



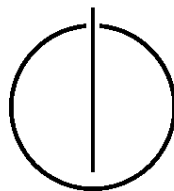
DEPARTMENT OF INFORMATICS

TECHNICAL UNIVERSITY OF MUNICH

Master's Thesis in Information Systems

**Identification and Evaluation of Use Cases for
Inter-organizational Business Capability
Modeling**

Oliver Schmidt





DEPARTMENT OF INFORMATICS

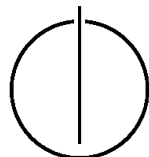
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Identification and Evaluation of Use Cases for
Inter-organizational Business Capability Modeling

Identifizierung und Evaluierung von Use Cases für
Unternehmensübergreifende Business Capability
Modellierung

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Submission Date: October 15, 2020



I confirm that this master's thesis is my own work and I have documented all sources and material used.

Munich, October 15, 2020

Oliver Schmidt

Abstract

Organizations face several challenges due to the changing business environment, including continuously changing customer needs or technical innovations. In order to cope with these various challenges, organizations are increasingly engaging in collaborations with their suppliers, customers, and even their competitors. Diverse aims are persuaded by such an approach, ranging from synergy effects to knowledge exchange. The complexity of such collaborations requires an adequate Enterprise Architecture Management (EAM), but even then, it is a challenging task. Business capability modeling is an approach to address this issue. It structures and illustrates the complexity in a different way to provide new and additional insights. Business capabilities provide an abstracted and holistic view of an organization, which can be used to align the business and IT. This view is captured in a Business Capability Map (BCM). Although the use of the BCM was initially for single organizations, it is increasingly used for the inter-organizational collaboration context. One of such a collaboration context is the horizontal inter-organizational collaboration. The collaboration participants are typical competitors from the same industry, having the same or similar business capabilities, which allows creating a common business capability map for collaboration endeavors. However, research in this domain is still limited while gaining increasing importance in practice. There is a demand for empirical results of the actual usage of such a common business capability map, which is represented by possible use cases.

Hence, it is necessary to continue the research to obtain comprehensive insights and create a profound and holistic understanding that is of great interest to researchers and practitioners alike. Therefore, this thesis aims to contribute to this research field by employing a multiple case study of the use of business capability maps in horizontal inter-organizational collaborations with five collaborations from various industries. The overall structure is divided into three parts: First, the identification of use cases for BCM through a literature review, which represents the state of the art and the starting point for identifying use cases for horizontal inter-organizational collaborations. Second, typical collaboration challenges are identified in the literature and evaluated for the horizontal collaboration context as well as if the BCM can address the challenges. Finally, the challenges and success factors for a BCM usage in the collaboration context are determined. This thesis resulted in a concept of 23 use cases for three different inter-organizational collaboration contexts.

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Outline of the Thesis

CHAPTER 1: INTRODUCTION

The first chapter presents the background and motivation of the thesis. It explains why research about use cases for horizontal inter-organizational business capability modeling is worth pursuing and how this thesis's objectives are connected to the current state of research and practice. The end of the chapter outlines the approach chosen to accomplish the objectives.

CHAPTER 2: FOUNDATIONS

The theoretical background defines essential concepts and presents the context in which this thesis is placed. The chapter presents the concept of business capability modeling and maps. The theoretical foundations of enterprise architecture management and how business capability maps are connected to this concept are outlined.

CHAPTER 3: RELATED WORK

The third chapter summarizes existing research of business capability maps and their use cases and the challenges organizations face when engaging in inter-organizational collaborations. Also, the research gap is presented.

CHAPTER 4: CASE STUDY METHODOLOGY

This chapter presents the empirical multiple case study conducted in the thesis. First, the scientific methodology of the empirical study is explained. Then, an overview of the five case collaborations is presented in detail.

CHAPTER 5: RESULTS

The results chapter presents the findings from the multiple case study, which is the evaluated use cases as well as the challenges and success factors found. Furthermore, the findings for the inter-organizational collaboration challenges are presented and discussed.

CHAPTER 6: DISCUSSION

The discussion outlines the key findings of the thesis and reviews the research quality of the presented study. Moreover, the limitations of the work are discussed.

CHAPTER 7: CONCLUSION

The final chapter summarizes the work and presents an outlook to potential future work.

1 Introduction

This chapter presents the overall background to this research and explains motivation in section 1.1, followed by a description of the research objectives and questions in section 1.2. Afterward, the underlying research approach and design for the thesis is presented in section 1.3.

1.1 Motivation and Research Problem

Organizations increasingly face several challenges due to the changing business environment over the years. These challenges range from changing customer needs, increasing time-to-market pressures, and the continuous emergence of new technical innovations [46, 153]. Hence, organizations must change and adapt to the changing environment. They often try to achieve this solely by internal improvements and changes [153]. However, there is a growing shift to more collaboration to cope with these various challenges and leverage the improvements and opportunities involving such participation. This approach to cross-organizational borders and establish partnerships involves collaborating with customers, suppliers, and even competitors operating in the same business. This becomes increasingly important since organizations are more and more intertwined [46]. When engaging in such inter-organizational collaborations, organizations pursued diverse aims, ranging from cost reductions, increased flexibility, synergy effects to knowledge exchanges [127, 46, 160].

Besides various reasons and advantages, the inter-organizational collaborations involve the fact that the organizations face several challenges during engaging in such collaboration [111]. These challenges must be known in order to deal with them. Nevertheless, organizations concentrate on their core competencies and complement missing knowledge, abilities, or products through collaborations [46, 153]. In this context, organizations can collaborate at different organizational levels, including business processes or their IT [49, 46]. However, the complexity of such inter-organizational collaborations requires an adequate enterprise architecture management [49]. Many organizations try to use their enterprise architecture management function effectively to better support aligning their business with their IT and not in an inter-organizational collaboration context [49]. Consequently, it is a challenging task for organizations to engage in inter-organizational enterprise architecture management collaboration endeavors. Business capability modeling is an approach to address this problem. The concept attracts increasing attention in the en-

terprise architecture management community. Business capabilities provide an abstracted and holistic view of an organization, which can be used to align the business and IT [22, 144]. A typical modeling result is the business capability map, which helps to structure and illustrate the complexity in a different way providing new and additional insights [22]. The business capability map is used in various application scenarios concerning single organizations, including strategic IT demand planning, application portfolio management, or outsourcing decisions [1, 22, 144, 26]. Although the use of the BCM was initially for single organizations [22], it is increasingly used for the inter-organizational collaboration context [150, 18, 138, 91]. However, research in this domain is still limited while gaining increasing importance in practice. Organizations can engage in different forms of collaborations [64]. The horizontal inter-organizational collaboration is one specific context. This specific collaboration is distinguished by his participants, which are typically competitors from the same industry and part of the same value chain [64]. These organizations own the same or similar business capabilities allowing them to create a common business capability map for their collaboration endeavors. Although there is empirical literature describing use cases for the BCM in the context of a single organization, only a few papers describing use cases in the inter-organizational collaboration context. Empirical results of the actual usage of a common business capability map for the horizontal inter-organizational collaboration context are missing. Furthermore, there is limited knowledge about the challenges and success factors for the use of BCM in such a context. Although the empirical literature provides challenges for the BCM implementation [1], these results are in the context of single organizations and not for the inter-organizational collaboration context. Additionally, the knowledge about typical challenges organizations must face in such horizontal inter-organizational collaborations is insufficient. Since these organizations use the BCM as the main tool for their collaboration, it should also be investigated if the BCM can address the diverse challenges of inter-organizational collaborations.

This thesis fills this research gap by providing a design science approach, included with a multiple case study on the task of business capability maps' in horizontal inter-organizational collaborations. Hence, this thesis aims to contribute to this research field by employing a multiple case study with five collaborations from various industries. In total, twelve semi-structured interviews with experts from four of the collaborations were conducted. This thesis comprises three parts: First, the identification of use cases for BCM through a literature review, which is the starting point for identifying use cases for the BCM usage in horizontal inter-organizational collaborations. In the second part, typical challenges organizations face when engaging in such a collaboration are identified in the literature, and the impact of the business capability map on the challenges is evaluated. Finally, the challenges and success factors for a BCM usage in the collaboration context are determined. The aim of this thesis is thus twofold: on the one hand, to contribute to the empirical research by providing insights about the task of the BCM in such collaborations and the impact on collaborations as well as further directions for research. And on the other hand, to provide insights for practitioners by presenting use cases for the BCM,

success factors, and challenges when using the BCM in such a collaboration context.

1.2 Research Questions and Objectives

The following thesis aims to explore the applicability of business capability modeling in the context of horizontal inter-organizational collaborative enterprise architecture management in general and to identify use cases and the impact on the collaboration in particular. This includes providing practical value for the enterprise architecture discipline and at the same time contributing to the academic body of knowledge. Based on a scientific literature review and talks with experts from the Enterprise Architecture field, the research aim and the four research questions were identified. More details on the thesis's justification and positioning and corresponding literature gap analysis results can be found in Chapter 3. Their interconnectedness between research questions and the applied methodology is further detailed in Section 3.2.1. The following four research questions are examined in this thesis:

Research Question 1: What use cases for the business capability map can be found in the literature?

The first research question deals with the identification of use cases from the literature, which forms the basis for research question 3. Therefore, a literature review was conducted to identify use cases for a single organization as well as for the inter-organizational context. The resulting list of use cases forms the basis for discussing and evaluating use cases for the horizontal inter-organizational collaboration context.

Research Question 2: What are typical challenges in inter-organizational collaborations, and can the business capability map be used to resolve them?

Given the complexity of inter-organizational collaborations, the research question 2 aims to discover how the BCM can support a horizontal inter-organizational EAM collaboration. Therefore it is essential to know the typical challenges that arise when engaging in such collaborations. Hence, in a first step, typical collaboration challenges must be identified according to the literature, which can be used as a discussion point in the interviews. Accordingly, a literature review to identify challenges collaboration face was conducted and afterward evaluated in the multiple-case study for the horizontal inter-organizational context. In the second step, a mapping of potential use cases for the BCM, which could resolve these challenges, was conducted.

Research Question 3: What are use cases for the business capability map in horizontal inter-organizational collaborations?

The third research question intends to evaluate the found use cases from research question 1, for a horizontal inter-organizational collaboration context and to identify potential new use cases. This step is done through an expert evaluation within the multiple case study.

Research Question 4: What are challenges and success factors for the business capability map usage in inter-organizational collaborations?

To provide a holistic picture of the current business capability map usage, the challenges collaborations are facing during this process were examined. Furthermore, critical success factors from the challenges and discussions with the multiple case study experts were derived.

1.3 Research Approach

In order to answer the previously defined research questions, this study employs a multi-method research design encompassing a design science approach embedded with a multiple case study.

First, the current state of the art regarding the usage of the business capability maps in the literature, and typical challenges organizations face when engaging in inter-organizational collaborations is identified. Second, the current state of the usage at each case study partner is explored. Third, challenges with the adoption and usage and success factors in this context are identified. Fourth the identified use cases in the literature are evaluated, and potential new use cases for the usage of the business capability map in horizontal inter-organizational collaborations are defined. This step is conducted with the multiple case study.

The design science approach is adopted as the overall research design. Based on the research objective, to acquire knowledge and an understanding of the task of business capability maps in horizontal inter-organizational collaborations, design science is a suitable paradigm. It addresses this goal through the construction of innovative artifacts for unsolved and important business problems [68], which is a fitting characterization for the underlying research setting. The design science (DS) research in this thesis follows the methodology presented by Peffers et al. [114] and the guidelines by Hevner et al. [68]. In both cases, the approaches describe the performance of DS in the information systems discipline. Peffer's [114] process proposes six consecutive steps where the output of each is treated as the input for the next step, with the possibility to iterate and refine the previous steps. As a consequence of this thesis's research design, the fourth and fifth step are combined into one, considering the simultaneous performance of the *demonstration* and *evaluation* part. The resulting process with the undertaken steps and the associated chapters for this thesis is shown in Figure 1.1. Each step is further elaborated in the following.

Identify problem and motivate: The first step includes a detailed research problem identification and motivation, specifying the identified problem's definition and importance. Pffers et al. [114] argue that it may be useful to atomize the problem conceptually so that the solution can capture its complexity to better justify the solution's value. This approach

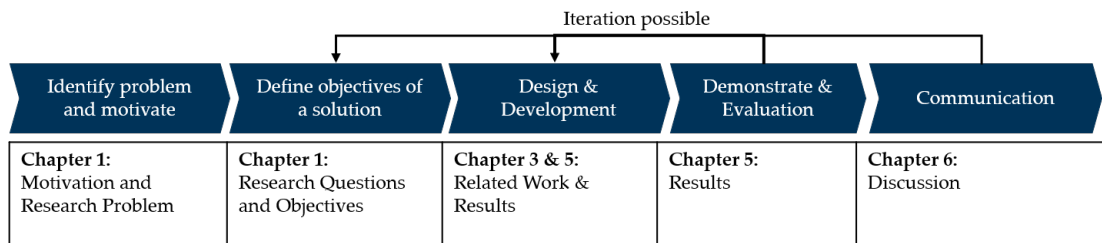


Figure 1.1: Overview of the underlying research approach according to Peffers [114] and Hevner [68]

is incorporated into this thesis by creating an explanatory construct (see section 3.2.1) for the subject under study - the BCM usage in a horizontal inter-organizational collaboration context. The research problem is defined in the first chapter. This activity involves a first literature review about the current state of research done in the field of business capability and inter-organizational collaboration in EAM. To summarize, the existing problem is the missing understanding of a BCM usage in horizontal inter-organizational collaborations. The first draft of this research was presented at a German conference for enterprise architects to get possible feedback from experts in this field. All of them stated that the research of using a BCM in a horizontal inter-organizational collaboration context is interesting. However, even if the experts were interested in the approach but could not provide direct feedback.

Define objectives of a solution: The second step is the definition of the objectives regarding the solution to the problem. The objectives can be inferred from the actual problem specification and are presented in Section 1.2. Generally, this thesis comprises three objectives. In order to solve the problem of the missing understanding of the usage of a BCM in horizontal inter-organizational collaborations, use cases were identified and defined through the multiple case study. Additionally, the challenges and success factors for the BCM usage in such a context are presented. The third objective is concerned with identifying and evaluating challenges that are inherent to inter-organizational collaborations for the horizontal inter-organizational collaboration context and the BCM concept.

Design and development: During the third phase of design and development, the actual artifacts are created. The concrete artifacts defined during this process are *use cases*, *challenges (collaboration & usage)* and *success factors* for business capability maps in the context of horizontal inter-organizational EAM collaboration. This thesis addresses these four artifacts as their outcome. The developed artifacts are illustrated in Table 1.1, which shows the interaction between the research activities and the created artifacts.

Development process	Developed artifact	Evaluation method
Analysis of literature to develop a list of use case (see Section 3.2.3) as well as the identification of use cases from case studies for the horizontal inter-organizational context (see Section 5.4)	Use cases	Multiple case study (Expert interviews)
Analysis of literature to develop a list of typical challenges for inter-organizational EAM collaborations and the identification of challenges from case studies(see Section 3.2.4). Furthermore, the conceptual mapping of use cases to the inter-organizational collaboration challenges (see Section 5.3)	Challenges in inter-organizational EAM collaborations	Multiple case study (Expert interviews)
Identification of challenges from case studies (see Section 5.4)	Challenges for BCM usage in inter-organizational collaborations	Multiple case study (Expert interviews)
Identification of success factors from case studies (see Section 5.5)	Success factors for BCM usage in inter-organizational collaborations	Multiple case study (Expert interviews)

Table 1.1: Developed artifacts in this study

Demonstration and evaluation: The creation and evaluation of artifacts are conducted by expert interviews during the multiple case study and the results are presented in Chapter 5. After each interview an evaluation for possible new use cases is done, to create possible new artifacts, which are evaluated in follow-up interviews. This process step resulted in an iterative forth and back between the *design and development* and the *demonstration and evaluation* step, continuing until the last interview. After the completion of all interviews, the collected information is transcribed, aggregated, and analyzed.

Communication: The final communication step summarizes the problem, created artifacts, and its characteristics (utility, novelty, design rigor, and effectiveness to the researcher). Further, limitations and future work is described. This phase is presented in Chapter 6 and Chapter 7. The results are documented in this thesis.

2 Theoretical Background

This chapter constitutes the theoretical foundation and the position of this thesis in its associated research field. Section 2.1 addresses enterprise architecture and enterprise architecture management concepts, which form the research field. Section 2.2 provides information on the business capability concept in the field of enterprise architecture. Section 2.3 focuses on inter-organizational collaboration, its structure, definition, and characteristics. This develops the foundation to distinguish the various types and forms of collaborations.

2.1 Enterprise Architecture and Enterprise Architecture Management

This section focuses on the enterprise architecture discipline and the main aspects covering this research field. An overview of these concepts and their relationship is presented in figure 2.1. The concepts are in the following sections presented and discussed.

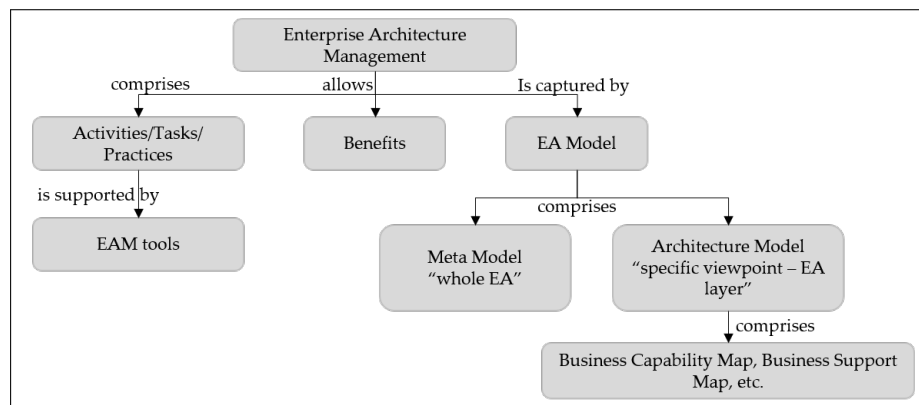


Figure 2.1: EA concepts for this thesis

2.1.1 Enterprise Architecture

In the field of information systems, various definitions of the term Enterprise Architecture (EA) can be found. Zachman, who first shape the term EA, defined it as a set of descriptive representations relevant for describing an enterprise where an enterprise is widely

defined as any socio-technical organization such that the descriptive representations serve as a baseline for changing the instantiated enterprise [164].

Since the first definition of the term, EA has developed to comprehensive research discipline resulting in the creation of different definitions for the term over the years [133]. According to Urbaczewski and Mrdalj, it can be seen as a description or blueprint of a macro view of the system and operations shaping it [145]. Although the various definitions consider EA from different perspectives, it can be argued that the core concept reflects the representation of all entities of the system and their relationships in the organization. Therefore, for a unified understanding of the term in this thesis, the definition by the American National Standards Institute (ANSI) - ANSI/IEEE Std 42010-2011 - is used, which is defined as follows:

Definition: Enterprise Architecture

Enterprise Architecture is the “fundamental concepts or properties of a system in its environment embodied in its elements, relationships, and in the principles of its design and evolution” [72].

With this definition in mind, it can be noted that EA should provide a holistic view of an organization, including the business processes and IT systems and their interrelationship. It must ensure that the business with its current and future objectives and the IT are aligned [72].

2.1.2 Layers of Enterprise Architecture

As mentioned in the previous subsection, the enterprise architecture aims to provide a holistic view of an organization’s components and relationships. However, the EA covers a wide range of different facets and artifacts of the enterprise, ranging from IT-related to business-related aspects, resulting in a complex structure. In order to manage a large number of entities and make it usable in practice, the enterprise architecture is split into architectural layered representations [155]. Each layer summarizes related aspects to itself. Since different and separated models typically represent each layer, the number of artifacts and their relationships is reduced, which decreases the overall complexity. Different concepts to document the architecture in layers can be found in the literature. For example, Winter and Fischer [155] describe a hierarchical view with five layers, including the business architecture, the process architecture, the integration architecture, the software architecture, and the technology architecture. However, the thesis refers to the approach presented by Buckl et al. [30], which consists of three layers. Figure 2.2 provides the illustration of the EA comprising the three cross-cutting layers.

The model is split into the three layers *organization & processes*, *application & databases* and

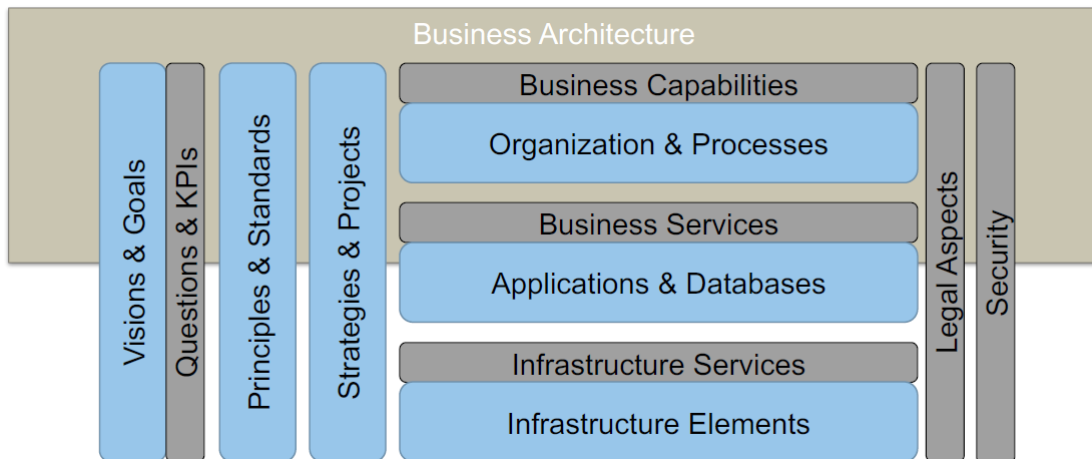


Figure 2.2: Layers and crosscutting functions of an enterprise architecture according to Buckl et al. [30]

infrastructure elements:

- The **organization & processes** layer describes the organization related aspects of the enterprise, such as organizational units, business locations, business roles, or business processes.
- The **application & databases** layer comprises the business applications and their interfaces to each other. It contains software components and data resources.
- The last layer, **infrastructure elements** layer contains the technical infrastructure components, such as hardware units and network nodes.

In addition to these layers, abstractions for each of them are included in the form of *business capabilities*, *business services* and *infrastructure services*. At the top, the business capabilities, which are the subject of this thesis, are defined as a functional building block of the business architecture that supports the business model and the business strategy. A detailed definition of business capabilities is found in the Section 2.2. The abstraction business services represent the organization's business services and processes, which are part of the business capabilities enabling them. The infrastructure service abstraction represents technical services provided by the infrastructure elements.

Additionally, some models define so-called crosscutting functions, which influences entities in all layers. The crosscutting aspects of the presented model are the *visions & goals*, *principles & standards* and *strategies & projects*. These elements are illustrated vertically and are not part of any specific layer. The vision & goals aspect are operationalized using the strategies & projects, which are used to transform EA entities. This transformation is restricted by *principles & standards* as well as *legals aspects*, which are needed to be met and

considered and are documented in *security policies*. Questions & KPIs are an abstraction of the visions & goals and are used to control the EA entities. The underlying gray field in the model, which represents the business architecture, is described in detail in section 2.1.4. In practice, these layers are mostly not approached in an integrated way. Instead each domain in these layers speaks its own language, develops its own models, and uses its tools and methods [75]. Since one objective of this thesis is to identify use cases for a business capability map, representing business capabilities and their possible connections to other abstractions layers, the clarification of the layers and their interconnection is essential. To represent EA models, so-called viewpoints exist. These graphical representations of the enterprise architecture aim a particular stakeholder to enable communication and a common understanding [92].

2.1.3 Enterprise Architecture Management

In order to create, manage, and utilize the models provided by EA, a structure management process is necessary. Enterprise Architecture Management (EAM) goes beyond EA's descriptive purposes, providing an approach for a systematic way to understand, plan, develop, and control an enterprise architecture to align business and IT [6].

The enterprise architecture management leverage the EA as an instrument for a wide range of application scenarios [7, 105] within the organization, such as:

- Strategies and goals management
- IT/Business alignment
- Quality management
- Managing the application landscape
- Sourcing decisions
- Project portfolio management
- Process optimization
- Compliance management

A high heterogeneity shapes the notion of enterprise architecture management with no common definition. Sometimes the term EA and EAM are even used as synonyms [23]. Moreover, there are different perceptions regarding the meaning, tasks, and goals of EA and EAM. The understanding of EAM in the literature depends strongly on the respective author. Based on the missing general definition, the following holistic definition according to Ahlemann et al. [6] is used in this thesis:

Definition: Enterprise Architecture Management

Enterprise Architecture Management "is a management practice that establishes, maintains and uses a coherent set of guidelines, architecture principles and governance regimes that provide direction for and practical help with the design and the development of an enterprise's architecture in order to archive its vision and strategy." [6]

According to this definition, the EAM as a management practice of the EA does not refer to a simple management function of the IT architecture but contains an explicit business focus. Therefore, it can be concluded that there is a value in adopting EAM for an organization, which is also reported in the literature. Benefits of EAM are, among others, improved decision-making, reduced IT costs, business-IT alignment, regulatory compliance, or reduces IT complexity [137].

Hence, to support EAM activities, many visualization tools have been developed. These EA visualizations are a common tool and play an essential role in EA management. They can be used for various purposes, among other things, to communicate and analyze complex information. However, EAM tools follow different approaches leading to different strengths and weaknesses of each tool. An evaluation of a variety of EAM tools can be found in the Enterprise Architecture Management Tool Survey ([24]) by the sebis chair of the Technical University of Munich.

In order to cope with the challenges involving the EAM, a set of techniques, methods, and approaches for the documentation, analysis, and communication of the EA is required. Therefore, several **EA frameworks** have been built over time for specific purposes and fulfill the needs of various stakeholders to facilitate EAM. The most popular concepts include the Zachman Architecture Framework [164], The Open Group Architecture Framework (TOGAF) [139]. The main task of these frameworks is to document, analyze, and plan both the existing Enterprise Architecture as well as the target architecture. Matthes [104] created a comprehensive overview of the 50 most common frameworks.

The following presents a short description of the two most used frameworks. The Zachmann Framework is typically used to describe an existing enterprise architecture, see figure 2.3. It offers a two-dimensional matrix with six columns and rows, where each column represents a question (e.g., "how," "what") and each row a perspective of a certain kind of employee (e.g., Executives, Architects). Each of these cells represents different views that need to be modeled to describe the enterprise. The framework is regarded as an ontology, providing a structure and not a methodology for creating the actual models.

In contrast to the Zachmann framework, TOGAF is regarded as a method to develop an actual EA. The framework is a well-established EA framework [56]. The latest TOGAF version during the writing of this thesis is version 9.2. It is structured in seven parts, providing, among others, a set of tools, a shared vocabulary, reference models, a list of recommended standards for implementing the components of an EA. It is a complete approach to plan, design, and implement the EA. The development process and the core of TOGAF are the Architecture Development Method (ADM), which provides guidance on the entire process of creating the EA. TOGAF also comprises a method for capability-based planning, which focuses on planning, engineering, and delivering strategic business capabilities to the enterprise [139]. Therefore, business capabilities are encapsulated into the three dimensions, people, process, and material.

	DATA #I _{dat}	FUNCTION #I _{fun}	NETWORK #I _{net}	PEOPLE #I _{peo}	TIME #I _{tim}	MOTIVATION #I _{mot}	
SCOPE (CONTEXTUAL)	List of Things Important to the Business 	List of Processes the Business Performs 	List of Locations in which the Business Operates 	List of Organizations Important to the Business 	List of Events Significant to the Business 	List of Business Goals/Strat Critical Success Factor 	SCOPE (CONTEXTUAL)
Planner	ENTITY = Class of Business Things	Function = Class of Business Processes	Node = Major Business Location	People = Major Organizations	Time = Major Business Event	Ends/Means=Major Bus. Goal/Critical Success Factor	Planner
ENTERPRISE MODEL (CONCEPTUAL)	e.g. Semantic Model 	e.g. Business Process Model 	e.g. Business Logistics Systems 	e.g. Work Flow Model 	e.g. Master Schedule 	e.g. Business Plan 	ENTERPRISE MODEL (CONCEPTUAL)
Owner	Ent = Business Entity Rel = Business Relationship	Proc = Business Process IO = Business Resources	Node = Business Location Link = Business Linkage	People = Organization Unit Work = Work Product	Time = Business Event Cycle = Business Cycle	Ent = Business Objective Means = Business Strategy	Owner
SYSTEM MODEL (LOGICAL)	e.g. Logical Data Model 	e.g. Application Architecture 	e.g. Distributed System Architecture 	e.g. Human Interface Architecture 	e.g. Processing Structure 	e.g. Business Rule Model 	SYSTEM MODEL (LOGICAL)
Designer	Ent = Data Entity Rel = Data Relationship	Proc = Application Function IO = User Views	Node = I/O Function Processor, Storage, etc. Link = Line Characteristics	People = Role Work = Deliverable	Time = System Event Cycle = Processing Cycle	Ent = Structural Assertion Means = Action Assertion	Designer
TECHNOLOGY MODEL (PHYSICAL)	e.g. Physical Data Model 	e.g. System Design 	e.g. Technology Architecture 	e.g. Presentation Architecture 	e.g. Control Structure 	e.g. Rule Design 	TECHNOLOGY MODEL (PHYSICAL)
Builder	Ent = Segment/Table/etc. Rel = Pointer/Key/etc.	Proc = Computer Function IO = Data Elements/Sets	Node = Hardware/System Software Link = Line Specifications	People = User Work = Screen Format	Time = Example Cycle = Component Cycle	Ent = Condition Means = Action	Builder
DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)	e.g. Data Definition 	e.g. Program 	e.g. Network Architecture 	e.g. Security Architecture 	e.g. Timing Definition 	e.g. Rule Specification 	DETAILED REPRESENTATIONS (OUT-OF-CONTEXT)
Sub-Contractor	Ent = Field Rel = Address	Proc = Language Stmt IO = Control Block	Node = Address Link = Protocols	People = Identity Work = Job	Time = Interrupt Cycle = Machine Cycle	Ent = Sub-condition Means = Step	Sub-Contractor
FUNCTIONING ENTERPRISE	e.g. DATA	e.g. FUNCTION	e.g. NETWORK	e.g. ORGANIZATION	e.g. SCHEDULE	e.g. STRATEGY	FUNCTIONING ENTERPRISE

Figure 2.3: Zachmann framework [61]

2.1.4 Business Architecture

The Business Architecture (BA) is a high-level description of an organization that provides a common understanding of the organization’s design and plays a significant role in translating the business strategy to the IT-domain [146, 144]. Despite the fact that the term "Business Architecture" is used in various publications, different definitions exist [146, 144]. Based on Versteeg et al. [146], business architecture is defined as follows in this thesis:

Definition: Business Architecture

Business Architecture is the “grouping of business functions and related business objects into clusters over which meaningful accountability can be taken as depicted in the high level description of the related business processes”. [146].

The business architecture provides a semantic framework for arranging the responsibilities around the most critical business activities (for instance, production, distribution, marketing) and/or economic activities (for instance, manufacturing, assembly, transport, wholesale) into clusters [146]. Therefore, it helps in understanding and clarifying the organization’s design from a business perspective, resulting in new insights, including a better understanding of the strategy itself and its consequences. Although the BA can show higher-level management how their strategy will be implemented in their organization, it is more common to go straight to the technical architectures instead of using a business architecture approach [146].

Due to the concept of the business architecture, it is possible not only to describe the architecture of an enterprise (the concept of Enterprise Architecture), but also the structure

and activities of multiple organizations (e.g., supply chain level) [146]. Using the business architecture as part of the enterprise architecture and enterprise architecture management approach can help align the link between business and IT as well as strategy and operations [146, 144]. One current effective approach in the business architecture is business capability modeling. The approach has been identified as the missing link between the business and IT alignment [146].

2.2 Business Capabilities

This section starts with the basics of business capabilities, including the definition of Business Capabilities (BC) and their role in the EAM field. The business capability research originates from two research streams, the resource-based view and enterprise architecture [113]. The EA research stream was already mentioned. The resource-based view (RBV) tries to explain the difference in firms' performance in the same industry with the differences in internal sources of a firm [78]. It suggests looking at a firm as a bundle of resources, which are "all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness" [20]. In the RBV, capabilities are described as a bundle of strategically essential skills and knowledge for managing assets and coordinating activities [113]. However, despite the wide use of the term *capability*, these two research streams are not aligned, resulting in different definitions and misinterpretations. An overview of the different directions and definitions are presented in [113, 157, 107]. The meaning varies based on the context and origin, such as business strategy, operations management, or information systems. Nevertheless, most definitions agree, in essence, that a business capability is an ability that a business may possess to achieve a specific business goal. Still, this definition does not sufficiently distinguish business capabilities from processes. Beimborn et al. provides an adequate distinction between those two terms: "capabilities represent firm-internal encapsulate services, i.e., units of business functionality. In contrast, a workflow or procedure is the end-to-end group of activities that describes how a capability is performed, while a business process is the interconnection resp. a composition of capabilities to fulfill a market demand " [22]. Therefore, business capabilities define *what* to do, rather than *how* [144]. In this aspect, they distinguish from processes because processes are about the *how*. Business capabilities are typically written as nouns [144]. *Product development* or *client relationship management* are examples of a business capability.

The research provides several characteristics for a business capability [157, 113, 56, 144]. These characteristics are:

- encapsulate and abstracts all resources
- stable over time

- horizontally structured as a complete and non-overlapping decomposition of the organization
- can be broken down into a hierarchical structure with fine granular capabilities
- phrased in business terms, not in technical terms

A business capability is an element of the EA layer model's business architecture layer, presented in Section 2.1.2. They provide an abstraction for describing the organization on an abstract level and can be seen as a link between the business model and the layers further down in the EA layer model.

Since no concise definition is found in the literature, the following definition for a business capability is used during the thesis:

Definition: Business Capabilities

A business capability is "a functional building block of the business which supports the business models and the business strategy, i.e. it defines the organization's capacity to successfully perform a unique business activity" [56].

The business capability is an abstraction, incorporating business processes, human resources, and technical resources, as illustrated in Figure 2.4. This highlights the fact that a business capability is related to the business in many ways.

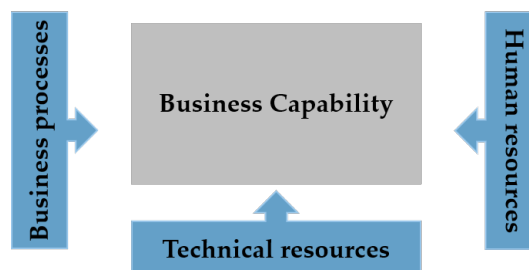


Figure 2.4: Elements of a Business Capability

The management of the business capabilities, as well as the models resulting from them, are commonly known as capability-based planning [82, 139]. This approach focused on the planning, engineering, and delivery of strategic business capabilities to the organization. It includes different activities, or to rephrase it in another way, the complete process of obtaining business capabilities.

2.2.1 Business Capability Maps

After an enterprise's business capabilities are defined, they need to be represented in a concise model. This model should allow representing the business graphically and, at the same time, allow to analyze the capabilities from a strategic point of view [22]. One of the most common ways to capture and document them is a business capability map [22, 82]. It is an architecture viewpoint for visualizing the business capabilities. Figure 2.5 shows an example of such a capability map. However, other representations of business capabilities are also possible. The model can also be a mind map, as Ulrich and Rosen [144] shows. They present a mind map where the business capabilities are mapped to an organization's different business units. Nevertheless, the business capability map has established itself as a proven form of presentation of business capabilities, like a best practice. This is confirmed by numerous authors who currently consider business capability maps to be the best possible form, since it is the most commonly used form [1, 26, 22, 144].,

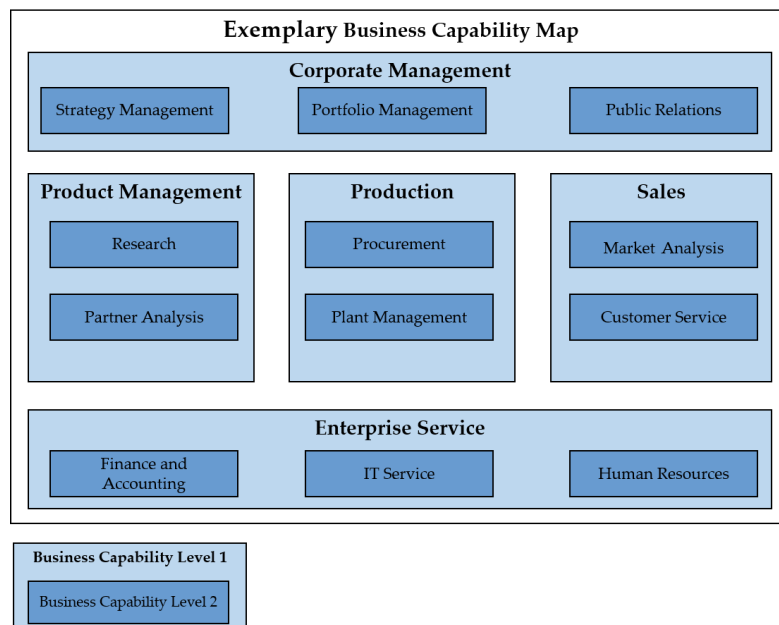


Figure 2.5: Example of a Business Capability Map [26]

In the following, the definition of the BCM is presented, which is referred to in this thesis:

Definition: Business Capability Map

A Business Capability Map is a "nested hierarchy of capabilities and a taxonomic diagram that describes the interplay of capabilities while doing business." [22]

Business capability maps do not reduce complexity. Instead, they structure and illustrate it in a different way that provides new and additional insights. The BCM represents a nested hierarchy of capabilities, meaning business capabilities can be decomposed into finer levels, also consisting of business capabilities. At the highest level, the "top-level capabilities" are documented, which are the basis for further decomposition. Decomposition is not strictly limited, and different opinions exist about the granularity of a BCM. Keller et al. [82] describe, for example, a hierarchical level of 5-7 for a BCM, whereas other publications describe business capability maps with two levels [26]. Ulrich et al. argue that BCM's are decomposed into "Levels 1-3 for purposes of planning and Levels 4-6 for purposes of detailed business/IT mapping" [144]. The process of creating business capabilities is described as Business Capability Modeling. However, it is not part of this thesis and is not further presented. The interested reader is referred to the literature in the Literature Review, see Section 3.2.2.

Business capabilities can be made measurable by applying specific attributes [82]. Various terms are used in the literature for attributes, such as indicator [22] or metric [10]. By visually highlighting the concrete value of an attribute for a business capability, simple business capability maps turn into business capability heat maps. The management of attributes can be made accessible via a graphical user interface as part of a software solution or BCM tool. Beimborn et al. [22] provided an example of such a graphical user interface with their proposal of a "capability cockpit".

2.2.2 Heat Maps

Heat map analysis is the most proposed method by researchers for business capability maps in determining areas for analysis [144, 51, 11, 56, 17, 26, 90, 140, 82, 84, 1, 134]. While business capability maps only show the structure of the capabilities as a hierarchical taxonomy, heat maps highlight different aspects of relevant business capabilities and related entities by color-coding. The different values of the attributes are usually visualized by color, texture, or specific edge representation of a business capability's boxes and surfaces. This approach can be used, for example, as a high-level method for representing capability gaps or facilitates investment decisions.

The value of a capability attribute, for example, the attribute *strategic business value* with the values *high* or *normal* can thus be made easily visible [26]. The result is a model that highlights the strategic relevance of business capabilities, making it easier to determine business-critical business capabilities. Figure 2.6 illustrates this approach, visualizing the strategic importance of each business capability. For instance the *Strategy Management* represents a business capability with high strategic relevance. This approach can be extended by different attributes for business capabilities, leading to different assessments. Hence, the heat map can be used as basis for different decisions [22, 10, 82].

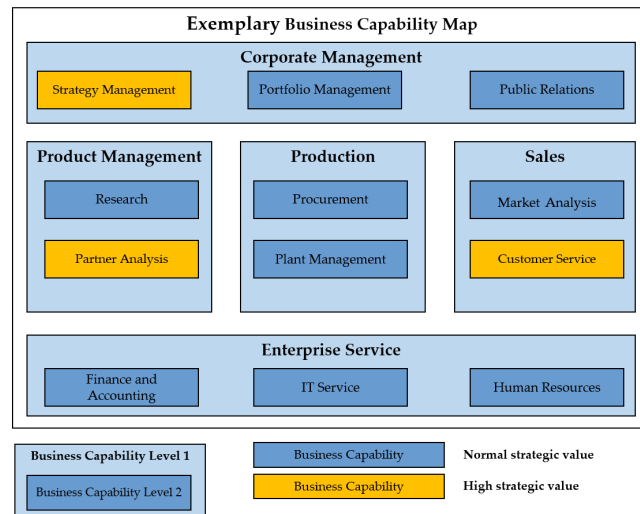


Figure 2.6: Example of a Business Capability Heat Map based on [26]

2.2.3 Incorporating the BCM into the Enterprise Architecture

Since business capabilities are an abstraction of people, processes, and technologies, they provide an intermediate abstraction linking up to strategies, goals, objectives, and down to the processes, application, system, services. The business capability map is, in principle, complementary to other models. To achieve the optimal utilization of BCM's, they must be incorporated into the enterprise architecture [144]. Incorporating the business capability map into the larger business architecture and IT architecture is an important step and requires the mapping to other models, structures, and business objects [144, 26]. All objects in the organization can be loosely coupled to business capabilities and displayed in the business capability map. Therefore, the business capabilities act as a mediator between the different objects and aspects of the organization, such as portfolios, applications, or business processes.

After evaluating the literature about the usage and the use cases involving a business capability map, a model was created representing the BCM in connection to different aspects of the business. It is based on the findings in [144] and the literature regarding the BCM use. It does not provide a fixed model. Further mappings are possible but were currently not found in the literature. The model is illustrated in Figure 2.7. The model describes the mapping of the BCM to nine different business aspects of the organization:

- **Strategy & business model mapping:**

In order to align the business capabilities with the organization's strategic requirements, a mapping is required between the strategy and business capability map. This allows evaluating how the business capability supports the strategy. The business strategy can consist of elements like strategy statements, organizational goals

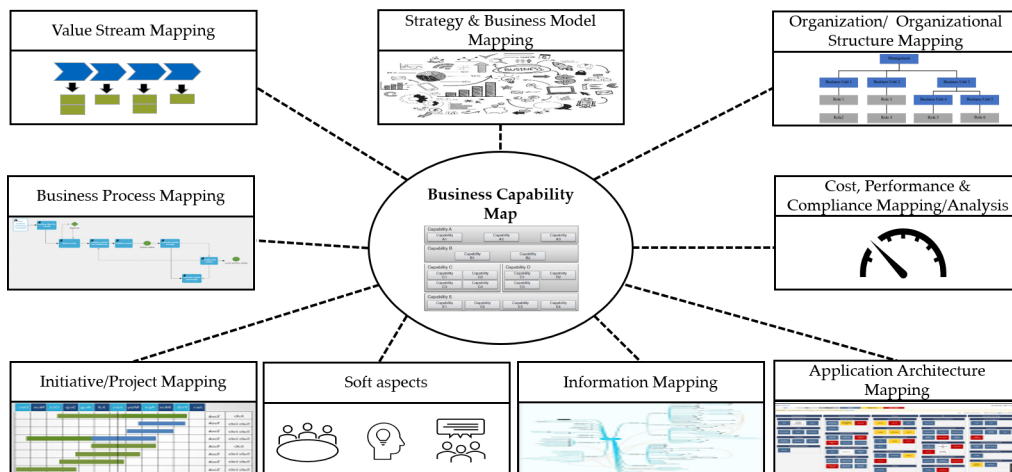


Figure 2.7: The Business Capability Map Incorporated into the EA

and objectives, generic business models, and/or applied business models (business cases) [146].

- **Business process mapping:**
Business capabilities require business processes for their actual execution. The business process consists of a set of operations executed in an ordered sequence according to certain business rules [144].
- **Initiative/project mapping:**
The business capability map allows the possibility to map initiatives and projects and accompanying information to the business capabilities, resulting in an approach to managing the project portfolio.
- **Soft aspects:**
This field describes the soft aspects of an organization where the BCM can be used. Publication for this topic is scarce since research and frameworks are quite focused on an organization's hard aspects [113].
- **Information mapping:**
This mapping describes the possibility of mapping the information required by a business capability to it [144]. Information can be structure in an information architecture responsible for defining the fundamental business entities of an enterprise, which should relate directly to information required by the capabilities [144, 118].
- **Application architecture mapping:**
Application architecture is a part of the EA and forms an open system influenced by the organization. It represents a set of applications and their interdependencies and

needs to be maintained with an application portfolio [28]. Business capabilities are related to the applications supporting them [1]. Several applications can be mapped to a specific business capability, and an application can be used to support several business capabilities.

- **Cost, performance, compliance & complexity mapping/analysis:**
This mapping or analysis describes the ability to map metrics to the BCM for analysis purposes [1, 22]. Different metrics, also known as attributes, are provided in the literature. These metrics depending on the type of business capability and the level it resides [22]. However, research on the topic of how to measure business capabilities is rare [113]
- **Organization/organizational structure:**
The business capability map allows the mapping of the organizational structure to individual business capabilities. This could be, for example, the mapping of business units to business capabilities [144].
- **Value stream mapping:**
Business capabilities can be mapped to value streams (an end-to-end collection of activities that create value for a customer). Value stream mapping is a lean manufacturing technique. It can be used as an organization improvement tool to visualize the entire production process, including the material and information flow, to bring a product or group of products to the end customer [135]. Value streams are not business processes because they represent a high-level view consisting of stages, where business capabilities can be mapped to.

These mappings depend on the availability of information about the relation between single enterprise architecture elements, which creates possible usage scenarios and use cases for the business capability map in each of these business mappings. The use cases identified in the literature review are linked to their respective BCM mapping, see Section 3.2.3. In order to limit the content of the present thesis, no profound foundation of related disciplines such as project portfolio management, value stream management, or similar topics is discussed.

2.2.4 Similar Concepts to Business Capability Modeling and Maps

During the literature review on business capabilities, the concept of Business Component Modeling [54] was identified, which reveals similarities to the Business Capability concept.

The **Component Business Model** was created by IBM and is a structured representation of the organization divided into a reusable and loosely-coupled business-level block [36]. Like the business capability, a business component is a logical view of part of an enterprise that includes resources, people, and systems to deliver some value. Additionally, the business component concept includes business services as an interaction interface between the

2 Theoretical Background

business components into the concept. The business service is described as a grouping of business functionalities, such as workflow, tasks, activities. The similarities between the business capability and business component concept are obvious. Some researchers even interchangeably use the terminology [21]. However, there is no research on a comparison of both concepts and a clear differentiation between both. This could be related to the fact that the business component modeling concept is patented by IBM, which results in additional requirements or restrictions on public research. This assumption is supported by the fact of the low number of research papers not directly associated with IBM [54, 134, 21].

Despite this, the actual representation of the model differs from a business capability map. Figure 2.8 shows an example of a component business model from [128]. The components representing the enterprise are grouped by business competencies vertical and by accountability level horizontal. The business competencies represent a high-level description of the activity conducted, and the accountability level, the strategic relevance [134].

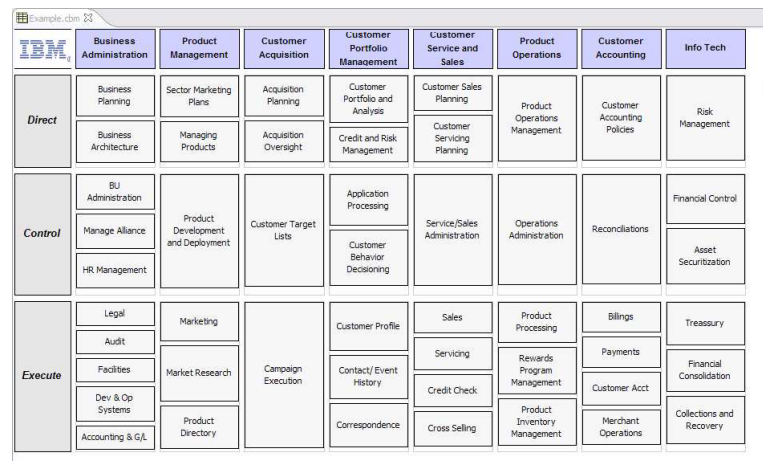


Figure 2.8: Example of a Business Component Model [128]

The second model is the **enhanced Telecom Operations Map™** (eTOM) [83] by the Tele-Management Forum. Instead of describing the organization with business capabilities, eTOM focuses on business processes and describes all the enterprise processes required by a service provider. It is an industry reference model, which is agreed on by many large companies and maintained by a group that fosters knowledge exchange and promotes best practices within the industry. The framework provides a hierarchy, relationships, and individual process decompositions for the business processes of communication service providers and other organizations within the telecommunication industry, such as suppliers. Therefore, the framework allows the analysis of an organization's existing processes, the development of new processes, guidance for third service, and software providers. Figure 2.9 shows an example of the eTOM model with a level zero view of level one processes. It can be argued whether or not the high-level business processes are similar to business

capabilities.

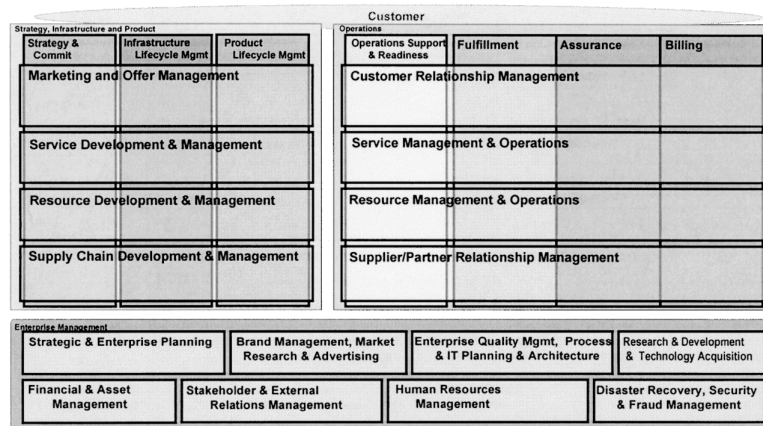


Figure 2.9: Example of an eTOM model level 0 view [83]

2.3 Inter-organizational Collaboration in Enterprise Architecture Management

This section gives a brief overview of the inter-organizational collaboration in enterprise architecture, without the claims of a complete explanation of this complex area. Due to the current environment, organizations today do not compete individually. Instead, they form supply chains or collaborative networks (CN). Organizations are pursuing different goals by creating collaborative networks such as market opportunities, customization, costs and risks reduction, virtual size, knowledge acquisition, sharing, or collaboration preparedness [119, 163, 148, 3, 14]. The notion of a collaborative network, also called a business network, is highly abstract so that any set of relationships or network actors are covered. According to Camarinha-Matos and Afsarmanesh, “CN is a network consisting of a variety of entities (e.g. organizations, people, machines) that are largely autonomous, geographically distributed, and heterogeneous in terms of their operating environment, culture, social capital, and goals, but that collaborate to better achieve common or compatible goals, thus jointly generating value, and whose interactions are supported by computer networks” [34]. Since these organizations are highly dependent on each other, including their connection through business processes or IT, the concept of inter-organizational enterprise architecture management is becoming an essential factor. However, even though the literature unveils research in the field of inter-organizational business process management [106] and interoperability of IT systems [27], scarce research is conducted regarding inter-organizational enterprise architecture management. Nevertheless, research attempts have been made to extend the enterprise architecture to a business ecosystem architecture, to establish EAM frameworks or extend existing ones to support inter-organizational

collaboration [48, 109, 131]. The complexity of conducting enterprise architecture management in inter-organizational collaborations raises many challenges for organizations [109]. One of this thesis's aspects is identifying the challenges the organizations face when engaging in inter-organizational collaborations and whether the business capability map can help resolve them.

These organizations engage in a specific type of relationship to form their collaboration, influencing how they achieve these goals. Besides that, the partnership can be realized at different levels, including different resources, like human and financial resources, and systems, business processes, skills, information, and knowledge [46]. However, different definitions and concepts exist for capturing and understanding the inter-organizational collaboration in enterprise architecture management.

2.3.1 Different Collaboration Directions and Forms

As collaborative networks is a highly generic notion, some researchers have focused on the different types of configurations and relations in collaborative networks [50]. This thesis focuses on the definition provided by Hagenhoff [64] for the distinction between different collaborations. Hagenhoff [64] differentiates three essential criteria:

1. direction of cooperation
2. intensity of cooperation
3. areas of cooperation

The **(1) direction of the cooperation** is categorized into three possible structures, see figure 2.10:

- **horizontal**, if different organizations are part of the same value chain. The organizations' products or services are similar or the same, making them direct competitors in the same industry sector. They share resources and/or processes to reduce costs, improve innovation, or better serve their customer.
- **vertical**, if organizations belong to different stages of the value chain and arrange their services and processes in a customer-supplier relationship.
- **hybrid**, if the organizations belong to different industries and engage in horizontal and vertical collaborations to create new products or services.

The **(2) intensity of cooperation** can be described using the time span and the level of formalization. Based on the time span criteria, collaborations can be divided into short and long-term forms of collaboration. Whereas short term collaborations are mainly goal-oriented and disintegrate after reaching the set goal. The degree of formalization describes

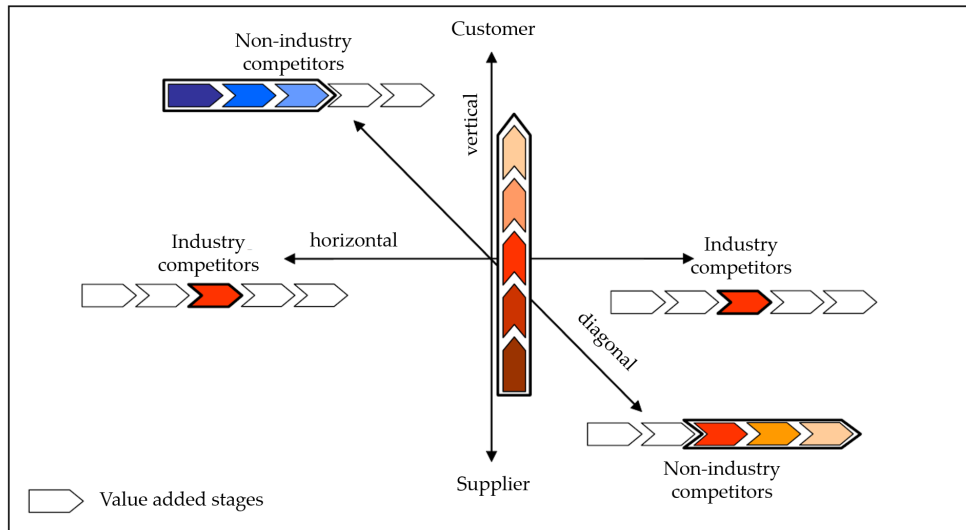


Figure 2.10: Direction of the Collaboration [64]

the way in which the partner companies link functions, tasks, or processes. This characteristic gives information about how difficult or simple it is to terminate the cooperation and enter a collaboration.

The **(3) areas of cooperation** describe the different business fields where the collaboration can occur. These areas can represent, for example, procurement cooperation or production cooperation.

Each collaboration context offers a unique setting for a collaboration form. Collaboration forms can be anything from a stable relationship among partners in a supply chain to cooperation in a virtual organization. However, the concepts and definitions underlying the different collaboration forms are not presented in this thesis. It is important to highlight that the dominant factor for this thesis is the collaboration direction. This thesis considers only the *horizontal* inter-organizational collaboration as a unit of analysis. As mentioned, in such collaborations are participant's typical competitors from the same industry sector and have similar or the same business capabilities. These circumstances allow the creation of a common business capability map for all organizations participating in the collaboration.

3 Related Work

In order to investigate the relevant contributions of the research area, this chapter provides a review of the literature relevant to this research. The chapter starts with an explanation of the literature search methodology, illustrates the identified contributions, and ends with a summary and assessment of this chapter. The corresponding research questions are answered and discussed in detail in Section 3.2.3 for research question 1 and Section 3.2.4 for research question 2 of this chapter. Section 3.2.2 analyses the scope and depth of the existing Business Capability Modeling research with an in-depth focus specifically on the studies addressing the usage and implementation of business capability maps. This develops the foundation for the design and development of use cases for business capability maps as artifacts. Based on the theoretical background and related work, Section 3.3 discusses the research gap and provides a summary and assessment of the literature review.

3.1 Literature Review Methodology

The methodology behind this literature review follows a structured search process based on the guidelines of Webster and Watson [152]. The approach is considered by many as the quasi-standard for a systematic literature review in the information systems research field, leading to its selection for the thesis. The review is conducted in three sequential steps as follows:

(1) Creation of research baseline:

The literature is roughly screened to create a theoretical knowledge background and to identify first gaps in the field of inter-organizational EAM and the usage of BCM in this context. Based on this information, the research topic was refined, and the basis for the theoretical foundation in Chapter 2 was created.

(2) Literature review:

The found research gaps were further evaluated, which lead to a research concept, which is presented in Section 3.2.1 and research questions (Section 1.2) with associated search queries. The first query deals with the business capability modeling concept, whereas the second query corresponds to the topic of inter-organizational EA collaboration. However, due to the vast number of results, it necessary to limit the results by introducing further search terms. Afterward, a third search query (the concept of business component modeling) was added to the literature review. However, this leads to no additional contributions.

The results of the queries are discussed below. The papers' pre-selection was based on a set of criteria, which was applied during abstract reading.

General inclusion and exclusion criteria:

- Available as full text
- German or English as language
- Clear focus on enterprise architecture context

A full-text reading is conducted for the final inclusion or exclusion, and additional query-specific inclusion criteria are applied. The review considers six well-known databases for information systems (IS) contributions. The following sources are chosen as they are generally considered to be the most important article databases in the fields of IS:

- EBSCOhost Online Research Database (<https://www.ebsco.com/>)
- ScienceDirect EScience Direct (<https://www.sciencedirect.com/>)
- Scopus (<https://www.scopus.com/>)
- IEEE Xplore Digital Library (<https://ieeexplore.ieee.org/Xplore/>)
- ACM Digital Library (<https://dl.acm.org/>)
- Web of Science Core Collection (<http://www.webofknowledge.com/WOS>)

Additionally, the review incorporates the best practice of *back and forward reviewing* to broaden the found results. This process step helps to "accumulate a relatively complete census of relevant literature" ([152]).

(3) Literature analysis, interpretation, and summary:

The found articles are analyzed, structured, and summarized, lead to the results presented below. Section 3.2.1 aggregates all relevant concepts into a common image, which is used as an explanatory construct to describe the usage of business capability maps in the context of horizontal inter-organizational EAM collaboration.

The following presents the search queries in detail:

Search Query One: "*Business capability*" OR "*Business capabilities*"

In line with the first research question, the primary purpose of the first search query is to assess the research in the field of business capability modeling as a subfield of enterprise architecture management, particularly in the context of the actual usage of business capability maps. Articles are eliminated when the term capability is used as a synonym

unrelated to this thesis's definition, i.e., capability as "ability" synonym. Additionally, articles are excluded, which use the term only in the abstract without actual context in the full text. The found literature is then used to identify use cases for a business capability map, see Section 3.2.3. The results of the query are illustrated in Table 3.1.

Databases	Search area	Number found literature
EBSCOhost Online Research Database	"TX ALL Text"	358
ScienceDirect	"Title, abstract or author-specified keywords"	31
Scopus	"Article title, Abstract, Keywords"	358
IEEE Xplore Digital Library	"All"	73
ACM Digital Library	"Anywhere"	139
Web of Science Core Collection	"All Fields"	193
Back- & Forward Search	-	20
Total (without duplicates):		203

Table 3.1: Search results for query one

Search Query Two: *"Ecosystem" OR "Inter-organizational" OR "Cross-organizational" OR "Virtual organization" OR "Network environment" OR "Business network" AND "Challenge" OR "Risk" OR "Problem"*.

The second search query is used to create an overview of the research in inter-organizational EAM collaboration, especially with regards to challenges in this field. The results are the input for the challenges, which emerge if EAM is carried out in an inter-organizational collaboration. The results of the search serve to answer research question 2 partially. After the first assessment, the sample size (>10.000 documents) for each database is too large for an in-depth analysis. Furthermore, the found literature contained a larger number of entities with low, respectively, no relevance. Considering the research area of inter-organizational collaboration and the vast availability of academic papers in this field, the search results are explicitly limited to the enterprise architecture field and the topic of challenges, risks, and problems observed in this field. Therefore, the query is extended with the term *"Enterprise architecture"*, limiting the overall result scope. This factor made it inherent to use the additional back-and-forward search to narrow down the missing of possible relevant research papers. The results of the query are illustrated in Table 3.2.

3.2 Literature Review Results

In this section, the results of the literature review and addressed research questions are presented. Firstly, the findings serve to develop a model that explains how different factors influence the usage and use cases of business capability maps in an inter-organizational

Databases	Search area	Number found literature
EBSCOhost Online Research Database	"TX ALL Text"	3
ScienceDirect	"Title, abstract or author-specified keywords"	242
Scopus	"Article title, Abstract, Keywords"	93
IEEE Xplore Digital Library	"All"	57
ACM Digital Library	"Anywhere"	25
Web of Science Core Collection	"All Fields"	3
Back- & Forward Search	-	23
Total (without duplicates):	-	124

Table 3.2: Search results for query two

collaboration context. Secondly, the results are analyzed to identify the current research state on business capabilities maps and related work to this thesis. Lastly, the results are used to answer RQ1 by identifying use cases for business capability maps and partly RQ2 by identifying existing challenges in the inter-organizational EAM collaboration literature.

3.2.1 Explanatory Construct

The literature review has provided essential insights into business networks and their classification (see Section 2.3). The primary purpose of the explanatory construct, as shown in Figure 3.1, is to specify the factors influencing or impacting the business capability map usage in an inter-organizational EAM collaboration setting. The factors were elaborated from the inter-organizational EAM collaboration literature and represent the different research directions taken. Hence, this explanatory construct's overall goal is to enhance the communication and understanding regarding the literature review findings and create a structured view of the underlying research of this thesis allowing for a systematic data collection and analysis.

The core is the business capability map with the respective use cases, which are influenced by the challenges, success factors, and the collaboration context. The collaboration context is identified during the multiple case study and is presented in section 4.1.4. The challenges are identified during the interviews and are presented in section 5.4, whereas the success factors are created from the expert interviews and the challenges and are presented in Section 5.5. The challenges organizations face during their inter-organizational collaboration are evaluated during the expert interviews. The evaluation includes assessing whether the challenge is perceived in the collaboration and whether the BCM can help resolve challenges. The results are presented in section 5.3.

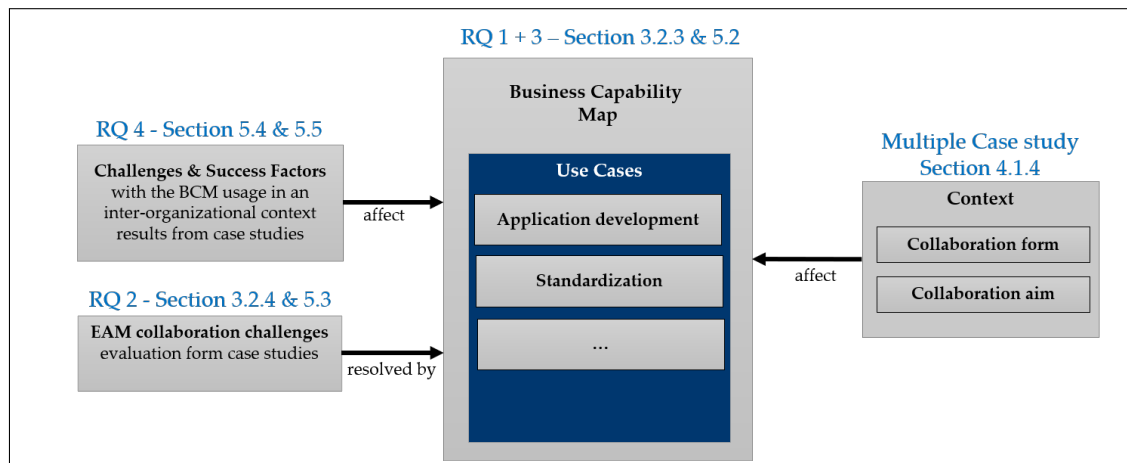


Figure 3.1: Explanatory construct business capability map usage in inter-organizational EAM collaborations

3.2.2 Usage of Business Capabilities and Business Capability Maps

The following presents the literature found for search question 2 and addresses the concept of business capabilities in enterprise architecture and enterprise modeling.

Despite the numerous publications found, most of these are not relevant to this thesis. However, the high number of found literature can be seen as an indicator of the importance and relevance of the business capability concept in research.

A few authors release conceptual publications for the topic of business capabilities, not including the business capability map concept. Barroero et al. [21] extended the TOGAF meta-model with business capabilities to link business changes to data, application, and technology architecture. Their approach considers new architectural artifacts for TOGAF and names changes to the meta-model to remodel TOGAF as a capability-centric approach. Moreover, further investigations concerning the analysis of the business capability concept and its usage in EA frameworks, where an ontological analysis of the concept is performed [108, 16, 45]. However, no detailed information on these publications is presented since these concepts are not relevant to this thesis.

Further conceptual work investigating the current state of the business capability concept is literature reviews, like [156, 157, 87]. They summarize the current state of the different types of capabilities, methods for designing and developing capabilities, elements and characteristics of capabilities, frameworks for capabilities, and suggestions for future research in this field. Further publications are concerned with the modeling of business capability maps. Brits et al. [29] provides a conceptual approach for business capability modeling and guidelines on how to differentiate between different types of business capabilities (functional, integral, dynamic, and strategic capabilities). Their work includes a list of critical information that should be analyzed to identify business capabilities. These in-

clude customers, suppliers, operational business processes, and strategic objectives. This information is used to model each business capability utilizing a framework for analysis and feedback loops for development. Loucopoulos et al. [100] present a capability modeling approach that integrates four additional views and their interaction with the capability view (capacity, ability, ownership, value). These views include the operational view (information, processes, transaction, actors, roles), technological view (goals, rules), service view (service processes, atomic services, software services), and contextual view (user context, business context, situation, variation).

Other researchers distanced themselves from conceptual research activities and investigated concrete methodologies for a capability-based EAM. Aldea et al. [10] proposes a methodology for capability-base planning in association with the ArchiMate modeling language. They proposed an extension for the capability and metric concept to evaluate and assess the gap of capabilities of the current performance level to the desired level. The provided metrics for the capability assessment are strategic Key Performance Indicators (KPIs), including process performance, process variance, and information consistency. They propose the use of a heat map to visualize improvement potential.

These publications are mainly concerned with the concept of business capability and were partly used for the theoretical foundation of the business capability concept. However, overall, they do not fit the purpose of this thesis. To create the list of use cases for the business capability map, dedicated literature concerning the use cases for the business capability map is needed. A few publications could be identified concerning this topic. They provide concrete applications for the BCM in the EAM domain for a single organization context.

Kurnia et al. [90] research benefits and blockers associated with specific EA-related activities and their respective artifacts. They structure their findings into eight activity areas of enterprise architecture practices, where the business capability modeling area represents one. The present activities of their results include the assessment of the relative maturity (often against external industry benchmarks), articulating business capability improvements, and heatmapping of capabilities to priorities areas for IT investments. They argue that the benefits can be summarized to the clarity of priorities, which results in the following usage: “ helps business executives and architects agree on the set of strategic business capabilities, discuss their priority and criticality to the organization, develop a shared understanding of their required maturity levels and propose some IT investment programs intended to uplift their maturity.” However, their results do not detail and consider the possibility of mapping the BCM to other areas of the business. Additionally, they present two blockers for BCM. First, when the architecture is not positioned high enough in the organizational hierarchy and second, the cultural difference between business and IT.

Khosroshahi et al. [84] conduct extensive research on the practices and use cases of the business capability map for the enterprise architecture management field. They identified

14 use cases and evaluated them through expert interviews with 25 organizations on the feasibility and benefits they provide. The use cases are not described here because they can be found in the list of use cases. Their results show that at the time of writing their paper (2018), the concept is still in an early stage, as most of the use cases are in a planned state. Furthermore, use cases that aim to decrease the complexity of the EA (e.g. harmonization potential) or reduce costs are regarded as highly useful. However, not all use cases are considered useful. Additionally, they provide challenges for organizations using the BCM concept. These involve lack of understanding, high creation effort, positioning of applications, missing acceptance, high maintenance effort, missing management support, missing information, missing contact persons.

Bondel et al. [25] report from the modeling and usage of a business capability map based on a case study in a single organization. Their major findings are that the involvement of the whole business leadership leads to a better business-IT alignment, a common language, and a better understanding between all business units. Furthermore, they describe the usage of the BCM as a tool for structuring strategy development. They provide the business capability map's usage in an assessment of the strategic relevance of the business capabilities in the BCM. For this process, the interviewees were asked about a business capability's strategic relevance, which is influenced by the organization's success, unique selling propositions, and long-term orientation. Additionally, each business capability's current health state was asked to identify gaps between the current and "optimal" state to identify potentials for improvement. This assessment's results are captured using color coding on the BCM to highlight the strategic relevance and improvement potential for each business capability. This shows the importance of the heat mapping approach.

Keller [82] explains the basic idea of capability-based modeling and provides a set of examples of concrete applications for business capabilities in EAM. These use cases include investment decisions, IT/business alignment, outsourcing decisions, and IT demand management. Additionally, he presents attributes that can be mapped to the business capability (performance metrics and cost information for a capability, service level agreements for a capability, compliance criteria), which can be used as a basis for further use cases.

Beimborn et al. [22] introduces the concept of business capability maps, which was developed based on resource-based theory and competence-based theory. They illustrate the practical applicability of their concept on an example from the banking industry. Furthermore, they argue that the BCM can be used for outsourcing decisions and presents key indicators for evaluating a business capability for this decision.

Khosroshahi et al. [85] present an approach for a capability-based evaluation of the application landscape using KPIs. They developed three KPIs related to the complexity, quality, and impact to measure the application portfolio. The results are visualized using heat mapping on the business capability map.

Amiri et al. [78] hypothesized that by using a capability-based view, the communication between senior management, particularly the communication between the CIO and other members of the top-level management team, is improved. They argue that by using the capability-based terminology, the understanding of IT's role in an organization is fostered.

Ulrich and Ronson [144] present a detailed overview of the business capability map concept and their integration into the enterprise architecture. They discuss the different capability mappings and their connection to the IT architecture transformation, the service-oriented architecture, and the transformation of core IT architectures. Their work presents different use cases in this context and forms, among others, the basis for the present thesis.

Moreover, a few publications of the usage of business capabilities in an inter-organizational collaboration setting could be found. These are added to the list of use cases.

Lachenmaier et al. [91] makes recommendations for the design of a reference architecture for EA in inter-organizational collaborations. Through a case study analysis and their conducted literature review, they develop suggestions to support organizations' interoperability in the development of enterprise architectures. They mention that in their case study, capability-based planning is used. This planning is used to identify relevant architecture components, based on capabilities and roles necessary for the delivery of a common service. Capabilities that are stated as important for interoperability support are, for example, flexible contracting, data acquisition, and data exchange. However, their approach does not mention the usage of a business capability map and is restricted to identifying capabilities necessary for the interoperability between organizations.

Tepandi et al. [138] presents the development of an inter-organizational reference architecture for the Once-Only Principle in Europe. The project aims to simplify the public administration process for citizens and businesses across Europe, by ensuring that the same information of users must only be provided once and can be reused and shared between authorities. TOGAF and the Once-Only Principle are used as the basis for their reference architecture. Their business architecture process model addresses the business interaction between actors involved in the collaboration and the business capability map, which is used to specify each actor's responsibilities in the process. The roles present in the process are data consumer, data provider, evidence service broker, and the identity provider. The BCM is actively used to enable "the participants to accurately identify the business capabilities required for the role they intend to play" in the business network.

Bakhtiyari et al. [18] present a capability-based approach for enterprise architecture for business network planning. They introduce in their approach so-called "novation requirements" to capture correspondences between organizations in a business network, expressing the relationships between business processes and artifacts, such as services, resources,

or data repositories. These novation requirements act in the business network as a relationship between the business capabilities of individual organizations. In order to do that, the artifacts are first mapped to the local capability map of individual organizations. These are then aligned with a global business capability map for the business network. The global BCM with global business capabilities enables identifying novation opportunities between artifacts in each organization. This setting allows distinct outsourcing and sourcing decisions to leverage the business network, allowing access to organizations' capabilities in the network.

Weber et al. [150] propose a multi-stage approach to generate value scenarios in platform-based ecosystems based on business capabilities, which is evaluated with companies in the area of the industrial internet of things IIoT. Their approach consists of three steps: 1) The identification of company-specific business capabilities 2) the assessment of business capabilities against business capabilities needed in the platform-based ecosystem, to highlight the business capability relevant for the context of IIoT 3) the generation of value chains from the identified business capabilities of each participating organization. This process allows companies to identify if they can be part of the value chain as well as to generate new value chains based on business capabilities provided by participating organizations.

Toppenberg et al. [141] demonstrate how CISCO, uses its enterprise architecture function to manage the integration execution of newly acquired companies. Their acquisition process comprises various artifacts including an enterprise reference model to capture the current state of the business, capability roadmaps that describe how to transition from the current state to a future state, capability heatmaps to identify capabilities for the acquisition which are critical for the value creation and a business capability map to envision and communicate the to-be scenario of the acquisition.

The here presented literature concerning the usage of a business capability map, was used to identify the list of uses cases detailed in the next section.

3.2.3 Use Cases for Business Capability Maps

As already mentioned in the theoretical section about business capability maps (see Section 2.2.3), the effective usage of such maps depends on the connection to other views or areas of the enterprise architecture. For example, the capability-based documentation of the as-is landscape of the application requires knowledge about the relation between a business capability and the underlying applications, which are part of the application architecture. The single elements and their relationships are typically represented in EA models and need to be connected. Therefore, the BCM model in the theoretical foundation was created and used to structure the use cases identified in the literature. These mappings provide usage scenarios for the BCM where the individual use cases find an application. Only sufficiently described use cases are considered. In overall 23 use cases are identified.

Eighteen use cases are found in the single organization context (intra), and five use cases are found in the inter-organizational collaboration context (inter). Table 3.3 presents all found use cases and their description. The use cases are assigned in the following to their respective mapping. This is done by identifying the context in which the use case is used. For example, if the use case requires mapping the BCM to the applications, then the use case is grouped to the application architecture mapping.

The first part presents the use cases identified for a single organization setting. Use cases could not be identified for all of the nine mappings. No use cases could be found in the *value stream mapping*, *business process mapping*, *information mapping*. In the following are the mappings and their respective use case presented:

Organization/Organizational Structure Mapping:

- **Stakeholder group and concerns:** The business unit to business capability mapping is part of a possible example for an organization/organizational structure mapping [144]. This mapping allows identifying the groups of stakeholders that are interested in a capability and capturing each stakeholder's concerns. This is important as any business capability will probably impact multiple stakeholders.

Initiative/Project Mapping:

- **Agile team organization:** [1] describes a use case where a BCM is used to evaluate the staffing of agile project teams. For this process, the user stories are mapped to the addressed business capabilities, which allows assessing the addressed business capabilities by a project team. User stories that support different business capabilities are a possible indicator of an incorrectly defined team or product. Heat mapping indicates missing or incorrect staffing within a business capability. According to a conducted expert evaluation by [1], the use case would not bring any benefits or new insights for EA optimization, and no actual implementation of this use case could be observed, which is consistent with the presented low ranking for actual benefits.
- **Running projects & cost:** This use case provides information on the current status of projects [1]. The running projects are mapped to the addressed business capabilities, which allows supporting the long-term planning of IT budget and projects. A heat mapping can indicate the number of projects or other statuses like project costs for each business capability on the map.

Application Architecture Mapping:

- **Application lifecycle:** This use case focuses on the retirement dates of applications and the support of application planning [1]. The age of applications is seen as an important driver for the application portfolio planning, which should be kept in focus. However, this approach is only possible if a mapping between applications and

the BCM is applied. Heat mapping can be used as a method to indicate the age of applications [1].

- **Application extended support:** This use case describes the possibility of evaluating applications that have run out of vendor support [1]. A business capability supported by applications with missing vendor support can lead to extensive costs or security issues due to missing regular software updates. A heat map is presented as a possible visualization for applications that have run out of support.
- **Capability spanning applications:** The capability spanning application use case investigates the complexity of the application landscape [1]. Applications that support multiple business capabilities are seen as complexity drivers as they indicate unnecessary dependencies within the EA. On the other hand, the same capability implemented by multiple applications can create unwanted redundancy in enterprises [144]. Heat mapping at the business capability level can be used as a possible visualization to indicate the number of capability spanning applications. Additionally, a possible solution for both problems can be eliminating and consolidating duplicated systems into modular systems to reduce overlaps [144].
- **Cloud candidates or cloudification:** The cloud candidates or cloudification use case evaluates and helps to identify possible business capabilities as cloud candidates [1]. Application migration to the cloud can increase the effectiveness (outsourcing of business activities) and efficiency (costs). Khosroshahi [1] argues that a possible visualization is color-coding at the business capability level, which indicates the amount of application that operates in the cloud, or which application operates in the cloud not.
- **Application harmonization:** The business capability map can be used to evaluate the redundancies of applications within a business capability, which indicates harmonization potential [1]. Functional redundancy is an indicator of application landscape complexity and are avoidable IT costs [1, 132]. A high rate of redundancy reflects a high rate of complexity since simple changes affect multiple applications. Additionally, the map allows identifying capabilities with a high diversity of applications between different business units. Standardized solutions per capability can reduce operating costs.
- **Infrastructure components:** This use case addresses the complexity and diversity of the underlying IT infrastructure within EA [1]. It evaluates business capabilities supported by applications with multiple infrastructure components and relates them to IT costs. A high number of infrastructure components correlate with high complexity resulting in high operating costs for the application [132].
- **Infrastructure components – extended support:** Infrastructure within extended support indicates old technologies and avoidable costs [1]. Heat mapping can be used as

a possible method for the BCM to indicate the number of infrastructure components that are on extended support for each application within a business capability [1]. However, like the agile team organization use case, this use case was evaluated by experts in the study [1] as not beneficial and without new insights for EA optimization resulting in low value for practical implementation.

Cost, Performance, Compliance & Complexity Mapping/Analysis

- **Compliance issues:** Each business capability should meet different compliance criteria, such as regulatory requirements or security policies [1, 82]. Heat mapping can visualize the number of compliance issues within a business capability and can provide transparency for project definitions. Furthermore, it can highlight business capabilities that are supported by applications with numerous compliance issues [1].
- **Capability dependencies:** The use case describes the complexity between business capabilities, quantified with the number of dependencies between them [1, 56]. Khosroshahi et al. [1] argue that business capabilities should be highly decoupled to reduce complexity. Additionally, they present a heat mapping method, which can be applied at the business capability level to illustrate the number of dependencies to other business capabilities. Whereas, [56] presents a method consisting of three phases for the analysis of dependencies between business capabilities. They advise that for seamlessly establishing and integrating new business capabilities into the existing business capability landscape, the dependencies between capabilities should be investigated to deliver transparency and fully understand them. Their approach incorporates the assignment of the business entities to business capabilities, which is represented by a business entity map and an information ownership map to support the analysis. However, both papers determine the need to understand the business capability dependencies to create transparency, a full understanding of their relationships, and reduce complexity.
- **IT costs for applications:** IT costs are an important factor for enterprise architecture decisions [1]. The BCM allows the shifting of investments on technical resources to investments on capabilities [113]. A heat mapping can indicate the average operating costs for each application within a business capability. This provides a business-oriented view on the technical layer, highlighting possible architectural optimization potential. However, the capability view also facilitates focused business investment decisions. It enables the enterprise to break down their strategy and focus the investments at improving business capabilities, to ensure that a capability adequately supports the business [144].
- **Costs and the number of users per application:** The progress in relation to the strategic goals of a company or organization represents an important factor. The BCM shifts this technical perspective to a business perspective as the Key Performance Indicators (KPIs) are mapped to their respective BC. Khosroshahi et al. [1] present a

technical mapping of an application indicator (costs and the number of users per application) to their respective business capabilities. Applications with few users and high IT costs are possible candidates for migration to other existing applications.

- **Business process performance per capability:** Further, KPIs, which were found in the literature to measure the performance of a business capability, are *process performance* and *process variance*, which provides an approach to measure business capabilities from a process perspective [10]. Additionally, the attribute *information consistency* were found, which relates to the information architecture [10].

Soft Aspects

- **Communication improvement:** One of the most mentioned benefits for the BCM is the improvement of communication between business and IT, hypothesized to reduce the misalignment between them [26]. However, there is still missing empirical data to fully prove the communication improvement between both fields with the help of the BCM. Amiri et al [79] presents an empirical-based work that examined if using the Capability-Based View will improve communication between senior management, primarily focused on the CIO's communication towards the other management team members. This leads to the assumption that the Business Capability Map can be used as a tool for communication. Nevertheless, this raises further questions such as which stakeholders are involved, or how and which other organizational levels benefit from the capability-based terminology [113]? This thesis is also interested in the impacts and involved stakeholders in the BCM communication process in an inter-organizational setting.

Strategy & Business Model Mapping

- **Business impact - strategic relevance:** The business impact use case is concerned with the impact analysis of a specific business capability [1, 82, 26, 11, 144]. According to their strategic value, the evaluation of a business capability allows improved long-term planning of the EA and projects. Furthermore, this use case can help business executives and architects to identify and agree on a set of strategic business capabilities to discuss their priority and critically to the organization [90]. Therefore, heat mapping can be used to highlight the strategic relevance, the improvement potential, and possible gaps of each business capability [26]. The overall purpose is to determine each business capability's current performance levels and compare it with the desired levels to optimally support the strategic goals [11]. The difference between these current and desired levels is called a capability gap.
- **Outsourcing for single organization:** The use case describes the outsourcing decision of an organization using the business capability map [22, 82]. Several organizations concentrate on their core competencies and outsource other parts of their business. The evaluation of a business capability for potential outsourcing is mainly

based on the criteria of non-strategic relevance and high operating costs of a business capability [22]. Beimborn et al. [22] presents four key factors to identify core capabilities. Core capabilities are highly strategic relevant and should not be included in outsourcing decisions. The four factors include inimitability, non-substitutability, interconnectedness, and contribution to the perceived customer benefits of the end product, which can be used to assess the strategic relevance of a business capability. Non-strategic capabilities with high operating costs are prime candidates for any wave of outsourcing [82]. The outsourcing of business capabilities does not necessarily change the structure of the business capability map. However, underlying business capabilities can be removed or replaced by business capabilities with only interaction functionalities. A possible visualization to present an overview of the current outsourcing state is the marking of possible potential for outsourcing and/or outsourced business capabilities.

Information Mapping

- In this mapping, the literature does not describe any concrete use cases at the moment. However, it is mentioned several times to map information to the BCM. This information includes the person responsible for the business capability, the systems that support the business capability, and interfaces to other business capabilities [26].

The literature provides only use cases for three of the nine mappings for an inter-organizational collaboration context. These mappings are the strategy & business model mapping, the value stream mapping, and the cost, performance, compliance & complexity mapping/analysis. The following describes the use cases found for this context:

Strategy & Business Model Mapping

- **Value creation potential & to-be scenarios for merger & acquisition:** Mergers and acquisitions are a major challenge for many firms. [141] presents an approach where the BCM is already used in the pre-acquisition phase to create a map of the combined organization. This approach can help to identify and capture the critical value creation potential of the acquisition target in an early state. Whereas BCM can help in the whole merger and acquisition process to envision and communicate the to-be scenario of the acquisition.
- **Outsourcing in an inter-organizational collaboration:** The use case describes the outsourcing decision of an organization using the business capability map in an inter-organizational collaboration setting [18, 19]. Organizations are provided with a view to identifying business capabilities in a collaborative setting, which are possible candidates for outsourcing configurations. The considerations are mainly the same as for the decision of single organizations, but to fully leverage the business

network, organizations can in-source and out-source business capabilities to or from organizations participating in their collaboration. This mature outsourcing setting results in increased access to business capabilities that an organization does not own or have access to.

Value Stream Mapping

- **Roles and responsibilities clarification for collaborative value streams:** The Business Capability Map enables collaboration partners to identify the BCs they must provide or are responsible for in collaborative projects or value streams [138, 150]. It allows them to identify if they are capable of participating, and if yes, which role they intend to play. Furthermore, Bcs which are relevant for the collaboration can be highlighted [150].
- **New collaborative value steams identification:** This use case describes the possibility to identify and create new value streams and business ideas from the BCM, by combining capabilities of different partners from the collaboration [150]. Weber et al. [150] present an approach for platform-based ecosystems. In their approach are new value streams created by combining the business capabilities of partners from the ecosystem.

Cost, Performance, Compliance & Complexity Mapping/Analysis

- **Benchmarking:** This use case takes the original KPI use case and takes it one step further to a collaborative environment. This use case is only vaguely mentioned in the literature [90] but was included because it is suitable for inter-organizational collaboration. It describes the performance evaluation of an organization's business capability in relation to the performance of the same business capability with that of other organizations in the collaboration. This enables an organization to assess its relative maturity [90]. In order to this, respective benchmarks for each BC needs to be generated, agreed on, and be shared in the whole collaboration. A first starting point to develop such benchmarks could be the found KPIs in the same mapping.

Use Case	Description	Usage context*	Sources
Organization/Organizational Structure Mapping			
Stakeholder group and concerns	Business unit to business capability mapping to identify groups of stakeholder and concerns for a business capability	intra	[144]
Initiative/Project Mapping			

Continued on next page

Table 3.3: Summary of use cases identified in literature

Use Case	Description	Usage context*	Sources
Agile team organization	Mapping of use stories to business capabilities to evaluate the staffing of agile project teams	intra	[1]
Running projects & cost	Long term-planning of projects due to the mapping of running projects to BCs	intra	[1]
Application Architecture Mapping			
Application lifecycle	Assessment of retirement dates of applications	intra	[1]
Application extended support	Assessment of applications that have run out of vendor support	intra	[1]
Capability spanning applications	Assessment of application landscape complexity, which are represented by capabilities supported by multiple applications	intra	[1, 144]
Cloud candidates or cloudification	Evaluation and identification of cloud potential by presenting which applications already operates in the cloud	intra	[1]
Application harmonization	Assessment of functional redundancy of applications within BCs	intra	[1]
Infrastructure components	Evaluation of BCs and their infrastructure components and cost	intra	[1]
Infrastructure components – extended support	Evaluation of BCs with infrastructure components run out of vendor support	intra	[1]
Cost, Performance, Compliance & Complexity Mapping/Analysis			
Compliance issues	Evaluation of compliance issues for business capabilities	intra	[1, 82]
Capability dependencies	Evaluation of BCs complexity represented by dependencies between them	intra	[1, 56]
IT costs for applications	Assessment of average operating costs for each application with a BC	intra	[1, 113, 144]
Costs and the number of users per application	Assessment of applications with few users and high IT costs	intra	[1]
Business process performance per capability	Assessment of business process performance for BCs	intra	[10]
Benchmarking	Creation and sharing of benchmarks for BCs	inter	[90]
Value Stream Mapping			

Continued on next page

Table 3.3: Summary of use cases identified in literature

Use Case	Description	Usage context*	Sources
Roles and responsibilities clarification for collaborative value streams	Identification and evaluation of BCs, whether a participation in a value stream is possible and which role and responsibility is intended	inter	[138, 150]
New collaborative value streams identification	Identify and creation of value streams from BCs within the collaboration	inter	[150]
Strategy & Business Model Mapping			
Business impact - strategic relevance	Evaluation of BCs according to their strategic value	intra	[1, 82, 26, 11, 144, 90]
Outsourcing for single organization	Evaluation of potential BCs for outsourcing	intra	[22, 82]
Value creation potential & to-be scenarios for merger & acquisition	Identify and capture the critical value creation potential of the acquisition target and communicate the to-be scenario of the acquisition	inter	[141]
Outsourcing in an inter-organizational collaboration	Evaluation of BCs for in and outsourcing within the collaboration	inter	[18, 19]
Soft Aspects			
Communication improvement	BCM as tool for the communication between business and IT (shared taxonomy and vocabulary)	intra	[26, 79, 113]
Information Mapping			
-			
Business Process Mapping			
-			

Usage Context*- intra: single organization; inter: inter-organizational

Table 3.3: Summary of use cases identified in literature

3.2.4 Challenges in inter-organizational EAM Collaboration

The following section primarily addresses research question two, which asks for typical challenges in collaborations to evaluate these for the horizontal inter-organizational setting. Given the complexity of business networks, the research question aims to discover how the BCM can support the horizontal inter-organizational collaboration. In order to do that, this thesis follows a similar approach already done in research for EA frameworks, which investigates how well EA frameworks can address the diverse challenges of inter-organizational collaboration [111]. Mueller et al. [111], identified main challenges for the network organizations according to the literature and analyzed them from their perspective, how well the TOGAF framework can address these challenges. Therefore it is important to know the main challenges that arise when engaging in such collaborations.

Hence, in the first step, common challenges must be identified according to the literature, which can be used as a discussion point in the interviews. Furthermore, the challenges are evaluated concerning a possible mapping to the BCM concept, which is done in the multiple case study.

The challenges are identified using the literature review results and clustered into one of the six groups (*governance, social issues, standardization & information systems, information & knowledge, process and product and network management*), describing the same thematic content. However, not all identified challenges are selected for the actual evaluation in the case studies. Overall, 32 challenges are identified in the literature. The complete list can be found in the appendix 8.1. The table contains the name of the challenges, a short description, and each challenge's source(s). The challenges are prioritized according to their number of sources and for a possible horizontal inter-organizational context as well as for a possible mapping to the BCM. The process is peer-reviewed by a second researcher. The mapping should represent if the business capability map can be used directly or indirectly to resolve certain problems and challenges which typically appear in inter-organizational collaborations. The list of relevant challenges is illustrated in Table 3.4 and in the following further described. The resulting list consists of 15 challenges and is ranked according to the relevance, represented by the number of found literature for each challenge. The challenges are described in the following:

- **Lack of information & knowledge sharing** is one of the most stated challenges in the information systems literature. It describes the problem to find the right balance between risks, e.g., intellectual property leakage and loss due to insufficient protection of knowledge assets and knowledge and information exchange for efficiency and effective collaboration. Additionally, information visibility is a key factor in this process.
- The **lack of trust and commitment** challenge was found in 15 sources. It describes the challenge of establishing trust and commitment among involved organizations in a business network. This can hinder the sharing of sensitive information, which reduces the overall collaboration effectiveness [9]. Any collaboration requires a base level of trust between participants, which fosters communication and knowledge creation [3]. Without commitment, common goals in collaboration cannot be achieved [8].
- The **heterogeneity & lack of standardization** challenge is ranked third and describes the heterogeneity at different levels between participants in a business network. It describes the difference between partners that exist in terms of incompatible hardware and operating systems or differences in languages, where open Standards can help, e.g., to avoid getting locked into partners or increase communication and knowledge exchange [52, 94].
- **Risk identification and management** challenges are found in eight sources and describe the missing understanding of risks that may occur and the actions to resolve

Challenge	Source/s
Lack of information & knowledge sharing	[2, 121, 49, 93, 40, 110, 80, 15, 74, 42, 101, 102, 108, 28, 126, 162, 38, 53, 129, 31, 95, 39, 12]
Lack of trust and commitment	[37, 3, 121, 80, 43, 71, 126, 136, 35, 125, 96, 165, 124, 117, 57]
Heterogeneity & lack of standardization	[48, 110, 99, 32, 35, 77, 52, 117]
Risk identification and management	[70, 136, 65, 67, 41, 15, 89, 116]
Failing communication and timely response	[69, 126, 35, 154, 58]
Ontology differences	[48, 94, 110, 80, 33]
Partner/s identification and selection	[121, 35, 154, 53, 57]
Balance of benefits and costs	[121, 102, 55, 97]
Communication between geographically separated teams	[121, 149, 58]
Decision making (slowness, subjective, no goal-orientation)	[28, 66, 124]
Achievement of operational alignment	[71, 47, 102]
Selection of investment type	[103, 117, 39]
Lack of top management support & commitment	[89, 35, 154]
Inter-organizational connections	[147, 88, 15]
Equal access to information	[143, 108]

Table 3.4: Summary of selected challenges in inter-organizational EAM collaboration sorted by relevance

these risks. Understanding risks in collaborations help in supporting decisions and reduces risks of the participants [9]. A shared understanding of the risks in the collaboration is needed [9, 50].

- The **failing communication and timely response** challenge is concerned with the effective and efficient inter-firm communication, which should be supported by telecommunication links and tools. Insufficient communication involves the risk of collaboration failure [9]. Effective communication between participants in the collaboration requires a common language to share information and knowledge [148].
- **Ontology differences** as challenge refers to an impeded communication due to the

absence of a formal, explicit specification of a shared conceptualization/schematics and alignment of models and languages [148, 9]. Organizations must agree on the terms they use in their collaboration [9]. A shared ontology can be used to share knowledge and avoid misunderstandings between different actors [9].

- The **partner/s identification and selection** can be impeded by differences of objectives, strategies, core competencies, and capabilities. Lack of information about partners can hinder the right selection of partners [9]. Incompatible goals between participants increase the risk [9].
- The challenge of the **balance of benefits and costs at the firm level** is found in four sources and can be found at different organizational levels, such as cost-efficient links to companies or costs for change efforts.
- **Communication between geographically separated teams** represents the challenge of increased risk by a geographical separation between actors. Geographic locations may increase the risk, with there being a direct correlation between distance and risk. It can act as a barrier to communication between participants [119].
- The **decision making (slowness, subjective, no goal-orientation)** challenge covers the decision-making process, which is often based on the own point of reference and personal experiences" vs. goal-oriented & trust-based decisions [124].
- **Achievement of operational alignment** describes the challenge of a missing alignment of processes between participants.
- The **selection of investment type** challenge addresses the problem of decision making in a business network situation for investments. Information systems involve myriad issues that require legal formalization (multiyear financial commitments to IT products and services providers), which makes the right investment decision difficult.
- **Lack of top management support & commitment** describes the missing strategic integration of the top management, which involves continuing contact among top leaders to discuss broad goals and changes. The top management is responsible for every activity at all levels of the organization. The top-level commitment is expected for various decision-making processes necessary for effective collaboration[9].
- The **inter-organizational connections** challenge represents the capability to handle the connection to network actors to enable fast response times and greater variety when new opportunities arise, to cut undesirable information flows and increase agility and performance.
- **Equal access to information** as a challenge covers the missing equality in access to resources in the network for network members.

3.3 Limitations of Related Work

This section summarizes the limitation of the related work as well as the position of the thesis in the research field. This comprehensive literature review covers the two broad fields of business capability modeling and enterprise architecture management challenges in inter-organizational collaborations, in which this study is situated. Further, this literature analysis lays the foundation for the use cases and challenges that are concerned with horizontal inter-organizational collaborative EAM. The BCM concept receives a lot of attention in the EAM community, including researchers and practitioners. The popularity originates from the fact that it represents a business-oriented visualization, which can display the information from a business perspective in context and one view when linked to other aspects of the business. One of the most linked views of the business capability map is the technical layer, which displays technical and business-related information. The preferred visualization to identify areas for improvement within the BCM is heat mapping, which allows highlighting certain aspects.

The current research on business capability modeling and maps is still focused on approaches and frameworks for modeling. Nevertheless, several publications are concerned with the actual use of BCMs. However, the application is described with varying degrees of detail. The review results in some very interesting literature regarding the usage of business capability maps for single organizations and inter-organizational settings. Sufficient research on empirical evidence on the usage of business capability maps in practice is still missing. The literature evaluation reveals that the concept is at the very beginning, and practical insights about the use and the implications of the usage context are still missing. Further, insights regarding the use cases of BCM, particularly regarding soft aspects like communication improvement, would be beneficial. Although there is intensive research conducted in a different direction on the topic of BCs and the BCM, practical insights for the usage of the BCM in an inter-organizational field are still rare. Inter-organizational collaborations are structured in many ways, with different goals, leading to different application scenarios for a BCM. Especially the use of the BCM in a horizontal inter-organizational collaboration context is not sufficiently investigated.

This thesis aims to fill the knowledge gap of possible use cases in a horizontal inter-organizational collaboration context and present associated challenges and successes factors. The use cases identified in this thesis are intended to provide a start point for further research and practitioners a suitable list for implementation. Furthermore, the use cases and challenges found are the basis for the discussion with the experts from our multiple case study.

4 Case Study Methodology

This chapter discusses the research design and methodology for this study. The structure of this chapter is as follows. Section 4.1 discusses the multiple case study design. Section 4.1.1 describes the data collection process for the study. Section 4.1.2 discusses the interview guide and the selection of use cases for the interview guide. Section 4.1.3 presents the case study analysis process, whereas Section 4.1.4 presents the case descriptions.

4.1 Multiple Case Study Design

The presented research adopted the case study method to investigate the current usage of the business capability map in a horizontal inter-organizational setting in practice and to evaluate the identified use cases for this collaboration context. Since this study is qualitative and exploratory in nature, the most appropriate data collection method is case studies [161]. In empirical research, a fundamental distinction can be made between qualitative and quantitative approaches [161]. The case study, as a qualitative method, allows in-depth examination of contemporary events within its real-life context, especially when the boundaries between phenomenon and context are not clearly apparent [161]. A multiple case study method is chosen, allowing the possible comparison of data from various horizontal inter-organizational collaborations. This provides the possibility to generate richer results with greater potential for explanations. The thesis aims to investigate the current use cases of the concept BCM in horizontal inter-organizational collaborations. On the other hand, it is the goal to get expert opinions on possible use cases for their collaborations. Hence, an approach is chosen that allows the most open communication possible [161]. The case study considers the recommendations by Yin [161]. The units of analysis in the context of this research are complete horizontal inter-organizational collaboration cases using the business capability map, rather than separate interviews of their individual participants.

The case study is part of the design science methodology (see Section 1.3) and is used to validate the artifacts by applying them to their defined problem context and developing new artifacts from information given by interviewees. The verification process is done by evaluating whether the artifact contributes to a solution to the research problem and possible use case in a horizontal inter-organizational EAM collaboration.

4.1.1 Data Collection

The thesis favored interviews as a qualitative method, as they offer the possibility to uncover information that would not have been collected using quantitative methods such as questionnaires [161]. Furthermore, the decision to employ interviews as a data collection method is supported by the fact that a questionnaire would only provide insufficient information about the context of each use case, such as possible considerations and implications. Interviews are especially useful as a qualitative research method when the researcher is interested in collecting facts and wishes to understand respondents' opinions and experiences [161]. However, a questionnaire prior to the interview phase was prepared, which could be used for study participants not available for interviews. The questionnaire included roughly the questions as the interview guide but was not applied. First-degree data collection techniques are applied by conducting semi-structured interviews with experts from the cases [123]. This approach allows for open communication and a natural communication environment [161]. In principle, interviews can be divided into unstructured, semi-structured, and fully structured interviews [161, 123]. In the semi-structured interview, the questions are planned but are not necessarily asked in the interview guide's order. Moreover, this thesis includes a third-degree data collection technique [123]. This includes the evaluation of already available documents for one of the case collaborations, since no interviews could be conducted with this case. A case study protocol is created according to Runeson and Höst [123]. The interview guide was created after the case study protocol was finished.

Different approaches exist to structure and conduct interviews [112]. The interview could be fairly structured with a pre-defined list of questions, or it could be unstructured, which allows respondents a high degree of freedom for storytelling to a given topic. Furthermore, the interviews can be conducted in a group discussion with more than one expert interviewed at the same time or in a single expert fashion per interview. The interview guide was used for the entire semi-structured interviews to miss no questions at any point. The interviews were conducted in an open manner allowing a natural flow of conversation and possible sub-questions for the identification of use cases. The narrative interview technique [76] was incorporated into the interview sessions, especially when the interview part about the use cases were discussed. This approach allowed to start with an impulse from the interviewer, such as a short description about a use case, allowing the interviewees to answer freely and without restriction. The interview was conducted over the phone or via conference tools. Furthermore, it was with the respondent's permission, recorded for transcription. Prior to the start of the interview, the study was shortly explained. Each interview lasted approximately 40 minutes to one 90 minutes, depending on the interviewee's availability.

4.1.2 Interview Guide Introduction

The interview guide is divided into five parts and is provided in Appendix 8.2. The first part of the interview guide contains several introductory questions concerning the respondent's professional background, role, and organization. The second part of the interview guide served to acquire information about the EAM collaboration, which served as case. During the third part, general information about the collaborative business capability map is asked. In the fourth part, the interview guide questions aim to evaluate the, through the literature identified, use cases as well as to identify new use cases. Each use case presented in the interview guide includes a description. This is necessary to ensure that each participant fully understands the presented use case to collect results in a standardized way, enhancing their generalizability. Moreover, it could resolve any remaining unclarity about the use case and offer experts the opportunity to provide remarks and possible inspiration for further use cases. However, not all use cases found in the literature are included in the interview guide. A pre-selection of use cases is made due to the limited time given by an interview and the fact that not all use cases are considered important and possible in inter-organizational collaborations. The selection was peer review form a second researcher.

Since the research is oriented to identify and define use cases and potential use cases for the horizontal inter-organizational collaboration context, the following steps are defined: After evaluating the previously identified use cases from the literature review (see Table 3.3), a list of use cases are defined, which is seen as relevant for the interviews. Since some of these use cases are equivalent or identified as non-relevant for the inter-organizational collaboration context, this list is further refined into a final selection of use cases (some use cases are defined as meta use cases, i.e., they encompass at least two other pre-defined use cases). The following use cases are included or excluded:

The use cases found in an inter-organizational collaboration context are completely included in the interview guide since they already represent use cases for an inter-organizational collaboration, which needs to be evaluated for the horizontal inter-organizational collaboration context. This includes the following use cases:

- Outsourcing/sourcing decisions
- Support merger & acquisition
- Clarification of responsibilities
- Creation of new value streams and business ideas
- Benchmarks

Additional to these use cases, the use case *business capabilities enrichment* is included. The use case is found in the inter-organizational literature for BCM. However, it is rather vague

described in the literature. It was first included in the interview guide for the interviews, but by further refinements of the interview guide dropped. The use case is not relevant for the actual use of the BCM but occurs during the creation of the collaborative BCM and is therefore not included in the evaluation of use cases for horizontal inter-organizational collaboration.

Furthermore, the meta use case *application development* is included in the interview guide which resulted from discussions with EAM experts. The use case can be placed under the application architecture mapping category and tries to examine if the BCM can also be used in a collaborative development process for applications.

The following use cases are excluded since they are too specific to the single organization:

- Capability dependencies
- IT costs for applications
- Identify stakeholder groups and concerns

Following meta use cases are created to incorporate the use cases found in the literature for the single organization context. These are used as the basis for discussions of potential use cases in the respective collaborations:

- Application portfolio management
- Project portfolio management
- Information & knowledge sharing
- Standardization
- Strategic decision-making
- Communication improvement
- Compliance issues
- Shared ontology

This preselection resulted in a list of 15 use cases, which are evaluated during the interviews.

The fifth and last part of the interview guide includes the question about the challenges with the usage of the business capability map and the challenges occurring in an EAM

collaboration. Each collaboration challenge is presented with a short description of itself, ensuring that each participant fully understands the presented challenge. Further, the interview guide was reviewed by one researcher, which provided feedback and comments on the interview questions, resulting in minor revisions to improve the clarity of questions.

4.1.3 Data Analysis

The interviews' twelve audio recordings are carefully transcribed for the data analysis using the qualitative data analysis MAXQDA Plus 2020 transcription tool. The phrases are clustered into statements, which address the previously defined use cases as well as possible new ones. Additional clusters are created for identified challenges with the usage of the business capability map in an inter-organizational collaboration context. By clustering the data from the interviews, the challenges for using the BCM are identified. Since some of the interview respondents have German as their native language, the interviews for them were held in German. The transcribed answers are, therefore, partly in German as well. However, summaries, comments, and quotes from these interviews are translated into English and presented in this thesis.

Each interview results are documented in a concept matrix according to the concept of Webster and Watson [151] for evaluating literature reviews. It provided a structured content analysis, whereby the relevant information is extracted from the text to reduce the amount of data. The interview guideline is used to create categories as well as new categories, are inductively created. The relevant text passages are then assigned to the respective categories. For this task, Microsoft Excel is chosen as a documentation medium. The interview information and empirical material are coded and clustered according to the explanatory construct (see Section 3.2.1). These categories include, for example, the different challenges found for the BCM usage in the collaborations, as well as the use cases for the collaborations.

4.1.4 Case Collaboration Description

Data collection through interviews requires identifying possible participants [161]. The participants are identified based on contacts from previous research projects from the chair of Software Engineering for Business Information Systems (sebis) at the Technical University Munich. Even then, finding possible case study partners as well as to get their agreement to collaborate in this study is a challenge. Regarding the novelty of the BCM concept in an inter-organizational collaborative environment, a limited number of such cases are available and even accessible for analysis. Suitable case study partners in this specific *horizontal* inter-organizational collaboration setting are sparse.

The case studies are called *case collaborations* in this thesis. The evaluation of the use cases and the identification of possible further use cases, as well as the identification of current

challenges and success factors of the usage of a BCM in a horizontal inter-organizational EAM collaboration setting, are based on five cases collaborations. However, the interviews could only be conducted with case collaboration members one, two, three, and five. For these case collaborations, expert interviews with twelve experts are conducted. Case collaboration four was no longer available when the interviews were conducted. In this case, only existing documents and protocols from previous studies of the sebis chair with this case study partner could be evaluated.

Yin [161] has emphasized the importance of a clear specification of the case under study. The research uses different collaborations as the context for collecting information by each interviewee associated with one case. The inter-organizational collaborations have different aims at utilizing the BCM for their needs as well as different forms in which they collaborate. Hence, different use cases are possible for different collaboration forms and their context. The detailed description tries to clarify the context by framing and analyzing the respective collaboration settings. This allowed the researcher to capture the usage of a BCM in different collaboration settings. A summary of the case collaborations is shown in Table 4.1. The following presents each case collaboration in detail:

	CC* 1	CC 2	CC 3	CC 4	CC 5
Main Reason for Collaboration	Harmonization	Harmonization	Reference architecture	Reference architecture	Merger
Participants are Competitors	No	No	No	Yes	Yes
Collaboration Form	Working group	Working group	Community of practice	Community of practice	Working group
Industry	Broadcasting	Broadcasting	Broadcasting	Banking	Lottery/ Gambling
Number of interviewed experts	8	1	2	0	2
Data collection	Interviews	Interviews	Interviews	Protocols & Documents	Interviews

*CC: Case Collaboration

Table 4.1: Overview of case collaborations

Case collaboration 1:

The first case collaboration is an inter-organizational EAM collaboration, consisting of eleven organizations from the public service media company from one European country cooperating in a working group. Each organization participating in the collaboration has more than a thousand employees. The collaboration has a non-hierarchical structure, and the participants, even though they are in the same industry, are no direct competitors. Additionally, the collaboration consists of permanent members and associated members without voting rights. The reasons for collaborating in the EAM area is as followed:

- Identification of possible collaborative projects
- Identification of harmonization potential mainly in the application architecture but also at the business process level
- Establishing comparability between organizations
- Creation and roll out of possible common application and technology standards
- Knowledge exchange through a common wording and same framework

In order to do this, they chose to start working with a business capability map, since they identified the map as a possible way to collaborate in the EAM field. At the time of the interviews, the EAM collaboration had used the BCM for roughly two years. However, the actual usage is still in the early phase. The questioned organizations participating in the collaboration were using the business capability map in their own organization for roughly two years, roughly the same time frame as in their EAM collaboration. The collaboration consists of different working groups. One of them is EAM working group, which currently uses the BCM. The interviews are conducted with experts from this working group.

Case collaboration 2:

In case collaboration two, the inter-organizational EAM collaboration consists of four organizations from one European country's public service media company sector. Each organization participating in the collaboration has more than a thousand employees. The collaboration has a non-hierarchical structure, and the participants, even though they are in the same industry, are no competitors. Each organization speaks a different language. However, the collaboration form is roughly the same as in case 1. Their collaboration aims are similar to case 1 as they want to identify potentials for harmonization, also in the application architecture, but instead of business processes, they want to harmonize their business objects across organizations. The business capability map is at the current state of the EAM collaboration not finished and communicated for the collaboration. However, it is investigated how the BCM can support the collaboration aims. The organizations have roughly two years of experience with the business capability map.

Case collaboration 3:

The third case collaboration is also an inter-organizational collaboration of four public service media organizations of several European countries with a community of practice as identified collaboration form. Each organization participating in the collaboration has more than a thousand employees. The collaboration is not an EAM collaboration, meaning they are not concerned with managing their EA in an inter-organizational setting. It is a community of practice [60], which is part of a larger association of multiple members from Europe. Their collaboration reasons are exchanging knowledge and developing an industry-specific reference model of a business capability map. This model can then be

shared and adopted by its members. Therefore, the BCM is not used for management endeavors in the collaboration, but purely a basis to exchange and share knowledge about the concept, including use case for the map. Nevertheless, the case is investigated for use cases for the collaboration. This can help discover the full potential of BCM in horizontal inter-organizational collaborations. This initiative to create the BCM started roughly two years ago.

Case collaboration 4:

The fourth case collaboration is an inter-organizational collaboration of organizations operating in the banking and finance industry. The collaboration is an independent member-owned, non-profit association with the aim to establish and promote a common architectural framework for enabling banking interoperability. The creation and modeling of the business capability map were done in a community of practice [60] of related association. Their reason for collaboration is to provide a reference model, which can be used by their members operating in the same industry. Hence, it has the same structure and goals as case collaboration 3. It is included due to the same reason as case collaboration 3. No interviews could be conducted with the presented collaboration. Only documents and protocols of a prior conducted study with the collaboration could be used as a source of information.

Case collaboration 5:

Case collaboration five is an inter-organizational collaboration active in the lottery and gambling industry. The BCM was used as a tool during the merger process, consisting of 10 organizations. The organizations can be regarded as small-medium size, according to their number of employees. This was also the reason for the collaboration as well as to identify potential synergies and create a shared understanding and taxonomy and the application harmonization. The BCM is, in this context, used to support the collaboration.

Each collaboration has a profound knowledge about the EAM concept, but still missing knowledge about business capability maps and their usage (average two years). Twelve interviews with experts of four collaborations could be conducted, with five different roles (Enterprise Architect, Head of Metadata, Business Analyst, Department Manager IT, Head of Strategy), as seen in Table 4.2

Participant	Case	Role	Experience EAM (years)
I1	Case 1	Enterprise Architect	5
I4	Case 1	Enterprise Architect	4
I5	Case 1	Enterprise Architect	3
I6	Case 1	Enterprise Architect	3
I8	Case 1	Enterprise Architect	2
I9	Case 1	Enterprise Architect	5
I12	Case 1	Enterprise Architect	5
I11	Case 1 & 3	Head of Metadata	10
I10	Case 3	Enterprise Architect	5
I2	Case 2	Business Analyst	5
I3	Case 5	Department Manager IT	10
I7	Case 5	Head of Strategy	2

Table 4.2: Overview of interviewed experts

5 Results

This chapter presents the results of the conducted empirical study, including the analysis and identification of possible use cases for the business capability map in section 5.2. Afterward, the evaluation of the challenges (see Section 5.3) when engaging in horizontal inter-organizational collaborations are presented. Finally, the challenges (see Section 5.4) and success factors (see Section 5.5) for using the BCM in this context are outlined. Thus this chapter aims at answering research questions 2, 3, and 4.

5.1 Current Experience of BCM in the Organizations and Collaborations

Based on the structure of the interview guideline, the first important part to analyze is the current experience with the BCM. Considering that the results of the study are based on the experience and opinion of EAM experts, a detailed overview of the experts and their EAM experience is presented in Table 4.2. The following presents an overview of the organizations and their BCM experience. In the interviews, the participants are asked how many years they have been using the business capability map in their organization and the collaborations. This gives a good overview of the experience of the BCM concept. Figure 5.1 provides an aggregated overview of the answers regarding the years of use or, respectively, the years working with the concept in each collaboration.

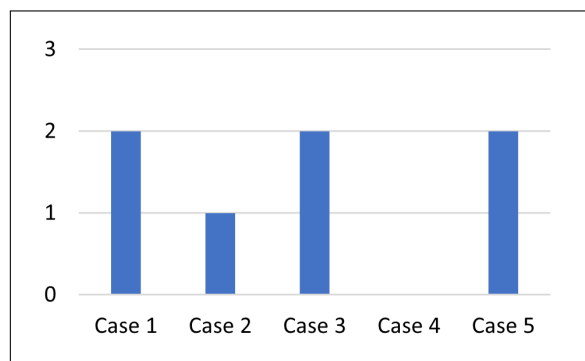


Figure 5.1: Years of using the BCM

The figure shows that the business capability maps usage is still in the early stage within the interviewed collaborations. This is underlined by the fact that the BCM is at most used

for two years in the collaborations. Case collaboration 4 could not be interviewed, leading to no results. Even in the organizations which participate in their respective collaboration is the concept with a maximum of two years still in an early state. Based on this fact and the respondent's answers, it can be concluded that the current maturity level of the BCM in the interviewed collaborations is still relatively low. The collaborations of cases 1 and 2 are at the "exploring" stage, where the full usage of the BCM is unclear.

Mapping of information

The interview guide asks which data are mapped to a single business capability for the collaboratively created business capability map illustrated in Table 5.1. This presents a first overview of the information and objects the collaborations consider to map to the BCM. Case collaboration 1 and 5 map their applications to the BCM, which is also considered by case collaboration 2. This mapping is currently considered as the primary usage for the BCM by case collaboration 1 and 5. The application architecture mapping and the resulting optimization and decision-making based on this view are seen as the major role for the EAM collaborations. Case collaboration 1 and 2 also consider mapping their collaborative projects to the business capability map, which is currently not done. Case collaboration 3 and 4 do not actively use the BCM in an EAM collaboration sense where active optimizations for specific organizations are planned, so no information or data mapping to the BCM is done and planned.

	Applications	Collaborative projects
Case collaboration 1	done	considered
Case collaboration 2	considered	considered
Case collaboration 3	-	-
Case collaboration 4	-	-
Case collaboration 5	done	-

Table 5.1: Information mapped to the BCMs

5.2 Identification and Evaluation of Use Cases by Experts

The interviewees are asked about the current usage of the business capability map and whether the use cases provided in the interview guide are possible in their collaboration. Additionally, the multiple case study is used to identify and derive further potential use cases. The following results for the current and potential usage of the business capability map are provided in three parts. The first part presents the results for case collaboration 1 and 2. The second part presents the results for case collaboration 3 and 4. The results for the collaborations 1 and 2 as well as 3 and 4 are presented together. This method is taken since these collaborations are represented by the same collaboration form, as well as only

a limited number of expert interviews could be conducted for these cases. In addition, for cases collaboration 4 no interviews could be conducted, and only a few documents and protocols from a prior study are available for the evaluation. The results for case study 5 are presented alone since it is a different collaboration form than the other collaborations. The evaluation of the use cases is conducted under the nine different mappings from our BCM model since these are required to make the use cases possible.

5.2.1 Current and Potential BCM Usage Case for Collaboration 1 and 2

The following describes the use cases for collaboration 1 and 2. There are currently three use cases in case collaboration 1 and one use case in case collaboration 2 in use. The use cases are found in the *application architecture mapping*, *the soft aspect*, and *the strategy & business model mapping*. The interviewees see the potentials for the other mappings. However, at the current state of the collaboration, these areas require a high BCM maturity level at each organization and within the collaboration. Furthermore, they require a high stakeholder involvement or do not conform with the current aims of the EAM collaboration (mainly optimization and increasing efficiency of the current application architecture). As a result, it was mentioned that these areas are not relevant or feasible at the moment. Nevertheless, high potentials are seen in these areas for the future. No use cases could be identified in the *organization/organizational structure mapping* and *business process mapping*. Although the interview partners in case collaboration 1 mentioned that they try to identify a possible usage for the BCM, at the current state, no results are available. The same results are obtained for case collaboration 2.

According to the interviewees of case collaboration 1, the current primary usage for the BCM is the mapping of the application architecture to the business capability map. They want to create a joint representation of the application landscape and use this view to manage the applications and create a to-be application architecture state. Therefore, they want to compare with a business capability view, which application portfolio exists for each organization to identify potentials for application harmonization. In case collaboration 2, the business capability map is currently only in a planned state and not fully communicated in the collaboration. The actual use of the business capability map has not yet been fully determined. The mapping of the application architecture is considered in case collaboration 2 but is mentioned that this process requires a lot of resources, which are not necessarily available. This is supported by the fact that in case collaboration 2 the organizations currently do not have a fully documented application architecture. This missing documentation makes the process even more time and labor-intensive since the documentation must start from the very beginning. However, the potentials in the application architecture mapping and the resulting use cases are seen and evaluated as possible for this collaboration.

A first business capability map was used in an application development project. The use cases are described according to the mappings presented in Section 2.2.3. The findings are presented, starting with the three mappings the for current BCM usage. The results are

structured according to the following mappings:

- (1) **Application Architecture Mapping**
- (2) **Soft Aspect**
- (3) **Strategy & Business Model Mapping**
- (4) **Information Mapping**
- (5) **Value Stream Mapping**
- (6) **Initiative/Project Mapping**
- (7) **Cost, Performance, Compliance & Complexity Mapping/Analysis**

(1) Application Architecture Mapping

The functional comparison of applications for all organizations' business capabilities yields a much clearer picture than a mapping of applications to business processes, especially since business processes can vary between organizations. The comparison of applications supporting a business capability allows the following two use cases:

- **Application harmonization**
The business capability map is used to identify across organizations to determine which applications are used for the same business capability to reduce the overall number of different applications. Applications with the same functionality supporting the same capability can be consolidated to reduce the overall complexity. All interviewees of case collaboration 1 highly identify this use case. It is the same use case that is identified in the literature.
- **Potential application functionality**
Instead of buying new applications to fill the gaps in functionality, it might make sense to utilize the existing applications fully. The purchase of new applications can be very expensive, so it makes sense to evaluate existing applications' functionality. Mapping applications to the business capability map allows a direct comparison of what the organizations use for individual business capabilities. If applications overlap, the functional use of both can be compared in order to draw possible conclusions regarding their respective functionality. This allows using existing applications instead of investing in new applications that are redundant in their functionality. Interviewee I9 (Enterprise Architect) mentioned this possibility: *"since even if the organizations use the same application each organization could use it for other business capabilities"*. This use case is newly identified.

After a common basis is created, where all organizations in the collaboration use the same application, it is possible to monitor the applications in the same way as in a single organization. This approach allows the usage of use cases identified in the literature for the application architecture mapping for single organizations for case collaboration 1 and 2, see Section 3.2.3. The following use case are included:

- Application lifecycle
- Application extended support
- Capability spanning applications
- Cloud candidates or cloudification
- Infrastructure components
- Infrastructure components - extended support

Three experts of case collaboration 1 mentioned another use case for the collaborative created BCM. The use case is currently in a progress state:

- **Common applications procurement**

The use case describes the possibility of integrating the business capability map in their process for bundling procurement projects for common applications (I11, Head of Metadata; I4, Enterprise Architect; I1, Enterprise Architect). The BCM can help to identify common applications, which are used by all organizations. It was mentioned that one organization is responsible for the managing and purchasing of an application for the whole organization, leading to cost reductions in the procurement process. The information about which application and who is responsible for the application can be mapped onto the BCM or be color-coded onto the map. This presents an overview of the current state and possible potentials.

This use case could not be evaluated with case collaboration 2, because it was identified after the sole interview with case collaboration 2.

Furthermore, the following use case is found in case collaboration 2, which uses the unfinished map selectively in a collaborative development process. The following use case could be defined from this case study partner:

- **Collaborative application development**

The collaborative business capability map was used in a collaborative application development project to create a platform with content from different collaboration organizations. The business capability map was used in the application development process to get an overview of which business capabilities are needed for the application and which organization must provide which business capabilities (I2, Business Architect). However, due to the interview setting's limitation, it was not possible to explore the whole application development process and how the business capability map is integrated with the whole process. Due to the similar collaboration structure

and the aim of the case collaboration 1 to further engage in collaborative projects, like in collaborative application development, this use case is also possible in case collaboration 1.

(2) Soft Aspect

This mapping included evaluating whether the BCM can be used for soft aspects in the collaboration, which resulted in two used cases. The use case *BCMs comparison regarding business understanding*, which was identified for case collaboration 4 (see Section 5.2.2) is also evaluated for case collaboration 1 and 2. This use case is only possible if new organizations join the collaboration, which is not the case for case collaboration 1 and 2. Both collaborations are stable in this context.

- **Inter-organizational communication between Enterprise Architects**

The business capability map is the primary tool used in the collaboration and provides a common communication basis between the different enterprise architects and IT departments of each participating organization. (I1, Enterprise Architect). It was mentioned by all interviewees of case 1, that this mainly supports direct communication with other enterprise architects of organizations within the collaboration at the current state. This communication is made possible by the BCM by creating a common language and terminology. The statement of interviewee I12 illustrates this well: *“We have the same uniform value space. So, I also always bring the BCM into position. Because no matter what we do with it, mapping of indicators, goals, projects, and applications. We have a common value space. And we take a look at it and say ah: User Response Management: We know what is meant by this.”* Due to the same collaboration form, this use case is also in case collaboration 2 possible, and the BCM can also be used in this context when the map is established in this case collaboration.

Besides the described use case, another use case could be identified in these mapping. Interviewee I2 (Business Architect) mentioned that the language of the organizations in case collaboration 2 is different, which is also fostered. This particular circumstance leads to the following use case, which is only relevant for case collaboration 2:

- **Language unification**

A common BCM in English and a mapping between BCMs in the respective national language of the organizations can reduce language barriers and possible misunderstandings

(3) Strategy & Business Model Mapping

This mapping included evaluating the use cases *outsourcing and sourcing decisions* and *Value creation potential & to-be scenarios for merger & acquisition*. Nevertheless, the new use case business capability assessment for collaboration, which is currently in use in case collaboration 1, could be found. Other potential use cases in this mapping were not identified.

- **Business capability assessment for collaboration**

A business impact analysis to evaluate business capabilities from a strategic perspective is highly dependent on the individual organization, as each organization defines its strategy. Each organization's strategy highly depends on the maturity of an organization and the maturity of the business capabilities (I12), resulting in different strategic relevant business capabilities for each organization. Therefore, that use case *business impact – strategic relevance* would make no practical sense in the EAM collaboration (case one - I12). However, case collaboration 1 incorporates beside their business relevant capabilities, capabilities that are necessary for their collaboration endeavor. The BCM allowed them to identify and document the business capabilities needed for the collaboration (I12). The use case describes the assessment of business capabilities needed for the collaboration and whether these are sufficiently developed. Due to the same collaboration form, the use case is also possible in the case collaboration 2. The BCM can be used in this context when the map is established in this case collaboration.

- **Outsourcing in an inter-organizational collaboration**

Every interviewee of case collaboration 1 stated that the BCM could be a good first starting point for a collaborative discussion about the possibility of outsourcing business capabilities. It could even be possible for competitors to evaluate certain settings for outsourcing decisions (I1, Enterprise Architect). The possibility to outsource certain business capabilities to participants to leverage the collaboration was also mentioned (I9, Enterprise Architect; I2, Business Analyst). Such a project was conducted in case collaboration 2. Interviewee I2 also argued that the project planning would have been faster with the BCM. Both interviewees stated that this specific outsourcing setting would be a long-run goal, which can be supported by evaluating and comparing the business capabilities. It was also mentioned that it should be considered to include the value and maturity of business capabilities in such a decision-making process (I2, Business Analyst). Low-level maturity business capabilities can be taken over by organizations with higher maturity for the business capability. However, the BCM cannot be treated as the sole instrument for such decision-making because various sources and models need to be considered (I5, Enterprise Architect). Additionally, such a use case is only possible if all stakeholders performing the strategic decision are involved in the process (I8, Enterprise Architect). The sole interviewee of case two also argued that their thought process for

outsourcing decisions are BCM oriented, but the visualization and discussion on the actual map could create a more structured process (I2, Business Analyst). A possible consideration could be to map the information required for such decisions on the BCM.

- **Value creation potential & to-be scenarios for merger & acquisition**

This used case was discussed under the meta use case *support of merger & acquisition*. Every interviewee of case collaboration 1 and 2 stated that this use case is not relevant due to their specific organization and collaboration structure. They argued that this is due to their specific organization structures as a public service media company.

(4) Information Mapping

The interviewees are asked if they could consider the BCM to exchange information by mapping possible information essential for the collaboration. With the input of the experts, the following use case is identified:

- **BCM-base wiki with common application and technology standards**

One interviewee mentions the possibility of sharing information and knowledge by linking the BCM with an especially created wiki, allowing them to share information and knowledge specific to the business capability (I2, Business Architect). This approach is the BCM, the navigator, forwarding the person with a click on a business capability to the respective wiki page containing information relevant to the BC. The shared information includes internal directives, instructions, and standards, which were previously unknown to everyone. This concept could be expanded to accompany information and knowledge exchange for the collaboration (I2, Business Architect). One of these information is sharing which applications for which business capabilities are used in each organization (I8, Enterprise Architect). Another collaboration aim of case one is creating possible common application and technology standards, which should apply for the whole collaboration (I12, Enterprise Architect). Such information can be made accessible with the mentioned approach. The importance of a wiki for exchanging information and knowledge is also mentioned by interviewee I5 and I6 (both Enterprise Architects).

(5) Value Stream Mapping

At the current state of the EAM collaboration, the value stream mapping is not considered. However, all interviewees of case collaboration 1 and 2 see high potential in this mapping and the two use cases identified in the literature. Other use cases as the already from the literature known use cases for this mapping could not be identified. In case collaboration 1 are large projects currently covered by one broadcasting company. However, it is mentioned that for future projects with multiple organizations involved, it would be possible to

create a collaborative value stream where a business capability mapping is possible. This circumstance would allow the use case **clarification of roles and responsibilities within collaborative value streams**. The second use case, the **creation of new collaborative value streams**, was also seen as a possible and exciting use case for their collaboration, but all interviewees mentioned that it is not feasible at the current state. The sole interviewee I2, from case collaboration 2, in his role as Business Analyst, also sees great potential in these use cases. He also mentioned that he tries to create these values streams for his organization with this research's input. Moreover, with success, they can also be tested in the collaboration.

In the end, it can be concluded that the approach of value stream mapping with its two included use cases, as presented in the literature, can also be applied in the presented collaborations.

(6) Initiative/Project Mapping

- **Running collaborative projects**

This use case makes sense in a collaborative environment for joint projects to identify projects, fields for collaboration, or evaluate benefits. Interviewee I12 (Enterprise Architect) mentioned that he could imagine mapping the collaborative projects on the business capability map. An approach similar to the use case for single organizations could be used for shared projects. A color-coding can indicate running collaborative EA projects for business capabilities. Additionally, it is possible to map project costs to the business capability map to present an overview of collaborative projects. A mapping of collaborative projects could support long-term planning (I9, Enterprise Architect). This approach can provide a first overview of ongoing projects. Whether this will be used to identify new collaborative projects remains to be seen. Interviewee I1 (Enterprise Architect) mentioned that project initialization is mostly through actual pains and follows less an analytical approach, but the business capability map can be used retrospective to manage and discuss each project's strategic impact.

Besides this use case, the following new use case was identified during the interviews with case collaboration 1 and 2.

- **Project information and outcome exchange**

This use case is identified in case collaboration1 and describes the possibility of learning from organizations' success and failures in the collaboration. The BCM simplifies the documentation and justification of strategic decisions for projects or initiatives, making it possible to retrospectively evaluate the decisions and share the outcome with collaboration participants (I1, Enterprise Architect). In mapping projects, their information, and possibly the outcomes to capabilities, strategic decision-makers could evaluate whether the same method could be successful in their own organization (I1, Enterprise Architect). However, this usage scenario requires certain

transparency and willingness to share success stories and possible mistakes in the organization and within the collaboration. This possible undesired transparency in the decision-making process was also mentioned by one interviewee (I11, Head of Metadata) and is found in the section about the usage challenges for the BCM.

(7) Cost, Performance, Compliance & Complexity Mapping/Analysis

The following two use cases benchmarks and compliance issues are evaluated under this mapping. Others than those already available for evaluation in the interview guide could not be identified.

- **Benchmarks**

Most interviewees rate this use case as possible and desirable, but extremely difficult to implement. Interviewee I11, I9, and I4 (Head of Metadata, Enterprise Architect, Enterprise Architects) mentioned that it is difficult to find the right abstraction for such Benchmarks, which allows comparability between organizations. It is also argued that such Benchmarks could be problematic with respect to the technical level. Even if all organizations use the same software, the probability is high that the software is adapted to the respective organization's environment. This difficulty is due to the workflow and process differences inherent to each organization (I11). This circumstance complicates the process of abstracting possible benchmarks from the technical level. Furthermore, such a use case requires a certain maturity and documentation of each organization's application landscape since it is impossible to establish comparability without the necessary information (I4). This use case would further increase transparency. However, this is not always seen as a possible benefit. One interviewee (I2) mentioned that certain parties could see this unwanted transparency, resulting in possible drawbacks such as budget cutbacks. He mentioned this use case would, therefore, not be possible or wanted in his collaboration. Hence, this use case highly depends on the wanted transparency and comparability within a collaboration. The problem of evaluating and measuring business capabilities is also mentioned in the literature [113]. It is a complex problem in a single organization setting and even more in inter-organizational collaboration. A possible approach could not be developed from the interviews and is also out of the thesis's scope.

- **Compliance issues for joint projects or shared applications**

The topic of compliance is highly dependent on the individual organization, as each organization defines its regulatory regulations and requirements. All interviewees for case collaboration and 2 regarded the topic as currently not relevant or planned. However, it could be considered for shared projects, applications, or even shared business capabilities, where common compliance, like collaborative defined application or technology standards, needs to be adhered to (I1, Enterprise Architect; I8,

Enterprise Architect). Whether the compliance is fulfilled can be shown on the map (I1, Enterprise Architect).

5.2.2 Current and Potential BCM Usage for Case Collaboration 3 and 4

Case collaboration 3 and 4 do not use the business capability map for EAM endeavors in their collaboration, limiting the business capability map usage. The interviewees mentioned that the aim of case collaboration 3 is the creation of a reference business capability map for an industry sector, without the usage for EAM in an inter-organizational context. The same results could be extracted from the documents for case collaboration 4. However, it was identified for case collaboration 4 that the business capability map can be used when new organizations join their collaboration. The use case was categorized under the soft aspect mapping since it describes a form of knowledge exchange. The following describes the use case:

- **BCMs comparison regarding business understanding**

New members can compare their own business capability map with the collaboratively created business capability map, which allows them to get new insights and knowledge about their own business. This can include uncovering missing business capabilities, which were prior not considered.

This use case is regarded as newly identified as it was not found during the literature review process. This use case could not be evaluated, whether it is possible for case collaboration 3.

During the interview with expert I10 from case collaboration 3, another use case for the BCM is mentioned, but without the horizontal collaboration context. The context for the use cases is in a business ecosystem setting and refers to the communication between the organization of interviewee I10 and third parties. The government and a consultancy agency represent the third parties. The use case was categorized under the soft aspect mapping since it involves the communication between network actors. The following describes the use case:

- **Communication with third parties – government & consultancies**

The BCM was used in a data governance project, where the government wants to have increased access to corporate data and contracts. The usage of the BCM is described as follows by the expert: “We are using the capability to prioritize or to identify which business domains or which capabilities we are going to address first. The first ones are maybe not the nicest ones for many companies because the capabilities are actually have nothing to do with the media company but other corporate ones like the business” (I10, Enterprise Architect). This prioritization is done to include

government requirements and does not necessarily match their prioritization (I10, Enterprise Architect). After the first prioritization is done, the intermediate results were given to a consultancy agency for the final prioritization of all capabilities. The use case is not part of a horizontal collaboration setting but still describes a form of inter-organizational collaboration and is therefore included in the final list of use cases. It describes the possibility to use the BCM to communicate business-relevant aspects with third parties.

No further or potential use cases could be identified during the interviews with case collaboration 3, which are possible in their specific collaboration. The evaluation of the use cases in the interview guide was not effective because the collaboration has no EAM aims, whereas the use cases are mainly concerned with this topic.

5.2.3 Current and Potential BCM Usage for Case Collaboration 5

During the interviews, two of the usage scenarios for the business capability map in the merger process could be identified. These two use cases represent main activities, which are needed during a merger. The first use case describes a typical EAM activity, which is needed during the merger process. It is the use case *application harmonization*, which corresponds to the use case found in the literature and in case collaboration 1. The business capability map allows for developing the optimal target architecture for the merging companies. With this holistic view of the applications, redundancies can be identified and gaps in the IT landscape can be uncovered. The use case is the same as in case collaboration 1 and is therefore not discussed in detail here again. The second use case is the *Organizational structure clarification*, which is presented in detail in the following:

- **Organizational structure clarification**

One interviewee mentioned that the BCM can be used to simplify the creation process of the organizational structure of the merged organization. Since the BCM is a high-level abstraction of the business represented by business capabilities it gives a good starting point and discussion basis for the creation of further detailed representations of the organizational structure. The business capability map was used during the merger process as a starting point to create the organization chart of their merged organization. The interviewee (I3, Department Manager IT) mentioned that this process reduces the problem and discussions involving organizational political topics in the creation of the organizational chart. These organizational political topics include the power differences of the merged organizations represented by, for example, the number of employees

This use case can be regarded as newly identified as it was not found during the literature review process.

No further or potential use cases could be identified during the interviews with case collaboration 5, which are possible or helpful in a merger process involving the collaborative business capability map. The use case found in the literature for the merger and acquisition case describes the usage prior to a merger; therefore, it is not applicable for this case collaboration, which is already in the merger process. The evaluation of the use cases in the interview guide was not effective, because after the merger the organizations can be regarded as a single organization, whereby the context of an inter-organizational collaboration disappears.

5.2.4 Summary BCM Usage for Case Collaborations

The following provides a summary of the identified potential use cases as well as the evaluation of the use cases identified during the literature review. Table 5.2 gives an overview of all use cases, their description, and the status of the use cases. The status describes whether the use case is found in the literature or is newly identified during the multiple case study. Overall, 24 uses cases for the horizontal inter-organizational collaboration are identified.

Use Case	Status	Description
Organization/Organizational Structure Mapping		
Organizational structure clarification	new	Creation of the organizational chart from the business capability map
Initiative/Project Mapping		
Project information and outcome exchange	new	Mapping of project information and outcome from individual organizations to the BCM to share success and failure for possible project adaption by other collaboration participants
Running collaborative projects	similar	Mapping of running collaborative projects to the BCM to create an overview about the collaboration areas and potential areas for collaboration
Application Architecture Mapping		
Application lifecycle	known	Assessment of retirement dates of applications
Application extended support	known	Assessment of applications that have run out of vendor support
Capability spanning applications	known	Assessment of application landscape complexity, which are represented by capabilities supported by multiple applications
Cloud candidates or cloudification	known	Evaluation and identification of cloud potential by presenting which applications already operates in the cloud
Application harmonization	known	Assessment of functional redundancy of applications within BCs
Infrastructure components	known	Evaluation of BCs and their infrastructure components and cost
Infrastructure components – extended support	known	Evaluation of BCs with infrastructure components run out of vendor support

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Table 5.2: Summary of use cases identified in literature

Use Case	Status	Description
Potential application functionality	new	Comparing application functionality between organizations for BCs to uncover unused functionality
Collaborative application development	new	Provide an overview in the collaborative application development process by identifying BCs from each organization needed
Common applications procurement	new	Identifying applications, which can be purchased together by one organization as well as provide an overview by highlighting such applications (e.g. mapping application owner)
Cost, Performance, Compliance & Complexity Mapping/ Analysis		
Compliance issues for collaborative projects or shared applications	known	Identify and highlight potential compliance issues for collaborative projects or shared applications
Benchmarks	known	Creation and sharing of benchmarks for BCs
Value Stream Mapping		
Roles and responsibilities clarification for collaborative value streams	known	Identification and evaluation of BCs, whether a participation in a value stream is possible and which role and responsibility is intended
New collaborative value streams identification	known	Identify and creation of value streams from BCs within the collaboration
Strategy & Business Model Mapping		
Business capability assessment for collaboration	new	Identification of BCs needed for collaborating and evaluation whether these are sufficient developed
Value creation potential & to-be scenarios for merger & acquisition	known	Identify and capture the critical value creation potential of the acquisition target and communicate the to-be scenario of the acquisition
Outsourcing in an inter-organizational collaboration	known	Evaluation of BCs for in and outsourcing within the collaboration
Soft aspects		
Inter-organizational communication between Enterprise Architects	similar	The BCM is used as basis for the communication between Enterprise Architects from different organizations within the collaboration, by providing a shared taxonomy and vocabulary
Language unification	new	A common BCM in English and a mapping between BCMs in the respective national language of the organization can reduce language barriers and possible misunderstandings
BCM's comparison regarding business understanding	new	New collaboration members can compare their BCM to the collaboration owned BCM to refine their understanding of their business
Information Mapping		
BCM-base wiki with common application and technology standards	new	Sharing of common application and technology standards with a BCM-based wiki with the whole collaboration and respective stakeholders interested in these or responsible to check their adherence
Business Process Mapping		

Table 5.2: Summary of use cases identified in literature

The current and indented usage for the BCM is focused on the current goals of the collaborations and their specific collaboration setting. Table 5.3 presents an overview of the collaboration aims and the current use cases in practice for each case collaboration.

Case Collaboration	Collaboration Aims	Use Cases in Practice
Case Collaboration 1	<ul style="list-style-type: none"> • Identification and support of collaborative projects • Establishing comparability • Identification of harmonization potential (applications and business processes) • Creation and rollout of possible common application and technology standards • Knowledge exchange through a common wording and same framework 	<ul style="list-style-type: none"> • Inter-organizational communication between Enterprise Architects • Application harmonization • Business capability assessment for collaboration
Case Collaboration 2	<ul style="list-style-type: none"> • Identification of harmonization potential for the application architecture and business objects 	<ul style="list-style-type: none"> • Collaborative application development
Case Collaboration 3	<ul style="list-style-type: none"> • Creation of a reference BCM • Knowledge exchange (e.g. use cases for BCMs) 	<ul style="list-style-type: none"> • None
Case Collaboration 4	<ul style="list-style-type: none"> • Creation of a reference BCM • Knowledge exchange (e.g. use cases for BCMs) 	<ul style="list-style-type: none"> • BCMs comparison regarding business understanding
Case Collaboration 5	<ul style="list-style-type: none"> • Identification of potential synergies • Management and rationalization of the application architecture 	<ul style="list-style-type: none"> • Organizational structure clarification • Application harmonization

Table 5.3: Overview of case collaborations and use cases in practice

Six use cases are actively in use in the case collaborations. Two of these use cases are prior identified during the literature review, whereas four are new use cases, identified during the interviews. In the case of collaboration, 1 are three use cases actively used. Case collaboration 5 uses two use cases, and in the case collaboration 2 and 4 are one use cases used. The current main focus for case collaboration 1 is currently in the application architecture mapping. The use case inter-organizational communication between Enterprise Architects in the soft aspects is a result of the general use of the BCM in the inter-organizational collaboration. The potentials in the other BCM mapping are seen and evaluated as possible, however at the current state not feasible. Case collaboration 2 does not use the BCM actively in their collaboration, and the usage for the map is not determined, but the potentials usage for the BCM was also recognized here. Furthermore, five new potential use cases, which can be used in such collaborations are found.

Case collaboration 3 and 4 are no active EAM collaborations, which limits the BCM usage greatly. Their main aims are the creation of a reference BCM and the knowledge exchange in this field, such as an exchange of use cases for the BCM. However, one use case could be identified in case collaboration 4 for the soft aspects, which is a result when new organizations join the collaboration (*compare BCMs to refine the understanding of what the business does*).

Case collaboration 5, as a merger, has the main aims to identify potential synergies and the management and rationalization of the application architecture. Two use cases, which are associated with this goal, are the (*clarification of the organizational structure after merger, application harmonization*).

However, the potentials for the other use cases and mappings are seen by all interviewees. Table 5.4 gives an overview of all use cases and the evaluation of each case collaboration. Most of the identified use cases can be used in case collaboration 1 and 2. Nine new use cases in the aspects, *organization/organizational structure mapping, initiative/project mapping, application architecture mapping, soft aspects* and *information mapping* are found. Whereas 4 of these new use case are already in practice, five are evaluated as potential use cases. Only in the business process mapping no use cases could be identified, which is the same result as in the literature review. This suggests that to derive use cases for this mapping is a very difficult approach. Moreover, one use case for the communication with third parties, is identified. This use cases is not concerned with the horizontal inter-organizational collaboration. The use case is the communication with third parties – government & consultancies. Nevertheless, the use case is included in the results section, since it describes a possibility to use the BCM in a general inter-organizational collaboration context.

Use Case	Status	CC1	CC2	CC3	CC4	CC5
Organization/Organizational Structure Mapping						
Organizational structure clarification	new	-	-	-	-	used
Initiative/Project mapping						
Project information and outcome exchange	new	potential	potential	-	-	
Running collaborative projects	similar	potential	potential	-	-	-
Application Architecture Mapping						
Application lifecycle	known	potential	potential	-	-	-
Application extended support	known	potential	potential	-	-	-
Capability spanning applications	known	potential	potential	-	-	-
Cloud candidates or cloudification	known	potential	potential	-	-	-
Application harmonization	known	used	potential	-	-	used
Infrastructure components	known	potential	potential	-	-	-
Infrastructure components – extended support	known	potential	potential	-	-	-
Potential application functionality	new	potential	potential	-	-	-
Collaborative application development	new	potential	used	-	-	-
Common applications procurement	new	potential	n/a	-	-	-
Cost, Performance, Compliance & Complexity Mapping/ Analysis						

Continued on next page

Table 5.4: Summary of use cases for the case collaborations

Use Case	Status	CC1	CC2	CC3	CC4	CC5
Compliance issues for collaborative projects or shared applications	known	potential	potential	-	-	-
Benchmarks	known	potential	potential*	-	-	-
Value Stream Mapping						
Roles and responsibilities clarification for collaborative value streams	known	potential	potential	-	-	-
New collaborative value streams identification	known	potential	potential	-	-	-
Strategy & Business Model Mapping						
Business capability assessment for collaboration	known	used	potential	-	-	-
Value creation potential & to-be scenarios for merger & acquisition	known	-	-	-	-	-
Outsourcing in an inter-organizational collaboration	known	potential	potential	-	-	-
Soft aspects						
Inter-organizational communication between Enterprise Architects	similar	used	potential	-	-	-
Language unification	new	-	potential	-	-	-
BCMs comparison regarding business understanding	new	-	-	-	used	-
Information Mapping						
BCM-base wiki with common application and technology standards	new	potential	potential	-	-	-
Business Process Mapping						
-						

* currently not wanted; CC: Case Collaboration

Table 5.4: Summary of use cases for the case collaborations

Further use cases, which are considered in the interview guide and led to no results or are integrated into other use case are as follows:

- **Business capability enrichment:** This use case is only relevant during the BCM creation process and is therefore not further evaluated and is not presented in the thesis since the use cases it not relevant for the actual usage of a business capability map.
- **Standardization:** This meta-use case had the aim to evaluate whether the BCM can be used to standardize the business process, application, or IT level. Therefore, this meta-use case can be found in the application harmonization use case.
- **Ontology sharing:** This use case was not adequately defined and later during the interviews integrated into the *inter-organizational communication between Enterprise Architects* since it represents no actual use case but a feature of the BCM. Since the BCM can provide a shared vocabulary and taxonomy.

5.3 Evaluation of inter-organizational Collaboration Challenges

Although organizations are aware of and convinced of collaboration benefits, many still encounter challenges when engaging in them. However, what are the key challenges the respondents encounter during their horizontal inter-organizational collaboration? Nine out of the twelve experts are asked to evaluate the list of fifteen challenges identified in the literature (see Section 3.2.4). The experts are from case collaboration 1, 2, and 5. The evaluation should include whether the experts perceive the challenge in their collaboration and whether they perceive that the business capability map can resolve a specific challenge.

Figure 5.2 provides an overview of all challenges with the evaluation of the experts. The results are presented aggregated for all collaborations. This is due to the small number of participants for cases 2 and 5. The length of the blue bars shows how many experts perceive the respective challenge in their collaboration. The orange bars' length shows how many experts assume that the business capability map can help in a specific challenge. The three major challenges are, *ontology differences, heterogeneity & lack of standardization, and failing communication and timely response*. The identified use cases, which can directly or indirectly help in resolving the challenges, are illustrated at the top of Figure 5.2. With the evaluation of the experts and the researcher's evaluation, a mapping between use case and challenge is provided if the use case can help reduce the challenge. The mapping can help to determine the extent to which the business capability map can resolve the challenge. The mapping was created after all expert interviews and could not be evaluated in its final form with the experts of the field. A mapping could be constructed for eight of fifteen challenges. The mapping represents how the BCM can help to resolve a challenge. No approach or connection could be identified how the BCM can help in the following seven challenges: *lack of top management & commitment, decision making, the balance of benefits and costs at the firm level, equal access to information, lack of trust and commitment, the achievement of operational alignment and selection of investment type*.

The following presents the evaluation of the eight challenges where the BCM can help. The evaluation is derived from the expert interviews and the researchers opinion:

Ontology differences: The BCM can provide a shared understanding and language for diverse members. A shared vocabulary and structure represent this. The ability to communicate efficiently is one of the foundations of cooperation between actors. To communicate efficiently, not only a common language is needed, but people communicating also need to have some basic understanding of concepts. They can use this basic understanding to teach each other additional concepts, at least up to the point where understanding the new concepts by the different people overlaps largely [5]. Additionally, the BCM helps to clarify what terms and concepts belong to the business model and how they relate to each other. This is represented by the use case inter-organizational communication for Enterprise Architects. However, a shared language is not a specific advantage of a BCM, as reference models or frameworks can also help to create a common language in general.

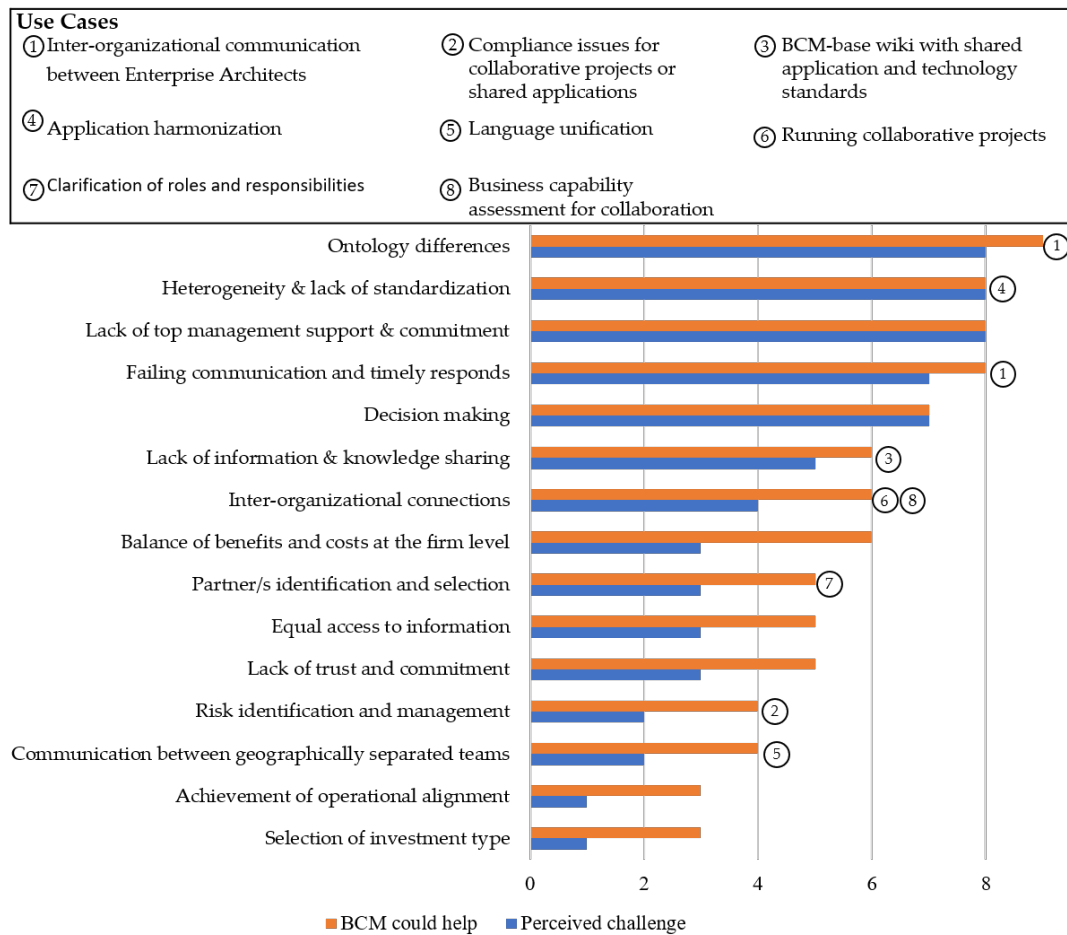


Figure 5.2: Typical collaboration challenges sorted by experts relevance

Heterogeneity & lack of standardization: This challenge can be directly linked to the *application harmonization* use case. The BCM can help address this challenge by allowing a structured view of the application landscape, making it possible to compare applications at the business capability level. Having established such a baseline makes it possible to identify harmonization potential for applications for all organizations. Nevertheless, even then, is it still a challenging process. Moreover, this only addresses the application level and does not consider the business process level or other business objects. Whether the BCM can help here remains open.

Failing communication and timely response: The BCM can provide a common understanding and language for diverse members. This is represented by the use case *Inter-organizational communication between Enterprise Architects*. The BCM provides a shared vo-

cabulary and structure. This common understanding creates clarity in the communication between all participants when discussing certain topics. The basis is always a specific business capability. However, this is not a specific advantage of a BCM, as reference models or frameworks can also help to create a common language in general.

Lack of information & knowledge sharing: This social challenge is also hard to address with only a BCM, as it requires a specific mindset and willingness to share information and knowledge. Nevertheless, if these requirements are met then it is possible to structure and visualize information and knowledge with the help of the BCM. This is represented with the use case *BCM-based wiki with common application and technology standards* since it provides a platform to shred such information.

Inter-organizational connections: The business capability map describes on a higher level how each organization in the collaboration has to operate to follow its strategy to achieve its business goals. By defining business capabilities, the organizations are encouraged to identify fields for collaborative projects archiving shared business goals. The use case *business capability assessment for collaboration* reflects this. Business capabilities needed for the collaboration should be defined, which needs to be evaluated for their sufficient development for effective inter-organizational collaboration. Additionally, the mapping of collaborative projects to the business capability map can create an overview of which areas cooperation is already taking place. Therefore it can be linked to the use case *running collaborative projects*. However, it is unlikely that the BCM can help to manage the inter-organizational connections.

Partner/s identification and selection: This challenge can be linked to the Clarification of roles and responsibilities within collaborative value streams use case. Collaboratively created value streams for projects mapped with business capabilities, allowing organizations to evaluate whether they can participate. This allows deciding if an organization is capable of delivering the necessary business capability needed for the value stream. Therefore it can be linked to the use case *roles and responsibilities clarification for collaborative value streams*.

Risk identification and management: This challenge can be linked to the *compliance issues for collaborative projects or shared applications* use case. The use case allows evaluating certain IT risks with shared applications from a business capability perspective. However, this is only a part of the risk that may occur in EAM collaborations. Whether the BCM can be used for further purposes in this area could not be identified.

Communication between geographically separated teams: This challenge can be linked with the use case *language unification*. Teams who communicate with different languages, which is possible in this context, can apply this use case to resolve misunderstandings in their communication. A further approach to how the BCM can help in this context is not derived.

After evaluating the provided list of inter-organizational collaboration challenges, the respondent is asked about other challenges they consider important in their collaboration. Other EA collaboration challenges that are not included in the above figure but are mentioned during the expert interviews are the challenge: *difference in the organizational culture* (case collaboration 1 and 2) and *openness for change* (case collaboration 2). The difference in the organizational culture challenge is mentioned by interviewee I12 (head of Metadata) of case collaboration 1 and interviewee I7 (Head of Strategy) of case collaboration 2. The openness for change challenge is mentioned by interviewee I7 (Head of Strategy) of case collaboration 2.

Difference in organizational culture: Each inter-organizational collaboration entity has its own organizational culture [130], which can influence the usage of the BCM. This factor requires the awareness of the different organizational cultures and can not be addressed by a BCM. However, during the interviews, it was mentioned that the BCM could be extended to support such aspects. Further research on how such an extension can look like can be worthwhile.

Resistance to change: This challenge is also identified in the literature and describes the internal resistance to change, which can be an obstacle to modernization. The BCM can not address this social issues.

5.3.1 Discussion of inter-organizational Collaboration Challenges

The evaluation's objective is to assess whether the business capability map could help address typical collaboration challenges. The experts evaluated if they perceive the EAM collaboration challenge and if they think the BCM helps address the challenge in their opinion. The identified use cases, which could help in addressing the challenges, are mapped to respective challenges. However, the mapping could not be discussed with the experts from the case collaborations, since the mapping was done after all interviews were conducted.

Overall, the social challenges are quite a challenging research topic and only possible to address at a certain point with a business capability map. The BCM can give a common language and structure for the participants of the collaboration. However, as it is no complete framework, it is not surprising that not all challenges and not every aspect of a challenge can be addressed with a BCM. Nevertheless, it is shown that the business capability map can help in more than eight of fifteen challenges collaboration faces with eight of the 24 use cases identified. Despite this, not all of these challenges in inter-organizational collaborations can be covered in their entirety. It should always be considered to use additional to the BCM a framework like TOGAF, which presents methods and methodologies for different aspects. However, it was also mentioned during the interviews that frameworks like

TOGAF are seen as rather complex, difficult to understand, requires a long familiarization period with impractical results. It should also be noted that such evaluations and also the evaluation of the interview results are always subject to interpretations due to the variability of how the researcher and the interviewee perceive the challenges. Thus, different researchers may come to a different conclusion than presented here.

5.4 Challenges with using the BCM in an inter-organizational Collaboration

This section describes the challenges for the BCM in an inter-organizational collaboration context. During the interviews, it became clear that the use of a business capability map for an inter-organizational EAM collaboration is still in its beginning and there are still many hurdles to overcome. The novelty of the BCM concept was inherent during the interviews, which is also revealed with our results. Each organization in the collaboration and the whole collaboration has to overcome these challenges to establish a successful approach to use the business capability map effective in their collaboration.

Understanding such challenges can help reduce and avoid risks when introducing the business capability map to an inter-organizational collaboration. Hence, one question of the interview addressed the challenges that arise when using the business capability map in their collaborative environment. The challenges for only case collaborations 1, 2, and 5 of the case studies presented above are collected and evaluated. This is due to the fact that only these three collaborations actively use the business capability map for their enterprise architecture management endeavor. Hence eleven of the twelve experts are interviewed about their challenges. The challenges all relate to the usage of the business capability map. However, not all are restricted to the inter-organizational context. While some of the challenges are known from past BCM research, others address new issues as a consequence of the collaboration perspective. The interviewees are asked to proactively describe challenges that arise with the usage of the business capability map in an inter-organizational setting.

Based on the interviews, a total of 13 challenges could be identified that organizations and collaborations have to pay attention to. The interviewees proactively mentioned twelve challenges. However, one challenge is identified during the interviews by the researcher and is added to the list. Figure 5.3 provides an overview of all twelve mentioned challenges by the eleven experts illustrated as a bar chart. Each bar illustrates a specific challenge from the experts. The length of the bars shows how many experts mentioned the respective challenge. This illustrates the importance of each challenge.

The three major challenges are *lack of acceptance and awareness by stakeholders and decision makers* (by 55% of experts), followed by the *issues with the naming of business capabilities* (by 45% experts) and the *labor and time-intensive work* (by 36% of experts). The challenges found, partly overlap with the challenges inherent when engaging in inter-organizational

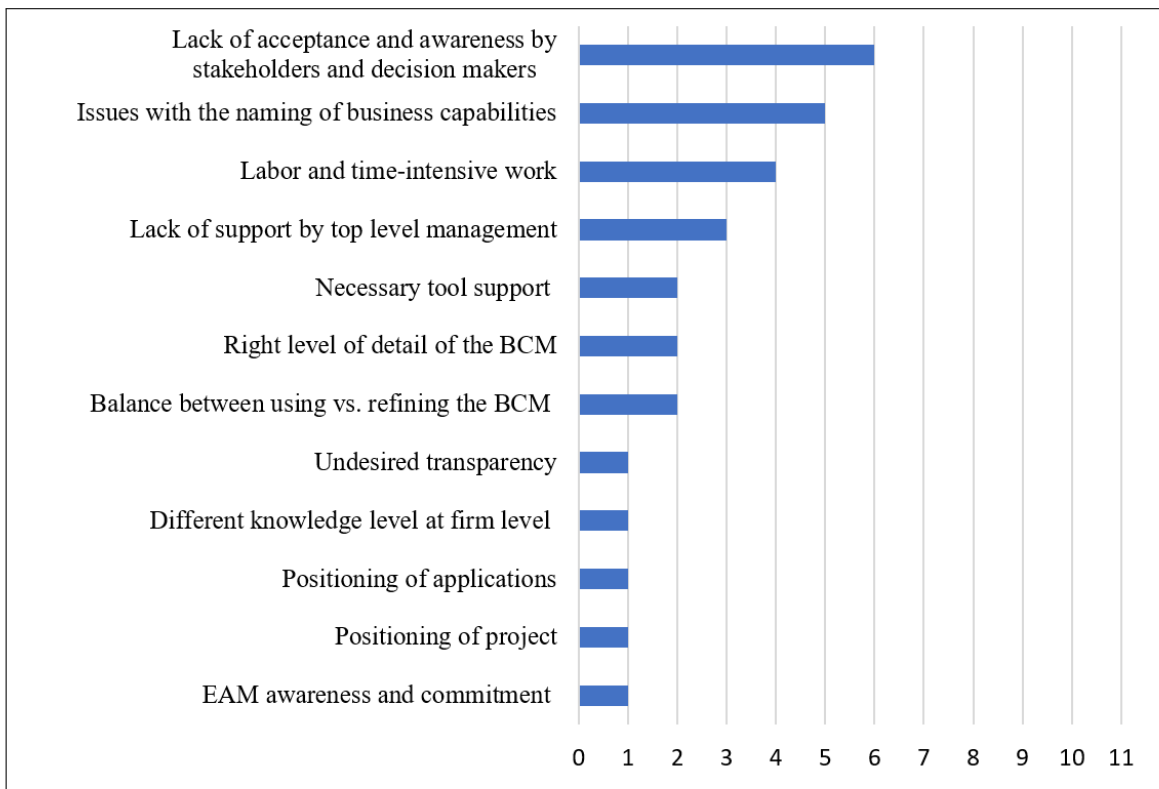


Figure 5.3: Statistic of mentioned challenges for the BCM usage sorted by relevance

collaborations. This becomes clear in the example of lack of support by top-level management. This challenge is found in the literature as typical collaboration challenges and is also actively mentioned by interviewees as challenges for using the BCM. This illustrates the complexity of the field and the interdependencies between different factors. All challenges are described in detail in the following:

Lack of acceptance and awareness by stakeholders and decision-makers: A major impediment for the actual usage of the business capability map is acceptance by other stakeholders and groups outside of the EAM working group (by 55% of experts). The BCM is perceived by other groups and stakeholders as a technical tool, instead of a technology-free model, which can be used for various strategic decisions (I1, Enterprise Architect; I4, Enterprise Architect; I9, Enterprise Architect). Furthermore, the business capability map is within each organization not yet sufficiently communicated (I8, Enterprise Architect; I9, Enterprise Architect; I7, Head of Strategy; I3, Department IT Manager). The term business capability has yet to be further propagated and explained. It is a time-sensitive process that requires the involvement of different stakeholders, which needs to gain a mutual understanding. Therefore, the usage of a BCM in such an inter-organizational environment

is not likely to advance unless the relevant stakeholders within the organizations are ready.

Issues with the naming of business capabilities: This challenge refers to the meaning and naming of the business capabilities (by 45% experts). It was mentioned that the naming of business capabilities, as well as the definitions, are not clear for every stakeholder (I12, Enterprise Architect; I5, Enterprise Architect; I6, Enterprise Architect; I4, Enterprise Architect; I9, Enterprise Architect). The terms used for the business capabilities are not always compatible with the wording of the business nor the IT. Consequently, this could have an impact on the usage of the BCM and eventually needs further refinement and agreement on the terms for business capabilities (I12, Enterprise Architect). However, it was mentioned that a perfect definition and naming of business capabilities are rather unlikely because the process depends on the understanding and perception of people (I12, Enterprise Architect). The EAM working group of case collaboration 1 already implemented a process for the refinement of business capabilities to cope with this problem.

Labor and time-intensive work: One major challenge is seen in the high work-intensive task of mapping the application architecture of each organization to the collaborative business capability map (by 36% of experts). The work required to create this mapping in order to optimize and create tangible results on this basis of this application architecture mapping is perceived as great difficulty (I2, Business Analyst; I1, Enterprise Architect, I9, Enterprise Architect). This is complicated if no detailed documentation of the application landscape is available prior to this approach (I2, Business Architect). Another factor is time and resources, which are limited and cannot be used to pursue every possible approach (I12, Enterprise Architect).

Lack of support by top-level management: An impediment for the usage of the business capability map, which was mentioned by the participants (by 27% of experts), is the lacking support for the initiative across organizations, especially by the top management (I9, Enterprise Architect; I12, Enterprise Architect; I2, Business Analyst). Oftentimes stakeholders have less clarity and awareness of the use and advantages of business capabilities, which leads to less support. The management can have a difficult time appreciating the business capability effort until they see something tangible (I8, Enterprise Architect). This was specially mentioned for the application architecture mapping to the business capability map, since it requires a certain time to complete the mapping so that on this basis, actual optimizations can take place. It is hoped that these optimizations will result in cost-saving, which can be presented to the top-level management as a concrete result (I9, Enterprise Architect; I12, Enterprise Architect).

Necessary tool support: It was mentioned that the possibility of a use case also depends on the possibility to support the use case with the functionality of the currently used tools (by 18% of experts). Use cases where problems could occur by the mapping of business capabilities to other objects or information would be postponed at first (I5, Enterprise Ar-

chitect; I2, Business Analyst).

Right level of detail of the BCM: It was mentioned that the right level of detail of the business capability map can be a problem (by 18% of experts), which is represented by the granularity level of a specific business capability (I12, Enterprise Architect; I5, Enterprise Architect)

Balance between using versus refining the BCM: This challenge describes the balance between creating a “perfect” model and using the current business capability map (by 18% of experts). The BCM is perceived as imprecisely defined in certain areas of the model, leading to a certain room for interpretation of what a specific business capability does (I8, Enterprise Architect). The balance to use the model and at the same time to further develop the model represents a great challenge (I8, Enterprise Architect). Large changes to the map can cause communication and stability problems and must be considered (I12, Enterprise Architect). A certain work stability must be established.

Undesired transparency: One interviewee (9% of experts) mentioned that the business capability map could uncover unwanted transparency in the decision-making process, which can lead to rejections of the concept (I11, Head of Metadata).

Positioning of applications: The right mapping of applications to business capability was mentioned as one challenge (by 9% of experts). Leading to a certain uncertainty whether the business capability map is not correctly defined, or the application is out of place. This uncertainty is increased due to the challenge (3) the issues of the naming of business capabilities, which creates an additional room for interpretation whether the application supports the current business capability or not (I8, Enterprise Architect).

Positioning of projects: This challenge (by 9% of experts) deals with the same problems as the challenge positioning of applications, only with projects as mapping objects (I12, Enterprise Architect). This challenge needs to be considered with the mapping of collaborative projects to the business capability map.

Different knowledge level at firm level: One interviewee (9% of experts) mentioned that efficient usage of the business capability map requires a certain knowledge level of the business capability map by all participating organizations (I11, Head of Metadata).

EAM awareness and commitment: One interviewee (9% of experts) mentioned that the EAM concept is still not considered and embraced by all people, which should form the basis for the BCM concept (I12, Enterprise Architect).

Based on the respondent’s answers, it can be concluded that the following challenge is present, but was not proactively mentioned by the experts:

Missing knowledge about the actual usage of the business capability map in an inter-organizational context: During the interviews, it could be identified that the missing knowledge of the actual usage of a business capability map in an inter-organizational collaboration is an inherent challenge. Hence, it was mentioned that the working group of case collaboration 1 tries different approaches and methods to obtain possible results and new insights, which use cases could be successful and which are not (I12, Enterprise Architect).

5.5 Success Factors for the BCM Usage

From the challenges with the usage of the BCM and the discussions with the experts, success factors are developed, which are essential for a successful implementation of the BCM and the use of it in organizations as well as in inter-organizational collaborations. The success factors are defined with the input for the expert discussion. In the following, the most important success factors for a practical introduction and application of the business capability concept are summarized. The success factors reflect the challenges, which are partly concentrated on the introduction phase of BCM's. However, in principle, these factors also play a role during the application of BCM's and should be considered.

- **Sufficient communication of the BCM to necessary stakeholders and decision-makers in each organization:** Of high relevance is the participation of the relevant stakeholders, who are entitled to make the required decisions. The experts in case collaboration 1 made it clear that the delivery of a tangible BCM value proposition is a big challenge for the collaboration. Hence, BCM value proposition needs to be communicated to the right stakeholders in the right way and its implementation and usage has to be perceived to be beneficial. The success of any new process or topic comes with the available benefits and the realization thereof. The value proposition of the BCM usage has to be supported by an adequate communication policy since there are doubts about the cost-benefit ratio, which affects the needed resources and might produce unwanted resistance. In this respect, the business capability concept does not differ significantly from other methodological instruments. The business capability team should consider educating the necessary stakeholders and decision-makers on the benefits of business capabilities using workshops, case studies, and examples to address this issue. Interviewee I2 (Enterprise Architect) recommended for this process the possibility of a step-by-step introduction, which is currently being tried out on them. In this process, the BCM is only shown in parts to discuss specific tasks.
- **Overcome barriers that hinder the BCM usage due to lack of top management support within each organization:** Active participation or at least an active support from the company's senior management is essential for an effective usage of the

BCM. Otherwise, the developed concepts and the desired usage cannot be archived. Without a successful basis in individual organizations, it is rather difficult to effectively use the BCM concept in a collaboration. Therefore, a sufficient basis should first be established in the individual organizations. The introduction of BCM should be accompanied by change management activities to promote a change-friendly and supportive culture.

- **Right balance between ease of use versus sufficient accuracy of the BCM:** It is not absolutely necessary and also difficult in the collaboration to decompose all capabilities into finer details. However, a business capability map that is "too pragmatic" can lead to problems in the assignment (mapping) of objects. This can be seen in the challenges of the positioning of projects and applications. Therefore, the right balance must be found.
- **Sufficient communication that the BCM mappings are a work and time-intensive task:** It must be clearly communicated that the creation of the BCM mapping is time-intensive task, especially in the initial phase, like for the applications architecture mapping. Only through these mappings can the use cases be implemented. It must be ensured that the necessary resources, whether financial, time, or human, are available.
- **A step-by-step and iterative procedure for introduction and expansion:** The collaborations show that the business capability map concept requires a sustainable change management. An iterative and multi-stage procedure, in which individual mappings and the resulting use cases are accessed, can reduce the complexity. The orientation on *good practices* can help, but it requires documented good practices, which are still missing in the literature.

These success factors are extremely important during the introduction phase of BCM in the individual organizations as well as in collaboration. As already mentioned, collaborations are at an early stage of the BCM application and are still increasingly concerned with the integration of the BCM concept into all areas of the different individual organizations in order to fully leverage the business capability map in inter-organizational collaboration. However, the success factors should also be taken into account when actually applying the BCM in the individual use cases.

6 Discussion

This chapter summarizes and discusses the key findings of the multiple-case study by means of the research questions (see Section 6.1). Followed by a discussion about the limitations of this master's thesis (see Section 6.2).

6.1 Key Findings

This thesis aims to investigate the application of business capability maps in horizontal inter-organizational collaborations, thus answering the research questions that have been defined. The following discusses the finding according to the four research questions.

Research questions 1: What are use cases for the business capability map found in the literature?

In order to answer the first research question, a literature review is conducted, where the current usage of business capability maps in the literature is investigated. Overall 23 use cases for the business capability maps (see Table 3.3), for the context of single organizations as well as for inter-organizational collaborations, are identified. All use cases are categorized according to the BCM model, which describes the different mappings of the BCM to different aspects of the business. Nine of such mappings are identified in the literature including, *organization/organizational structure mapping, initiative/project mapping, application architecture mapping, cost, performance, compliance & complexity mapping/analysis, soft aspects, strategy & business model mapping, information mapping, value stream mapping* and *business process mapping*. From the 23 use cases are 18 found in the context of single organizations, which are categorized to the six mappings, *organization/organizational structure mapping, initiative/project mapping, application architecture mapping, cost, performance, compliance & complexity mapping/analysis, soft aspects, strategy & business model mapping*. The main mapping with the most use cases (with eight use cases) is the application architecture mapping, followed by the cost, performance, compliance & complexity mapping/analysis with 5 use cases. The 5 use cases identified in the inter-organizational collaboration context are found for the 3 mappings, *cost, performance, compliance & complexity mapping/analysis, value stream mapping, strategy & business model mapping*. For neither the information mapping nor the business process mapping are use cases found. However, the literature review showed that there is already research in the field of the BCM usage for inter-organizational collaboration. The found use cases are used as input for the expert discussions to answer

research question 3.

Research questions 2: What are typical challenges in inter-organizational collaborations, and can the business capability map be used to resolve them?

Organizations engaging in inter-organizational collaborations face inevitable challenges resulting from the collaboration. Hence, the challenges organizations face when engaging in horizontal inter-organizational collaborations were investigated.

In addition, these collaborations cooperate in the EAM field, which increases complexity. Therefore, first, a literature review to identify typical challenges for inter-organizational collaborations were conducted, which were prioritized. The resulting list of 32 challenges was then reduced to 15 challenges, which were evaluated during the multiple case study with the experts. The challenges are reduced to the time limitations inherent with an interview. This list presents an insight into the challenges organization faces when engaging in horizontal inter-organizational EAM collaborations. In addition to these findings, it was also investigated whether the BCM can help to resolve these challenges. This aspect was evaluated during the expert interviews and is shown in Section 5.3. The results show that in eight out of 15 challenges the BCM can help directly or indirectly with eight specific use cases (see Table 5.2). The use cases were mapped onto the respective challenge visualizing the challenge. Challenges which can be addressed are among others *ontology differences, heterogeneity & lack of standardization, failing communication and timely responds or lack of information and knowledge sharing*. Nevertheless social challenges are a difficult field and difficult to support with a BCM, since their current main property is to provide a shared vocabulary and taxonomy.

Research questions 3: What are use cases for the business capability map in horizontal inter-organizational collaborations?

Research question 3 is the main research question for this thesis, which investigates the usage of a business capability map for a horizontal inter-organizational collaboration context. The multiple case study enabled are used to analyze the usage of the BCM at different horizontal inter-organizational collaborations. Research question 1 shows that initial studies in the literature provide first insights into the usage of a BCM in an inter-organizational collaboration context. The investigated collaboration form is especially concerned with the horizontal context, which is not investigated yet. Therefore, the multiple case study are used to evaluate the defined list of use cases from research question 1 and evaluate the use cases with the experts for a potential usage in their collaboration.

Overall, 24 use cases are identified and defined, which can be used in a horizontal inter-organizational collaboration context. These are defined for three different collaborations setting with five case collaborations. Nine of these use cases are new and not prior documented in the scientific literature. Moreover, it is elaborated which of the mentioned use cases are already implemented, planned, or potential by the experts for their collaboration.

The results Table 5.3 illustrates the current situation. Currently, only six of the 24 use cases are identified in practice, whereas no use case is planned. In case collaboration 1 are three use cases actively used, these include *inter-organizational communication between Enterprise Architects*, *application harmonization*, and *business capability assessment for collaboration*. Case collaboration 2 used the *provide overview of collaborative application development* use case and case collaboration 3 the *comparing BCMs to refine the understanding of what the business does* use case. Case collaboration 5 used the two use cases *clarification of organizational structure after merger* and *application harmonization*, whereas case collaboration 3 does not use any use case. The current main focus is on the application architecture mapping for the BCMs. The current and indented usage is focused on the collaborations' current goals and their specific collaboration setting. The results reveal that the BCM concept is novel in the inter-organizational collaboration community, and most of the interviewed collaborations started considering the BCMs two years ago. Nevertheless, all other use cases are seen as potential use cases for case collaboration 1 and 2. In overall eight new use cases in the aspects, *organization/organizational structure mapping*, *initiative/project mapping*, *application architecture mapping*, *soft aspects* and *information mapping* are identified. One of these new use cases is also used in case collaboration 1. The others are potential use cases. The potentials of the BCM usage can be seen in case collaboration 4. The case collaboration had no plan for an active usage of the BCM during the study. However, during finishing the writing of this thesis, this collaboration undertakes measures to implement the use case benchmarks as the main objective of their collaboration. This shows that the study can give a good overview of the current state and potential use case for the BCM in horizontal inter-organizational collaborations. Nevertheless, as the maturity of the BCM in each organization and collaboration grows, it increases the knowledge about potential use cases. Further application scenarios only come with progressing time.

Research questions 4: What are challenges and success factors for the business capability map usage in inter-organizational collaborations?

As described above, while several studies examine the usage of a business capability map, there is a lack of empirical research on the impact of introducing as well as using the BCM in an inter-organizational collaboration context. Hence, the challenges when using the BCM within the case collaborations were investigated. In order to this, interviewees were asked to describe the challenges they face when using the BCM in their inter-organizational collaborations. The overall outcome is that 13 challenges were identified, for the usage of business capability maps in inter-organizational collaborations, see Table 5.3. The three major challenges are *lack of acceptance and awareness by stakeholders and decision makers* (by 55%), followed by the *issues with the naming of business capabilities* (by 45% experts) and the *labor and time-intensive work* (35% experts). Among the others are *lack of support by top-level management*, *necessary tool support*, *right level of detail of the BCM*, *balance between using and refining the BCM*, *undesired transparency*, *different knowledge level at the firm level*, *positioning of applications and projects*, *EAM awareness and commitment*, *missing knowledge about*

use cases for the BCM for the collaboration. The challenges are mainly concerned with the introduction of the BCM concept in each organization, which turns out to be a difficult endeavor. Further research on how to communicate and introduce the BCM concept in organizations could help in this aspect.

The success factors were derived from the challenges and discussion with the experts. Five success factors were derived, which aims to resolve the main challenges experts face, see Section 5.5. These five success factors are (1) *sufficient communication of the BCM to necessary stakeholders and decision-makers in each organization*, (2) *overcome barriers that hinder the BCM usage due to lack of top management support within each organization*, (3) *right balance between ease of use versus sufficient accuracy of the BCM*, (4) *sufficient communication that the BCM mappings are a work and time-intensive task*, (5) *a step-by-step and iterative procedure for introduction and expansion*. Most of these success factors are related to the introduction phase of the business capability map, however, the success factors should also be taken into account when actually applying the BCM in the individual use cases.

6.2 Limitations

This thesis has a few limitations, which are mentioned in the following. The potential threats to the validity of this master's thesis will be discussed based on Runeson and Höst's [123] assessment criteria. The threats to validity can be divided into four types: construct validity, internal and external validity, and reliability. However, this thesis does not seek to establish any causal relationships, therefore threats to internal validity are not discussed.

Construct validity: This validity reflects to what extent the operational measures that are studied correspond to what the researcher has in mind and what is analyzed according to the research questions [123]. To minimize this threat, semi-structured interviews were conducted with different interest groups from different organizations in the collaborations with different backgrounds.

External validity: The threat to external validity relates to what extent the findings can be generalized and to what extent they are of interest to people outside the case study [123]. This aspect of validity is addressed by creating an analytical generalization by describing the cases in detail. In particular, this multiple case study provides empirical insights about the use cases for the BCM in inter-organizational collaborations. Furthermore, it sheds light on the challenges organizations face when engaging in horizontal inter-organizational collaborations and how the BCM can help to address them, as well as challenges, and success factors for the BCM usage in this context. The obtained findings should be considered valuable insights for other collaborations trying to use the BCM and organizations considering such collaborations.

Reliability: The threat to reliability relates to what extent the data and the analysis depend on the researcher and whether repeating the multiple case study would produce the same results [123]. One countermeasure taken to prevent this threat was the creation of a case study protocol that consists of notes and documents such as interview guidelines and audio recordings. Furthermore, the case study protocol with its detailed procedures are used for data collection and analysis. Nevertheless, the limitation of an interview-based multiple case study must be mentioned. Since such an approach relies on the subjective opinions of the interviewed experts, conducting this study with other experts could result in other or further results, since e.g. respondents can have a different knowledge level about the BCM concept. Additionally, conducting this with other collaborations could also result in other results, as the collaborations can have a different BCM maturity level and knowledge about the BCM concept.

Additionally, the following limitations are identified during the multiple case study:

Data saturation: When conducting interviews, several researchers have highlighted the importance of a sufficient number of interviewees so that several sources of variability, such as different respondents' roles, experience, and background, are included in the study [122]. Guest et al. [62] have investigated the number of interviews and at which point data saturation is reached. Their results show that for the most part the data saturation is met at 12 interviews. However, due to the complexity of the study, this value can be set higher. Due to the complexity of the context of the unit of analysis, which is the collaboration, it can be argued that it would be possible to get further insights when increasing the number of interviews. This is especially the case considering case collaboration 2, where only one expert was interviewed.

Early state of BCM in the collaborations: The maturity of the BCM concept at each collaboration was at an early stage, and the possible usage of the BCM was not really defined, which resulted in difficulties in deriving possible use cases. In several cases, interviewees made statements that were rather vague in the sense that it was unclear if they use the business capability map for the process or if they describe the process itself without an application of the map. When asked about specific use cases and how the BCM is integrated, the answers and examples became significantly fewer and vaguer. This is due to the relative novelty of the BCM concept and missing documented use cases for the business capability map, especially in an inter-organizational collaboration context. This statement is supported by the fact that no further documented horizontal inter-organizational collaborations that use the business capability map as a tool could be found during this thesis's writing.

7 Conclusion

This last chapter provides a summarizes of the research results of the master's thesis and gives an outlook for future work.

7.1 Summary

This research aimed to reveal the current status of BCMs in horizontal inter-organizational collaborations and to identify and evaluate potential use cases in this context. The thesis followed a design science approach in combination with a qualitative research approach. A multiple case study with five inter-organizational collaborations were conducted, whereas interviews were conducted with four of these collaborations with 12 experts. The business capability map concept is still in its early stage, where the usage of such a map is not fully investigated. The literature mainly focuses on how to create the BCM with little information about the usage of the map. Nevertheless, some use case can be found in the literature, which is presented in this thesis (see Section 3.2.3). This list of use cases is the result of a conducted literature review and answers research question 1. The list was the starting point for the discussion with the experts from the collaborations to identify use cases for a horizontal inter-organizational collaboration context. Through this research, 23 use cases for the horizontal inter-organizational collaboration were identified 5.2.4. The use cases and steps currently undertaken are aligned with the current aims of the collaboration leading to a focus on the management, optimization, and rationalization of the application architecture, which is the main aim for the EAM collaboration in case collaboration 1, 2, and 5. Furthermore, the goals of the collaborations align with the current perception of the EAM function in the collaboration. The other mappings and included use cases, like the value stream mapping, are currently not considered and need further work and integration in each respective organization. For example, to be able to use areas such as value stream mappings in an inter-organizational collaboration context, these mappings must already be established in the respective organizations. Furthermore, the results also show that the usage for the BCM is influenced by knowledge about potential use cases. Of the 5 case collaborations, 3 (case collaboration 1, 2, and 5) are actively using the BCM in their collaboration endeavor. All study participants considered the use of the BCM as a maturing journey. Different perspectives, processes and approaches need to be included or undertaken to improve and learn from success and failure. At the same time, failure is regarded as a possibility to learn new insights and ways of a task, process, or use case involving the business capability map. The use case generation is a time-sensitive

process that requires further maturity in each organization of the collaboration so that from this knowledge use cases for an inter-organizational collaboration can be derived. However, the results shed light on the current and potential usage of BCMs for horizontal inter-organizational collaborations. The research has resulted in a final list of potential use cases, as well as use cases already implemented by the participating case study partners, which is presented in section 5.2.4.

It provides and illustrates the current challenges and success factors for BCM usage in collaborations. 13 challenges are identified, which needs to be resolved to use BCM effectively in the collaboration. In all the collaborations examined, it is found that it takes a very high effort to use the BCM. This is not due to the effort needed to create the business capability map itself, rather due to the effort required to create the mappings of different aspects to the BCM. The challenge *lack of acceptance and awareness by stakeholders and decision makers* is the most mentioned challenge, which highlights how important the communication and integration of the BCM concept in different areas of each organization is. This forms the basis for the efficient usage. Furthermore, five success factors are identified, which attention must be paid to. They correspond to the challenges identified. Furthermore, the thesis aimed to identify challenges that are inherent in inter-organizational collaborations and evaluated these for the case study context and if the BCM can help to resolve these challenges. The results show that the BCM can partly help in eight of 15 challenges directly or indirectly. However social challenges are difficult to address by the BCM concept. The BCM can be used as a central view to connect the organizations in a horizontal inter-organizational collaboration. This thesis provides an initial concept with six use cases already in usage as well as potential use cases, which can be used in different collaborations.

7.2 Future Research Directions

This thesis shows a concept for the usage of the business capability map in horizontal inter-organizational collaborations. Despite this, some open issues are identified, and potential future work directions are possible.

Most of the investigated case collaborations are still in an early stage of the BCM usage in their collaboration. Further research could focus on expanding the cases to get further insights and compare the results. Therefore, a second case study at a later stage where the BCM concept's maturity is at a further step and more knowledge about potential use cases for the collaboration are acquired can lead to new insights.

Furthermore, future research should consider involving participants from the business side and strategic decision making to gather more feedback on potential use cases from a more business-centered perspective. Additionally, the presented study was conducted with a limited number of participants. Therefore, it should be considered to increase the number of experts, especially for case collaboration 2.

The use cases provide a starting point for further research into the usage of business capability maps in an inter-organizational setting. During the literature research, it became clear that there is a lack of research on how to measure business capabilities. Hence, to create possible benchmarks for business capabilities it is necessary first to take this step. Furthermore, the use case outsourcing decisions need further research. During the interviews, it was mentioned that an outsourcing decision is based on further information, besides the BCM. Therefore, a possible research direction could be to investigate how a BCM can be connected to all needed information for these decisions.

During the interviews, the difference in organizational culture as a challenge was mentioned, which represents a soft aspect of an organization. The discussion about this topic with the respective expert during the interviews resulted in a possible future research topic. The organizational culture could be documented with the BCM, to assess possible differences in the organizational culture between collaboration participants. Furthermore, research on how the BCM could address further soft aspects, or how it must be extended to support such topics could be worthwhile.

The last possible topic is concerned with the success factors. It was identified that the organizations struggle with an effective integration of the BCM concept in their organizations. Therefore, developing an approach or methodology to define, integrate, and communicate the BCM concept into organizations can be worthwhile.

Nevertheless, this research gives a first impression about the current state and its weaknesses. Precisely those can be used further to challenge the importance and usage within the collaboration. It came out that many interviewees are interested in this work and want to improve on a collaborative level.

8 Appendix

8.1 A1. Collaboration challenges

Table 8.1: Summary of all identified challenges in inter-organizational EA collaboration

Challenge	Description	Source/s
Governance challenges		
Inadequate cooperation and coordination	The right configuration of the collaboration management structures is a challenging task, especially in terms of finding the right coordination and control mechanisms that allow for effective management without reducing collaboration flexibility, therefore coordination mechanisms have to be agreed upon that help to deal with problems and precarious projects	[44, 121, 48, 94, 89, 120, 142, 52, 63, 39, 103]
Fuzzy collaboration agreement & legal issues	The relationship between members of the business networks is based on short term contractual and informal agreement, which are insufficiently defined as well as issues of liability and intellectual property rights	[94, 115, 35, 154, 69, 57]
Intellectual property rights infringement	The infringement or violation of an intellectual property right (e.g. copyrights, patents, trademarks, industrial designs)	[108, 74, 39, 57]
Balance of benefits and costs	Balance of benefits and costs at different levels such as cost-efficient links to companies or costs for change efforts	[121, 102, 55, 97]
Missing specification of rules	Missing specification of rules for interaction and processes for social learning	[44, 4, 108]
Management of shared control	The use of information network technology makes 'shared control' a key challenge for effective networked information systems	[44, 98]
Selection of investment type	Information systems involve myriad issues that require legal formalization: multiyear financial commitments to IT products and services providers (e.g., hardware leasing agreements, software licenses, support relationships) the right investment decision is difficult	[103, 117, 39]
Social issues		
Lack of trust and commitment	Challenge to establish trust and commitment among involved organizations	[37, 3, 121, 80, 43, 71, 126, 136, 35, 125, 96, 165, 124, 117, 57]
Failing Communication and timely responds	Effective and efficient inter-firm communication is essential and needs to be supported by telecommunication links and tools	[69, 126, 35, 154, 58]
Decision making (slowness, subjective, no goal-orientation)	Decisions are based on own point of reference and personal experiences" vs goal-oriented & trust-based decisions	[28, 66, 124]

Communication between geographically separated teams	Risk may be increased by geographic locations with there being a direct correlation between distance and risk	[121, 149, 58]
Personal relations	Personal relations between network members (or representatives of member enterprises, respectively) play a vital role	[37, 121, 73, 59]
Lack of top management support & commitment	Missing strategic integration, which involves continuing contact among top leaders to discuss broad goals and changes	[89, 35, 154]
Degree of harmony, vision and common ground	Missing of an open and honest sharing of views, expectations, ethics, and values	[37, 81]
Missing leadership	Inter-organizational networks are typically characterized by a lack of formal hierarchies and roles and have no formal structure of leadership	[73]
Sticky socialization	A significant challenge is that enterprises, over time, develop sticky socialization patterns with entrenched partners and these may be very resistant to change, making them vulnerable to opportunistic behavior	[102]
Standardization & Information Systems challenges		
Heterogeneity & lack of standardization	Difference between partner that exist in terms of incompatible hardware and operation systems, the difference in languages,..., where open Standards can help, e.g. avoid getting locked into partners, increase communication, knowledge exchange,... (Business Capabilities-, Process-, IT-level standardization)	[48, 110, 99, 32, 35, 77, 52, 117]
Scalability/Flexibility/ Accessibility issues	Inflexible technical infrastructure leads to problems by system integrations to reach a temporary business goal. Scalability has been identified in the information systems literature as one of the most prominent risk factors for discontinuity	[37, 99, 158]
Inadequate security and safety mechanisms	Whenever organizations share knowledge, the possibility of a security breach arises. Backup strategies are a vital component of disaster recovery planning as they can greatly reduce the time for recovery	[142, 52, 86]
Information & knowledge challenges		
Lack of information & knowledge sharing	Problem to find the right balance between risks, e.g. intellectual property leakage and loss due to insufficient protection of knowledge assets and knowledge and information exchange for efficiency and effective collaboration	[2, 121, 49, 93, 40, 110, 80, 15, 74, 42, 101, 102, 108, 28, 126, 162, 38, 53, 129, 31, 95, 39, 12]
Ontology differences	Impeded communication due to the absence of a formal, explicit specification of a shared conceptualization/schematics and alignment of models and languages	[48, 94, 110, 80, 33]
Equal access to information	Not all members of a network have equal access to resources within the network; rather, access is a function of one's position - location or status - within a network	[143, 108]
Process and product challenges		
Lack of modularization	Missing modularization of processes, products, and services, which could quickly and inexpensively be altered for processes, products or integrated into existing ones	[97, 13, 88]

Missing integrating, linking and coupling of process and data	Connecting companies required integration not only of technical systems but also of business processes	[88, 98, 159, 57]
Network management challenges		
Risk identification and management	Missing understanding of the risks that may occur and the actions to resolve	[70, 136, 65, 67, 41, 15, 89, 116]
Partner/s identification and selection	Partner selection can be impeded by differences in objectives, strategies, core competencies, and capabilities	[121, 35, 154, 53, 57]
Achievement of operational alignment	Missing operational alignment and methods that help this process	[71, 47, 102]
Inter-organizational connections	Missing capability to handle the connection to network actors to enable fast response times and greater variety when new opportunities arise, to cut undesirable information flows and increase agility and performance	[147, 88, 15]
Entering and exiting the network	Missing capability to connect and disconnect to network actors in a dynamic business network	[42, 98, 74, 57]
Limited resources	The provision of the required resources can be one of the most problematic issues	[52]
Integration vs. separation	Trade-off between competence-based islands and integrated solutions	[71]
Resistance to change	Internal resistance to change, which can be an obstacle for the modernization	[52]

8.2 A2. Interview guide

Interview Guide – The Task of Business Capability Maps for inter-organizational Enterprise Architecture Management

Interview Data

Interviewer: Oliver Schmidt Date: _____
Questionnaire-No.: _____ - _____

Research Description

Our research aims to explore practical insights about the usage of Business Capability Maps (BCM) in inter-organizational Enterprise Architecture Management (EAM) collaboration and the associated challenges and success factors accompanying this usage scenario.
The collected data will be treated strictly confidential and completely anonymized.

Background

a) Which role do you have in your company?

- | | | | |
|---|---|---|--|
| <input type="checkbox"/> Dept. Manager (IT) | <input type="checkbox"/> Dept. Manager (Business) | <input type="checkbox"/> Area Manager (IT) | <input type="checkbox"/> Area Manager (Business) |
| <input type="checkbox"/> Enterprise Architect | <input type="checkbox"/> Project Manager (IT) | <input type="checkbox"/> Project Manager (Business) | <input type="checkbox"/> Product Owner |
| <input type="checkbox"/> Software Developer | <input type="checkbox"/> Solution Architect | <input type="checkbox"/> Other: _____ | |

b) How many years of professional experiences do you have in Enterprise Architecture Management?

- | | | | |
|--------------------------------------|--------------------------------------|---------------------------------------|-------------------------------------|
| <input type="checkbox"/> 1 – 2 Years | <input type="checkbox"/> 3 – 5 Years | <input type="checkbox"/> 6 – 10 Years | <input type="checkbox"/> > 10 Years |
|--------------------------------------|--------------------------------------|---------------------------------------|-------------------------------------|

c) To which industry does your company belong?

- | | | | |
|---|--|---|---|
| <input type="checkbox"/> Media Industry | <input type="checkbox"/> Construction Industry | <input type="checkbox"/> Education, University | <input type="checkbox"/> Agriculture, Mining |
| <input type="checkbox"/> Finance, Insurance, Property | <input type="checkbox"/> Government | <input type="checkbox"/> Health Industry | <input type="checkbox"/> IT, Technology |
| <input type="checkbox"/> Retail / Wholesale | <input type="checkbox"/> Service Industry | <input type="checkbox"/> Transportation, Logistic | <input type="checkbox"/> Communication, Utility |
| <input type="checkbox"/> other _____ | | | |

d) How many employees does your company have?

- < 10 employees 11 – 50 employees 51 – 100 employees
 101 – 500 employees 501 – 1000 employees > 1001 employees

e) How many years have you been using BCMS in your own organization?

- 1 – 2 Years 3 – 5 Years 6 – 10 Years > 10 Years

f) How long is the BCM used in the collaboration?

- 1 – 2 Years 3 – 5 Years 6 – 10 Years > 10 Years

g) How many organizations are part of the EAM collaboration?

Information about the Collaboration

- 1.1. Can you shortly name the objectives of the EAM collaboration?
- 1.2. How is the time horizon of the collaboration? (short- or long-term)
- 1.3. How is the organizational structure and management of the collaboration?
 - Does the collaboration have a hierarchical structure?
 - How is the collaboration coordinated? (single coordinator/self-coordinated)
 - Does the collaboration itself own resources?
- 1.4. Do you know similar EA collaboration groups?

BCM Usage

General information about the BCM

- 2.1. How and why was the idea to use BCM introduced?
- 2.2. How would you describe the difference between your collaborative created BCM and a BCM for a single organization?
 - How are strategic business capabilities handled?

Use Cases which are supported by BCMs

- 3.1. What information is mapped to the BCM?
 - Architecture related: e.g. applications
 - Business related: e.g. projects
- 3.2. Can you give use your opinion about whether our BCM use case (**see appendix 1 – use cases**) can be used in your collaboration or are possible in an inter-organizational collaboration context?
- 3.3. Do you think there are additional use cases possible? (e.g. topics)
 - Advantage to map additional information to the BCM (new use cases)
 - Strategy definition or development
- 3.4. Did you use prior to BCM any other approach to address the mentioned scenarios? If so, how would you describe the difference?

Researcher

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Challenges during the collaboration

- 4.1. Can you please shortly answer for each challenge in **appendix 2 - collaboration challenges**, if you perceive this challenge yourself **and if the collaborative BCM** can/could help to address this challenge?
- 4.2. Do you perceive further challenges in the collaboration, which you address with the BCM?

Challenges with the usage of collaborative BCM

- 5.1. Which challenges and problems occur with the usage of BCM?
- 5.2. Can these challenges be resolved? How? (E.g. tool support)

Discussion

Do you have any feedbacks, comments or suggestions?

Researcher

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Appendix 1: Use Cases

Number	Use Case	Description
Intra-organizational use cases		
1	KPI Benchmarks	Collaborative creation and sharing of performance metrics for capabilities (e.g. intra-organizational: assessment of the ratio of operating costs with the number of users - indicator for application importance & efficiency)
2	Application portfolio management	Management of the complete application landscape of the organization (assessment of IT demand against capabilities for unimportant features and strategically unimportant capabilities or assessment of applications without vendor support, or retirement dates)
3	Compliance issues	Assessment of possible compliance issues for each business capability
4	Project portfolio management	Assessment of projects per capability & long-term planning of IT budget and projects
5	Communication improvement	Common basis and improved communication between business and IT
6	Information & knowledge sharing	Information exchange through e.g. enriching the capability map with additional information like performance metrics, the person responsible for the business capability, the systems that support the business capability, etc.
7	Shared ontology	A formal, explicit specification of a shared conceptualization/schematics and alignment of models
8	Standardization	Assessment and identification of possible standardization candidates (Business Capabilities-, Process-, IT -level; e.g. reference processes)
9	Strategic decision-making	Strategic (IT) decision making on the basis of capabilities, which are enriched with their respective strategic relevance (keyword: capability-based planning)
Inter-organizational use cases		
10	Outsourcing/Sourcing decisions	Assessment of possible capabilities (e.g. non-strategic, high operation costs) for in-/out sourcing
11	Support Merger & Acquisition	E.g. usage of capability maps to envision and communicate the to-be scenario of the acquisition
12	Application development	Assessment and development of applications for common capabilities in a joint manner
13	Business Capabilities enrichment	Enriching an organizations Business Capability by Business Capabilities provided by participants of the collaboration
14	Clarification of responsibilities	Enables collaboration partners to identify the Business Capability they must provide/are responsible for in collaborative projects or value streams
15	Creation of new value streams and business ideas	Shared identification of new value streams or business ideas within the collaboration

Appendix 2: Collaboration Challenges

Number	Challenge	Description
1	Selection of investment type	Information systems involve myriad issues that require legal formalization: multiyear financial commitments to IT products and services providers (e.g., hardware leasing agreements, software licenses, support relationships) which makes the right investment decision difficult
2	Decision making (slowness, subjective, no goal-orientation)	Decisions are based on own point of reference and personal experiences" vs goal-oriented & trust-based decisions
3	Failing communication and timely responds	Effective and efficient inter-firm communication is essential, supported by telecommunication links and tools
4	Communication between geographically separated teams	Risk may be increased by geographic locations with there being a direct correlation between distance and risk
5	Lack of top management support & commitment	Strategic integration, which involves continuing contact among top leaders to discuss broad goals and changes
6	Lack of trust and commitment	Challenge to establish trust and commitment among involved organizations
7	Heterogeneity & lack of standardization	Difference between partner that exist in terms of incompatible hardware and operation systems, difference in languages, etc.; where open Standards can help; e.g. avoid getting locked into partners, increase communication, knowledge exchange, etc. (Business Capabilities-, Process-, IT -level standardization)
8	Lack of information & knowledge sharing	Balance between risks (e.g. intellectual property leakage and loss due to insufficient protection of knowledge assets) and information exchange for efficiency and effective collaboration
9	Equal access to information	Not all members of a network have equal access to resources within the network; rather, access is a function of one's position - location or status - within a network
10	Ontology differences	Communication is complicated by the absence of a formal, explicit specification of a shared conceptualization/schematics and alignment of models
11	Inter-organizational connections	Capability to handle the connection to network actors to enable fast response times and greater variety when new opportunities arise, to cut undesirable information flows and increase agility and performance
12	Partner/s identification and selection	Partner selection can be impeded by differences of objectives, strategies, core competencies and capabilities
13	Risk identification and management	Missing understanding of the risks that may occur and the actions to resolve
14	Balance of benefits and costs at the firm level	Balance of benefits and costs at different levels (e.g. cost-efficient links to companies, costs for change efforts, etc.)
15	Achievement of operational alignment	Missing operational alignment and methods that help this process

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