meso level of analysis, where absorptive capacity is becoming more relevant and readily observable. Moreover, my new conceptualization enriches the multilevel nature of absorptive capacity by complementing extant macro-level frameworks with a meso-level focus where the latent and active contexts of absorptive capacity are strongly linked with each other. The links between these levels and contexts consist of managerial actions, organizational routines, and mechanisms in both directions. This suggests that the two contexts do not operate in isolation, but rather complement each other. Hence, future research can delve deeper into mechanisms and factors affecting (a) the link from latent/organizational level to active/team level; (b) the processes and moderators of links between different team-level absorptive capacity dimensions; and (c) the link from active/team level to latent/organizational level.

# Chapter 6

## A tentative management model of team absorptive capacity

Reflecting on the two cases presented at the beginning of this thesis, where two apparently similar teams achieved opposite results in absorbing knowledge, it became clear that the management of teams is crucial for their absorptive capacity, in the active context. Moreover, as I continued on my journey, it also became evident that management also matters for absorptive capacity development in the latent context, but has a direct effect on absorptive capacity results in the active context.

Returning to the overarching aim of the thesis, in the following I aim to summarize and elucidate my findings. Since management is most relevant for absorptive capacity in the active context – “where the rubber meets the road,” as it were – I will also develop a tentative management model of team absorptive capacity, providing recommendations for what managers can do to enhance the absorptive capacity of a team help a team in learning how to learn.

### Departments are stables; teams are the racetrack

My general aim in this thesis was twofold. First, I wanted to understand why the absorptive capacity of an organization is low or high. Second, I wanted to find out what managers can do to enhance the absorptive capaci-

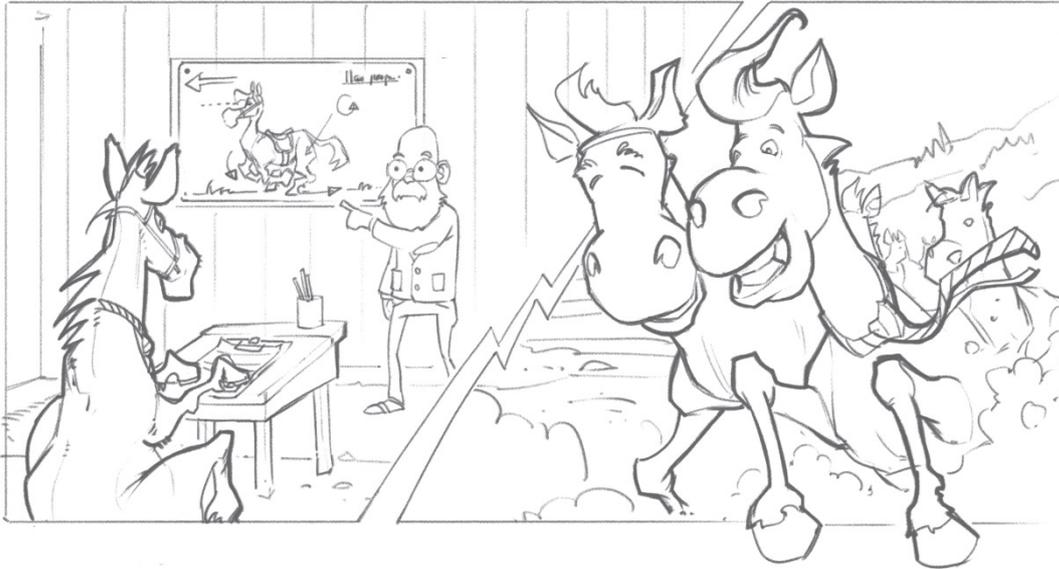
ty of their organizations. Regarding the first of these aims, we can't determine the level of absorptive capacity at the organizational level without studying teams involved in knowledge transfer and development. My findings reveal that in order to assess an organization's absorptive capacity, the focus of assessment must be on teams – the active context of absorptive capacity. Taking the team-level perspective doesn't provide a measuring stick that gives us a direct answer about the level of a team's absorptive capacity, but we do need to observe the team's actions and activities related to the specific dimensions of absorptive capacity in order to assess this level. However, my findings also reveal that while organizational absorptive capacity is built up in the permanent organization through its individuals and organizational structures and mechanisms – the latent context of absorptive capacity – absorptive capacity is exerted in teams, the active context, as teams harvest absorptive capacity accumulated in the latent context of the organization.

Aggregated absorptive capacities of teams involved in knowledge absorption and development will determine the level of performed absorptive capacity at the organizational level. Hence the level of absorptive capacity of an organization can only be observed in action, and will vary with the absorptive capacities of teams involved at any given time. Organizational absorptive capacity matters “on the racetrack,” when deployed to meet a need in the organization, but it is prepared and maintained “in the stables” – that is, in the latent context. Moreover, the active and latent contexts are strongly connected: individuals involved in the active context will absorb experience and knowledge that will flow back to the organization and enrich its absorptive capacity when those individuals return to the “stables” – their original departments.

Regarding my second general aim, the thesis reveals that interaction between individuals is important in building up collective absorptive capacity, and managers can facilitate the development of organizational absorptive capacity by providing a certain context for individuals in the organization. Furthermore, the thesis shows that different managerial and organizational attributes can be used to increase absorptive capacity when performed in teams, as well as built up in the line organization. In sections 6.4 to 6.6 below, I present a tentative model based on my findings that shows how a

team's absorptive capacity can be enhanced by judicious composition of team members and actions from the team manager.

Absorptive capacity is built up in departments but exerted in teams



## Helping individuals' absorptive capacities to thrive

Even in their original article, Cohen & Levinthal (1990) argued that organizational absorptive capacity is a mosaic of individuals' absorptive capacities and the links between them. Findings from my research show that it is important to dig deep into the organization, and understand that everyone is an individual, with unique needs that must be met if they are to thrive and build up their potential and realized absorptive capacity. Moreover, each individual has personal psychological characteristics that influence their potential and realized absorptive capacity in different ways. In relation to the discussion of absorptive capacity in active and latent contexts, individuals' absorptive capacities are the cornerstones of organizational absorptive capacity, both when built up in the latent context and exerted in the active context.

Individuals with certain characteristics are more apt to develop potential absorptive capacity, which is important for tasks of an explorative and creative nature. Others are apt to develop realized absorptive capacity, which is important for exploitative tasks. Bearing this point in mind will help managers to staff teams and assign the right tasks to the right people. My findings also tell us that absorptive capacity is not innate, and might be developed where individuals show affinity and put in the right kind of effort to develop either potential or realized absorptive capacity based on their personal characteristics.

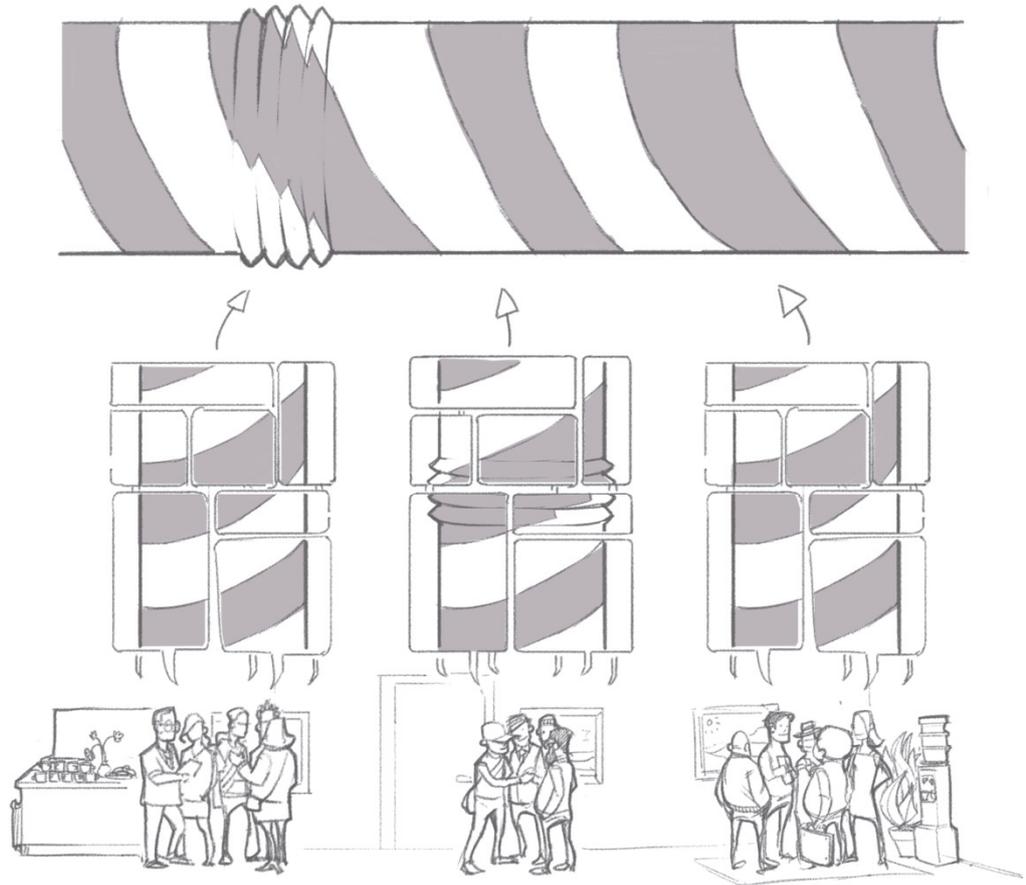
Managers may face challenges when dealing with such personal characteristics, but only they can provide the context needed for individuals to develop their absorptive capacity. Training and education will help, as will providing the appropriate work environment. To increase people's efforts to develop their absorptive capacity, different contexts and different managerial styles will be required, depending on whether individuals have the propensity to develop potential or realized absorptive capacity (which depends on their personal traits and motivation). This focus on individuals and their needs in terms of context is the key to improving organizational

absorptive capacity. We need every piece of the puzzle to create the big picture.

## Organizational absorptive capacity depends on individual interaction

This brings us to the next question: how is the absorptive capacity of a group aggregated from the absorptive capacity of individuals within it? My findings suggest some answers. The paramount observation from my time in Power Gen is that interactions between individuals are crucial for the development of a group's absorptive capacity. When people interact with each other, they build up their collective absorptive capacity. Through their interactions, they learn who they need to talk to, depending on the task and the issues they are facing. Sometimes the people they need are identified by their formal titles, but often it is informal ties and connections that allow the interaction to flourish and foster the group's absorptive capacity. The interaction is not easy to control or steer, but it can be facilitated through managerial actions and organizational support. For example, managers can organize weekly seminars on specific themes, with a specialist delivering a short lecture and the time and space for employees to ask questions and discuss issues and improvements with each other and the specialist. Moreover, managers could encourage employees to communicate with their peers in other departments, or establish physical project rooms where employees could gather for coffee and informal chats that might lead to future cooperation and interaction.

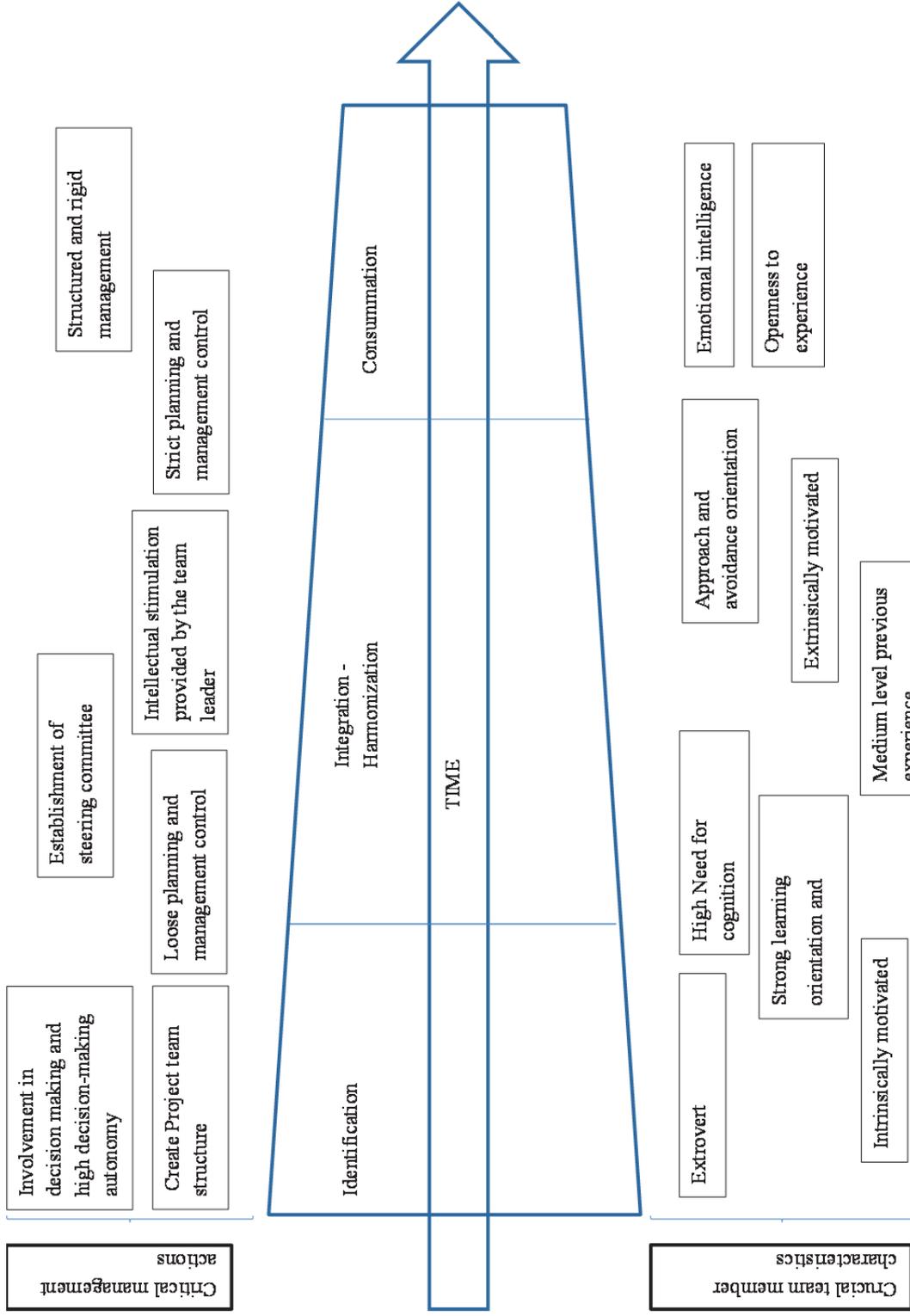
Individuals' absorptive capacities are aggregated to organizational absorptive capacity through interaction among individuals



## A tentative model for managing team absorptive capacity

As noted, organizational absorptive capacity is built up in the latent context and performed in the active context, i.e. in teams. Hence it is important to take the right management approach in both contexts. Considering my findings, I have developed a tentative model for the management of team absorptive capacity (see Figure 4). The central cone represents team absorptive capacity, with four dimensions as presented in Paper 4. The time axis passing through this cone provides the sequence of dimensions. Above the cone are clustered critical managerial actions; they correspond to the management of different dimensions according to their placement. Below the cone are the crucial characteristics of individuals that should be involved in the team through different phases; again, their position indicates which are most appropriate characteristics for the respective dimensions of absorptive capacity.

Figure 4: A tentative model for managing team absorptive capacity



Regarding managerial actions, my findings reveal that laxer management could be better for potential absorptive capacity, where the team needs to understand new knowledge, identify what they need to absorb, and decide who within the team will absorb different portions of new knowledge. This is applicable for the initial phase of knowledge transfer and development projects. However, findings suggest that management should be tightened up for the later phases, in order to enhance the realized absorptive capacity of the team.

In terms of the enhancement of potential absorptive capacity, the following findings could be applied. Paper 1 suggests that the team leader could involve team members in decision-making and provide space for them to explore new ideas. Another finding of this paper is that it could be worth creating a project team structure in which the team leader isolates the team from the rest of the organization and provides the necessary space for potential absorptive capacity to flourish. Findings in Paper 2 suggest that high decision autonomy could be given to the team members in order to facilitate their potential absorptive capacity, while Paper 5 proposes that more relaxed planning could be applied in the initial phase in order to benefit the team's potential absorptive capacity. Finally, Paper 5 also shows that, during the initial phase of absorptive capacity, a steering committee could be established to provide general direction for the team; this will facilitate both potential and realized absorptive capacity.

Turning to guidance on realized absorptive capacity alone, Paper 1's findings suggest that strict planning and management control in the later phases of knowledge transfer and development projects could boost the team's realized absorptive capacity. In Paper 2, we find that the team leader should intellectually stimulate team members to enhance their realized absorptive capacity. In Paper 5, findings suggest that the team leader should apply structured and rigid management in the later phases in order to facilitate the team's realized absorptive capacity.

Regarding the crucial characteristics of team members (shown on the lower side of the model), my findings suggest a possible team composition that will facilitate the team's absorptive capacity. For potential absorptive capacity, findings in Paper 2 reveal that the team could be staffed with intrinsically motivated members, who will have high learning orientation and

creative self-efficacy. In Paper 3, we find that the team should be staffed with extroverts with a high need for cognition, in order to bring in members with high potential absorptive capacity. Findings from Paper 5 suggest that the team should be staffed with employees who have medium level of experience in knowledge transfer and development projects, since such a background is beneficial for both potential and realized absorptive capacity. Furthermore, the team should include extrinsically motivated individuals, who have high approach and avoidance orientation; according to Paper 2, they could have higher realized absorptive capacity. Findings from Paper 3 reveal that the team should be staffed with people who have high emotional intelligence and openness to experience, in order to involve individuals with high realized absorptive capacity.<sup>3</sup>

## Issues with the tentative model

Creating a tentative model for the management of team absorptive capacity based on my research brings many benefits for project managers responsible for knowledge transfer and development projects, as it will help them increase the absorptive capacity of their teams so they can efficiently absorb and consume new knowledge. However, the tentative model is not a panacea; it should be applied and adapted to each project individually. No doubt executive managers will have questions and thoughts about the model; here, I discuss some of the issues that are most readily apparent at this stage.

Looking at the characteristics positioned on the lower part of the model, one question that could be raised is: Should we have two different con-

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<sup>3</sup> As described in Chapter 3, as my PhD journey progressed, I wised up to the fact that team absorptive capacity is different from organizational absorptive capacity and needs to be conceptualized as such. Before that realization, I used the definition for organizational absorptive capacity in two papers dealing with team absorptive capacity. However, since the team absorptive capacity conceptualization is part of the original definition but provides a more accurate description of the new dimensions, the findings in my other papers are relevant and applicable in the model. The question for future research is whether the definition of organizational absorptive capacity is applicable for individual absorptive capacity. One thought is that transformation and exploitation dimensions are more related to the organizational/collective level, while acquisition and assimilation dimensions are more relevant for individuals, with an emphasis on individuals' ability to create and sell new ideas, as well as the ability to act as knowledge selectors and generators in a knowledge network.

figurations of team members, one more cognitively driven and the other more reward-driven? One possible solution would be to have a stable core including both types of people present throughout the process, but involve more cognitively driven people in the early stages and more reward-driven people later on.

Another issue is the links between dimensions, and how to recognize when the team is passing from one dimension to another. Here, the project manager could identify a number of milestones that clearly symbolize the point of transition between different dimensions, and adapt their management style according to those milestones. Example of milestones could be gate reviews for each dimension where the team is questioned and tested by gate keepers making the check whether the team has control over absorption process.

## Ex-post application of the model

Let us return once more to the two examples that opened this thesis, and consider how the model might have helped the less successful team, in the light of some additional details about the two teams and their management. The first and most obvious factor is the composition of the team. The failed team lacked individuals who were cognitively driven to understand new knowledge, and was predominantly staffed with individuals who were more reward-driven, with the result that they spent too long trying to understand and make sense of new knowledge. Furthermore, because their preference was for clear solutions and getting immediate rewards, they insisted on having planning schedules that limited their ability to understand new knowledge even further.

On the other hand, the manager of the successful team applied a loose management style, and involved everybody in the team in discussions and decisions. This prepared the ground for the team to collectively make sense of new knowledge, and to create new ideas with the knowledge they absorbed. It also helped team members understand who knew what, and made it easier to decide who would absorb which parts of the new knowledge. The stuffing of the team was also adequate with mix of both

introvert and extrovert team members and this combination enhanced team's efficiency to absorb and utilize new knowledge.

Without carrying out a detailed analysis of two cases, it is clear that the model could help both teams. It could help the failed team in terms of staffing and management style throughout the entire project timescale – and it could also help the successful team, since its manager didn't take a stricter line towards the later phases, which caused some inefficiency for the team. In future, the model could help team managers create solid foundations for their projects by staffing their teams correctly and following the recommended managerial actions to enhance the absorption and utilization of new knowledge.

Future research should build upon the model by adding new recommendations for managers in terms of managerial actions and the type of individuals to be involved in such projects.

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