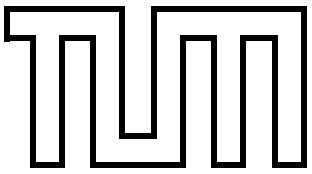

FAKULTÄT FÜR INFORMATIK

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Inter-organizational Enterprise Architecture Management in Associations of Organizations

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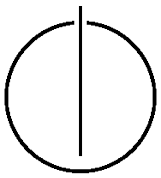

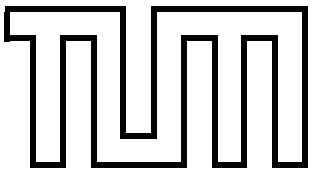

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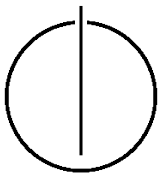
Inter-organizational Enterprise Architecture Management in Associations of Organizations

Organisationsübergreifendes Enterprise Architecture Management in Assoziationen von Organisationen

Author:	Duygu Akdemir
Supervisor:	Prof. Dr. Florian Matthes Fakultät für Informatik Technische Universität München
Advisor:	Fatih Yılmaz, M. Sc. Fakultät für Informatik Technische Universität München
Date:	February 15, 2020



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

Munich, February 15, 2020 Duygu Akdemir

Abstract

Nowadays, organizations have to cope with the changing business environment resulting from factors e.g. continuous advancement of technologies. In order to remain innovative and attractive for customers in this new environment, organizations are shifting from competition to cooperation. Companies increasingly cooperate with other companies including competitors from the same industry, organizations from different sectors, and other stakeholders. In doing so, the aim is often to gain benefits by creating synergy potential and exchanging knowledge. Organizations in cooperation are to a certain degree connected and related to each other, especially regarding their processes and IT. In this context, inter-organizational enterprise architecture occupy an important function. Usually, Enterprise Architecture Management (EAM) has the objective to support the alignment of business and IT of a single company. In terms of cooperation and interconnection among organizations, the significance and importance of inter-organizational enterprise architecture are increasing.
As little research has been conducted on collaboration across individual organizations in the field of EAM, the aim of this master's thesis is to fill this gap by providing a structured literature review on inter-organizational cooperation types and a multiple embedded case study on inter-organizational EAM in the media industry. The first part of this master's thesis presents an overview of 43 types of cooperation grouped into 14 categories and their characteristics. Based on these findings, a classification of the two case study partners using a morphological box is possible. Both partners of the case study are a type of working group. The second part of this master's thesis includes the case study. In particular, eleven public service media companies from a German working group and an international working group with representatives from Belgium, Germany, Switzerland, and England were analyzed. In total, 13 semi-structured interviews with employees performing the role of an enterprise architect were conducted. Each interview was split into four units of analysis, namely the reason for collaboration, the collaboration process including the challenges and benefits of the cooperation, the EAM including enterprise architecture artifacts, and the role of enterprise architects in the collaborative environment. The findings show, that both working groups are still at the initial phase of their cooperation. The collaboration across these organizations are formed by different causes such as cost-saving opportunities commissioned by top management or voluntary exchange of knowledge and experiences from individual employees. The findings reveal little to no change in the traditional role of an enterprise architect in the collaborative environment across organizations. However, the results indicate that cooperation between individual companies in the field of inter-organizational enterprise architecture is more likely if the companies are from the same industry and operate in the public sector.

Contents

1. Introduction

This chapter presents the motivation and the necessity of this master's thesis in Section 1.1. Subsequently, the objectives and the corresponding research questions of this thesis are emphasized in Section 1.2. In Section 1.3, the underlying research approach is described, which is intended to serve as a basis for answering these research questions.

1.1. Motivation

In recent years, the environment in which organizations operate has undergone a continuous and fast change of business. These changes arise as a result of new technologies, growing number of similar businesses and the internet including down-driven prices [76]. Companies need to abandon the traditional thinking of competition which implies the existence of markets and the law of supply and demand [76]. They must embrace the environment in which they operate as a whole ecosystem [76]. In this respect "[...] cooperation has become more important than the competitive strategy" [37]. There is a shift from competition to coevolution with customers, suppliers, investors, and competitors [76]. Coevolution involves not only cooperation with others, but it also comprises the whole dynamic network as a process of cooperation and competition to gain new opportunities [76]. With the increasing number of collaboration and cooperation with stakeholders and other organizations, companies have to bear in mind that neither their IT nor their processes are isolated from their cooperating companies [25]. In fact, companies are increasingly intertwined and interconnected with their business partners [25]. In this context, the concept of inter-organizational enterprise architecture management is becoming an important part of companies.
Over the last few years, enterprise architecture has especially gained a high level of dissemination and acceptance in the research and practice [2, 72]. EAM in its intrinsic motivation is created for a single organization with the aim to establish the "alignment of business and IT" and to provide a holistic view by considering information technology, business processes, business goals and strategies of a company [72].
However, with the cooperation between companies and the high degree of interconnection, the individual enterprise architecture must be harmonized to achieve the defined common goals [64]. In the literature, several attempts have been made to establish new frameworks of EAM or prepare existing frameworks to support inter-organizational cooperation (e.g. [79, 98, 39, 40]), to identify challenges with focus on extending enterprise architecture to business ecosystem (e.g. [25]), and to propose recommendations for the preparation of collaboration across organizations (e.g. [64]).
As the literature reveals little research concerning the collaboration across individual organizations in the field of enterprise architecture, the goal of this master's thesis is

to fill this gap by providing a multiple embedded case study in two working groups across public service media companies. In particular, four units of analysis are covered in order to acquire a detailed understanding of the extent of collaboration between enterprise architects. These are the reason for collaboration, the collaboration process, EAM including enterprise architecture artifacts, and the role of enterprise architects within the context of inter-organizational collaboration. Moreover, this master's thesis presents at first types of inter-organizational cooperation and analyzes the characteristics of the identified types. Based on these findings, a classification of the case study partners is made.

1.2. Research Questions

The aim of this master's thesis follows a twofold approach based on the presented motivation in Section 1.1. In order to gain an understanding of cross-organizational cooperation, the first goal is to identify possible types of cooperation and their characteristics. Afterwards, this will serve as a basis for the classification of the case study partners. The second objective and the focus of the master's thesis is to provide insights into the collaboration across organizations in the field of EAM. Consequently, the following three research questions are derived:

- **Research question 1 (RQ1):** *Which types of inter-organizational cooperation between companies exist in literature?*

  This research question aims to identify cooperation types based on extensive literature research. In particular, literature addressing inter-organizational cooperation should be reviewed. In the end, a list of possible inter-organizational forms of cooperation will be presented, which are further grouped and categorized according to their content and relevance.

- **Research question 2 (RQ2):** *What are the characteristics of the identified inter-organizational cooperation?*

  The objective of this research question is to identify and analyze the characteristics of inter-organizational cooperation types. With the list of designated cooperation types provided from the RQ1, the characteristics of the types will be elaborated. In addition, a morphological box will be demonstrated as an overview of the conceivable characteristics and possible specifications.

- **Research question 3 (RQ3):** *How and to which extent does collaboration between enterprise architects take place within associations of organizations?*
  - Why do enterprise architects from different companies work together?
  - How is the collaboration process between enterprise architects structured?
  - Which enterprise architecture artifacts are developed or used together?
  - How does the collaboration affect the traditional role of enterprise architects?

The main part of the master's thesis focuses on research question three. It addresses the observation of two associations of organizations collaborating in the field of EAM. The aim is to achieve a detailed understanding and comprehension of collaboration between enterprise architects across individual organizations. This will be done by analyzing and evaluating four main areas of the collaboration. The first unit of analysis includes the reason for the cooperation and the background of the collaboration. Secondly, the collaboration process including the structure of meetings, benefits, and challenges regarding the collaboration as well as the impact on the single organizations should be analyzed. The third unit of analysis will provide insights regarding the utilization and application of enterprise architecture artifacts in the collaboration and in the individual organizations. The last area has the purpose of determining whether the collaboration has an impact on the traditional role of an enterprise architect concerning responsibilities and skills. Further, additionally required roles in the collaboration will be identified and a change in the way of working will be highlighted.

1.3. Research Approach

As described in Section 1.2 this master's thesis is divided into two main parts. Therefore the research approach is based on two research design methodologies namely the structured literature review and case study. Figure 1.1 illustrates the structure of the master's thesis including the research questions and the corresponding research method. The first part includes the RQ1 and the RQ2. Both research questions are based on the structured literature review according to vom Brocke et al. [114] and Webster and Watson [117]. A literature review contributes to identify relevant sources for the investigated topic, to determine the relevance as well as the rigor of the topic, to create a solid foundation and uncover gaps in the research [114, 117]. A detailed description of the conducted literature review is presented in Chapter 4.
In order to investigate a contemporary phenomenon in its real context, the third research question is answered by using a case study [123]. The third research question, which constitutes the second part of this master's thesis, is based on the caste study approach according to Yin [123] and Runeson and Höst [96]. Due to the fact that the RQ3 focuses on the topic by answering questions such as "how" and "why" as well as base on a contemporary event without the possibility of manipulating behavior, the use of a case study as recommended by Yin [123] is a suitable method. Yin [123] and Runeson and Höst [96] propose a process involving four phases. The first phase encompasses the case study design. The case study will be conducted in eleven organizations from two working groups in four units of analysis. These working groups were chosen due to the fact that they include different individual organizations which cooperate with each other beyond the company borders in the field of EAM. Thus, this case study represents an embedded multiple case study (Type 4) as described by Yin [123]. The embedded multiple case study addresses the aforementioned four units of analysis in Section 1.2. The second phase concerns the preparation for the data collection by establishing the interview guideline and reviewing it with a second researcher. Afterwards, in the third

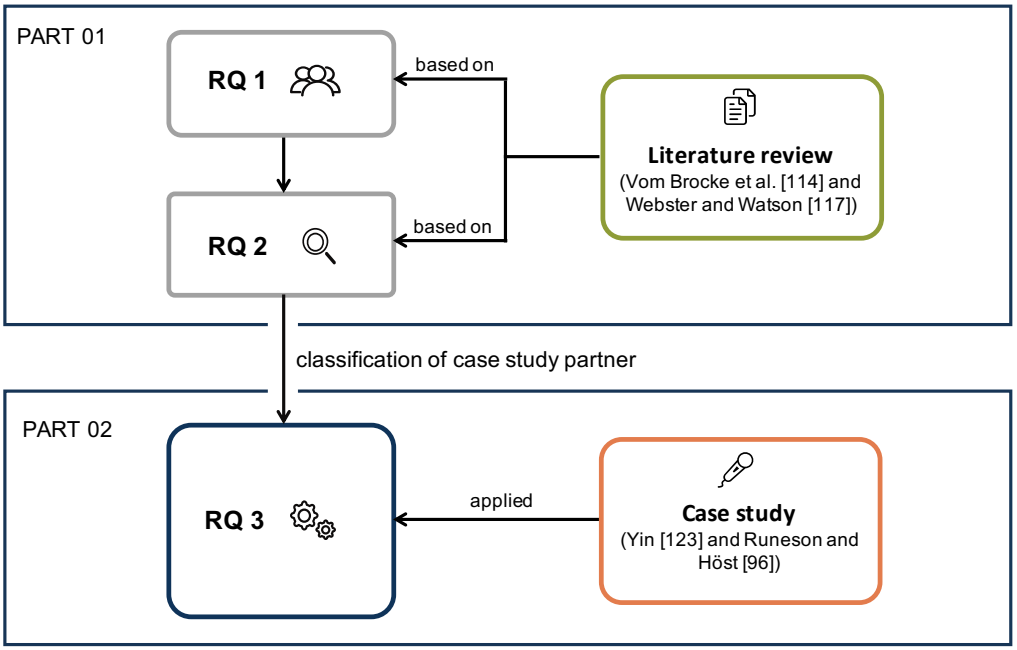


Figure 1.1.: Overview of research approach including research questions and research method

phase, only first-degree data in the form of semi-structured interviews with 13 interviewees were collected. These interviewees mainly hold the role of the enterprise architect but also have positions like Project Manager, Portfolio Manager, Head of IT and System Architect. The last phase includes the analysis of the collected data. In doing so, 13 semi-structured interviews were coded by following the integrated approach according to Cruzes and Dybå [20]. The interview guideline served as a start list for the coding. In addition, new codes were inductively identified and created. After the preliminary coding, codes were refined and merged by combining similar codes and duplicates were removed.
The remainder of the thesis is structured as follows: In Chapter 2 a basis for key terminologies regarding collaboration and EAM is provided. Chapter 3 presents existing and relevant literature in the field of inter-organizational EAM. Chapter 4 identifies and describes inter-organizational cooperation types and their characteristics by providing a morphological box as an overview. The case study is outlined in Chapter 5 including the findings regarding the reason for collaboration, collaboration process, EAM including artifacts and the role of enterprise architects in a collaborative environment. The key findings of the case study are highlighted and described in Chapter 6. Chapter 6 also discusses the limitations of the structured literature review and case study. Finally, in Chapter 7 a summary of this master's thesis and an outlook for possible future researches are given.

2. Foundations

This chapter provides an overview of the underlying concepts and terms of this master's thesis. The purpose is to establish a common understanding and enable a fundamental basis of the key terminologies. This chapter will start with the introduction of the term cooperation (see Section 2.1). In Section 2.2, concepts of EAM are described, which also play a role in the conceptualization of the semi-structured interviews. Emphasis is paid on the role of the enterprise architect in Section 2.2.1, enterprise architecture layer in Section 2.2.2, tools in Section 2.2.3, enterprise architecture artifacts in Section 2.2.4, and modeling guidelines in Section 2.2.5.

2.1. Cooperation

The literature reveals various terms for describing the relationship between organizations and partners. Terms such as **competition**, **cooperation** and **coopetition** are commonly used to characterize the interactions between companies (e.g. [37, 10, 83]). In the following, the three concepts are defined and a terminology, which is used in the context of this master's thesis will be presented.
Competition involves rivalry between companies that want to improve the achievement of a goal at the expense of another company [35]. In a competitive relationship, the power and dependency are equally distributed among the companies [10]. Competitors will not strive for similar goals, but they are often similar in their design [10]. Further, the competitors have to acquire resources from the same supplier [10]. The decision for a relationship based on competition is preferred by companies that have a strong position in the market and are not dependent on the resources of the competitor [10].
Compared to competition, **cooperation** describes the relationship among legally independent organizations with a frequent exchange of information, business and social exchange in order to fulfill common tasks and to accomplish shared goals [10, 14, 13]. Additionally, the organizations are also economically independent in the non-cooperating areas [13]. Companies engaging in cooperation can be direct competitors or companies from other industries [34]. However, cooperation does not imply that cooperating organizations do not compete [10]. Cooperation is based on a formal agreement like the creating of a strategic alliance or it can comprise an informal agreement which is based on trust and social norms [10, 13]. Due to the adjustment of power and dependence between the companies, conflicts in cooperation are a rarity [10].
The term **coopetition** was coined by the founder of the company Novell, namely Ray Noorda. The word is composed of the aforementioned words "cooperation" and "competition" [37]. According to Ganguli [37] the term "[...] is used to define the complex multidimensional business relationships that today's companies have with one another"

[37]. Coopetition comprises both concepts. On the one hand, the competitive part of coopetition involves invisible norms, object-oriented goals, power, and dependency, whereby the latter two being linked to the position of the actor in the network. This is often equally distributed [10]. On the other hand, at the cooperative side, the power is based on a functional aspect and the dependency of the organizations is based on a formal agreement or trust. By cooperating, clear norms are set and shared goals are defined [10]. Such a relationship aims an economic or/and a non-economic exchange [10]. A relevant concept in coopetition is the concept of being a complementor, which means offering products or services that complement each other rather than providing substitutes [37].
For the purpose of this master's thesis the collaboration between companies is referred to the described concept **cooperation**. In particular, inter-organizational cooperation is addressed, which means that cooperation across companies will be considered. Collaboration within a company will not be covered. However, in the context of this master's thesis, cooperation and collaboration are used as synonyms.

2.2. Enterprise Architecture and Enterprise Architecture Management

Enterprise architecture enables a holistic view of an organization [66]. Works in the enterprise architecture field (e.g. [2, 56, 11]) often refers to the definition of an architecture provided by ANSI/IEEE Std 1471-2000. They define architecture as: "The fundamental organization of a system embodied in its components, their relationships to each other, and to the environment, and the principles guiding its design and evolution" [43]. According to this definition, Aier et al. [2] outline, that an enterprise architecture is a representation of the foundation of an organization. In a similar manner, Keller [56] defines enterprise architecture "[...] als die Beschreibung der Struktur eines Unternehmens" [1] [56]. Enterprise architecture aims to simplify the IT of an organization by ensuring a balance between complexity, IT costs, targeted changes and the competitiveness of an organization [11]. Bente et al. [11] provide a more detailed definition of an enterprise architecture by considering the current and future state of the IT landscape and the roadmap to achieve this transformation. Thus, they state

> "Enterprise architecture (EA) is the representation of the structure and behavior of an enterprise's IT landscape in relation to its business environment. It reflects the current and future use of IT in the enterprise and provides a roadmap to reach a future state."[11]

Throughout the remainder of this master's thesis, the definition of an enterprise architecture according to Bente et al. [11] will be used. An enterprise architecture is divided into various layers (see Chapter 2.2.2).
The utilization of the enterprise architecture in order to achieve the alignment of business and IT is considered as EAM [72, 11]. EAM is the process of defining activities

[1] "[...] as the description of the structure of an enterprise"(translation by the author)

in projects in accordance with the company's objectives in order to move from an as-is state to a to-be state [11]. It focuses on the strategic goals, assets, business solutions and the measure of KPI's [11]. Keller [56] also perceives EAM as a process of an activity. However, like the most terms in the field of enterprise architecture, there is no consistent definition for EAM [72]. Matthes et al. [72] constitute to a very detailed definition of EAM:

> "Enterprise architecture management is a continuous and iterative process controlling and improving the existing and planned IT support for an organization. The process not only considers the information technology (IT) of the enterprise, also business processes, business goals, strategies etc. are considered in order to build a holistic and integrated view on the enterprise."[72]

Based on this definition two main goals of EAM can be derived. The first objective is gaining a shared vision of the current state of a business and IT, as well as to achieve an awareness of the challenges and opportunities deducted from the current state [72].
The following sections provide a more detailed insight of EAM including the activities of an enterprise architect, enterprise architecture layer, tools, architecture artifacts, and modeling guidelines.

2.2.1. Role of Enterprise Architect

To understand the role of an enterprise architect, this part will introduce possible activities and provide a list of required skills of that position, as it involves many different facets to manage an enterprise architecture. Due to this fact, a complete demonstration of all activities concerning the role of an enterprise architect is not possible [11]. However, Bente et al. [11] present eight frequently identified activities from the literature and practices, which are:

- **Defining the IT strategy:** The main tasks of an enterprise architect are strategy oriented works. Defining the IT strategy is one of the fundamental building blocks of further tasks. Upcoming decisions and concepts are made and established on the basis of this strategic orientation. This task implies a three-step process of (1) defining the objectives, (2) setting rules for achieving the defined objective over the given period and (3) identifying initiatives. It is important not to mistake the role of the enterprise architect for that of the CIO. Enterprise architects are participants in strategic boards and meetings. Their primary assignment is to develop decisions and drafts. The ultimate responsibility lies with the CIO.

- **Modeling the architectures:** The role of the enterprise architect includes modeling the current use of IT in the company and creating roadmaps for future use. The task is to visualize relations across business and technology. By using a model, the future IT evolution of a company can be visualized and the need for action can be identified. It serves as a tool for communication to explain and implement changes. In addition, an analysis and evaluation of changes and strategic

adjustments can be made on the basis of a model. The model can be used as an orientation framework for operations and information systems.

- **Evolving the IT landscape:** In order to evolve the IT landscape of a company, the key challenge is to identify applications and define key performance indicators (KPI's). The goal is to enable application rationalization to profit from strategic benefits like cost and complexity reduction.

- **Assessing and developing capabilities:** Four main capability areas can be attributed to enterprise architects. These include business acumen, technical expertise, process excellence and organizational leadership. The business acumen relates to the individual's knowledge and skills in a certain business domain. Depending on the IT organizations, the technical expertise, as it already suggests, implies technical capabilities, for instance, Java/JEE, MS SQL Server, and Unix/C. While the process excellence addresses the need for an understanding in the area of IT processes such as software engineering, quality management, and vendor relationship management, the organizational leadership entails soft skills regarding handling with people, communication and collaborative competencies. In this context, enterprise architects need to build and strengthen their competencies through trainings, job rotations, and joining community of practice.

- **Developing and enforcing standards and guidelines:** As the name of the activity suggests, the responsibility of an enterprise architect is to develop and follow standards and guidelines in order to facilitate consistency by developing business solutions and to achieve strategic architectural goals by synchronizing the vision with the strategy. In doing so, technologies, trends and past projects will be analyzed to establish and provide technology standards and guidelines for future projects.

- **Monitoring the project portfolio:** Since the IT strategy is defined, the next task is to plan the portfolio. The identified need for actions is divided into work packages, which will be realized in individual projects. The enterprise architect takes the role of an advisor and assessor in portfolio management. The main task is to consolidate IT needs from all business area, investigate in IT initiatives within the portfolio, supporting the prioritization of projects, and ensuring the compliance with architectural principles and standards by designing solutions.

- **Leading or coaching projects:** If projects involve a high risk for the enterprise architect and their decision, like when it affects several layers of a project, the entire project needs monitoring by the EA, was initiated by the EA, or the EA acts as a mentor for novices, then they can also act as technical leaders.

- **Managing risks involved in IT:** Enterprise architects are familiar with the risk management policy of the organizations. As a consequence, they are to a certain degree responsible for the identification and management of risk in projects and IT landscape.

Most popular skill categories
Generic skills
Social skills
Ability to manage and comprehend complex entities
Domain knowledge
Program or Project Management skills
Work management skills
Leadership skills
Communication skills
Ability link architecture to organizational activities
Stakeholder management skills
IT skills
IT understanding
Office system skills
IS understanding
Service architecture skills
Integration architecture skills
Modeling tool skills
Modeling skills
Business skills & Methods
Business understanding
Ability to conceptualize and describe operations
Cooperation skills
Knowledge management skills
Enterprise Architecture skills
Modeling skills
Architectural framework skills
Comprehension of overall view
Ability to manage different abstraction levels
Documentation skills
Knowledge management skills
Development management skills
Legal Environment skills
Legislative knowledge
Security skills
Contract management skills

Table 2.1.: Skills of enterprise architects according to [124]

As already partly addressed in activity "assessing and developing capabilities", an enterprise architect requires several skills to fulfill those presented tasks and activities. For this purpose, Ylinen and Pekkola [124] conducted a qualitative survey to extract these needed skills among enterprise architects. Based on the list of enterprise architect skills from the TOGAF framework and the results of the questionnaire, they identified 257 different skills and classified them into different skill groups. The most and popular ones are presented with the related skill category in Table 2.1. The category generic skills includes skills related to the collaborative working on enterprise architecture, including communication and cooperation. Further, domain knowledge and the ability to manage and comprehend complex entities also one of the most needed skills. The second main category describes skills concerning the understanding of business and processes. As indicated by the described activities based on the findings from Bente et al., the participants also mentioned skills associated with program or project management like leadership skills and work management skills. The results regarding the enterprise

architecture skills are more surprising [124]. Even though, architectural skills such as modeling and architectural framework skills are the main activity of an enterprise architect, most of the participants did not find it as necessary to mention them [124]. While technical skills associated with an understanding of IT and office systems like Microsoft Excel, legal skills involve security skills, contract management, and legislative knowledge. Skills regarding fraud play no important role for enterprise architects [124].
Summarized, the results of the literature show that the role of an enterprise architect has a set of comprehensive tasks across several levels of an organizations and include diverse skills from behavioral skills to hard skills. The following quote precisely summarizes the findings related to the role of an enterprise architect:

> "The ideal architect should be a man of letters, a skilled draftsman, a mathematician, familiar with historical studies, a diligent of philosophy, acquainted with music, not ignorant of medicine, earned in the responses of juris consultis, familiar with astronomy and astronomical calculations."Marcus Vitruvius Pollio

The role of an enterprise architect is a multidimensional personality [11], which would be with all the identified characteristics "[...] a five-legged sheep - a superman or superwoman who masters everything"[124].

2.2.2. Enterprise Architecture Layer

Enterprise architecture can be divided into various layers related to the business and IT aspects of an organization [16]. Winter and Schelp [120] distinguish between the following five layer: business strategy layer, organization/business process layer, integration layer, software/data layer and IT infrastructure layer. A similar view of enterprise layers is provided by Winter and Fischer [119]. They analyzed several enterprise architecture frameworks and identify also a five layered enterprise architecture approach. The **business strategy layer**, also called **business architecture** [119], describes the goals and success factors, which are relevant for the organization [120]. Further, it identifies the targeted market segments, strategic projects, and core competencies [120]. Organizational units, business locations, business roles, business functions, business processes, metrics, services flows, business information objects and aggregated information flows are assigned to the **organization and business process layer** [120]. The third layer, **integration layer**, comprise applications and enterprise services [120]. While the **software and data layer** describes the software components and data resources, the last layer, the **IT infrastructure layer**, entails the specific hardware units and network nodes [120].
In addition to this view of an enterprise architecture, Buckl et al. [16] describe three essential cross-cutting aspects, that influence the design of the architecture (see Figure 2.1). Those are **strategies & goals**, **requirements & projects** and **blueprints & standards**. The aim of the cross-cutting aspect strategies & goals is to define a need for action [121]. Those identified strategies and goals will be measured with KPI's and realized as projects in the next cross-cutting aspect requirements & projects [95, 121]. In order to guarantee consistency and a certain degree of standardization within the company, the

identified requirements are implemented on the basis of standards and blueprints [95]. Apart from the cross-cutting aspects, Figure 2.1 merely makes a distinction between three layers. Compared to the aforementioned five-layered enterprise architecture, this conceptual structure combines the business and organization layer as well as the software and data layer with the IT infrastructure layer. As a consequence, this holistic view of an enterprise architecture comprises the following three layer: **business & organization**, **application & information** and **infrastructure & data**. Between each of the layers are the appropriate services that deliver information and artifacts from one level to the other and serve as connecting components [95, 121]. On the top, there are the business capabilities describing the core competencies of an organization [95]. As described above, the business & organization layer comprises all business-related aspects, which are linked via the **business services** with the application & information layer [121]. The business service includes business objects, business services, and service level agreements [121]. The infrastructure service links the application & information layer with the infrastructure & data layer by encapsulating infrastructure services [121].
Based on this approach a four layered conceptual visualization of the enterprise architecture is used for the purpose of this master's thesis. From top to bottom it starts with **business- & organization- & business process layer** via **application layer** to **data layer** and complete with the **IT-Infrastructure layer** (see Figure 2.2).

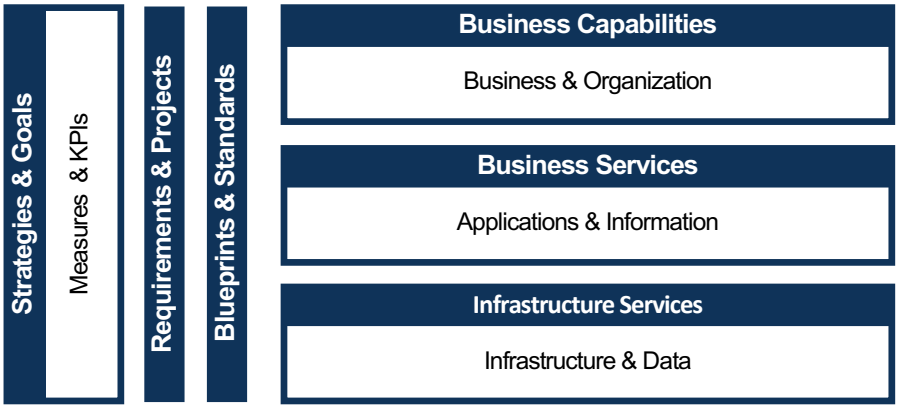


Figure 2.1.: Enterprise architecture structure [16]

2.2.3. Tools

EAM uses tools, so-called repositories, to visualize complex information [95]. Roth et al. [95] outline three essential reasons for a visualization of enterprise architecture. These are to convey and analyze information, increase transparency and to encourage the engagement of stakeholders [95]. According to Bente et al. [11] an EAM tool should have the following properties: Timeline for planning, rationalization of applications, various visualization possibilities of models particularly different stakeholder views, the opportunity of knowledge exchange and integrability with further tools. However, for the

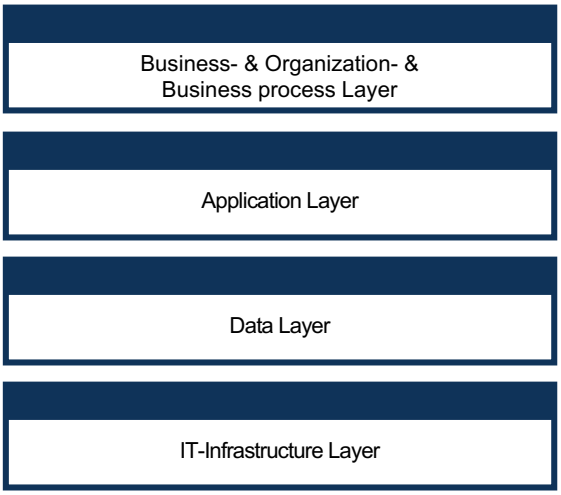


Figure 2.2.: Enterprise architecture structure used in this master's thesis based on the approach provided by [16]

purpose of this master's thesis, not only tools regarding EAM are considered, but additionally, tools for collaborative working and communication are part of the investigation.

2.2.4. Enterprise Architecture Artifacts

Based on the findings in the works of Winter and Fischer [119], Kotusev[61, 60, 62] nine artifacts are considered. In collaboration with a scientist of the Chair of Software Engineering for Business Information Systems (sebis), special attention was paid to choose artifacts in such a way that all layers of an enterprise architecture were considered. In addition, the list was kept short to allow an effective survey within a limited time frame. In the following an overview of the nine artifacts will be provided.

IT strategy/vision

Mack and Frey [69] defines a strategy as follows: "A strategy takes a vision or objective and bounds the options for attaining it." [69]. In doing so, defining a goal is an essential component of a strategy [56]. In the context of strategy specification, Winter and Fischer [119] observe among other things the definition of success factors, core competencies, product, and service model. According to Gartner a strategy consists of the three following components:

- Definition of an end point, which is the to be achieved goal or vision.
- Description of the options for achieving the objective that constitutes the core strategy.
- Definition of the steps that need to be taken, including projects and tactics [69].

With regard to an IT strategy, five important elements should be included, which are application portfolio change, business process integration, infrastructure, service, and sourcing [69]. The application portfolio change describes the change regarding the application portfolio for the future [69]. Business process integration concerns the degree of application integration regarding business processes throughout the organization [69]. This is intended to create a single operation unit [69]. The latter represents the management of the employees who are involved in the fulfillment of the strategy [69]. While the infrastructure encapsulates the hardware, software, and systems of an organization, the service element represents the level of service [69]. This can be a service-level-agreement or derived from the budget [69].
Kotusev [60] describes visions as on a high-level conceptualization from the business perspective by focusing on the alignment of IT investments with business results. A vision is established in collaboration with the enterprise architects and with a leader from the business side. This then serves as the basis for managing and prioritizing IT investments [60].

Business capability models

Business capability models, also often called business capability maps (e.g. [61]), are one of the widespread and discussed artifacts in the area of EAM [55]. In the context of this master's thesis, the terms business capability model and business capability map are used as synonyms. By means of business capabilities, a link between business and IT is achieved through a common language across the stakeholders [110, 55]. According to the definition provided by The Open Group [44] a capability describes:

> "An ability that an organization, person, or system possesses. Capabilities are typically expressed in general and high-level terms and typically require a combination of organization, people, processes, and technology to achieve. For example, marketing, customer contact, or outbound telemarketing."[44]

A similar view, which focuses on the business and features of capabilities is represented by Forrester Research. They define business capabilities as unique, independent building blocks of the company, which take the business interests into account and represent stable business functions [55]. Those capabilities can be derived from the organizational model [55]. Summarized, business capabilities support the company by answering the question what actions the organization is taking by ignoring the answers to where, why and how [110]. By analyzing and visualizing business capabilities as a capability map, the organizational environment complexity can be significantly reduced, and a consideration of a business ecosystem can be obtained [110]. The capabilities are presented on a single page and often established by architects and business leaders collaboratively [61]. It can contain business strategy, objectives, customers, and partners in addition to the defined capabilities [61]. Business capabilities can be mapped on different levels (see Figure 2.3).
The lower the level, the more detailed the view of the capabilities [110]. The first three levels contain the decomposition for planning and analysis purposes, while levels 4-6

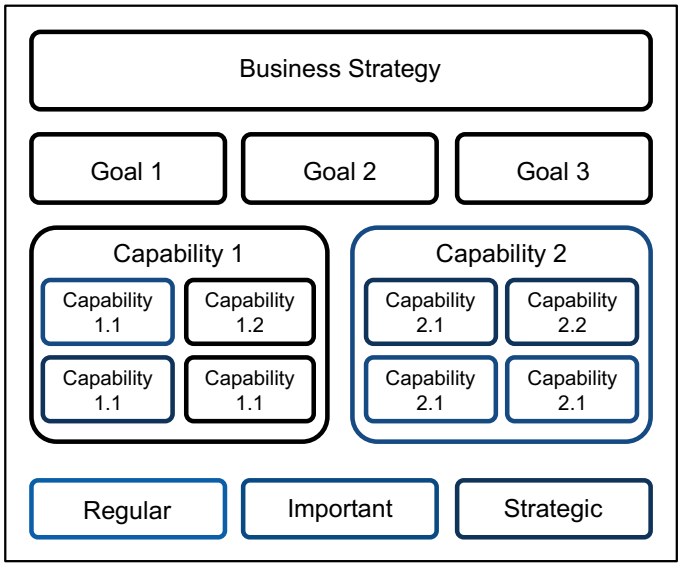


Figure 2.3.: Level of business capability model [62]

are intended for a detailed description [110]. Specifically, levels 4-5 include capabilities related to business logic such as SOA business services. Level 6 is typically the most intense level of a detail view of a capability [110]. Ulrich and Rosen [110] present ten principles that serve as guidance for the creation and use of business capabilities. Those ten principles are (1) consider only capabilities, that define what a business does, (2) define capabilities as nouns, (3) use business terms to define capabilities, (4) take only stable capabilities into account, (5) capabilities can only occur once on the capability map, (6) there is a single capability map for the whole company, (7) clearly separated capabilities from line of business, business units, business process, and value stream, (8) capabilities are related to IT implementations and to the future IT architecture, (9) capabilities include automated capabilities and (10) incorporate capabilities into the business/IT ecosystem [110].
The business capability map can be used for various cases of application. Based on the findings of Ritzenhöfer G. and Forrester Research, Keller [55] listed four main use cases by using the established business capability model. Therefore, like stated by Kotusev [61], business capability models can be used to identify and make decisions regarding investments. As already mentioned business capability models are used to achieve an alignment between IT and business. This is done by analyzing the gap of IT support across the organization [55]. Further, it is reinforced by the decision of outsourcing and IT demand management [55].
In the context of enterprise architecture, business capabilities provide a link between business requirements and IT solutions [110]. Related to EAM, Aleatrati Khosroshahi et al. [4] conducted expert interviews in 25 organizations to give answer to questions of how business capability models are implemented in practices and their potential application. The results reveal that most of the organizations use business capability models to support strategic decisions, enable a better communication between IT and manage-

ment, improve transparency, and establish the future architecture. Fourteen use cases were pre-defined and evaluated in the interviews. Business capability models were already often used in use cases like capability spanning applications, harmonization potential, projects, IT costs, and application lifecycle. However, the findings of the interviews also affirm that organizations just did the first steps towards the application of capability models in EAM [4].

Roadmaps

Roadmaps can also be divided related to their special domain like investment roadmaps, divisional roadmaps, capability roadmaps, and technology roadmaps [61]. They comprise a structured view of planned IT investments for the future [61]. These are mostly presented as a timeline in accordance with the capabilities or business areas and outline the high-level goal that has to be achieved in the upcoming years [61]. Roadmaps provide support in prioritizing IT initiatives, aligning future IT investments with business plans and initializing IT projects [61]. Similar to the artifact strategy/vision, roadmaps are developed jointly with the business side and architect [61]. Business capability models and roadmaps provide complementary information. While the business capability model provides information to support decision-making regarding IT investments, roadmaps provide decision making on the start and schedule of an investment [61]. Further, roadmaps describe defined common long-term goals for business and IT [61].

Value chains

Value chains, also often called as business activity model or value reference models, are "Structured graphical representations of the added value chain of an organization" [62]. According to The Open Group [44] a value chain diagram provides a holistic view of the company and its external interactions with the environment. Thus, it serves as an orientation tool [44]. They are developed in collaboration with business leaders and architects and focus on the strategic alignment of business objectives [62]. Value chains provide a prioritizing of IT investments and offer an improvement in terms of IT and business alignment [62].

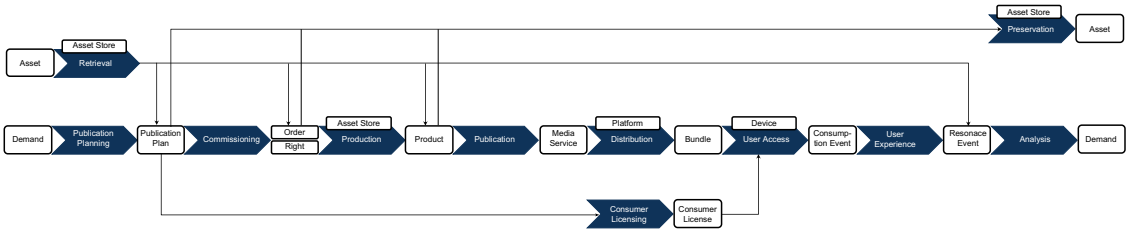


Figure 2.4.: Value chain model of media companies on a high level [27]

In the following, the value chain of a media industry is discussed and examined in more detail. The EBU [27] proposes a value chain model, that comprises the core business objects and business process of a media company. By its generic nature, it is adaptable

in all media companies and can therefore serve as a reference model [27]. Figure 2.4 illustrates the core value chain model related to media companies. The business objects are shown in white, which are asset, demand, publication plan, order, product, media service, bundle, consumer license, consumption event, resonance event. By using processes (in blue), business objects as input objects can be transformed into output objects. Moreover, the process retrieval, production, distribution, user access, and preservation include so-called enablers. They are instruments to support and execute a process activity [27].

As-is and to-be architecture

An as-is and to-be architecture is an enterprise architecture model "[...] of an actual corporation or government agency" [119]. In more detail, the as-is view describes the current implemented status of the business process, infrastructure, and systems, while the to-be view (also often mentioned as target states) represents the future architecture on a long-term view of an organization [100, 62, 65]. The as-is view of an organization includes the existing documentation, namely models, diagrams, and documents [100, 2]. It is used as a starting point for deriving gaps, identifying relationships of the components and analyzing the current state [100, 2]. Compared to the as-is view, the target architecture defines activities around these gaps, outlines goals with regard to IT investments and provides new components by considering IT resources and infrastructure [100, 62]. It serves for planning purposes [2]. Through these activities the company can achieve competitive advantages and the alignment of IT and business on a long-term basis [100, 62].

Application portfolio

Application portfolio is assigned to the IT-related artifacts and has the purpose of presenting high-level descriptions of technical landscape [60]. An application portfolio contains a set of all applications run by a company [56, 93]. Concerning the term application, Schwinn and Winter [99] differentiate between the technical view and the business view to specify applications. The latter describes applications that include functionalities with regard to the sharing of business processes, information, reuse, and responsibilities in a close context. In comparison, the technical view includes all kinds of software artifacts such as modules, components, and data structures [99]. For the purpose of this master's thesis, both the technical view and business view are considered as an application. Application portfolios are often used in connection with the term management, which describes the process of optimizing the set of applications in an organization from an economic point of view [56]. A similar approach is provided by Simon et al. [101] by focusing on the aspects of process and goal. They describe application portfolio management as an ongoing decision-making process to evaluate applications of a company from a business and technical perspective. Decisions are made regarding measures for optimization, solutions, and suggestions against issues and to achieve the business goals [101]. The primary goal of application portfolio management is to reduce the complexity of the application landscape [101]. In order to achieve the goal of an application port-

folio management, Keller [56] proposes a cyclical process including five steps. The first step involves the recording of the current state of the application landscape to get an overview of all applications that are running in the organization. This is followed by an evaluation of the as-is state by using analytical methods. As a third step, based on the evaluation of the as-is state, the to-be application portfolio can be identified and a requirements analysis can be carried out. This will lead then to the planning of actions that have to be taken to achieve the to-be application portfolio. The last step involves the realization of the determined actions in projects [56]. Thus, application portfolios support the planning of IT projects and IT-assets [60].

Landscape diagrams

Landscape diagrams are also known under other terms like system interaction diagrams, platform architectures, relational diagrams, platform architectures, or integration contexts [61]. Similar to application portfolios, landscape diagrams are IT-focused artifacts [60]. However, unlike application portfolios, landscape diagrams represent the interconnections and relationships between different applications, databases, platforms, systems, and business processes of an enterprise [61]. In particular, the current state of the IT landscape is described in a high-level manner [61]. Landscape diagrams are related to IT projects [61]. When projects are completed, landscape diagrams must be updated and constantly maintained by the architect [61]. Landscape diagrams are intended to assist architects in deciding on implementation options for upcoming IT projects, IT assets, as well as in optimizing and rationalizing the IT landscape [60, 61].

Standards

This master's thesis examined various types of standards. Those are reference models, namely application, data, and technology reference models.
According to Federal Enterprise Architecture Framework (FEAF) [30], an application reference model is for the categorizing applications and their relevant components. It serves as a basis for identifying gaps and redundancies in order to achieve cost-saving opportunities by reusing duplicates [30].
Data reference models support the sharing and use of information and data [30]. In particular, a uniform exchange of data and the reuse and retrieval of information is made possible through uniform management of data by categorizing and describing information [30].
Technology reference models are developed collaboratively with an architect and with an experienced person for this area [61]. They provide an overview of standardized and available technologies in the company [61]. The IT projects should be in alignment with the standardized set of technologies in order to gain the objective of homogeneity of technologies and provide consistency in the IT landscape [61]. This overview should be updated yearly [61].

Architectural principles

Principles support the mission and vision of an organization. These are general rules and guidelines [44]. They are developed and defined by architects and represent an assessment of the feasibility of future IT decisions [62].
Architectural principles according to The Open Group can be described as

> "[...] a set of principles that relate to architecture work. They reflect a level of consensus across the enterprise, and embody the spirit and thinking of existing enterprise principles. Architecture principles govern the architecture process, affecting the development, maintenance, and use of the enterprise architecture."[44]

Architectural principles, in particular, regulate the use of IT resources and assets and serve as a consensus-building process between IT systems [44]. Furthermore, they facilitate homogeneity concerning the decision-making process related to IT and business [62, 61]. Architecture principles should be derived from the business objectives, should be future oriented and should not be changed frequently [44].

2.2.5. Modeling Guidelines

EAM is often associated with the designing of models and diagrams [11]. The models focus on a specific function that relates to a part of the reality of an organization and are presented in an abstract way, whereas points of interest are illustrated in detail [11]. Bente et al. [11] summarizes that models serve as a blueprint for the planning, offer analysis and evaluation, implement and execute operations and are used as a means of communication for the initiation of changes. In doing so, modeling guidelines including architecture description language are an important aspect. In enterprise architecture, no standardized language for creating and designing models has be determined [11]. This leads to a major obstacle, especially in terms of cooperation between people and companies regarding notation, definition of terminology and used vocabulary [11]. Jonkers et al. [53] describe the three most important elements of a modeling language. These are a uniform modeling language for companies, different possibilities of visualization adapted to different interest groups, and analysis techniques to support the understanding of complex models. This also enables effective communication between different interest groups on the basis of a coherent model [53].
An example of such a modeling language is the well-known architecture description language ArchiMate. It provides guidelines for visualization to describe stakeholders concerns [45]. In particular, it involves several concepts for representing the relationship and dependencies of architecture domains [45]. EAM tools support the visualization of models [11].

3. Related Work

Searching for related works show that there is still a considerable gap in the topic of this master's thesis. However, several papers try to comprise the idea of inter-organizational EAM by using different terms such as extended enterprise and inter-enterprise architecture. Moreover, some authors discussed inter-organizational EAM by providing suggestions for extending the enterprise architecture framework. From the results of related work three rough point of view can be retrieved. Therefore, this chapter is divided into three parts. The first part includes related works regarding an extension of the enterprise architecture framework and addresses specific frameworks or stages. The second part deals with the inter-organizational aspects by using already existing frameworks. The collaborative aspect is discussed in the third section. These works cover either the inter-organizational relationship in general or outline the collaborative aspect particularly.

3.1. Aspect of Extending Enterprise Architecture

Tambo [105] analyzes and discusses the concept of extended enterprise architecture in the context of inter-organizational relationship between companies and technologies. There are three essential perspectives of extended enterprise architecture that are divided into business interaction of supply chain management, business relationship management, and inter-organizational information systems. Furthermore, Tambo conducted a case study in a trading company. The literature review shows that the concept of extended enterprise architecture is a broadly comprehensive and not clearly defined concept. Tambo states that the complexity of the concept was not sufficiently reflected and discussed in the literature [105]. The complexity ranges from commercial factors to macroeconomic factors through to regulatory delimitations [105]. However, he emphasizes crucial concepts as a framework to warrant the acquisition of extended enterprise architecture benefits. Those are precision, imbalance, heterogeneity, transformation, temporality, and maturity [105].

Schekkerman [98] provides the Extended Enterprise Architecture Framework (E2AF). He describes the framework as a communication framework, which should aid the individual stakeholders of a program to communicate. The framework considers the column "with who ", where value net relations and collaborating elements like collaborative business goals, information exchange, and collaboration principles are described. Schekkerman [98] believes that complex concepts should be handled together to ensure component coherence and smooth operation. However, the framework leaves the

question open whether it is an internal extension of the framework or the inclusion of external relationships.

Drews and Schirmer [25] have the opinion that an enterprise architecture should consider the complex environment and extent their architecture according to a business ecosystem perspective. They identify 16 challenges of enterprise architecture and EAM from a business ecosystem perspective by conducting four case studies in logistics, health care, retail, and education sectors. The challenges referred to four main categories. The first category includes challenges regarding the modeling of extended enterprise and business ecosystem such as "shared ontologies" and alignment of different models to a certain degree [25]. The second area deals with concerns regarding the tool support for data exchange and ontologies. Issues concerning management are the third category. This encompasses challenges like information governance across the participating companies, determining tasks, roles and processes from an ecosystem architecture viewpoint, and governance structure, which involves the independence of different stakeholders [25]. The last category contains the consideration of other actors such as inhabitants and customers, the application of "smart objects" and the comprehension of the way of life including the environment of the actors [25]. These challenges are related to socio-technical challenges. Drews and Schirmer [25] also propose approaches to deal with the identified challenges. They provide four solutions that substantially oriented towards common standards, ontology, framework, vocabulary, and method for data exchange [25]. As a result of the case studies, Drews and Schirmer [25] ascertain five stages from enterprise architecture to business ecosystem architecture. These include enterprise architecture, extended enterprise architecture, federated or collaborative network architecture, focused business ecosystem architecture, and business ecosystem architecture. The five stages differ in the involved stakeholders and the degree of connection regarding architecture and applications. Thus, the first stage implies the well-known enterprise architecture for individual companies. The second stage incorporates further stakeholders (e.g. customers, partners, and suppliers) and is guided by a focal actor. In contrast, in the third stage, the actors share information of their enterprise architectures like interfaces and artifacts. In doing this, the actors of the network gain an improvement of shared initiatives [25]. If a major actor analyzes the architecture of his customers, suppliers or partners with the purpose to improve his strategy and/or production, the organizations are located to the third stage [25]. Investigating in the architecture of the representative actors will affect their transformation of the architecture. This happens as a result of the developed product. The last stage focuses on the whole ecosystem. Compared to the third stage, where only representative stakeholders are considered, the major actor analyzes the whole ecosystem to gain an overview of the stakeholders [25].

By categorizing models and analyzing issues of business-to-business integration Goethals et al. [39] recommend the Framework of Architectural Description of the Extended Enterprise (FADEE), which based on the Zachmann framework. According to them, such a framework would supports the CIO and CEO regarding strategies, managing of implementation and to monitor developments. In another work, Goethals et al. [40] show a theoretically perspective of how the FADEE can be applied to the extended en-

terprise concept.

Vargas et al. [112] present the term inter-enterprise architecture by filling the gap between three areas: strategic alignment, enterprise architecture and enterprise collaboration. This concept describes the adaptation of tools and methodologies from a single organization to a collaborative environment in order to enable the alignment of business processes and information and communication technologies. They also emphasize two types of cooperation, namely supply chains and networks, where this type of architecture is applicable. Moreover, Vargas et al. [112] provide a conceptual model of inter-enterprise architecture, which include a seven-step collaboration process, a strategic alignment model and elements of the enterprise architecture. In a further work, a comprehensive Framework of Inter-Enterprise Architecture (FIEA) including modeling views (business, organization, resources, process, knowledge, IS/IT based on Internet), life cycle phase (creation, conceptualization, definition, operation, evolution, dissolution) and modeling detail level (general, partial, particular) is proposed [111]. Yet, another work suggests the inter-enterprise architecture is used in order to solve the issue of unexpected events in a hierarchical production planning in the context of collaborative network [113].

3.2. Aspect of Inter-organizational Enterprise Architecture Management

Based on a literature review Mueller et al. [79] extract 37 challenges of inter-organizational EAM. Further, The Open Group Architecture Framework (TOGAF) 9.1 was used to address these challenges in order to determine the suitability of the framework for network organization. Depending on the scope and characteristics the challenges were grouped into further six categories, namely challenges regarding governance, infrastructure and application integration, process and data integration, organization of network organization, social issues, and strategy [79]. Mueller et al. [79] found out that the category governance and strategy are partially handled by the framework. The governance challenges are covered by stakeholder management of the TOGAF framework. Nevertheless, there is a gap in handling challenges like ”intellectual property rights”, choice of investment types and liability. Regarding strategy, the framework support challenges concerning operational alignment and balance of benefits as well as the costs by facilitating value measurement methodologies [79]. But it is still open how to improve operational efficiency and managing the integration or separation of partners. Moreover, through the Architecture Development Model (ADM), TOGAF 9.1 provides cycle appropriate approaches for the analyzed challenges of the categories' infrastructure and application integration, and process data integration. However, there is nearly no support for the challenges in the category organization of the network organization. The framework merely serves guidance in establishing standards and consistent language. The category of social issues is covered to a certain degree by the framework, namely by the meta-level of TOGAF. As a consequence of the comprehensiveness of the category and less relatedness to TOGAF, Mueller et al. agreed to not extend this category. The

results show that TOGAF 9.1 is not an applicable framework for organizing network organizations. Thus, the framework needs to be extended concerning network organizations [79].

Gous et al. [42] compared two business architectures of inter-organizational innovation networks by using the Zachman Framework. Key findings were that the objectives of the networks were heterogeneous composite, the innovation life cycle plays an important role, both innovation networks with an entrepreneurial focus and networks with a research focus need different architecture, an active intermediary is necessary to determine appropriate partners and that the geographical location of the networks do not have an impact on the architecture.

Bakhtiyari et al. [7] define network planning requirements for business networks to extend enterprise architecture regarding services, resources, business objects, and processes. In detail, Bakhtiyari et al. derive two key artifacts from three types of business networks. Those are headquarter-subsidiary, virtual organization, and business network orchestrator [7]. They focus on the artifacts' alignment and extension. Referring to the key artifacts, they identify six constraints in order to describe the extension for services and resources [7]. On the basis of a case study in an eGovernment network, the results were applied by using the ArchiMate method.

3.3. Aspect of Collaborative Relationships

Diirr and Cappelli [23] address in their work cross-organizational relationship. In order to gain a fundamental understanding of collaboration between organizations, a systematic literature review in this field was conducted. They identified nine relevant categories, including motivation, definition, types of relationship, structure, lifecycle, analysis, benefits, challenges and further research areas. Based on their literature review they described cross-organizational collaboration as a process, in which an exchange and share of information, expertise, and resources take place. Further, two types of relationships between organizations are classified: ad hoc and structured. Ad hoc describes an informal and irregular interaction. A structured relationship can contain both: an organization has the power over the other organizations or an equal distribution of the power. Based on the type of relationship, the structure of cross-organizational relationships can vary from a supply chain structure to a peer to peer structure. The lifecycle of such a collaboration includes mainly five steps, which are creation, operation, evaluation, evolution, and dissolution. Diirr and Cappelli [23] also named several benefits such as entry in new business and markets, overcome market challenges and risk sharing. Along with the benefits, the cross-organizational relationship also faces some challenges like infrastructure problems and collaboration issues. However, Diirr and Cappelli [23] point out that organizations still need support and guidance in conducting relationships in order to enable effective collaboration and interoperability of their processes.

As a part of the project for the development of reference architectures for intelligent traffic services, Lachenmaier et al. [64] develop guidelines for preparing enterprise architecture for cooperation between organizations. According to Lachenmaier et al., the participated organizations need to be interoperable and should collaborate on all layers of their enterprise architecture [64]. On the vision and strategy level, the involved organizations should be aware of the goal they pursue as well as the added value and the risks to their organization. Moreover, on the business level organizations have to provide flexible agreements, that summarize the cooperation between the organizations, data exchange, and financial topics [64]. To allow an improvement in communication between the collaborated organizations, they should also have a common understanding of terms in the context of a glossary. Further, organizations should model their (business-) processes and identify the roles as well as responsibilities. The collaboration of organizations can also take into account the organizational aspects like the need for hiring new staff/roles. The information layer should focus on interfaces and data objects for data exchange between the organizations [64]. According to Lachenmaier et al. [64] the organizations should define architectural principles on the IT infrastructure layer. Because of the heterogeneity, it is difficult to make more recommendations. The governance has an important role in the inter-organizational collaboration. There should be an architecture governance board which consists of representatives of each organization. However, Lachenmaier et al. [64] also state that inter-organizational EAM is still at the beginning and there is further need for research in the area of the application and economic efficiency.

Due to the fact that enterprise modeling frameworks deal with social phenomena, Pant and Yu [82] focus on enterprise modeling frameworks in the context of coopetition. Based on four key characteristics of coopetition relationships, namely complementarity, interdependence, trustworthiness and reciprocity, they identified 15 relevant requirements to enable the representation of coopetition in enterprise modeling frameworks. Pant and Yu [82] provide a first visualized example, including the resource aspect, the aspect of sharing knowledge and the aspect of learning between organizations.

Bente et al. [11] give a first approach in collaborative enterprise architecture by purposing the application of enterprise architecture practices to the well-known lean and agile methods. They provide a six-step guidance on how enterprise architecture can be realized by applying the lean approach, the scrum architecture by involving different stakeholders from business and IT areas, an iterative architecture by introducing the Kanban method and the representation of the Enterprise 2.0 concept. These recommendations are demonstrated on the basis of hands-on case studies.

4. Types and Characteristics of Inter-organizational Cooperation

This chapter gives an overview and characterization of possible types of inter-organizational collaboration between organizations. Thus, it will address the first and second research questions of this master's thesis. The focus of interest in Section 4.1 is the structured literature review. Section 4.2 deals with the listing of the identified types based on the literature review. The characteristics of cooperation types will be presented in Section 4.3, while in Section 4.4 the characteristics of each identified inter-organizational cooperation type will be discussed.

4.1. Structured Literature Review

As specified in Chapter 1, the research questions one and two are based on a structured literature review according to vom Brocke et al. [114] and Webster and Watson [117]. vom Brocke et al. recommend a five-phase approach for conducting a literature review (see Figure 4.1). In order to define the scope and goal of the literature review, the taxonomy of literature review provided by Cooper [18] was followed in the **first phase**. The taxonomy suggested by Cooper includes the following six characteristics: (1) focus, (2) goal, (3) perspective, (4) coverage, (5) Organization and (6) audience. The focus of the literature review is to gain fundamental knowledge about inter-organizational cooperation types (1) from a neutral perspective (3) by providing relevant sources with different approaches. However, this does not necessarily entail the critical analysis of certain aspects. By synthesizing and conceptualizing (5) the identified relevant sources, the goal is to achieve an overview and to provide a summary of these concepts (2). As a result of the limitations of the search process concerning the keywords and databases, the literature review can be taken as representative coverage (4). Thus, the literature review aims to address audience of general scholars (6). In the **second phase**, a conceptualization of the topic was carried out to obtain relevant keywords for the initial search process in **phase three**. This was done with a concept map and led to the following keywords: organization, enterprise, collaboration, "co-operation", relationship, part-

Figure 4.1.: Five-phase approach of literature review [114]

nership, type, form, characteristics, "inter-organizational", "inter-enterprise", "cross-organizational", "cross-enterprise", Unternehmenskooperation, "zwischenbetriebliche Kooperation", Unternehmensnetzwerke, Wertschöpfungsnetzwerk, Arten, Typen, Formen, Eigenschaften, Charakteristika. The search process consists of four consecutive steps. Due to the topic being related to the field of business and strategy management, the search was conducted in four databases in interdisciplinary areas with focus on business. The German literature was also taken into account in order to not miss any relevant literature. Moreover, the first search and the conceptualization in phase two showed that the concept of cooperation with specific forms is more widespread in the German literature. Using databases like Web of Science, Scopus, EBSCOhost, and SpringerLink, efforts were made to cover well-known and important journals, conferences, proceedings, and books. After determining the databases and the aforementioned keywords, the results of the search were screened by title, abstract and keywords. In the first screening, 139 sources were identified. Subsequently, duplicates were removed and the identified sources were reviewed to ensure quantitative relevant for this master's thesis. Overall, 26 sources from the search process were selected. Table 4.1 gives an overview of the search process including databases, search queries, area of search, limitations during the search, number of hits, number of identified first sources, and number of identified relevant sources. The last two steps of the search process comprise the backward and forward search as recommended by Webster and Watson [117]. This allows the identification of further relevant sources that could not be revealed by using predefined keywords and databases. While the backward search indicates prior and older sources, the forward search provides sources, which cite the identified relevant papers [117]. Both contribute to additional ten sources, that have to be taken into account. In addition, one relevant paper was provided by the advisor from the Chair of Software Engineering for Business Information Systems (sebis). In summary, 37 literature were identified as relevant. Finally, in the **fourth phase**, it is suggested to provide a concept matrix to enable an analyzing and synthesizing of the findings. As a result of the research questions one and two already focusing on a specific concept, namely on types and characteristics, the conceptual matrix will be replaced by a table of identified types in Section 4.2 and a morphological box in Section 4.3. The **fifth phase** mentioned by vom Brocke et al. contains the research agenda, which can be ignored in the context of the master's thesis as it has no relevance for the purpose of this master's thesis.
In summary, the literature research shows a rapid number of publications concerning types of cooperation and their characteristics in the German literature. Whereas, the findings in the English literature represented a significant gap. This could be due to the fact that the term cooperation is not widely used in English literature, but is rather known under specific names of cooperation types. However, most of the results have not addressed the subject of the search. Thus, only the literature targeting one or more cooperation types and/or the characteristics of cooperation and classification were considered. Literature, which includes topics regarding meta-model, definitions provided by encyclopedia, ontologies and mathematical explanations of networks were excluded.

Database	Search Query	Area	Limitation	Hits	# Articles	# Relevant
Web of Science	(organization OR enterprise) AND (collaboration OR "co-operation" OR relationship OR partnership) AND (type OR form) AND characteristics	Topic	Sort by relevance, 500 articles	2.602	28	3
	("inter-organizational" OR "inter-enterprise" OR "cross-organizational" OR "cross-enterprise") AND (collaboration OR relationship OR "co-operation" OR partnership) AND (type OR characteristics OR form)	Topic	Sort by relevance, 500 articles	638	16	1
Scopus	(organization OR enterprise) AND (collaboration OR "co-operation" OR relationship OR partnership) AND (type OR form) AND characteristics	TITLE, ABS, KEY	Sort by relevance, 500 articles	4.420	17	3
	("inter-organizational" OR "inter-enterprise" OR "cross-organizational" OR "cross-enterprise") AND (collaboration OR relationship OR "co-operation" OR partnership) AND (type OR characteristics OR form)	TITLE, ABS, KEY	Sort by relevance, 500 articles	1.238	15	0
EBSCOhost	(organization OR enterprise) AND (collaboration OR "co-operation" OR relationship OR partnership) AND (type OR form) AND characteristics	AB Abstract	Databases: EconLit, Library Information Science & Technology Abstracts, Business Source Complete, relevance, Language: English, German, 500 articles	940	15	3
	("inter-organizational" OR "inter-enterprise" OR "cross-organizational" OR "cross-enterprise") AND (collaboration OR relationship OR "co-operation" OR partnership) AND (type OR characteristics OR form)	AB Abstract	Databases: EconLit, Library Information Science & Technology Abstracts, Business Source Complete, Language: English, German Sort by relevance	409	8	1
SpringerLink	(organization OR enterprise) AND (collaboration OR "co-operation" OR relationship OR partnership) AND (type OR form) AND characteristics		Entered in search field, Language: English, Sort by relevance, 500 articles	683.030	5	1
	("inter-organizational" OR "inter-enterprise" OR "cross-organizational" OR "cross-enterprise") AND (collaboration OR relationship OR "co-operation" OR partnership) AND (type OR characteristics OR form)		Entered in search field, Language: English, Sort by relevance, 500 articles	15.986	9	1
	(Unternehmenskooperation OR "zwischenbetriebliche Kooperation" OR Unternehmensnetzwerke OR Wertschöpfungsnetzwerk) AND (Arten OR Typen OR Formen) AND (Eigenschaften OR Charakteristika)		Entered in search field, Language: English, Sort by relevance, 500 articles	1.755	26	13

Table 4.1.: Overview of the research process

4.2. Overview of Inter-organizational Cooperation Types

The structured literature review reveals that there are many forms and manifestation of cooperation types in practice. The types of cooperation differ in several points of view. However, according to Rupprecht-Däullary [97], a major problem is the impossibility of a clear representation of the diversity of cooperation types. Thus, he refuses any presentation of cooperation forms. Moreover, he notices that an unambiguous assignment of different cooperation types is inefficient and unmanageable. Nevertheless, several attempts have been made to classify and organize collaborations between companies (e.g. [91], [102] and [47]). In the context of this master's thesis, the aim is to identify and analyze possible forms of cooperation between companies. Consequently, in the following chapter, the different types of cooperation will be elaborated based on the literature review.
Overall, the results of the structured literature review reveal 43 different terms of inter-organizational cooperation types. Golicic et al. [41] conducted a focus group interview to find out how company executives determine the relationship between other organizations. The findings show that the focus group pays attention to merely three types of relationships. These include the cooperative relationships (partnership, alliances), arm's length relationship (basic transaction), and integration (vertically integrated) [41]. Kaschny et al. [54] focus on "innovative company networks ", which include enterprise networks and clusters, strategic alliances and joint ventures. Besides the forms of cooperation between companies, they additionally mention non-profit institutions as cooperation partners. These non-profit institutions are chambers, associations, funding associations, colleges, universities, governments, and state institutions [54]. Yet, in this master's thesis, the differentiation of the types of cooperation according to the individual members will not be discussed in detail. Despite this, Mäntymäki et al. [71] compared business ecosystem with further concepts of a business network, namely industry, population, inter-organizational network, cluster, and value network. As industry and population describe concepts that focus on the competitive relationship of organizations, these concepts will no longer be considered. However, Cravens et al. [19], target different networks forms and classifies four types, namely hollow networks, flexible networks, value-added networks, and virtual networks.
Similar to Cravens' classification, an often-mentioned type of cooperation in the literature is enterprise networks (e.g. [28, 91, 73]). While in German literature it is often referred to as "Unternehmensnetzwerk"and "Unternehmungsnetzwerk"[102], in English literature it is more often mentioned as "inter-organizational network"[71] and "enterprise network"[54]. However, this also poses the problem of the non-uniform use of terms. A further investigation of the definitions of various used terms, reveals that the terms imply the very same concepts. Therefore, as a part of this work, the term enterprise network is used to describe this cooperation type. In addition, some authors, for instance Rief [91] and Männel [70], discussed the extension of the term "strategic"of strategic networks as a special form of enterprise networks. Rief [91] concludes that the additional term strategic does not represent a new concept and is therefore not mandatory. This is substantiated by the fact that this is not a constitutive characteristic of networks [91]. It only serves the purpose of additional differentiation of networks [91].

Regarding enterprise networks, the literature indicates several special forms, which are strategic networks, regional networks, project networks, integrated networks, innovation networks, and virtual enterprises. The differentiation of enterprise networks is based on several approaches for instance according to Sydow [104] (more on this in Chapter 4.3). As a result, the different network names are grouped by the concept of enterprise networks. However, in the further course of this thesis, the different characteristics between the network forms will be briefly addressed. Eckert [28] and Wolff [122] also focus on enterprise networks and differentiate them from other cooperation types. Special focus was paid on consortium, strategic alliances, virtual enterprise, franchising, joint venture, supply chain, regional networks, and strategic networks [28, 122]. According to Eckert [28], consortia, strategic alliances, franchising, and virtual enterprises can be characterized as enterprise networks if they fulfill the constitutive characteristics of an enterprise network (for consecutive characteristics see Chapter 4.3).
In addition, to the enterprise networks forms, forms like strategic alliances, joint venture, consortium, supply chain, community of interest, cartels, value-adding partnership, concern, research and development partnership are frequently discussed in the literature. Osiecka [80] indicates equity participation as a further form of cooperation. However, the literature shows that the equity participation of a company is often discussed in the context of joint ventures (e.g. [102]).
Besides the cooperation types with more or less explicit names, the literature also often addresses types of cooperation concerning contracts. A cooperation can be based on contracts, like license agreements [106, 78], long-term supply agreements/subcontracting [102, 80], franchising contracts [80], management contracts [106]. Further, Thoben and Jagdev [108] and Osiecka [80], also considers non-contractual agreements. Here, they are summarized as cooperation based on contracts and non-contractual cooperation. In relation to cooperation based on contracts, the cooperation franchising is often described. Although from a strict point of view franchising is a contractually agreed cooperation, an explicit distinction will be made here. This is due to the fact, that the literature often speaking explicitly of franchising cooperation (e.g. [28, 57]). Another possibility for cooperation is the collaboration of companies with non-profit organizations (e.g. [109]).
Männel [70] distinguishes between strategic groups as a collaboration type. Strategic groups imply members of companies from the same sector [89]. Furthermore, this group pursues similar strategic goals, whereby an entire industry could form a strategic group or also individual companies identify themselves as a strategic group [89]. However, strategic groups do not describe a collaboration between companies, but rather a tool for structural analysis of industries [70, 89]). Consequently, this type of group will not be discussed further and is not understood as a type of cooperation in terms of this master's thesis.
Forms of cooperation that were mentioned only once in the literature, such as catalytic alliances [116], social partnership [115], business webs [47], and cannot be assigned to one of the cooperation types, were classified as other forms of cooperation.
Table 4.2 shows an overview of the identified cooperation types from the literature in the first step. After analyzing and reviewing the identified cooperation types it quickly became clear that some forms could be grouped into 14 types of cooperation and categories. This is shown in Table 4.3.

Types of cooperation	No. of documents	References
Joint ventures	14	[47, 28, 57, 70, 91, 49, 106, 78, 54, 8, 102, 103, 80, 108]
Enterprise networks	13	[47, 122, 28, 70, 91, 49, 31, 78, 54, 102, 103, 108, 73]
Strategic alliances	12	[47, 122, 28, 57, 70, 91, 49, 78, 54, 8, 102, 103]
Virtual enterprises	11	[47, 28, 57, 91, 49, 8, 108, 19, 92, 86, 12]
Strategic networks	10	[47, 122, 70, 91, 49, 78, 102, 103, 80, 51]
Consortia/Working groups	8	[28, 57, 70, 78, 8, 102, 103, 80]
Franchising	7	[28, 57, 106, 78, 8, 108, 80]
Supply chains	7	[47, 28, 57, 49, 108, 86, 12]
Value-adding partnerships	6	[47, 70, 49, 102, 103, 52]
Research and development	5	[47, 54, 94, 5, 33]
Cartels	5	[70, 8, 102, 103, 108]
License agreements	4	[106, 78, 80, 108]
Regional networks	4	[123, 91, 102, 103]
Clusters	3	[54, 71, 12]
Project networks	3	[49, 91, 47]
Alliances	3	[31, 106, 78]
Concerns	3	[91, 102, 103]
Business ecosystems	3	[71, 76, 29]
Community of interests	2	[57, 8]
Integrated networks	2	[49, 47]
Non-contractual agreements	2	[108, 80]
Value networks	1	[71]
Equity participations	1	[80]
Long-term supplier agreements	1	[80]
Alliance networks	1	[70]
Strategic groups	1	[70]
Innovation networks	1	[31]
Management contracts	1	[106]
Collaboration with non-profit organizations	1	[109]
Extended enterprises	1	[108]
Market transactions	1	[108]
Contractual agreements	1	[108]
Catalytic alliances	1	[116]
Social partnerships	1	[115]
Arm's length	1	[41]
Cooperative types (partnership, alliances)	1	[41]
Vertical integrated	1	[41]
Hollow networks	1	[19]
Flexible networks	1	[19]
Value-added networks	1	[19]
Subcontracting	1	[102]
Business webs	1	[47]
Inter-organizational networks	1	[71]

Table 4.2.: Overview of cooperation types based on the structure literature review

Categories of cooperation types	Included cooperation types
Joint ventures	Equity participations
Enterprise networks	Strategic networks
	Virtual enterpirses
	Regional networks
	Project networks
	Integrated networks
	Innovation networks
	Business webs
	Inter-organizational networks
Strategic alliances	Alliances
	Alliance networks
Consortia/Working groups	
Franchising	
Supply chains/Value-adding partnerships	Supply chains
	Value-added networks
	Value networks
Cooperation based on contracts and non-contractual cooperation	License agreements
	Long-term supplier agreements
	Management contracts
	Non-contractual agreements
	Contractual agreements
	Subcontracting
Research and development	
Concerns	
Cartels	
Community of interests	
Business ecosystems	
Clusters	
Other forms of cooperation	Market transactions
	Catalytic alliances
	Social partnerships
	Arm's length
	Cooperative types (partnership, alliances)
	Vertical integrated
	Hollow networks
	Flexible networks
	Collaboration with non-profit organizations
	Extended enterprises

Table 4.3.: Categorization of cooperation types

4.3. Characterizations of Inter-organizational Cooperation Types

The literature shows that a systematic characterization of cooperation types is hardly possible. This is explained by the complexity and multidimensional nature of the cooperation forms [97]. Nevertheless, there are several approaches for characterizing cooperation types in order to facilitate a classification. Rupprecht-Däullary [97] for instance presents a morphological box including the most relevant dimensions (direction of cooperation, collaboration field, type of interdependence, degree of contractual commitment, space of cooperation) and their potential specifications. Similar to Rupprecht-Däullary [97], Killich [57] also presents possible characterization on the basis of a morphological box and, in addition to the already mentioned types, he differentiates between binding intensity and time. Whereas Rupprecht-Däullary [97] and Killich [57] have made no further categorization, Eckert [28] classifies his morphological box into two main properties concerning the cooperation type of enterprise networks. These are constitutive and consecutive properties. The constitutive property indicates characteristics that are necessary to identify a collaboration between companies as an enterprise network [28]. Thus, these specifications are required to be fulfilled, while consecutive properties refer to additional characteristics that can occur in all forms of specification in an enterprise network [28]. The six constitutive characteristics include the involved parties, level of cooperation, voluntariness of formation, number of cooperation partners, decision restriction and for network typically structure of the relationship [28].
Besides the concepts of the morphological box, Rief [91] relies on the classification approaches for networks forms according to Miles and Snow [74], Kutschker [63] and Sydow [104].
Kutschker [63] considers two already mentioned dimensions when classifying types of cooperation, which are not only for classification of network forms. The first dimension deals with the underlying relationship between the cooperation partners. This can be divided into three categories: non-contractual commitment, contractual commitment, and capital participation. The second dimension deals with the number of cooperation partners [63].
Sydow [104] classifies network forms according to the dimensions form of management (e.g. hierarchical, heterarchical) and temporal stability (e.g. stable, dynamic). Regarding temporal stability, he emphasized that in 1992, Snow has already identified a differentiation of networks depending on their temporal stability. Similar to the already defined characteristic time limitation, temporal stability describes long-term and short-term cooperation. Thus, long-term are stable networks and short-term oriented cooperations are dynamic [91]. The term heterarchical refers to the distribution of responsibility among the cooperating organizations [91]. In hierarchical networks, the network is managed by one or more companies [91]. These characteristics constitute a four-field matrix in which the four network types, strategic networks, regional networks, project networks, and virtual enterprises can be positioned (see Figure 4.2) [104].
Miles and Snow [74, 75] distinguish between two types of networks dealing with the inter-organizational aspect. They introduce the terms of dynamic networks and stable

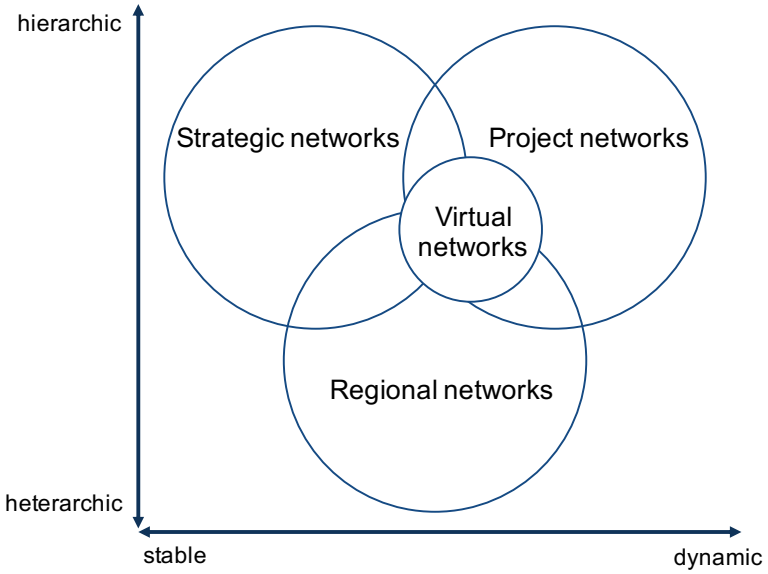


Figure 4.2.: Typology of inter-organizational networks according to Sydow [104]

networks. A dynamic network is characterized by vertical disaggregation [74]. Business functions that would usually be performed within an organization are now transferred into a network [74]. Market mechanisms and computer-based information systems, the so-called "Full-Disclosure Information System", have become an important function in dynamic networks [74]. At the heart of the network is the broker. As a business group, a broker is responsible for managing activities within the network [74]. This type of network exists only for a short time to produce a product or service [75]. In comparison to dynamic networks, in a stable network, the participating companies are closely linked to the core company through contracts [75]. However, they remain competitive [75]. According to Miles and Snow [75], "[...] the core firm is converting the network into a vertically integrated functional organization."[75].
In the following, the identified characteristics of cooperation based on the literature review are listed and briefly explained:

- **Direction of cooperation:** The cooperation direction describes the position of the value chain of the cooperating organizations to each other [97]. It can be characterized by three dimensions: (1) horizontal which represent cooperation of organizations of the same industry or the same strategic business area that collaborate across this field [97]; (2) vertical which is defined as the customer-supplier relationship [97]; (3) diagonal or lateral which describes the cooperation of organizations from different industries collaborate on different stages of the value chain [57].

- **Level of cooperation:** This characterization includes the differentiation between inter-company or cross-organizational collaboration of a cooperation [28]. Cross-organizational cooperation involves companies working together in committees

[107]. Inter-company cooperation refers to cooperation without an institutionalized body [107].

- **Involved parties:** The involved parties describe the nature of the cooperation partners, which can be organizations or other forms of organizations [28].
- **Voluntariness of formation:** The willingness to collaborate with other organizations can base on obligation, law, market, coercion or voluntariness [28].
- **Management:** According to Eckert [28], the management of cooperation includes the planning, control, and steering, which can be distributed or centralized.
- **Number of cooperation partners:** Collaboration can vary in numbers of the involved organizations. Thus, the literature often distinguishes between two or more than 2 partners [28, 47, 80]. Therefore, it is natural that it must be a cooperation of at least two partners because otherwise, it would not be a cooperation [47]. According to Kutschker [63], a distinction can be made between bilateral links, trilateral links, simple networks and complex networks. Bilateral links are characterized by the direct coordination and reaction of the cooperation partners of two organizations [63]. If a third partner is added, the relationship is named trilateral links [63]. This relationship enables coalitions, indirect relations and asymmetric information and power relations [63]. A simple network can already consist of several bilateral and/or trilateral links with a central partner coordinating the cooperation partners [63]. Compared to simple networks, complex networks encompass two conditions. It is referred to as complex networks when, firstly, the number of partners and the number of relationships is relatively high and, secondly, the proportion between obvious relationships and potential relationships is high [63].
- **Number of relationships:** This characteristic describes the number of organizations with which an organization has direct contact [28].
- **Structure of relationship:** In a network, the positioning of the relationships between the partners plays a crucial role. The cooperation between organizations and especially in networks are represented by edges and nodes [28]. In this context, the interaction between the collaborated organizations is crucial for identifying the type of cooperation [28].
- **Interdependence of partners:** The involved organizations may have a high or low dependency on the success of the cooperation [28].
- **Time limit:** Cooperations may exist for a short or specific period of time or can be based on an indefinite period of time [28]. While a limited cooperation is dissolved after the achievement of the objective or the task, several tasks are developed together in the case of a non-limited cooperation [57].
- **Time duration:** Regarding the time aspect of a cooperation Teusler [106] presents the time of duration in his work, different than Killich [57]. This concerns the further differentiation of the time limit characteristic, which can be short-term, medium-term, and long-term related to projects [24].

- **Time frequency:** The time frequency describes the repetition of communication with a certain organization [107]. This can be unique, sporadic, regular and permanent [125].
- **Objective limitation:** Similar to the temporal limit, objective limitation implies the limitation of tasks within a cooperation [47].
- **Aim of the cooperation:** Another point mentioned in Osiecka [80] is that formation of a collaboration with organization can pursue different goals like economies of scale, exchange of know-how or market entry and other.
- **Collaboration field:** Forms of cooperation can work together in one but also in several areas [97]. These areas can involve research & development, production, marketing, acquisition, sales, and finance [97, 28, 47]. However, other areas of cooperation of a company may be indirectly affected, but this characteristic addresses the direct area of cooperation between organizations [97].
- **Space of cooperation:** In the cooperation spaces, both the origin of the involved organizations and the scope of the cooperation are taken into account [97]. While local cooperations are ones with companies in the immediate vicinity, regional cooperations are ones with companies in the near environment [57]. Theling and Loos [107] provide concrete specification and limits regional cooperation to a distance of about 50 to 100 km. National cooperations refer to ones within the same country. International cooperations involves cross-border cooperation [57].
- **Type of interdependence:** The types of interdependence can be distinguished into arrangement cooperation, reciprocal/exchange cooperation and redistributive/joint cooperation [97]. The agreement cooperation includes non-contractual agreements such as compliance with guidelines, standards, and non-servicing of certain markets [97]. Reciprocal means a mutual cooperation of the activities e.g. production of material goods, procurement of raw materials [97]. Redistributive partnership includes the combining of resources and carrying out of joint activities [97, 80].
- **Degree of contractual commitment:** Business cooperation can be distinguished according to their contractual commitment. Rupprecht-Däullary [97] differentiates between non-contractual, contractual binding, while Killich [57] and Becker et al. [8] add the category equity interest. Contractual binding can base on written or verbal contracts [97] and should define the aim of the cooperation, the roles with their responsibilities and the cost [57]. If a contract is waived, the cooperation partners do not undertake any legal claims or obligations [97].
- **Binding intensity:** It encompasses the functional areas in which collaboration takes place, the degree of decision and the relationship to involved organizations [57]. If collaborations are merely based on the exchange of information and experiences, then they represent a low degree of binding intensity [57]. A medium binding describes the coordination of some activities within a cooperation [57]. In

case that all collaboration activities have to be coordinated with each other, a high degree of binding intensity is expected [57].

- **Decision restriction:** If independent enterprises decide to cooperate, the autonomy of the enterprises is often limited to a certain degree. This can range from none to the complete loss of autonomy [28].
- **Production sequence:** The production sequence identifies the order in which products are created [28]. This can be sequential or simultaneous [28].
- **Transparency:** The mutual knowledge and awareness of companies of a cooperation are characterized by the degree of transparency, which can be high or low [28].
- **Cooperation-specific investments:** Cooperation-specific investments are investments, which are related to the cooperation and have value for cooperation [28]. They can be categorized in negligible and significant [28].
- **Customer visibility:** The structure of some cooperation forms is recognizable from the customer perspective [28].
- **Vertical integration:** Vertical integration can be single-staged, multi-staged and completed in the value chain [28].
- **Formation process:** The process of a formation can be planned or emergent [28].
- **Dependency:** This property refers to the power of the cooperating organizations to each other [28].
- **Similarity of resource:** This characteristic describes in which degree the resources of the involved companies are correspond [28].

Figure 4.3, presented as a morphological box, provides an overview of the identified characteristics with their possible specification and references. In addition, the morphological box was extended by the characteristics of network forms introduced by Sydow [104], Miles and Snow [74, 75].
Comparing the characteristics regarding the cooperation forms in general and the explicit classification of network forms, it becomes apparent that only the designations differ, but more or less the same characteristics are described.

Characteristics	Possible specification						References
Direction of cooperation	horizontal		vertical		diagonal/lateral		[97, 78, 80, 106, 91, 28, 57, 8, 47]
Level of cooperation	inter-company			cross-organization			[28, 49]
Involved parties	organizations			other organizational forms			[28]
Voluntariness of formation	obligation, law, market, coercion			voluntary			[28]
Management	distributed			centralized			[28]
Number of cooperation partners	2			>2			[78, 80, 106, 28, 47]
	bilateral links	trilateral links		simple networks	complex networks		
Number of relationships	1:1			1:n (with ≥1)			[28]
Structure of relationship	number of edges < number of nodes			number of edges ≤ number of nodes			[28]
Interdependence of partners	low			high			[28]
Time limit	limited			unlimited			[78, 80, 106, 28, 57, 8, 47]
Time duration	short-term		medium-term		long-term		[106, 47]
Time frequency	unique	sporadic		regular	permanent		[106]
Objective limitation	limited			unlimited			[80, 47]
Aim of collaboration	economies of scale	know-how transfer		market entry	other		[80, 91]
Collaboration field	research & development	production	marketing/sales	acquisition	finance	other	[97, 80, 28, 57, 8, 47]
Space of cooperation	local	regional		national	international		[97, 78, 80, 106, 91, 28, 57, 8, 31]
Type of interdependence	arrangement cooperation		reciprocal/exchange cooperation		redistributive/joint cooperation		[97, 57]
Degree of contractual commitment	non-contract		contract		equity interest		[97, 80, 57, 8, 47]
Binding intensity	low		medium		high		[91, 57]
Decision restriction	non	low	medium	high	totally		[28]
Production sequence	sequential			simultaneous			[28]
Transparency	low			high			[28]
Cooperation-specific investments	negligible			significant			[28]
Customer visibility	visible			not visible			[28]
Vertical integration	single-stage		multi-stage		complete		[28]
Formation process	planned			emergent			[28]
Dependency	low			high			[28]
Similarity of resource	low		medium		high		[28]
Type of control	heterarchical			hierarchical			[104]
Temporal stability	stable			dynamic			[74, 75]

Figure 4.3.: Overview of the characteristics based on the findings from the literature

4.4. Inter-organizational Cooperation Types and Their Characteristics

In the following, the type of inter-organizational cooperation as identified in Section 4.2 from the literature are described. Particular attention is paid to the characteristics as addressed in Section 4.3. At this point, the visualization is omitted for each cooperation type according to the morphological box. This is explicitly intended for the case study partners in Chapter 5. However, appropriate properties are described.

Joint ventures

In the literature, joint ventures are often named in connection with strategic alliances. This is due to the fact that alliances can be further differentiated. In that context, a joint venture can be seen as one of the alliance forms [102, 78]. Cooperation is defined as a joint venture when partners decide to establish a new company and to manage it collectively [102]. Joint ventures represent long-term cooperation of at least two and rarely more than four partners, where the participants contribute financial, human, material and immaterial resources [47, 102]. As a consequence of the merging of functions, joint ventures are associated with a high degree of formalization [47]. Consequently, this cooperation is not limited in terms of time and objective [47]. This type of cooperation is established to create new products and entry into new markets [28]. This can occur in national as well as international markets [28]. However, Sydow [102] subdivides joint ventures into two types, the 'non-equity alliances', also called contractual joint venture [118], and 'minority-equity alliances'. In addition to Sydow [102], Welge and Holtbrügge [118] distinguish between 'majority joint ventures' and 'parity-joint ventures'. Non-euqity alliances/contractual joint ventures are defined as companies that are not legally independent and where the partners have no equity interest in the partner [102, 118]. In contrast, majority joint ventures, parity joint ventures and minority equity alliances/joint ventures are, in terms of the equity participation. Minority equity alliances/joint ventures, for example, arise when the partner has a low equity interest [102]. Joint ventures can assume horizontal, vertical and diagonal cooperation [47].
Osiecka [80] lists equity participation as an independent form of cooperation. In the case of equity investments, as already mentioned, companies have shares in the capital of a company. This includes participation in profits and liquidation proceeds [85]. In addition, companies with equity interests can have an influence on corporate policy and be liable for losses [85].

Enterprise networks

The literature shows, that there is no common definition of the concept of enterprise network. Many authors, including Mildenberger [73] and Morschett [78], rely on the definition provided by Sydow [103]. He defines enterprise network as

> "[...] eine auf die Realisierung von Wettbewerbsvorteilen zielende Organisa-

> tionsform ökonomischer Aktivitäten dar, die sich durch komplex-reziproke, eher kooperative denn kompetitive und relativ stabile Beziehngen zwischen rechtlich selbständigen, wirtschaftlich jedoch zumeist abhängigen Unternehmungen auszeichnet. "[1] [103]

Eckert [28], in particular, discusses the six constitutive properties, which are the involved parties, level of cooperation, voluntarity of formation, decision restriction, number of partners and structure of the relationship. Similar to the definition of Sydow [102], Eckert [28] outlines that the participants of an enterprise network consist of a cooperation with companies. Consequently, enterprise network cooperations with institutes, universities, or local authorities are not considered [28]. Furthermore, such cooperations accommodate only inter-organizational cooperations [28]. As an inter-organizational collaboration, enterprise networks aim to produce products or services collectively in order to realize profits [49]. Moreover, the decision to form a cooperation must have a voluntary character [59]. Due to the voluntary collaboration with the companies as a network, the members maintain their autonomous nature [28]. Nevertheless, the definition according to Sydow [102] indicates that the collaboration with others includes a certain degree of economic independence, which can be based on a long-term contract or is simply a verbal agreement between the members [103, 28, 49]. Sydow [102] identifies nine possible contract types for networks: franchising contracts, license agreements, long-term supplier agreements, consortium contracts, system contracts, trade agreements, lease agreements, contracts for counter and compensation transactions, production contracts. Concerning the number of cooperation partners in an enterprise network, the literature shares the same standpoint. Several authors (e.g. [28, 91, 49, 71]) identify that a company network consists of at least three companies. In this context, it is also important to consider the structure of the relationship between the involved organizations. Enterprise networks are often explained by edges and nodes [28]. The nodes present the individual companies and the edges the relationship to each other [28]. It is expected that enterprise networks contain at least as many edges as nodes [28]. This results with at least three cooperation partners in a trilateral relationship, where each partner is connected with each other [21, 63]. Thus, linear cooperation is not possible [28]. In terms of the direction of cooperation, there are no concrete conclusions in the literature. Accordingly, horizontal as well as vertical and diagonal collaborations are possible [47, 49]. Another important point is that the collaboration is not limited to a single task and can be designed on a long-term basis for several projects [47]. Thus, an enterprise network is not restricted in terms of time and subject matter [47, 49].
In addition to the aforementioned properties, enterprise networks also described by four diametrical characteristic pairs [31]. One pair is the cooperation and competition also often called as coopetition (see Chapter 2). It should be noted that within a network there is still competition between the participants [71]. Since the participating companies in a network have the property to cooperate only in one or more areas together, these com-

[1] "[...] an organizational form of economic activities aiming at the realization of competitive advantages, which is characterized by complex-reciprocal, rather cooperative than competitive and relatively stable relationships between legally independent, but mostly economically dependent enterprises."(translation by the author)

panies continue to compete in the remaining areas [70]. An issue that arises through the cooperation with others is that both parties are engaged in learning the skills from each other [9]. This leads to the risk of substituting the core competencies from the cooperation partner [9]. As already mentioned, enterprise networks are characterized by the concurrent appearance of autonomy but also some degree of dependence on the members of the network. Autonomy and interdependence are the second pair [31]. Another pair is stability and flexibility, as already introduced in Chapter 4.3. Männel [70] also outlines that enterprise networks combine both the stability of hierarchical organization form and the market-oriented flexibility. In addition, the creation of enterprise networks is often addressed in the literature (e.g. [31, 70, 103]). A distinction is made between two types: The first type involves a so-called quasi-internalization, which intensifies the cooperation between companies [103]. If functions are shifted to other organizations, it is referred to as quasi-externalization. Both types of forming enterprise networks can be applied to horizontal and vertical cooperation [103].
In the literature, enterprise networks are divided into further possible forms of cooperation. These forms of cooperation are merely special forms of enterprise networks and are based on the fundamental understanding of enterprise network. However, a distinction of enterprise networks often follows the classification according to Sydow [104]. These special forms are **strategic networks**, **regional networks**, **project networks** and **virtual enterprises**. In addition to these mentioned forms, some authors (e.g [49, 31, 47]) also mention integrated networks, innovation networks, and business webs.
An important contribution in the literature on the organizational form of **strategic networks** was offered by Jarillo [51]. According to his definition, strategic networks are "[...] long-term, purposeful arrangements among distinct but related for-profit organizations that allow those firms in them to gain or sustain competitive advantage vis-a-vis their competitors outside the network."[51]. In comparison to the other enterprise networks, strategic networks differ in two main points. The first point is the focal management of the network [103]. While in enterprise networks, the involved companies are all equally, a strategic network contains one or more focal enterprises, a so-called "hub firm "[122, 103, 51]. As the name of the cooperation type indicates, the responsibility of such a hub firm is to manage the network proactively by strategically including contents of the strategy, relevant technologies, and manner of the inter-organizational relationships [51, 103, 104]. A further point in which strategic networks can be distinguished from other enterprise networks is the underlying intentional behavior [103]. According to Sydow [103], such networks have explicitly defined goals, a formal regulation of structure with concrete role assignments, and their own identity. With regard to the direction of cooperations, strategic networks can be vertical or diagonal [122].
Another special form of enterprise networks, which are often discussed regarding the typology based on Sydow [104] are the so-called **regional networks**. Regional networks comprise small and medium-sized enterprises, which have the characteristic of being operative and geographically agglomerated [102]. This means that they can consist of local educational and research institutions as well as regional chambers and authorities [102]. Due to the absence of a hub firm, strategic networks are organized heterarchical [104]. For this reason, activities are coordinated on an equal basis across the organizations [104].

Project networks are formed for individual projects with a time limit [49, 104]. However, like strategic networks, they are also managed focally whereby heterarchical project networks are also possible [104]. The main difference between strategic networks and regional networks is the short lifetime of project networks [104].
With the introduction and use of inter-organizational information systems, the **virtual enterprise** evolves [104, 84, 58]. The members of a virtual enterprise are interconnected via information and communications technology (ICT) systems in order to organize their activities [67]. In that context, Riemer and Vehring [92] classified three types of virtual organizations: internal virtual organization, network virtual organization, and outsourcing virtual organization. Considering the definition of the three types, only the second type is suitable in the context of enterprise networks and appropriate to the results of the other works of literature that addresses virtual enterprises. A virtual enterprise consists of several legally independent companies with a certain goal like producing a product or delivering a service [57, 8, 86]. These companies are not presented transparently in the market, but they appear as a single independent virtual company [57, 8, 86]. Like project networks, virtual companies are formed anew for each project and intended only for a short term [92, 49]. Once the objective has been achieved, these types of cooperation are dissolved [86]. Further, characteristic for virtual companies is a high degree of trust between the partners [86, 92].
In addition to the special form of enterprise networks based on the typology according to Sydow, Hess [49] identifies as a further network the **integrated network**. According to Hess [49], this type of network is hardly widely spread in the literature. Integrated networks are stable and polycentrically managed [49].
Only Fischer [31] addresses the form **innovation networks** in his work. Fischer observes that there is still no uniform description and definition of innovation networks in the literature. However, he shows in his findings that innovations require a network perspective [22], that the participated companies in a network need to be innovative and that networks support innovations [68]. Moreover, innovation networks are created for medium to long term cooperation [26, 22, 31]. Depending on the direction of cooperation, they can be organized monocentrically or polycentrically [26, 15]. Fischer [31] narrows the concept of innovation networks even more by focusing on vertical innovation networks. The vertical aspect will not be considered further in this chapter due to the fact that it is more a specialization of the cooperation form and the definition of the vertical orientation was already explained in Section 4.3. However, leaving out the vertical aspect here, Fischer [31] provides an explanation of the term based on the network definition according to Hippe [50]. Thus, an innovation network is "[...] a coordinated, cooperative collaboration between several independent companies focused on the process and marketing of innovations [...]"[31].
According to Hagenhoff [47], **business webs** are assigned to the cooperation type enterprise networks. A business web is a group of independent companies that create individual components to offer an 'overall value proposition', without a formal relationship [46]. They form are diagonal collaborations and do not combine functionalities [47].

Strategic alliances

One of the major cooperation types, that are discussed in the literature are strategic alliances. Strategic alliances involve a formal and long-term cooperation among at least two companies [103, 6]. A reason to form a strategic alliance is to achieve a long-term competitive advantage in order to compensate the own weakness with the strengths of the participated company [102]. The management of strategic alliances is polycentric, which means that all members enjoy equal rights [91]. However, the literature does not state clearly whether the cooperation orientation is vertical or horizontal. Sydow [102] claims that both horizontal as well as vertical dimensions are feasible. Männel [70], on the other hand, supports the view of only a vertical cooperation of strategic alliances, unlike his colleagues Gahl [36] and Killich [57]. They represent the view of a horizontal orientation and have the opinion that strategic alliances cooperate with competitors from the same industry. According to Gahl [36] this is motivated by the fact that the aim of such a cooperation is, as mentioned before, to improve the company's competitive position by collaborating in certain business areas. Therefore, a supplier and customer relationship, as it would be with a vertical orientation, cannot be considered [36]. From a vertical integration, both organizations complement each other from a functional perspective [102]. Therefore, in the context of this master's thesis, both approaches are understood as possible forms of strategic alliances. This allows companies to collaborate as vertical or horizontal alliances. Similar to the cooperation types of project networks, this form of cooperation also dissolves when the common purpose has been reached and the task is fulfilled [49]. Thus, such a cooperation type is limited in time and objective [49, 70]. However, Hammes [48] shows that a strategic alliance often involves contractual cooperation followed by joint ventures and that loose bonds are rather rare. Strategic alliances often occur in the areas of production, procurement, marketing, development, and research [102].

Consortia/Working groups

Organizations form a consortium, also known as working group, to conduct projects collaboratively on a temporary basis [102, 8, 57]. They are similar to a project community [57]. Characteristics for consortia are:

- Association of a few but at least two partners [70],
- Often cooperation with companies from the same value chain, namely horizontal cooperation (this does not imply that vertical and diagonal cooperations are not possible) [70],
- Companies maintain economically and legally independent [85].

The purpose is to realize common competitive advantages and to solve one or more tasks together in order to minimize the risks of projects and gain synergy potentials due to resources [70, 57, 85].

Franchising

As already mentioned, franchising can be seen as a contractually agreement and is similar to license contracts [80]. These rights may comprise the use of the brand name, an equipment and sales program as well as the manufacture of products according to certain procedures [106]. A franchise contract serves as the basis for the cooperation. Although a continuing obligation is created, both the franchisor and the franchisee are legally and financially independent [107]. The success of the franchisee depends on the franchisor [106]. However, a disadvantage for the franchisee results from the narrow, strategic guidelines and the restricted possibilities to make decisions [107]. There are three different franchising approaches [107]. The first approach involves the information and knowledge about the production of a particular product [107]. This is known as production franchising [107]. In distribution franchising, which is the second approach, the franchisee receives both the sales and distribution of a product from the franchisor [107]. The third approach is called service franchising. Here, as the name suggests, the franchisee gets to know about the execution of a particular service [107].

Supply chains and value-adding partnerships

In the literature, the term supply chain as one of the cooperation types is often used (e.g. [108, 86]). Supply chain is described as a cooperation of companies who acting as customer and supplier to deliver an end-product to the consumer [108, 86]. For example, the customer buys raw materials and sell them processed in the next step as supplier to the customer of the value chain [108]. These activities can include production, storage, distribution, and delivery [108]. The most important task of the involved companies is to schedule the activities as efficiently as possible [12]. Orders must be correctly forecasted, and delivery dates must be planned according to their own capacity [12]. For this reason, the cooperation seeks to achieve three essential goals: reducing inventories, increasing capacity and shortening lead times [47]. The focus of such a cooperation is to manage the flow of materials [12, 47]. However, the term value-adding partnership (or value networks) is also often mentioned in the literature (e.g. [52]). A detailed examination reveals, that these two cooperation types differ in two aspects. In comparison to supply chain, value-adding partnership can strive for objectives such as increasing the use of the product for the customer and increase quality, while supply chain aims to gain operational goals in production and logistics with the use of information systems [47, 49]. Further, supply chain focus on the management of physical products [47]. According to Hagenhoff [47], supply chain can be seen as a subset of value-adding partnership. The term value-adding partnership was introduced by Johnston and Lawrence [52]. They describe value-adding partnership as "[...] a set of independent companies that work closely together to manage the flow of goods and services along the entire value-added chain."[52]. Although the literature often takes the view that this involves only vertical cooperation (e.g. [47]), Johnston and Lawrence [52] explicitly draws attention to the fact that horizontal cooperation orientation is also a potential form of cooperation. In the literature, the relation of supply-chain and value-adding partnership to enterprise networks is frequently addressed. Thoben and Jagdev [108] even go so far as to state that

supply chains often take the form of a network enterprise in practice. This approach of supply chain is also supported by Pires et al. [86]. They describe supply chain as "a network of autonomous or semi-autonomous companies [...]"[86]. Even Sydow [103] and Hagenhoff [47] comes to the conclusion that value-adding partnerships are a form of enterprise networks. In fact, Hess [49] classifies both as strategic networks due to their often stable and focal nature in practice.

Cooperation based on contracts and non-contractual cooperation

Besides the already mentioned types of cooperation, cooperations based on contracts are also frequently outlined in the literature. In this way collaborations between companies may be founded on the following contracts:

- License agreements: A license indicates the right of a company to use an invention or a technology, which is legally protected or unprotected [77]. The right of use is contractually regulated for a consideration or compensation [77]. Compared to technology sales, license agreements are long-term cooperation between licensees and licensors [78].
- Long-term supplier agreement/Subcontracting: Another term used in literature is subcontracting [102] or long-term supplier agreements [80]. In this context, a task is outsourced and transferred to a supplier. The selected supplier is legally independent and is responsible for carrying out the task on the basis of a long-term contract [102]. The aim of this cooperation is to increase flexibility, reduce production costs and risks [102, 80].
- Management contracts: Due to the numerous design possibilities, a clear definition of management contracts is difficult [32]. The focus of management contracts is on the process of cooperation including the interchanging and conducting activities together [32]. In management contracts, the duration of the cooperation does not have a major impact [32]. Instead, the aim of such a contract is the exchange of knowledge, personnel, and other resources [32]. By creating of working groups in various areas, it is intended to identify common standards and quality assurance features [32].

Non-contractual cooperation, simply imply that the relations between the companies are not contractually regulated [80]. The relation to the cooperation partners exists on a basis of trust [108]. It is important to note that such collaboration often refers to services or products that do not constitute the core business and are standards [108].

Research and development

Research and development (r&d) cooperation represents a widespread type of cooperation between organizations [33]. According to Rotering [94] the aim of r&d cooperation is the involvement of external technological knowledge. Fritsch and Lukas [33] conducted questionnaires in three different regions in Germany. Based on these results,

r&d collaboration can exist with different kinds of partners. Thus, partners can be customers, organizations and research institutions [33]. Backes-Gellner et al. [5] also identify universities as a further partner. The participating members retain their economic independence and agree to cooperate on a voluntary basis [5]. Another investigation of r&d cooperations in Germany shows that the most r&d cooperations assume a horizontal cooperation orientation of approximately 76%, while vertical only comprise 24% of all r&d cooperations [94]. However, another descriptive analysis conducted by Backes-Gellner et al. [5] in a random sample of 957 companies in Germany shows that only 27% of the organizations collaborate as r&d cooperations and that most of them are vertically oriented. Consequently, such types of cooperation can engage in both vertical and horizontal collaboration. Further, the results of Rotering [94] show that 50.7% of r&d cooperations are of an international nature. Regarding the number of cooperation partners at least two to seven and more have been observed [94]. Whereby most r&d cooperations tend to consist of a small number of partners such as two partners [94, 33]. Moreover, r&d cooperation can base on both long-term or short-term collaboration and may be contractual or non-contractual [94]. While long-term collaborations aim to reduce time, cost and development failures as well as increase competitiveness of the involved partners, the intention of short-term collaborations is minimizing the risks of r&d and develop an entire system [94]. Long-term collaboration occurs in the field of basic research, construction and application technology [94]. Compared to this, short-term collaboration deals with experimental development and applied research [94]. According to Rotering [94], usually an organization take the responsible to coordinate within the collaboration.

Concerns

The legal basis of concerns (§18 of Aktiengesetzes (AktG)) [3] describes them as a group of dependent companies under the leadership of one company. The participating companies are called group companies [3]. Legally independent companies also can form a concern [3]. However, they must be managed by a single management [3]. As a consequence of this, they are economically dependent [102]. Depending on the intensity of the cooperation, a distinction can be made between three legal bases: integration, contracted-based group, and factual concern [90]. The integration is the integration of the organization into another organization but with the aspect that the integrated organization maintains its legal independence [90]. A contract group includes a control agreement and is often limited in time [90]. In the case of a factual concern, the cooperation between two partners include the following conditions: There exists a dependency relationship, the dependent company is a corporation and the leading company has an influence on the other company [90]. Concerning the cooperation orientation, there exists no restriction. Accordingly, concerns can assume vertical, horizontal and diagonal cooperation [102].

Cartels

Cartels consist of legally independent companies which aim to hold a dominant market position and restrict competition [102, 108]. This restriction of competition is achieved

by setting prices, conditions, territories or sanctions [70]. However, according to §1 Abs. 1 GWB [38], it is not allowed to form cartels. Concerning the direction of cooperation, only horizontal cooperations are possible [70].

Community of interests

The aim of such an association is to represent and enforce the common interests of several companies [57].

Business ecosystems

In the context of networks, the concept of business ecosystem plays an increasingly important role. The business ecosystem was firstly introduced by Moore [76]. According to Moore [76] a business ecosystem is

> "An economic community supported by a foundation of interacting organisations and individuals - the organisms of the business world. This economic community produces goods and services of value to customers, who are themselves members of the ecosystem. The member organisations also include suppliers, lead producers, competitors, and other stakeholders."[76]

Therefore, a business ecosystem is characterized by a high degree of interconnectedness with the aforementioned members [71]. According to Moore [76], the health of the business ecosystem depends on a so-called keystone. However, Faber et al. [29] identify in their work the following 12 types of business ecosystem:

- Plattform business ecosystem
- Innovation ecosystem
- Software ecosystem
- Knowledge ecosystem
- Digital business ecosystem
- Mobility business ecosystem
- IoT business ecosystem
- Entrepreneurial ecosystem
- Internet business ecosystem
- Mobile internet business ecosystem
- Customer-centric business ecosystem
- Family spin-off business ecosystem

Clusters

Similar to business ecosystems, a cluster is according to Carrie [17] a form of a network, which includes companies, customers and supplier. Moreover, the network can involve materials, components, equipment, training, and finance [17]. All members constitute a part of the value-added process [12]. In addition, Porter [88] outlines the geographical proximity of the collaborated members in a cluster. A cluster focuses on a geographical location where the involved members concentrate on a specific area [87]. To gain competitive advantages, the members of a cluster exchange information and knowledge and combine specific activities such as research, marketing and IT [12].

Other forms of cooperation

As already mentioned, another cooperation type is the collaboration with **non-profit organizations** [109]. From the perspective of the organizations, it is motivated by 'culture-building', talent extraction, 'strategy enrichment' and social engagement [109]. In terms of the collaboration with companies, non-profit organizations achieve benefits regarding 'human resource management', increase in revenue and synergies [109]. Tian and Sun [109] differentiate between six types of collaboration with non-profit organizations based on the objective and purpose. They are corporate philanthropy, employee volunteer program, sponsorship of causes, cause-related marketing, joint issue promotion, and corporate charity fund [109]. **Catalytic alliances** are a type of network organization, which is similar to already know concepts such as alliances and inter-organizational networks [116]. Compared to these forms, catalytic alliances aim to achieve social changes in public by addressing social problems [116]. This will be achieved by using intensively media resources to raise awareness of a topic and encourage individuals and organizations to action [116]. Moreover, Waddock and Post [116] identify that catalytic alliances are network-oriented and vision-driven organizations. The identity of catalytic alliances is characterized by the operation of the headquarters and the media images [116]. Similar to catalytic alliances, **social partnership** is another type of cooperation, that deals with social problem-solving [115]. It is a cooperation type in which organizations from different industries interact voluntarily with each other and contribute resources in order to solve an issue [115]. The cooperation area may concern education, development of economic and technologies[115]. Social partnership differentiates from public-private partnership in the point, that it also can comprise more private sectors than a relationship between businesses and government agencies [115]. A main characteristic of the social partnership is that it addresses issues that cannot be resolved by a single company [115]. However, the structure of social partnership comes close to a network [115]. The **hallow network** presents transaction-based organizations, which have a highly volatile environment [19]. This type of network is suitable for organizations that have a variety of different segments and different customer needs [1]. It includes a network of suppliers and buyers [1]. Similar to hallow networks, **flexible networks** have also a highly volatile environment [19]. Flexible networks are based on long-term arrangement and are confessed in the asset specificity. The members of such a network have a collaborative relationship [19]. According to Thoben and Jagdev [108] **market transac-**

tion is a transaction-based cooperation between two partners. This collaboration can be related to credit worthiness and payment schemes [108]. Under the term **extended enterprise** Thoben and Jagdev [108] encompass a "[...] high-level of cooperation between organizations."[108]. A key factor for such a collaboration between organizations is the use of closely connected ICT systems [108]. Both organizations consider each other in their business plans in order to enable the exchange of operational information [108]. Therefore, extended enterprises based on long-term relationships and aim to achieve competitive advantages by reducing cost, time and increasing the quality of the product or service [108]. By being willing to extend their activities, the collaborated organizations share the same vision and goal as well as made together decisions [108]. However, regarding the management of an extended enterprise no clear statement has been made. Thus, extended enterprises can be hierarchical or non-hierarchical [108].

5. Case Study

This chapter presents the results of the multiple case study. It starts with the classification of the case study partners based on the findings from Chapter 4 in Section 5.1. Afterwards, the case study design and background information of the case study partners will be provided in Section 5.2. Finally, Section 5.3 deals with the results of the interviews.

5.1. Classification of Case Study Partner

The previous Chapter 4 introduced the forms and presented the characteristics of cooperation types. Based on the findings from the literature review, the two case study partners are classified according to the forms of cooperation in order to identify whether they are similar or different types of cooperation. In doing so, the morphological box from Chapter 4.3 is used for classification.

Characteristics	Possible specification			
Direction of cooperation	horizontal	vertical	diagonal/lateral	
Number of cooperation partners	2	> 2		
Interdependence of partners	low	high		
Time limit	limited	unlimited		
Objective limitation	limited	unlimited		
Aim of the cooperation	synergy potential	know-how transfer	economies of scale	market entry
Voluntariness of formation	obligation, law, market, coercion	voluntary		
Management	distributed	centralized		
Time frequency	unique	sporadic	regular	permanent
Space of cooperation	local	regional	national	international

Figure 5.1.: Characteristics of case study partner one

The first case study partner consists of eleven German organizations from the same industry. As a result of this, the direction of cooperation is horizontal and it is based on a national level. Moreover, it is a collaboration across several voluntary companies, which leads to an inter-organizational cooperation. The involved companies remain legally independent and are treated equally. Thus, cooperation is not managed by a company that coordinates the cooperation centrally. A regular meeting between the companies takes place to solve the tasks and present the results. However, the cooperation between the companies is restricted to an assignment that, if it is fulfilled, the group will dissolve. Due to this fact, the cooperation is limited in time and scope. The collaboration aims to exchange knowledge and to gain synergy profits by supporting each other and developing a collaboratively EAM, which can be applied in individual organizations. Figure 5.1 shows the morphological box according to the identified characteristics of the case

study partner one.
The second case study partner has a similar view (see Figure 5.2). The only difference to case study partner one is that case study partner two comprises four companies from four different countries. Consequently, the collaboration is an international cooperation.

Characteristics	Possible specification			
Direction of cooperation	horizontal	vertical	diagonal/lateral	
Number of cooperation partners	2		> 2	
Interdependence of partners	low		high	
Time limit	limited		unlimited	
Objective limitation	limited		unlimited	
Aim of the cooperation	synergy potential	know-how transfer	economies of scale	market entry
Voluntariness of formation	obligation, law, market, coercion		voluntary	
Management	distributed		centralized	
Time frequency	unique	sporadic	regular	permanent
Space of cooperation	local	regional	national	international

Figure 5.2.: Characteristics of case study partner two

By comparing the characteristics with the predefined cooperation types from Chapter 4.3, the two case study partners can be classified into the cooperation type of **working group** (see Figure 5.3).

Characteristics	Possible specification			
Direction of cooperation	horizontal	vertical	diagonal/lateral	
Number of cooperation partners	2		> 2	
Interdependence of partners	low		high	
Time limit	limited		unlimited	
Objective limitation	limited		unlimited	
Aim of the cooperation	synergy potential	know-how transfer	economies of scale	market entry

Figure 5.3.: Characteristics of working groups

5.2. Case Design

The multiple embedded case study was conducted in two working groups in collaboration with eleven public service media companies from three different countries in 2019. One working group comprises companies from the German media industry with the exception of one company from Switzerland, while the second working group encompasses public service media companies across Europe including Germany, Switzerland, England, and Belgium. Based on a semi-structured interview with four units of analysis including the reason for collaboration, the collaboration process, EAM and the role of an enterprise architect, 13 people were interviewed in total. All four topics were addressed in all 13 interviews. Throughout this master's thesis, the German working group will be abbreviated as GerWG and the transnational working group as InterWG.

Working group	ID	Organization	Type	Tool	Role	Experience in EAM	Duration
GerWG	I1	O1	Semi-structured Interview	Phone call	Enterprise Architect	6 - 10 Years	2h 2min
GerWG	I2	O2	Semi-structured Interview	Phone call	Enterprise Architect	3 - 5 Years	1h 11min
GerWG	I3	O3	Semi-structured Interview	Phone call	System Architect / Enterprise Architect	1 - 2 Years	1h 32min
GerWG	I4	O4	Semi-structured Interview	Phone call	Head of Department for Planning & Software Development	1 - 2 Years	0h 46min
GerWG	I5	O5	Semi-structured Interview	Phone call	Project Manager	1 - 2 Years	0h 40min
GerWG	I6	O6	Semi-structured Interview	Phone call	Enterprise Architect	3 - 5 Years	1h 16min
GerWG	I7	O6	Semi-structured Interview	Phone call	Enterprise Architect	1 - 2 Years	0h 48min
GerWG	I8	O7	Semi-structured Interview	Phone call	Head of Studio & Media Technology	1 - 2 Years	0h 37min
InterWG	I9	O8	Semi-structured Interview	Video call	Lead Broadcast Architect Enterprise	>10 Years	1h 10min
GerWG	I10	O9	Semi-structured Interview	Video call	Portfolio Manager	3 - 5 Years	1h 00min
GerWG	I11	O9	Semi-structured Interview	Video call	Portfolio Manager	1 - 2 Years	
GerWG	I12	O10	Semi-structured Interview	Phone call	Enterprise Architect	6 - 10 Years	0h 38min
InterWG	I13	O11	Semi-structured Interview	Video call	Enterprise Architect	6 - 10 Years	1h 22min

Table 5.1.: Overview of the interviews and interviewees

As already mentioned, the two groups were chosen as a suitable group for the study as they are involved in the field of enterprise architecture and encompass a collaboration mainly between the role of an enterprise architect. The abbreviations O1, O2, O3, O4, O5, O6, O7, O8, O9, O10, and O11 are used to describe the different organizations (see Table 5.1). The interviewees will be cited by their assigned IDs, performed role and corresponding organization.

5.2.1. Background Information about Working Groups and Organizations

The eleven organizations mentioned above are all independent companies. Table 5.2 provides a detailed overview of the interviewed organizations related to member of working group, location, and number of employees in the organization. Even though they are engaged in the same industry, namely the media industry, the companies do not consider each other as direct competitors in terms of the definition from Chapter 2.1. This is due to the fact that both the companies of GerWG and InterWG are serving different target groups and geographically separate target markets (I2, Enterprise Architect, O2; I3, System Architect/Enterprise Architect, O3; I4, Head of Department for Planning & Software Development, O4; I13, Enterprise Architect, O11). Another reason for a not classical competitor relationship is the financing of the companies, which based on fee payments from the population (license fee) (I10, Portfolio Manager, O9). Nevertheless, to a certain point, there is also a competitive behavior between the companies. This arises at the program level, for example, when new and innovative ideas achieve a reputation among customers (I6, Enterprise Architect, O6). However, due to the fact that seven of the eleven companies, namely O1, O3, O4, O5, O6, O7, and O9, are part of a consortium in Germany, they are committed to cooperate together (I6, Enterprise Architect, O6). The consortium is made up of eleven companies from the German media industry. The aim of the consortium is to provide a wide range of television and radio programs collaboratively. The Top-IT Management of the consortium, which consists of the participating companies' directors, commissions several working groups within the consortium like collaboration projects in the area infrastructure, production technology, standardization of IT landscape, IT security and multimedia planning (I1, Enterprise Architect, O1; I4, Head of Department for Planning & Software Development, O4; I8, Head of Studio & Media Technology, 07). In the scope of this master's thesis, one of those cross-company working groups, the **GerWG**, is in focus of interest. Additional to the eleven companies from the consortium one public service media company from Switzerland, a research institution and another notable public service media company from Germany are also members of this working group GerWG as so-called associated members (I3, System Architect/Enterprise Architect, O3).
After the first step in June 2016 and a subsequent meeting with companies who had already made progress with the EAM initiative in their own company, the working group GerWG was officially founded in April 2018 (I1, Enterprise Architect, O1; I10, Portfolio Manager, O9). Thus, the working group is in the initial phase.
The second working group **InterWG** is located within a European association of public service media companies. This association consists of 70 members from 56 countries. In the context of this master's thesis, the focus is set on the business capability model

working group, which comprises companies from Germany, England, Switzerland and Belgium. Compared to the GerWG, which has the Top-IT Management as its principal, the InterWG is the result of action by individual members of the association to exchange knowledge on a voluntary basis. Since, the InterWG has started in August 2018, the working group is also in the initial phase, similar to the GerWG (I9, Lead Broadcast Architect Enterprise, O8).
In both working group the additional costs incurred within the scope of the cooperation, e.g. for travel to meetings, are borne by each of the companies individually.

Working group	Interviewed organizations	Location	No. of employees
GerWG	O1	Germany	approx. 4300
	O2	Switzerland	approx. 5000
	O3	Germany	approx. 2500
	O4	Germany	approx. 2500
	O5	Germany	approx. 3000
	O6	Germany	approx. 5000
	O7	Germany	approx. 700
	O9	Germany	approx. 6000
	O10	Germany	>1000
InterWG	O8	England	approx. 24000
	O11	Belgium	approx. 2000

Table 5.2.: Details of interviewed organizations

5.3. Results of the Case Study

This section outlines the results of the interviews. It aims to address the RQ3 and is divided into four units of analysis, as described in Chapter 1. Starting with the reason for collaboration beyond company boundaries in Section 5.3.1, the process of cooperation including meetings is subsequently given in Section 5.3.2. The third section focuses on EAM in a collaboration. Finally, the traditional role of an enterprise architect in the context of cooperation in the field of EAM will be discussed. The corresponding interview guideline can be found in Appendix A.1.

5.3.1. Reason for the Collaboration

Driving forces and triggers for collaboration

The interviewees reveal in total 17 driving forces and triggers for collaboration in the field of EAM. The following Table 5.3 presents the identified reasons sorted by descending relevance. Compared with the table, Figure 5.4 highlights the reasons for the collaboration of each working group.
The main trigger is the **opportunity to reveal IT cost-saving** aspects, which was mentioned by nine interviewees. After an analysis of the finances by an external company, the need for the companies to save costs was recognized (I1, Enterprise Architect, O1; I3, System Architect/Enterprise Architect, O3). With the means of the EAM and with the cross-border working group, the organizations endeavor to find potential for reducing costs in their own organizations (I2, Enterprise Architect, O2; I4, Head of Department for Planning & Software Development, O4). This could be achieved by **identifying potential cooperation projects** (e.g in the procurement of working materials), which was named as a further trigger by four interviewees (I1, Enterprise Architect, O1). Moreover, as mentioned in Section 5.2.1 the principal of the collaboration in the working group GerWG is the **Top-IT Management** of the consortium. This was also one of the driving forces for working collaboratively in the field of enterprise architecture (mentioned by five interviewees) (I3, System Architect/Enterprise Architect, O3). A further main trigger for collaboration is the **tradition of cooperation across the companies**. The consortium in which the working group GerWG is located has a tradition to collaborate with other organizations from the same industry. Therefore, the organizations have already worked together in different areas (I6, Enterprise Architect, O6). However, the idea of collaboration in the area of EAM was mainly **driven by a research institution** of the working group GerWG, to be precise by the initiative of one employee. In this process, two events played an important role in the development of the cooperation as pioneers, where the topic presented and discussed (I2, Enterprise Architect, O3; I4, Head of Department for Planning & Software Development, O4). In addition to the mentioned two reasons Top-IT Management and research institution, that led to the development of the cooperation, the **previous working group** in the area of reference architectures or system architecture laid the foundation for this working group in the field of EAM (I3, System Architect/Enterprise Architect, O3; I4, Head of Department for Planning & Software Development, O4). Three participants even mentioned as a reason for collaboration the desire to **increase efficiency among each company**. Another trigger is the **increasing exchange of experience and communication** between the organizations, which leads to an **increase cooperation**. In this context, the exchange of **knowledge and experiences during the introduction of EAM** plays a crucial role for the members of the working group. Each of the following triggers for collaboration in the area of EAM are only mentioned by two or one interviewee: **improve the IT Management in individual organization** by introducing and applying the methodical approach of EAM, **increase transparency and reduce silos**, **handle increasing IT complexity**, **methodical support for a common understanding by using EAM**, and **identify opportunities for standardization and establish a reference architecture**. The trigger **conference presentation** is

the reason why the cross-national cooperation was created. The presentation of the way of working and the tools used within the own organization led to a discussion which later resulted in the cooperation. Another interesting reason for collaboration only mentioned by one interviewee is the desire to **achieve a widely accepted model within the industry** and consequently also the potential of the broad use of the model in one's own company (I9, Lead Broadcast Architect Enterprise, O8). However, the importance of collaboration was expressed by one interviewee:

> "*Two heads are better than one. Two think more than one. Four ears hear more than two.*"(I10, Portfolio Manager, O9)

Triggers and driving forces	Mentioned by no. of interviewees
Reveal IT cost-saving opportunities	9
Top-IT Management	5
Tradition of cooperation across the companies	4
Identify and support potential cooperation projects	4
Increase efficiency among each company	3
Driven by research institution	3
One working group served as a pioneer	3
Increase exchange of experience and communication	2
Increase the cooperation between the companies	2
Knowledge and experience sharing during introduction of EAM	2
Increase transparency and reduce silos	2
Identify standardization opportunities and establish a reference architecture	2
Improve IT Management in individual organization	1
Handle increasing IT complexity	1
Methodical support for a common understanding of the business by using EAM	1
Conference presentation	1
Achieve a widely accepted model within the industry	1

Table 5.3.: Overview of reasons for collaboration

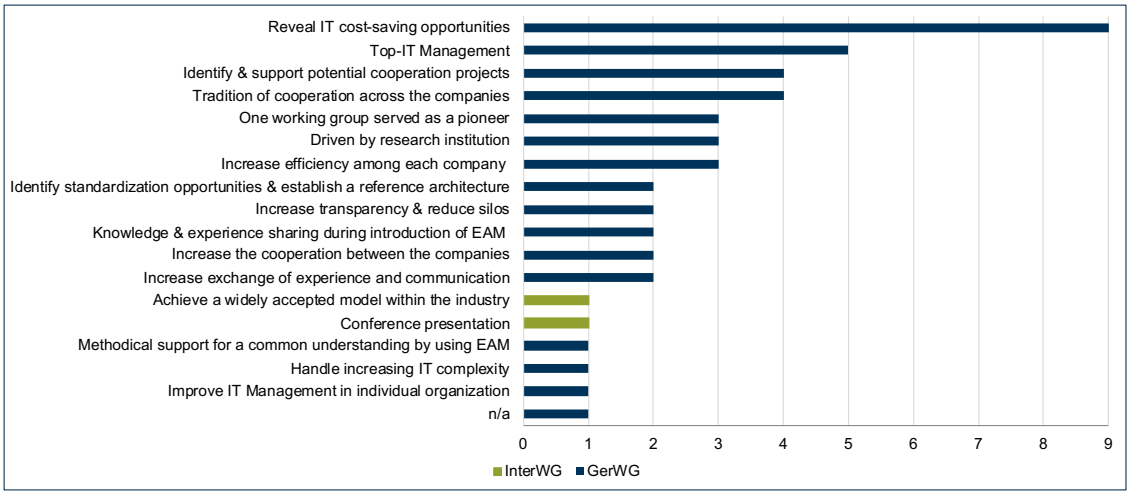


Figure 5.4.: Overview of reasons for collaboration according to GerWG and InterWG

Aim of the collaboration

The GerWG strives for seven main goals. Table 5.4 shows in descending order the identified goals mentioned by the interviewees. With 64% of the interviewees from the working group GerWG name the **identification of cost-saving opportunities** as the main objective. The benefit of cost-saving and reduction should be achieved by increasing efficiency and **identifying cooperation projects**, which is mentioned by 27% of the interviewees as an aim of the collaboration (I11, Portfolio Manager, O8; I3, System Architect/Enterprise Architect, O3). This includes for example to determine an organization to purchase specific products or systems in order to enable a cost-benefit (I1, Enterprise Architect, O1). Moreover, the organizations within the working group seek to **create comparability and adaptability** among the organizations with 45%. This will be given by establishing a common understanding related to EAM topics, to the collaboration itself, to what the own organization does and by achieving transparency (I3, System Architect/Enterprise Architect, O3). The adaptability of the organizations should be ensured by the fact, that they represent organizations from the same industry and should therefore perform similar tasks (I4, Head of Department for Planning & Software Development, O4).
Especially, for the members of the collaboration it is attractive to see the added value of EAM and potentially adapt concepts and deliverable of EAM to their own organizations (I8, Head of Studio & Media Technology, O7). A specific aim of the collaboration is to **establish a common EAM methodology** like identifying common EAM tools, including same configuration and common understanding of terminologies (I1, Enterprise Architect, O1; I3, System Architect/Enterprise Architect, O3) and **developing a common application landscape** with 18%. Only single interviewees outline goals related to the collaboration like **encourage exchange** within the collaboration, including data exchange and to **support each other** (I3, System Architect/Enterprise Architect, O3; I12, Enterprise Architect, O10). In particular, the goal of supporting each other in a highly

complex area such as EAM with regard to the manpower of the other companies is an important aim of the cooperation (I12, Enterprise Architect, O10). Due to the fact that the working group deals with EAM, it serves for this purpose to support other cooperation projects.
Compared to the working group GerWG, the working group InterWG mentioned two main goals regarding their collaboration (see Table 5.5). The first goal is to **establish a business capability model** of a media company. This capability model should serve as tool to support media companies (I13, Enterprise Architect, O11). The second goal, that was named is the **improvement of own developed concepts**. By working collaboratively, the own perspective can be broadened and the own work, that was developed in the own organization can be enhanced (I9, Lead Broadcast Architect Enterprise, O8).

Aims of GerWG	Mentioned by interviewees (rounded up in %)
Identification cost saving opportunities	64 %
Creation of comparability and adaptability	45 %
Identification and support of cooperation projects	27 %
Establishment of a common EAM methodology	18 %
Development of a common application landscape	18 %
Encourage exchange and communication between organizations	18 %
Support each other	09 %

Table 5.4.: Overview of the GerWG's objectives in collaboration sorted by relevance

Aims of InterWG	Mentioned by interviewees (rounded up in %)
Establishment of a business capability model	50 %
Improvement of own developed concepts	50 %

Table 5.5.: Overview of the InterWG's objectives in collaboration sorted by relevance

Supporters and opponents of the cooperation

Based on the results of the semi-structured interviews the following two main roles could be identified in the GerWG:

- Head of Department/Director of Department, including Middle Management, Supervisor and Decision-maker,
- Directly affected roles (i.e. roles in operational areas).

The role Top Management was explicitly provided by the interview guideline. Table 5.6 summarizes organizations' views on whether the roles support (S) cooperation, reject (O), or no clear statement could be made and the role has divided opinions (S/O). However, the table does not contain any information on whether these roles explicitly reject or support the cooperation in the mentioned organizations. It is more a general overview on the viewpoint of the roles.

	Role		
Organization	**Top Management**	**Head of Department / Director of Department**	**Directly affected roles**
O1	S/O	S/O	n/a
O2	S	O	O
O3	n/a	n/a	n/a
O4	S	S	n/a
O5	S/O	O	O
O6	S/O	S	n/a
O7	n/a	n/a	n/a
O8	n/a	S	n/a
O9	S	n/a	O
O10	S	n/a	n/a
O11	S/O	S	n/a

Table 5.6.: Overview of support and opponents of the collaboration

As already mentioned in Section 5.2.1, the Top-IT Management of the consortium, which includes the Heads of Departments from the different organizations, forms the principal of the GerWG. Due to this fact the interviewees mostly agree that they are supporters of this collaboration. However, in some companies the organizations observe that the Head of Department tend to assume a more rejective approach like in O2 and O5 (I2, Enterprise Architect, O2; I5, Project Manager, O5). Roles that are directly confronted with the cooperation and changes, e.g. in operational or service areas, also have a negative attitude towards the collaboration (I2, Enterprise Architect, O2; I5, Project Manager, O5; I11, Portfolio Manager, O9). Three of the interviewed organizations, namely O3, O7 and O10 could not identify a specific role, which could support or refute the collaboration.
The interviewees were also explicitly asked for their view of the Top Management. The IT-sided top management is clearly a proponent of the cooperation and offers its resources (I1, Enterprise Architect, O1; I7, Enterprise Architect, O6), while the top management on the business side is not aware of the existence of the collaboration. This is explained by the fact, that the GerWG is located on the IT Management level (I10, Portfolio Manager, O9). However, because of the tradition to cooperate within the consortium of the GerWG, the top management is by nature not opposed to collaboration projects (I12, Enterprise Architect, O10). A similar aspect is provided by the InterWG.

The top management is not aware of the collaboration between the organizations, but the Top Management see the results and deliverable of this collaboration (I13, Enterprise Architect, O11).
The reason for supporting the cross-border working group is, on the one hand, for the supporter to see the added value of collaboration to be convinced that the collaboration brings along an overall benefit on a long-term for all of the organizations by exchange of knowledge and experiences (I1, Enterprise Architect, O1; I5, Project Manager, O5; I12, Enterprise Architect, O10). Further, the organizations recognize the importance of a functioning EAM, which also support the cooperation projects within the consortium (I6, Enterprise Architect, O6). In the following Table 5.7 an overview of the reasons for supporting the cooperation is listed.

Reasons for support
Expectation of value and benefits for the individual organization
Recognize the importance of a functioning EAM
Positive exchange of knowledge and experience

Table 5.7.: Overview of reasons for support

On the other hand, a negative attitude towards the cooperation arises due to instructions from higher levels (see Table 5.8). Moreover, some organizations take the position to be independent and autonomous. Hence, they are not willing to suffer any disadvantages that might occur from the cooperation (I1, Enterprise Architect, O1). As a result of the changes the collaboration entails by adapting for example EAM practices including efficiency-raising measures, this may lead to additional work or omission of activities. Therefore these changes are not always welcomed (I2, Enterprise Architect, O2; I6, Enterprise Architect, O6). Moreover, the viewpoint of strategy is in the operational area seen as bad, because business has priority over strategy (I5, Project Manager, O5). Another reason is the highly abstract nature of EAM, which makes it difficult for the organization's employees to understand EAM and their value, as EAM's advantages can not be seen directly (I11, Portfolio Manager, O9). For this reason, the organizations do not necessarily want to allocate resources to it (I5, Project Manager, O5; I6, Enterprise Architect, O6).
In summary, the involved members of the working group GerWG act depending on whether the collaboration is supported or rather rejected by their own organization. This influence is also noticeable in the collaboration. Some companies tend to keep a low profile, while others invest a lot of time and energy in the cooperation (I1, Enterprise Architect, O1). Equally important is, that the working groups are still in the initial phase and therefore the cooperation and the EAM function is not yet fully understood in the individual organizations (I6, Enterprise Architect, O6). As a consequence it was difficult for them to judge the supporters and opponents of the collaboration.

Reasons for rejection
Difficult for employees to understand the concept behind EAM
View of "we are independent companies"
No direct benefits from the collaboration visible
Too much effort compared to the expected benefits
Operation before strategy
Resistance against changes
Instructions from a higher level

Table 5.8.: Overview of reasons for rejection

5.3.2. Collaboration Process

Basics of meetings

Neither the working group GerWG nor the InterWG follow a specific structure. The structure of the GerWG does not represent a hierarchy (I8, Head of Studio & Media Technology, O7). However, the GerWG includes a leader/coordinator who assumes the coordinating role and is responsible for the following tasks:

- Coordination of the working group,
- Moderation in the working group,
- Setting of the agenda,
- Preparation of the meetings,
- Creation of the protocols,
- Communication of decisions as well as information to other committees (I1, Enterprise Architect, O1; I2, Enterprise Architect, O2; I5, Project Manager, O5, I11, Portfolio Manager, O9).

All other members are treated equally and form a team (I1, Enterprise Architect, O1; I2, Enterprise Architect, O2; I4, Head of Department for Planning & Software Development, O4; I7, Enterprise Architect, O6; I11, Portfolio Manager, O9). Besides, the ”usual” members, the working group includes so-called associated members. These associated members are not affiliated with the consortium but are members of the working group to exchange experiences and expertise, which also means they have no voting rights (I3, System Architect/Enterprise Architect, O3). In addition, further small sub-groups are

being formed within the working group in order to work collaboratively on certain topics (I4, Head of Department for Planning & Software Development, O4; I6, Enterprise Architect, O6).
The InterWG takes a similar approach: This working group also does not contain any hierarchy and has only one position coordinating the collaboration including the following tasks:

- Setting the agenda,
- Organizing the meetings,
- Solving issues,
- Delivering the results (I13, Enterprise Architect, O11; I9, Enterprise Architect, O8).

However, compared to the GerWG, the InterWG is a sub working group of a working group (I9, Lead Broadcast Architect Enterprise, O8). Both the GerWG and the InterWG have presence meetings with all participating organizations which take place quarterly over 1-2 days (I1, Enterprise Architect, O1; I2, Enterprise Architect, O2; I13, Enterprise Architect, O11). If there are concrete topics that concern all members of the group, virtual meetings are also occasionally scheduled (I1, Enterprise Architect, O1). In addition to the presence meetings, there may be other frequent virtual meetings of the sub-groups of the GerWG (I1, Enterprise Architect, O1; I6, Enterprise Architect, O6). Different to the GerWG, the InterWG also has fixed bi-weekly meetings among all group members which takes place virtually over 2-3 hours (I13, Enterprise Architect, O11; I9, Lead Broadcast Architect Enterprise, O8). Table 5.9 summarizes the properties of the meetings of the two working groups.

	GerWG	InterWG
Structure of the meetings	No specific structure: • One leader/coordinator • Members are equally • Includes associated members	No specific structure: • One leader/coordinator • Members are equally
Design of the meetings	Physically meetings, Virtually meetings	Physically meetings, Virtually meetings
Frequency & duration	Physically meetings: once per quarter over 1-2 days Virtually meetings: frequently in sub-groups, occasionally in working group	Physically meetings: once per quarter over 1 day Virtually meetings: every second week over 2-3 hours
Other characteristics	Includes small sub-groups on certain topics	Is a sub working group of a working group

Table 5.9.: Details of the working group GerWG and InterWG

Topics in the meetings

In total, ten main topics could be identified from GerWG's meeting (see Table 5.10). Firstly, the GerWG discussed topics related to the collaboration, which comprise the aim of the collaboration, the tasks to achieve this goal, guidelines, the nature of the cooperation and opportunities for collaboration (I2, Enterprise Architect, O2; I7, Enterprise Architect, O6). A main topic in the meetings is the establishment of a common

Topics	
GerWG	**InterWG**
Business capability model	Business capability model
Topics related to EAM tool	
Establishment of a common understanding	
Architectural principles	
Reporting the current status in individual organizations	
Application landscape	
Topics related to collaboration	
Representing the results of the sub-groups	
Mutual support	
Special topics	

Table 5.10.: Overview of the addressed topics in GerWG and InterWG

understanding concerning EAM and terminology, for instance, defining applications (I1, Enterprise Architect, O1; I5, Project Manager, O5; I7, Enterprise Architect, O6). This ensures the same level of knowledge and understanding of the EAM with all participants of the working group (I7, Enterprise Architect, O6). Moreover, specific topics are addressed and discussed including business capability models, architectural principles and application landscape (I1, Enterprise Architect, O1; I3, System Architect/Enterprise Architect, O3; I4, Head of Department for Planning & Software Development, O4; I5, Project Manager, O5; I6, Enterprise Architect, O6; I7, Enterprise Architect, O7; I11, Portfolio Manager, O9; I12, Enterprise Architect, O10). Another topic in the working group is the used EAM tool (I3, System Architect/Enterprise Architect, O3; I1, Enterprise Architect, O1; I8, Head of Studio & Media Technology, O7). In particular, modeling in the tool, experiences regarding documentation and usage are shared (I1, Enterprise Architect, O1; I6, Enterprise Architect, O6). The members are acting as a user group by commenting on the work (I1, Enterprise Architect, O1). The individual organizations also report their current status related to the introduction of EAM in their organizations and represent projects of the single organizations (I1, Enterprise Architect, O1; I4, Head of Department for Planning & Software Development, O4). In this part, both the challenges faced by the members and the achieved successes are outlined. Due to this reporting, the members of the working group gain an overview of what happens in other organizations, what works well and where to provide mutual support (I6, Enterprise Architect, O6). Moreover, topics related to the subgroups and their results are presented (I4, Head of Department for Planning & Software Development, O4). A further significant part of the meetings is the mutual support between the members. This includes the training of others by those who have dealt with the subject matter extensively (I1, Enterprise Architect, O1). Finally, special topics are also considered in the working group, which

assumes general topics such as networking of systems and data objects (I6, Enterprise Architect, O6).
Only one topic was mentioned by the interviewees from the InterWG. They discuss the development of a collaboratively business capability model, including the definition of vocabulary and the description of activities (I13, Enterprise Architect, O11; I9, Lead Broadcast Architect Enterprise, O8).

Expected outcomes of the meetings

Table 5.11 shows the expected outcomes of the meeting from the GerWG in descending order. The interviewees (by five of eleven interviewees) point out that the exchange of experiences is an important expected result of these meetings. The aim is to learn from each other's experience concerning problem-solving, awareness of possible barriers, demonstrating best practices from individual organizations, identifying standards and challenges (I2, Enterprise Architect, O2; I3, System Architect/Enterprise Architect, O3; I6, Enterprise Architect, O6). In addition, the exchange of experiences provides an update on how far an organization is with the introduction of EAM and where each company sets its priorities (I7, Enterprise Architect, O7). These topics are not necessarily specific to EAM, but could possibly be supported by the group (I6, Enterprise Architect, O6). Additionally, there are more concrete expected deliverables such as business capability models, application landscape, modeling conventions, architectural principles and the development of a shared standard, which serves as a reference architecture, can be applied in the participating companies, and is binding (I3, System Architect/Enterprise Architect, O3; I4, Head of Department for Planning & Software Development, O4; I8, Head of Studio & Media Technology, O7; I11, Portfolio Manager, O9; I12, Enterprise Architect, O10). Surprisingly, only one interviewee mentioned the deliverable application landscape as an expected outcome although it is the order of the working group. As described in section "topics in the meetings", the expected outcome also includes that all members should have at the end of the meetings a common understanding of the topics that are addressed and discussed in the meetings (I1, Enterprise Architect, O1; I2, Enterprise Architect, O2). It is also expected that at the end of each meeting the next steps and actions which have to be taken until the next meetings are clearly stated (I1, Enterprise Architect, O1).
The identifying of systems and technologies which could be purchased together is another expected outcome (I7, Enterprise Architect, O7; I8, Head of Studio & Media Technology, O7). Furthermore, it is expected to support each other in the methodology of EAM including the support in the use of the tool (I3, System Architect/Enterprise Architect, O3; I12, Enterprise Architect, O10; I6, Enterprise Architect, O6). One interviewee noted that EAM in the granularity as it happens in the working group is not practicable in their own company (I12, Enterprise Architect, O10). Only by one interviewee, the achieving of functional transparency was mentioned. By using uniform terms and defining business capabilities comparability and consequently, functional transparency can be obtained (I3, System Architect/Enterprise Architect, O3). Also, only one interviewee has mentioned the strengthening of EAM in the individual organizations as an expected outcome. In the working group, the members are aware that EAM is an im-

portant method and that it is an asset for the organizations, although no immediate results can be obtained. Based on the high effort at the beginning of the introduction of EAM and the fact that the enterprise architects alone cannot afford it, the support of employees with expert knowledge is required in the company (I5, Project Manager, O5). However, this indicates the current lack of awareness of the relevance of EAM and the lack of support in the individual organizations. Moreover, an expected outcome is to set a shared vision for the future by defining further opportunities for cooperation in some areas (I7, Enterprise Architect, O7). Finally, for one interviewee is the exchange of data, an important part when it comes to the expected outcomes of the meetings (I2, Enterprise Architect, O2).
In the InterWG, the expected outcome of the meetings is to have a business capability model, which includes explanations and a glossary, just like their defined topics intend (see Table 5.12) (I13, Enterprise Architect, O11; I9, Lead Broadcast Architect Enterprise, O8).

GerWG	
Expected outcomes	**Mentioned by no. of interviewees**
Exchange of experiences	5
Business capability model	4
Deliver a shared Standard	4
Support with EAM including usage of the Tool	3
Have a common understanding	2
Purchase systems and technologies together	2
Architectural principles	2
Identify next steps (to-do's)	1
Exchange of data	1
Achieve functional transparency	1
Development of a common as-is application landscape	1
Strengthen EAM in the organizations	1
Modeling conventions	1
Set a shared vision	1

Table 5.11.: Expected outcomes of GerWG sorted by relevance

InterWG	
Expected outcomes	**Mentioned by no. of interviewees**
Business capability model	2

Table 5.12.: Expected outcomes of InterWG sorted by relevance

Benefits of the collaboration

The interviewed organizations were asked about the benefits of cooperation with other companies. In overall the eight benefits are identified from the interviews (see Figure 5.5). In descending order of relevance, the following benefits were mentioned:

- **Exchange of personal and professional experiences (mentioned by nine interviewees of GerWG):** The members share experiences with each other by answering what has worked, what has not worked so well, what are the advantages and disadvantages of certain methods and what the requirements of EAM in each organization are (I1, Enterprise Architect, O1; I2, Enterprise Architect, O2; I7, Enterprise Architect, O6). Due to the exchange, they will be encouraged to think outside the box and gain a broader point of view (I7, Enterprise Architect, O6). This exchange does not only have to take place in relation to enterprise architecture but can also refer to plans and projects that are started in the individual companies (I7, Enterprise Architect, O6)

- **Learn from others (mentioned by four interviewees of GerWG):** This includes the learning from the team members like gaining different approaches (I1, Enterprise Architect, O1). Additionally, this leads to self-improvement and self-reflection (I3, System Architect/Enterprise Architect, O3). Especially, for the associated members, the learning from the working group is an important advantage. They observe the approaches and contribute ideas which can then be tested in practice by the working group without binding impacts on the own organization (I2, Enterprise Architect, O2).

- **Benefit from other works (mentioned by four interviewees of GerWG):** The members of the working group work on different tasks within their organizations or within the working group. Thus, certain works are pushed forward or made available by the organizations. In this way, the members benefit from the work of others such as providing specific architectural principles (I1, Enterprise Architect, O1; I8, Head of Studio & Media Technology, O7). With regard to the associated members, they are also benefit by adopting the ideas of the working group for their own company (I2, Enterprise Architect, O2).

- **Save time (mentioned by three interviewees of GerWG):** By reusing the work results or part of the work provided by the members as well as to avoid reinventing

things, time can be saved and leads to more efficient working (I1, Enterprise Architect, O1; I6, Enterprise Architect, O6; I8, Head of Studio & Media Technology, O7).

- **Get support with specific questions and problems (mentioned by two interviewees of GerWG):** Within the collaboration, the members support each other and act as a contact person for specific areas, in which one or the other is more familiar with (I6, Enterprise Architect, O6).
- **Maintain accepted standards and models (mentioned by two interviewees of GerWG and InterWG):** One respondent mentioned that standards and frameworks gain more acceptance within the organization if they are already applied within several organizations. This can otherwise only be achieved by obtaining external consulting services, which are usually assigned higher credibility and higher priority than the company's own developments. This comprises the issue of the prophet without honor in its own land. In particular, at the current maturity level of EAM the cooperation can be beneficial (I3, System Architect/Enterprise Architect, O3). The same aspect is provided by another organization. By means of the collaborative development within a large association of a model, it will gain more reputation (I9, Lead Broadcast Architect Enterprise, O8)
- **Increase development of EAM (mentioned by two interviewees of GerWG):** The development of EAM is accelerated by the cooperation and contribution of all organizations (I5, Project Manager, O5; I6, Enterprise Architect, O6). Without the input of others, some activities, like the creation of a shared application landscape, would not be possible (I4, Head of Department for Planning & Software Development, O4). The collaboration provides a benefit for the members in so far as it is not possible to work on the topic in such a high level of granularity in their own companies as it is given in the working group (I12, Enterprise Architect, O10).
- **Gain higher quality of work (mentioned by two interviewees of InterWG):** This comprises the benefit of a higher quality and the improvement of already existing models by providing a more sharper and complete version (I13, Enterprise Architect, O11; I9, Lead Broadcast Architect Enterprise, O8).

While the organizations in the GerWG mentioned seven of the nine benefits, the InterWG brings up two benefits of "gaining a higher quality" of already developed models and "maintain accepted standards and models". This can be explained by the fact that the GerWG works together in more areas of EAM and that some of the involved organizations in the GerWG are still in the process of introducing EAM. In the InterWG, on the other hand, the companies only work together in the area of creating a business capability model, which was already developed in their own company.

Challenges of the collaboration

In the following, the nine challenges which have been observed across the two working groups are listed in the descending order by relevance (see Figure 5.6):

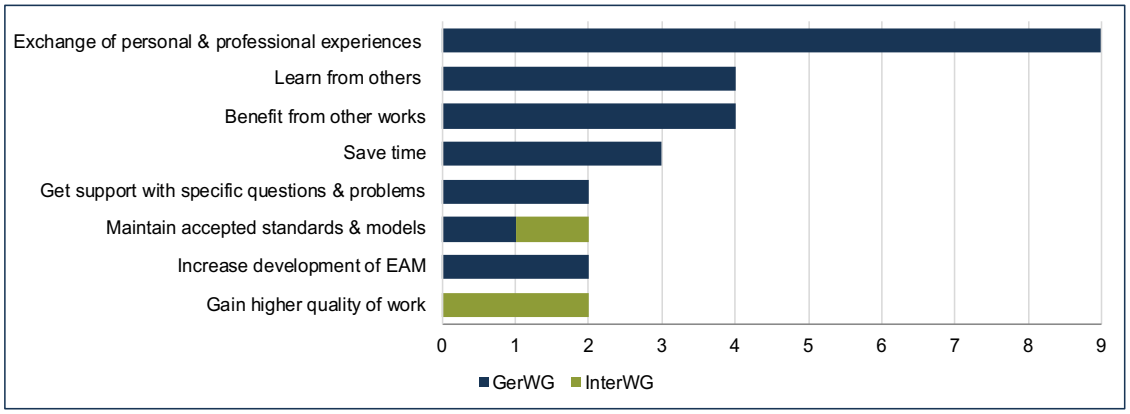


Figure 5.5.: Benefits of collaboration across GerWG and InterWG

- **Lack of resources:** The lack of resources is named by the interviewees as a major challenge. This includes the additional time effort for the preparing of supplemental work for the working group and financial support (I4, Head of Department for Planning & Software Development, O4; I6, Enterprise Architect, O6; I7, Enterprise Architect, O6; I3, System Architect/Enterprise Architect, O3). It is also stated that due to a lack of resources, the interests of the companies in the working group cannot always be considered. In such a case, the own work in the company takes precedence (I6, Enterprise Architect, O6).

- **Accessibility of comparability:** The comparability among the organizations is seen as another challenge within the collaboration (mentioned by three interviewees of the GerWG). Despite existing modeling conventions for the EAM tool and the attempt to create a consistent understanding, there is still enough room for individual interpretation, which hinders the comparability across organizations. Even the individual development of EAM in the own companies contributes to the various results and interpretations (I6, Enterprise Architect, O6). The consequence of this is that works in the collaboration will then drift apart and requires correction (I6, Enterprise Architect, O6; I11, Portfolio Manager, O9).

- **Conflict of interest between company and collaboration:** Another challenge, mentioned by two interviewees is the conflict of interest between the own organization and the collaboration. Although it is pointed out that this phenomenon does not occur frequently, this made the collaboration more difficult when members of the working group receive a delegation or instruction from a higher authority in their organization, which does not support the interest of the collaboration (I1, Enterprise Architect, O1). This can also be observed in the meetings, where some organizations have made more progress while other organizations are lagging with their tasks (I2, Enterprise Architect, O2).

- **Different levels of knowledge:** Two interviewees of the GerWG see the different states of knowledge as a challenge. In the working group, the level of knowledge

ranges from very experienced to complete beginners, who have almost no previous knowledge in the field of EAM. The design of the meetings must take this fact into account (I1, Enterprise Architect, O1). The knowledge deficits are of methodological and technical nature. In particular, the methodological issues comprise the organizing of a working group, keeping a working group together and achieving collaborative results within a working group (I2, Enterprise Architect, O2).

- **Consensus finding:** The sophisticated challenge of finding a common agreement with regards to decisions among companies was raised by both working groups. Naturally, the involved companies would like to represent and enforce their own interests in the working group. However, the challenge is to find an overall solution with which all organizations are satisfied (I7, Enterprise Architect, O6). This challenge also occurs by trying to bring people to think outside their already developed models and agree on a decision (I9, Lead Broadcast Architect Enterprise; O8).

- **Different languages:** Due to the transnational collaboration the members of the InterWG, stated the issue regarding the language. The collaboration is conducted in English but the involved organizations are from different countries with different national languages. In this context, English is not necessarily the first language of all members which leads to problems including not understanding or/and misunderstanding of the meaning of certain words, which play an important role for the modeling (I13, Enterprise Architect, O11; I9, Lead Broadcast Architect Enterprise; O8). This problem also arises when it comes to sharing information such as documentation, as most documents are in the local language (I13, Enterprise Architect, O11).

- **Imbalance within collaboration:** One interviewee recognized the imbalance within the working group as an additional challenge. As partly addressed in the challenge "lack of resource", some companies contribute more to the cooperation by providing preliminary work than others. Nevertheless, it is an aspect that has not yet been assessed negatively by the members of the cooperation (I12, Enterprise Architect, O10).

- **Poor personal relations:** The personal connection to the members in the collaboration was mentioned by one interviewee. In this respect, it needs time and a physical kick-off to get to know each other and get deeper into the work of each member (I13, Enterprise Architect, O11). As a consequence is the poor personal relation to the members.

- **Different state of EAM in the companies:** One participant of the GerWG noticed, that the application of EAM in the individual companies is at different stages. This can be explained by the fact that the individual members of the working group are located at different levels in their organizational hierarchy. In this way, a Head of Department is better able to promote EAM than an employee in a lower level of the hierarchy (I4, Head of Department for Planning & Software Development, O4).

In summary, the InterWG faces challenges predominantly in the three area regarding language, personal connection and finding consensus, while the GerWG addresses seven of the nine challenges, namely "different levels of knowledge", "different state of EAM in the companies", "conflict of interest between company and collaboration", "lack of resources", "accessibility of comparability", "consensus finding" and "imbalance within collaboration". Surprisingly, three of the interviewees admitted that they did not notice any challenges within the collaboration and that the collaboration is going well:

> *"No, I don't see any problems. Works fine, actually."*(I5, Project Manager, O5)

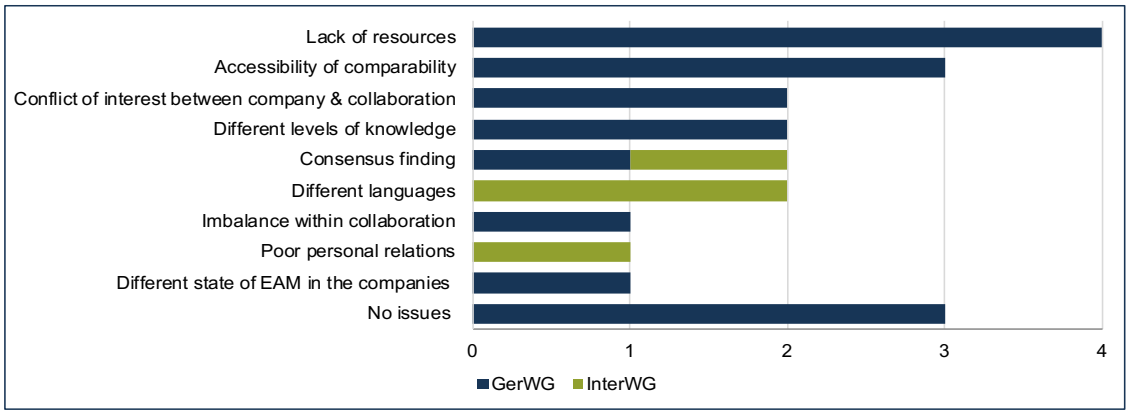


Figure 5.6.: Challenges of collaboration across GerWG and InterWG

Management of the observed challenges

Additionally to the challenges, the participants were asked how they manage these observed problems. Overall, it quickly becomes clear that the working groups do not yet have a defined and clear practice for addressing problems in cooperation. However, this can be attributed to the fact that the working groups have not observed any hard challenges (I13, Enterprise Architect, O11). Thus, the members of the working group are satisfied with the cooperation (e.g.: I10, Portfolio Manager, O9; I3, System Architect/Enterprise Architect, O3).
Nevertheless, three approaches could be identified from the interviews. In the following, these approaches to overcome or mitigating the problem from the working groups are described.
The **induction, support, and training of colleagues** is a possibility to overcome the different levels of knowledge. Attempts are made to induct and train colleagues by specific coaches or by individual members of the working group. The individual members with more experience in this field are willing to help companies in need of this support and training. In addition, attention was paid to the fact that topics were postponed because they were not yet fully understood and therefore could not be decided. In this way, the members had the possibility to deal with the topic and can get in touch if support is needed (I1, Enterprise Architect, O1). Special coaches were involved as support and

training of the members on the technical level. Moreover, for certain topics there were additional **groups for interested and professionally experienced members** in the field EAM to discuss topics in advance (I2, Enterprise Architect, O2).
A major approach mentioned by four participants is the **communication** within the working group. This approach was stated by one interviewee concerning the challenge of lack of resources. A way to handle this is to communicate the lack of resources openly in the working group. In this case, a solution could be found in the group if, for example, tasks could not be completed in time. Another way would be to go one hierarchy level higher in the own company and define the priority of the working group (I7; Enterprise Architect, O6). However, it was also mentioned that the communication and exchange in the collaboration play a crucial part to identify challenges and to avoid misunderstandings (I6, Enterprise Architect, O6; I10, Portfolio Manager, O9; I11, Portfolio Manager, O9).
In order to overcome the challenge of finding consensus, the recommendation is to **be open-minded**, including to be flexible, to listen to the members of the working group and to find compromises (I9, Lead Broadcast Architect Enterprise, O8).
No concrete practices exist for the remaining challenges. Regarding the challenge of different state of EAM in the individual companies, there is currently no concrete practice or proposed solutions. One respondent mentioned that they merely try to take the companies with them (I4, Head of Department for Planning & Software Development, O4). For the challenge of different interest between company and collaboration, one participant merely stated that there is nothing that can be done (I1, Enterprise Architecture, O1).

Measurement of collaboration

In both working groups the success of the cooperation is not measured by KPI's. However, in the GerWG, it was mentioned that an existing timetable could be used to determine the current state of the cooperation by checking whether contributions had been submitted within the given time frame (I1, Enterprise Architect, O1). It was also noted that the success could be measured on the basis of the maintained applications, but this is difficult because not every company tracks its success by the number of its applications (I5, Project Manager, O5). On the one hand, the members find it difficult to measure the success of the cooperation by defining numbers (I7, Enterprise Architect, O6; I1, Enterprise Architect, O1):

> *" [...] the topic is a bit difficult. How do you exactly measure the success of such EAM initiatives? This is not quite trivial."*(I7, Enterprise Architects, O6)

On the other hand, they would appreciate some form of measurement in order to recognize the benefit of the collaboration (I4, Head of Department for Planning & Software Development, O4; I6, Enterprise Architect, O6).

Exchange of information and knowledge

The collaboration is an open round that allows for a very open exchange of information and knowledge in order to enable transparency of the individual organizations (I3, System Architect/Enterprise Architect, O3; I5, Project Manager, O5; I4, Head of Department for Planning & Software Development, O4). They explicitly shared the following information and knowledge among their members:

- Presentation from the own organization (e.g. on the topic of establishing EAM) (I1, Enterprise Architect, O1),
- Documentation from the own organization (I1, Enterprise Architect, O1),
- Costs (e.g. transparency of costs regarding tools) (I1, Enterprise Architect, O1),
- Technical information that supports the work like software, hardware, and applications used in the own company, architectural principles, list of manufacturers, architecture models (I2, Enterprise Architect, O2; I3, System Architect/Enterprise Architect, O3; I4, Head of Department for Planning & Software Development, O4; I7, Enterprise Architect, O6; I8, Head of Studio & Media Technology, O7; I10, Portfolio Manager, O9; I13, Enterprise Architect, O11; I9, Lead Broadcast Architect Enterprise, O8),
- Training courses (I3, System Architect/Enterprise Architect, O3),
- Resources topics such as staff and financial resources (I10, Portfolio Manager, O9).

However, there is also information and knowledge that are intentionally withheld. These are:

- Internal discussion within the own organization (I1, Enterprise Architect, O1),
- Information that has not yet been made public and is confidential, sensitive, and commercial (I2, Enterprise Architect, O2; I12, Enterprise Architect, O10; I9, Lead Broadcast Architect Enterprise, O8),
- Information that does not fit the topic or is not relevant (I4, Head of Department for Planning & Software Development, O4),
- Personal data (I6, Enterprise Architect, O6),
- Topics related to strategy (rather less) (I12, Enterprise Architect, O10).

In the InterWG it was also added that most documents are in the national language, which makes it difficult to share information (I13, Enterprise Architect, O11).

Conflicts of interest

According to the interviewees, almost all companies have not yet experienced any serious conflicts of interest between their own organization and the collaboration. This

can be related to the fact that the companies all have the same mission and that the focus is on the methodology of cooperation (I3, System Architect/Enterprise Architect, O3). However, in three companies there were conflicts and decisions that did not harmonized with the interest of the cooperation. One of these topics was the inclusion of the role of the Process Owner as support for the development of the business capability model, where the willingness in the companies to include the role was not there (I1, Enterprise Architect, O1). Furthermore, due to economic efficiency, cooperation decisions regarding technical implementation are not always realized in individual companies (I3, System Architect/Enterprise Architect, O3). The third conflict, that was also mentioned as a challenge, is the issue of allocation of the working hours. On the one hand, there is the work in the own company and tasks that have to be fulfilled, whereas, on the other hand, there is the collaboration that requires additional work (I6, Enterprise Architect, O6; I7, Enterprise Architect, O6).

Impact of the collaboration on the companies

During the interviews, the participants were asked whether the decisions and taken resolutions had a binding nature. In addition, the impact and effect of the collaboration on the individual companies was considered.
The results show that seven of the interviewees of the GerWG are definitely of the opinion that the decisions have a binding character (see Figure 5.7). On the contrary, for four interviewees, including two associated members, the collaboration has not a binding nature.
A binding nature has the common methodology and the tools that are jointly decided upon (I5, Project Manager, O5; I7, Enterprise Architect, O6). In this context, the artifacts which are associated with the use of the common EAM tool such as the collaboratively developed business capability model and modeling conventions, also have a binding nature (I1, Enterprise Architect, O1; I6, Enterprise Architect, O6; I7, Enterprise Architect, O6; I11, Portfolio Manager, O9). The obligation arises in so far as individual companies can also examine decisions with regard to their own company's profitability as well as usefulness and ultimately decide against the decision of the collaboration, adapt the decisions or adopt the decisions to own company (I3, System Architect/Enterprise Architect, O3; I8, Head of Studio & Media Technology, O7). One of the participants expressed the hope that the decisions have a binding nature and that the involved companies would abide by the decisions. However, the participant also remarked that up to the current state of the cooperation, there were only a few binding decisions (I4, Head of Department for Planning & Software Development, O4). Decisions that are made in collaboration and affect other areas or roles of a company have to be approved by the Top-IT Management before they gain a binding nature (I1, Enterprise Architect, O1).
The associated members assume a special position in this process. They are seen as observers and serve the exchange of ideas. Thus the cooperation has no binding force on these organizations (I2, Enterprise Architect, O2; I12, Enterprise Architect, O10).
However, the decisions are rather rules or specifications that should be followed in order to make the cooperation work than instructions (I6, Enterprise Architect, O6).
Compared to GerWG, the InterWG has no binding influence on the individual compa-

nies due to the aim of the collaboration to create a common standard that can serve as a reference for public service media companies (I13, Enterprise Architect, O11).

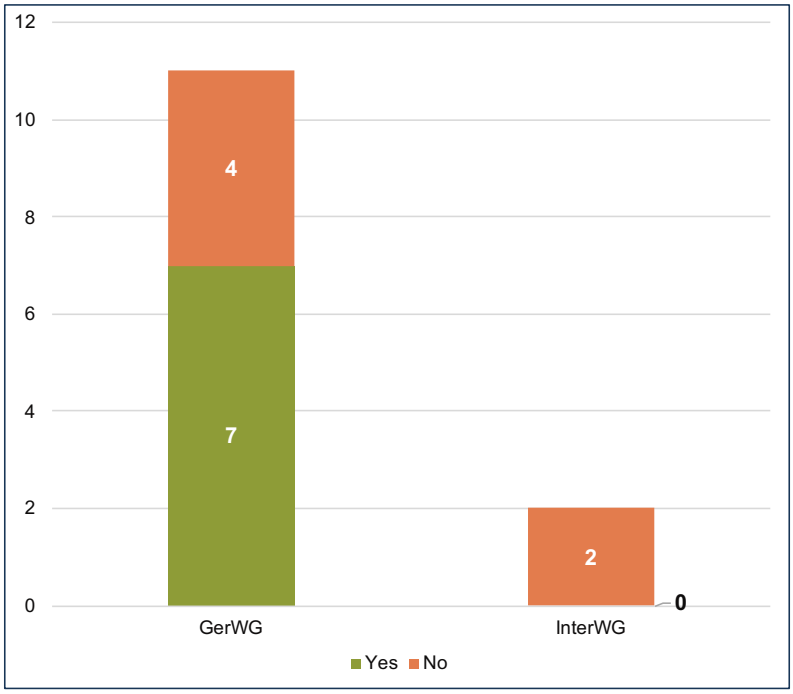


Figure 5.7.: Binding nature of collaboration on GerWG and InterWG

Nevertheless, the GerWG collaboration has a direct influence and impact on individual companies. This cooperation has an impact on the following:

- **Staff**, by sending personnel to the cooperation, forming and identifying new roles with new responsibilities in the own organization (I1, Enterprise Architect, O1; I6, Enterprise Architect, O6),
- **Processes and structures** by implementing artifacts retrieved from the collaboration, addressing requests for cooperation in different organizations e.g. for the purchase of new systems, applying gained experience through the exchange in the collaboration (I1, Enterprise Architect, O1; I6, Enterprise Architect, O6; I7, Enterprise Architect, O6; I8, Head of Studio & Media Technology, O7),
- **Usage of the shared EAM tool** by setting specifications such as options for customizing (I1, Enterprise Architect, O1),
- **Reputation of EAM and its approach** by promoting the EAM methodology within the own company, by defining the procedure of EAM through the lessons learned from the cooperation, and by using the results of the work to advance the own EAM initiative (I3, System Architect/Enterprise Architect, O3; I7, Enterprise Architect, O6; I10, Enterprise Architect, O9; I11, Enterprise Architect, O9; I4, Head of Department for Planning & Software Development, O4).

One participant of the GerWG did not provide any current concrete effects of the cooperation on its own company. Nevertheless, the interviewee expects that it will have an impact on decision-making processes in the future (I5, Project Manager, O5).
Concerning the associated members, the collaboration has an indirect effect on one or the other work in the own company by representing the results and obtaining recognition from the collaboration (I2, Enterprise Architect, O2). But even here, on a medium-term view, the cooperation can have an effect on the processes and structures if results from the working group are transferred to the company (I12, Enterprise Architect, O10).
In the InterWG, the participants also take the same aspect of the indirect influence on the work in their organizations (I9, Lead Broadcast Architect Enterprise, O8; I3, Enterprise Architect, O11). It was pointed out that the results of the cooperation can be used as a tool for decision making (I13, Enterprise Architect, O11). The following Figure 5.8 illustrates the impact of the collaboration on the organizations sorted by relevance and the working groups.

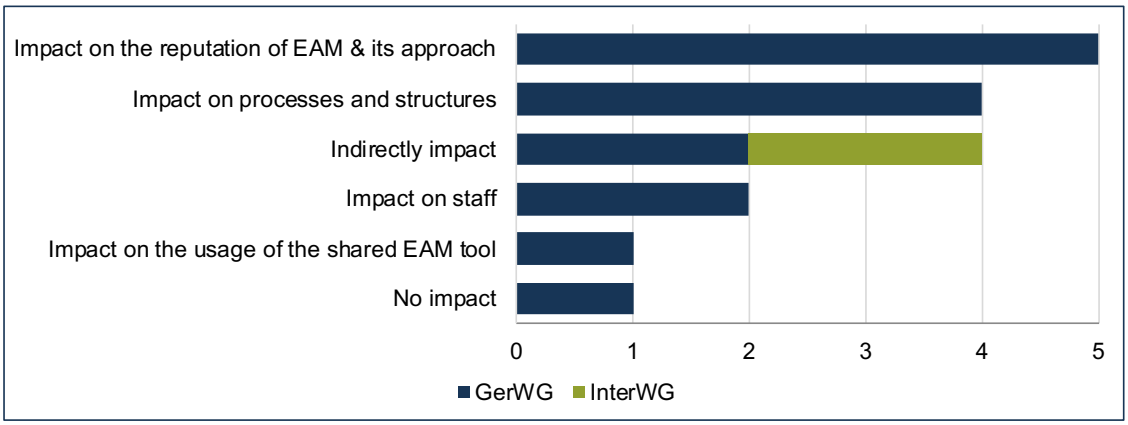


Figure 5.8.: Impact of collaboration on the organizations of the working groups

Recommendation for action

In the following Table 5.13, compiled on basis of the gained experiences, recommendations are given by the interviewed companies for companies that would like to start a collaboration in the field of EAM. The Table 5.13 includes the name of the recommendation sorted by the activity they should be taken, the corresponding description of what is implied by it and the number of interviewees that mentioned this recommendation.
The recommendations are based on the initial phase and limited to collaboration between organizations from the same industry with no competitive behavior, as the companies are at the beginning of the collaboration and as already mentioned from the same industry. However, one of the interviewees stated that an exchange with organizations outside their own sector is imaginable to gain new experiences (I3, System Architect / Enterprise Architect, O3). Another interviewee emphasized the competitive situation of the companies in cooperation. The greater the competition, the more challenging is the cooperation. He has the view that such a cooperation is particularly possible in the

Recommendation	Description	Mentioned by no. of interviewees
1. Do it.	This recommendation suggests taking the opportunity to develop a collaboration beyond the own company boundaries including the exchange, to think out of the box and to gain the approaches of other companies. Since enterprise architects are often in small teams in the company, the collaboration is especially valuable in the field of EAM.	3
2. Have passion for the subject.	This recommendation suggests the identification of the right people who are interested in these technical issues of the field EAM and the need for a person as driver with experience.	2
3. Do not have too high expectation.	This recommendation suggests taking small steps and gradually advance the topic of EAM.	1
4. Be a small group.	This recommendation suggests a small group for a cooperation. The collaboration should not have more than ten members.	1
5. Have support from the supervisor.	This recommendation suggests supporting and trusting in the members of the cooperation by their supervisor.	2
6. Do not form a hierarchy.	This recommendation suggests the equal rights of the members. There should be no hierarchy within the cooperation.	1
7. Start a Kick-off Meeting.	This recommendation suggests the beginning of the collaboration through a physical kick-off meeting to facilitate the members to get to know each other.	1
8. Provide clarity about common goals and mission.	This recommendation suggests the need for a precise definition of the common objectives that are pursued in the collaboration, emphasizing the task that is assigned to the cooperation from the initiator, and specifying the final deliverables and the exit point.	3
9. Create a common understanding.	This recommendation suggests a common approach to the EAM method, including a common language regarding modeling conventions. This is especially important if the cooperating companies already have their own EAM initiatives in their companies.	2
10. Build up a basic knowledge.	This recommendation suggests ensuring that the involved members in the collaboration are on the same level of knowledge. For this purpose, the possibility should be offered to give feedback on collaboration, to raise questions to make extra rounds on certain topics and to provide coaches and training. In this context, a good methodical and a good technical approach is needed.	2
11. Be transparent and flexible.	This recommendation suggests the openness towards members, including topics such as possibilities within the own company regarding documentation and availability of data.	5

Table 5.13.: Recommendation for starting collaboration beyond company boundaries

public sector (I6, Enterprise Architect, O6).

5.3.3. Enterprise Architecture Management

Layers of enterprise architecture

As introduced in Chapter 2 for the purpose of this master's thesis, a four layered conceptual visualization of the enterprise architecture is used. The interviewees were asked in which of the layers their work together concerning the working group. Figure 5.9 shows the results of the GerWG, while Figure 5.10 represents the results of InterWG. Based on these findings, the most frequently mentioned answers were taken as the final assessment. Table 5.14 and Table 5.15 show the conclusions for each of the working groups.

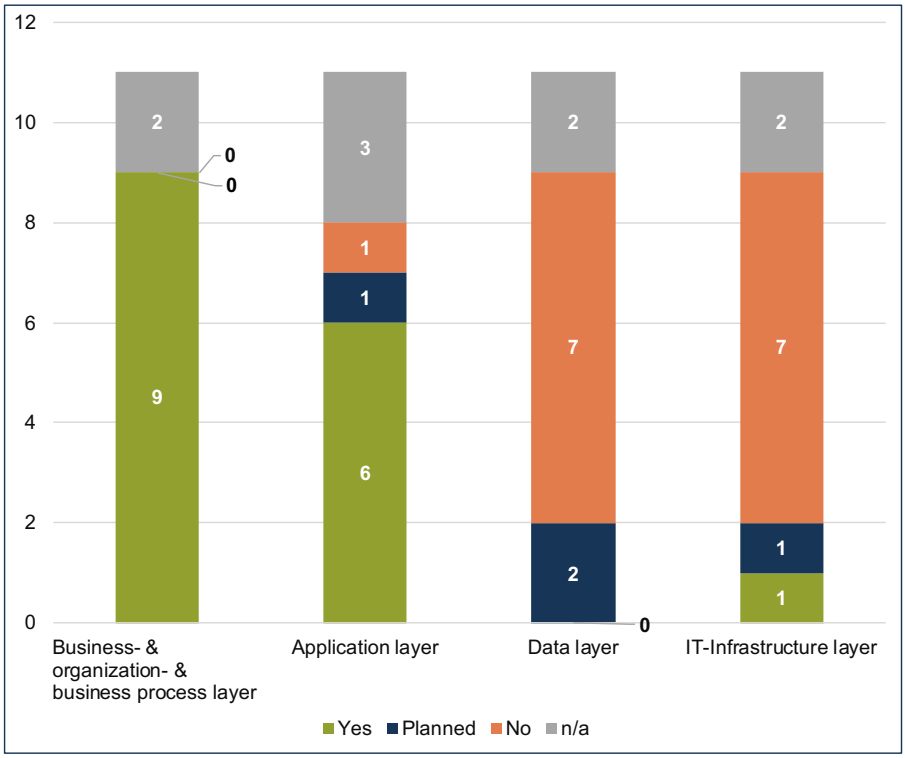


Figure 5.9.: Enterprise architecture layer addressed according to interviewees in GerWG

According to this definition, the interviewees of the GerWG operates mainly in the first layer, the business- & organization- & business process layer, by establishing a business capability model (I1, Enterprise Architect, O1; I2, Enterprise Architect, O2). This is reasoned by the given goal of identifying redundancies in the companies and thus offers a basis by looking at the business capabilities (I2, Enterprise Architect, O2; I3, System Architect/Enterprise Architect, O3). However, the business processes have not yet been discussed at this level, as there are other stakeholders in the company responsible for the

processes. Another aim of the collaboration is to identify which IT systems are used for which business capability in order to find cooperation possibilities and to establish an application landscape (I7, Enterprise Architect, O6; I11, Portfolio Manager, O9). In doing this, the collaboration also addresses the application level (I1, Enterprise Architect, O1). Although the cooperation is currently not working at the data level, two interviewees mentioned this being planned in the future. This is motivated by the need to identify what kind of information is in the systems, through which interfaces it flows, and to detect possible problems related to this area (I1, Enterprise Architect, O1). Other interviewees pointed out that the consortium already includes working groups which deal with the topic of meta data (I11, Portfolio Manager, O9; I7, Enterprise Architect, O6). The GerWG is not concerned with the IT infrastructure layer. Since there is already another working group within the consortium dealing with infrastructure topics including servers and technologies. However, the working group is exchanging information with this cooperation (I1, Enterprise Architect, O1).

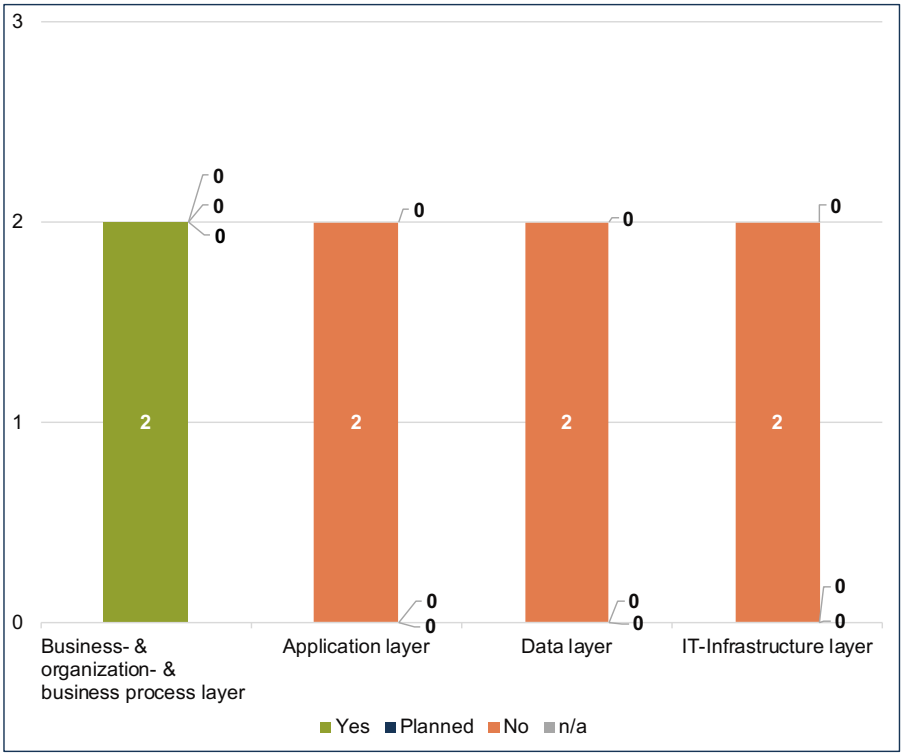


Figure 5.10.: Enterprise architecture layer addressed according to interviewees in InterWG

Similarly to the GerWG, the InterWG also operates with a main focus in the first layer. This is reasoned by the fact, that the aim of the collaboration is to establish collaboratively a business capability model, in order to support public service media companies. This is done by aligning technology and business architecture in a digital world and providing answers to the questions what the company must do, how it must change and how it must use technology (I9, Lead Broadcast Architect Enterprise, O8). Regarding

the other three layers, which are covered by other working groups within the association (I9, Lead Broadcast Architect Enterprise, O8), it is necessary to have the know-how of these layers for the discussions (I13, Enterprise Architect, O11).

Layer	Yes	Planned	No
Business- & organization- & business process layer	x		
Application layer	x		
Data layer			x
IT-Infrastructure layer			x

Table 5.14.: Enterprise architecture layer addressed in GerWG

Layer	Yes	Planned	No
Business- & organization- & business process layer	x		
Application layer			x
Data layer			x
IT-Infrastructure layer			x

Table 5.15.: Enterprise architecture layer addressed in InterWG

Tools

The tools that are used or planned to be used in both working groups to support collaboration are listed in Table 5.16.
The GerWG uses a shared EAM tool. However, each of the members has its own instance. This means that the tools are not connected to each other and therefore it is not possible to access the data stock of other companies (I2, Enterprise Architect, O2). All members who use the tool have the same customized version, which facilitates a simple import and export of data within the collaboration (I1, Enterprise Architect, O1). The main reasons to use the EAM tool are firstly the fact that two companies have already integrated the EAM tool into their organization, secondly that the range of functions like collaboration possibilities allows data to be merged from each individual and lastly also the cost and licensing aspect (I2, Enterprise Architect, O2; I4, Head of Department for Planning & Software Development, O4; I10, Portfolio Manager, O9). Further, if the cooperation becomes more intensive, with the Process Owners, the introduction of a process management tool may be planned for the future. Internally, two companies of the collaboration are already using the tool in their company (I1, Enterprise Architect, O1).

Additionally, to exchange documents and work collaboratively including communication, the GerWG uses a shared cloud-based server, instant messaging platform and web conference and video conference application (I1, Enterprise Architect, O1; I7, Enterprise Architect, O6).
A major difference between the two working groups is that InterWG did not decide on a common EAM tool. The members each use their own EAM tool in their company, but share the models created from the tool with the collaboration via export. Documents are exchanged and discussed by a collaboration software. Moreover, the introduction of an instant messaging platform may be planned in the future in the InterWG. Similar to the GerWG, InterWG utilizes office package, web conference and video conference application (I13, Enterprise Architect, O11).

Tools	GerWG	InterWG
EAM tool	x	
Office package	x	x
Shared cloud server	x	
Cloud-based instant messaging platform	x	Planned
Process management tool	Planned	
Web conference and videoconference application	x	x
Collaboration software		x

Table 5.16.: Details of used tools across GerWG and InterWG

Enterprise architecture artifacts

In the following Table 5.17 the enterprise architecture artifacts with regards to the organizations and working groups are shown. In particular, a detailed overview is given of which of the seven identified architecture strategies (IT strategy, business capability model, roadmaps, value chains, application portfolio, landscape diagrams, as-is and to-be architecture) are implemented in the organizations/working groups, are not implemented in the organizations/working groups or are planned to be implemented in the organizations/working groups.
As shown in Table 5.17, most of the companies, particularly eight out of eleven organizations, have defined an **IT strategy**. However, in one organization it is mentioned that this has been done at a high-level (I7, Enterprise Architect, O6; I6, Enterprise Architect, O6). Although the sharing of the own IT strategy in the cooperation has not been an explicit subject so far, exchanges only take place in specific areas relating to the strategy (I13, Enterprise Architect, O11; I8, Head of Studio & Media Technology, O7; I12, Enterprise Architect, O10). Commercial or sensitive information will not be shared with

the working group InterWG (I9, Lead Broadcast Architect Enterprise, O8). Thus, both working groups have no defined an IT strategy.
The table clearly indicates that the organizations are at different stages of development and implementation regarding a **business capability model**. Six of the organizations already had a business capability model before one was jointly developed in both working groups. This collaboratively developed model is also valid in the involved companies of the GerWG (I2, Enterprise Architect, O2). The reason why a business capability model was developed together in the GerWG is that the as-is application landscape is to be created with the support of the developed model. Furthermore, the model could be used to identify overlapping capabilities in projects (I1, Enterprise Architect, O2). Concerning the implementation and use of the collaboratively developed model, it is carried out in the companies by using it as a reference. The companies which already had a business capability model or at least a similar model try to validate their own model based on the jointly developed model and to understand and justify why certain descriptions are used differently for their own company. Thus the model is not adopted one-to-one (I2, Enterprise Architect, O2). One organization plans to implement the business capability model from the cooperation in their own organization. A difficulty that arises here, is the uncertainty of whether the developed model fits the organization's needs (I6, Enterprise Architect, O6). Four of the organizations have not developed a business capability model in their organizations.
A **roadmap** exists in most companies for individual projects or topics. Often there is no roadmap for the entire organization (I13, Enterprise Architect, O11; I2, Enterprise Architect, O2; I4, Head of Department for Planning & Software Development, O4; I7, Enterprise Architect, O6). One organization has a roadmap, which is developed for certain subareas in the organization (I2, Enterprise Architect, O2). Another organization has a roughly described roadmap that is still under development (here marked as partly) (I8, Head of Studio & Media Technology, O7). While the GerWG has a roadmap as a kind of timeline with milestones, it is not known whether the InterWG has created a roadmap for the collaboration. However, the GerWG's roadmap is not defined as a long-term strategic visionary goal (I2, Enterprise Architect, O2).
Five of the eleven organizations do not use a **value chain** to describe the activities of the resulting products. This follows from the fact that the term value chain is not widely used in the media industry. At the moment, company activities are described as processes, process control, process organization, or in terms of products rather than in value creation. One participant believes with the usage of the term value chain, it is more likely to be used as a buzzword or replacement term rather than for its actual meaning (I2, Enterprise Architect, O2):

> *"The term "value chain" is often used, but I don't have the impression that it is a reliable term, so that everybody knows what is intended and how it actually works. It is more frequently used as a buzzword or as a substitute term."*(I2, Enterprise Architect, O2)

Thus, there is still a lack of knowledge about the concept of the value chain in the organizations (I6, Enterprise Architect, O6). Two of the four companies with a value chain

define it as a very rough description of steps without any further detailed explanation (I4, Head of Department for Planning & Software Development Project Manager, O4; I12, Enterprise Architect, O10). Moreover, no common value chain was developed in both working group. However, in the GerWG, a value chain model of an association of public service media companies was consulted to create the business capability model. This value chain served as the basis and orientation for the business capability model (I1, Enterprise Architect, O1; I3, System Architect/Enterprise Architect, O3; I10, Portfolio Manager, O9). Consequently, the working group dealt with the topic, yet one participant remarked that the creation of a collaborative value chain in the GerWG could be a task for the future (I1, Enterprise Architect, O1).
In terms of the **as-is architecture**, most companies, in fact, eight out of eleven, have addressed the current status of their architecture even though it is still in progress. Regarding the **to-be architecture**, eight organizations either have a to-be architecture or are currently in the early stages of developing one. However, one interviewee mentioned, the focus on the to-be architecture instead of the as-is architecture as a result of the resources scarcity (I5, Project Manager, O5). Similar to the roadmaps, four interviewees remarked that the as-is and to-be architecture, if it exists, was created for individual areas, systems or projects and not for the entire company (I11, Portfolio Manager, O9; I13, Enterprise Architect, O11; I12, Enterprise Architect, O10; I2, Enterprise Architect, O2):

> "*Unfortunately, at the moment, this is only applied to individual systems and not to the overall context.*"(I11, Portfolio Manager, O9)

The GerWG is currently in the process of documenting the as-is architecture for the purpose of an application landscape in order to find duplication and derive possibilities for cooperation (I2, Enterprise Architect, O2; I3, System Architect/Enterprise Architect, O3). In this context, the members of the working group share, for example, information of systems and interfaces, yet the focus of interest is currently not on the to-be architecture (I1, Enterprise Architect, O1). Since the focus of the InterWG is on the establishment of a business capability model, there is no exchange about neither the as-is nor the to-be architecture.
Comparing between the artifacts, most organizations (nine out of eleven organizations) have an **application portfolio**. However, four of the organizations mentioned, that they have an application portfolio in the sense of a set of applications. This set describes which application is used for which purpose (I2, Enterprise Architect, O2; I1, Enterprise Architect, O1; I6, Enterprise Architect, O6; I12, Enterprise Architect, O10). One interviewee noted, that the set of applications is also based on projects and not for the whole company. However, the interviewee would not count it as a proper portfolio management (I2, Enterprise Architect, O2). For the purpose of this master's thesis it is classified as "exist in organization". Only two organizations state that they have no application portfolio. Referring to the working groups, the GerWG developed collaboratively a list of applications, by describing which application is used for which purpose, while the application portfolio does not play a role in the InterWG (I1, Enterprise Architect, O1; I2, Enterprise Architect, O2; I6, Enterprise Architect, O6). In this respect, the members of the GerWG also share the application lists of their organizations.

Similar, to the application portfolio, most organizations (eight of eleven organizations) have a **landscape diagram**. Only three of the organizations do not yet have a landscape diagram in their organizations. As stated by one organization, a reason for this is the text-based documentation. Transferring this to a model is very complex and difficult. The current focus is on other important topics (I11, Portfolio Manager, O9). The aim of the GerWG is to develop a common application landscape in the end. For this purpose and as support, individual landscape diagrams are shared within the GerWG via the collaboratively used EAM tool (I1, Enterprise Architect, O1; I7, Enterprise Architect, O6; I8, Head of Studio & Media Technology, O7). These diagrams are created in a way that they can form a common representation (I2, Enterprise Architect, O2). Again, the InterWG is not developing a common landscape diagram.

									Other	
	IT-strategy	Business capability model	Roadmaps	Value chains	As-is architecture	To-be architecture	Application portfolio	Landscape diagrams	Technology portfolio	Domain model
O1	n/a	✗	n/a	n/a	✓,▲	n/a	✓,▲	✓,▲	✓,▲	
O2	✓	✓	✓	✗	✗	✓	✓	✓		
O3	✓	✗	✓	n/a	✓	✗	✗	✓		
O4	✗	✓,▲	✓	✓	✓(partly)	✓(partly)	✓,▲	✗		
O5	n/a	✗	n/a	✗	✗	✓(partly)	✓	✗		
O6	✓	o	✓	✗	✓,▲	✓(partly)	✓,▲	✓,▲		✓
O7	✓,▲	✗	✓(partly)	✗	✓	✓(partly)	✗	✓		
O8	✓	✓,▲	n/a	✓	n/a	n/a	✓	✓		
O9	✓	✓	✗	✗	✓	✓	✓,▲	✗		
O10	✓	✓	✓	✓	✓	✓	✓	✓		
O11	✓	✓,▲	✓	✓	✓(partly)	✓	✓	o,✓		
GerWG	✗	✓	✓	✗	✓	✗	✓	✓		
InterWG	✗	✓	n/a	✗	✗	✗	✗	✗		

✗ = does not exist, ✓ = exists, ✓(partly) = in progress, o = planned, ▲ = shared with working group

Table 5.17.: Overview of enterprise architecture artifacts in organizations and working groups

Besides the above mentioned and predetermined enterprise architecture artifacts, further artifacts were mentioned, which are used or developed in the cooperation. One of these is a technology portfolio, which includes and describes technologies like operating systems and databases (I1, Enterprise Architect, O1). This portfolio was shared with the collaboration GerWG. Another company also uses domain models (I6, Enterprise Architect, O6).

Challenges during the creation of a business capability model

Due to the fact that both working groups have developed a joint business capability model or are in the process of developing one, they were asked about the challenges that arise when creating a cooperative business capability model. The following 14 challenges were mentioned:

- **Differentiation between business objects and business processes:** During the processing and in discussions, the members had difficulties to stay with business objects. In doing so, they mentally slipped back to business processes (I4, Head of Department for Planning & Software Development, O4).
- **Missing determination of degree of abstraction level:** The members of the cooperation were faced with the challenge of assessing how detailed certain capabilities need to be described. Depending on this, up to four levels had to be broken down (I1, Enterprise Architect, O1).
- **Lack of expertise of capabilities:** The members of the working group often have only a technical background and thus little knowledge in the field of EAM and application of capabilities (I4, Head of Department for Planning & Software Development, O4; I6, Enterprise Architect, O6). In particular, the required effort was underestimated (I6, Enterprise Architect, O6).
- **Missing representatives of experts**: Support from the business side and experts for special areas has been lacking in both the development and in the validation of the concepts (I6, Enterprise Architect, O6; I1, Enterprise Architect, O1).
- **Maintaining a common understanding of capabilities and definitions:** In order to reach a consistent model without overlaps and conflicts, it was necessary to ensure that the members had a common understanding of the capabilities and definitions including a glossary and distinction to similar meanings (I1, Enterprise Architect, O1; I7, Enterprise Architect, O7; I2, Enterprise Architect, O2).
- **Issues with naming in terms of capabilities:** In terms of naming, the collaboration tried to clearly distinguish capabilities from business processes by using substantiated verbs. But at the same time, it should be compatible with the wording of the management (I1, Enterprise Architect, O1). Therefore it was also difficult to agree on terms (I7, Enterprise Architect, O6).
- **Consensus on the model's objective and working method:** One interviewee mentioned that it is important to agree on the objectives and the way of working, including the awareness that it is more about the usability of the tool than establishing a perfect model (I2, Enterprise Architect, O2). Furthermore, finding appropriate methods to define a business capability model proved to be a sophisticated task. In doing so, the GerWG established a schema for defining the business capability and focused on title, description, objects, and objectives (I1, Enterprise Architect, O1).

- **Poor tool support:** Another challenge was the poor tool support including no possibilities for collaborative work (I6, Enterprise Architect, O6).
- **Own model in mind:** In the beginning, the members who had already developed their own business capability model in their company had their model in mind. Therefore it took them some time until they were ready to let go of their own model and respond to suggestions and new ideas (I13, Enterprise Architect, O10).
- **Working for a collaboration:** One interviewee mentioned that the thought of not working for the own organization but instead for a cooperation needed some warming up (I9, Lead Broadcast Architect Enterprise, O8).
- **Lack of language:** Most of the members in the GerWG are not native speakers of English. Nevertheless, the cooperation wanted to create a model in English, where the defining of terms is more complicated (I2, Enterprise Architect, O2).
- **Incomplete documentation:** During the cooperation the results were documented inconsistently. Therefore, some results have been lost. Accordingly, a complete and growing documentation is important (I2, Enterprise Architect, O2).
- **Arrangement of capabilities:** The excessive discussion focused on the geometric arrangement of the abilities, which missed the aim of the model. Thus it was finally decided to respect the hierarchy of the abilities (I2, Enterprise Architect, O2).
- **Lack of a solid relation of pure business objects and traditional practices:** This challenge was mentioned by one interviewee. It includes the need to reach a compromise between pure teaching regarding business objects and the applicability in practice, which uses different models of thinking and terms. Here, the comprehensibility for the use of the model in practice plays an important role (I1, Enterprise Architect, O1).

Figure 5.11 represents the identified challenges of collaborative working on a business capability model sorted in descending order by relevance and working group.

Standards

With regard to standards, interviewees were asked whether they apply and use the following standards: application, data, and technology reference model. In overall, most of the organizations do not use a reference model, at least not an explicit one (see Table 5.18). This could be the result, that many of the interviewees were not familiar with the terms and the concept of these reference models, which led to uncertain answers. Organization two developed a special type of reference model that has been successfully used within the company. This reference model covers all three areas and is coherent, meaning that a change in one model may require a further view in another model and will result in changes accordingly (I2, Enterprise Architect, O2).
Six organizations did not refer to an **application reference model**. However, three of the organizations states that they use an application reference model. One of these organizations does not use specific reference models but tries to introduce and emphasize

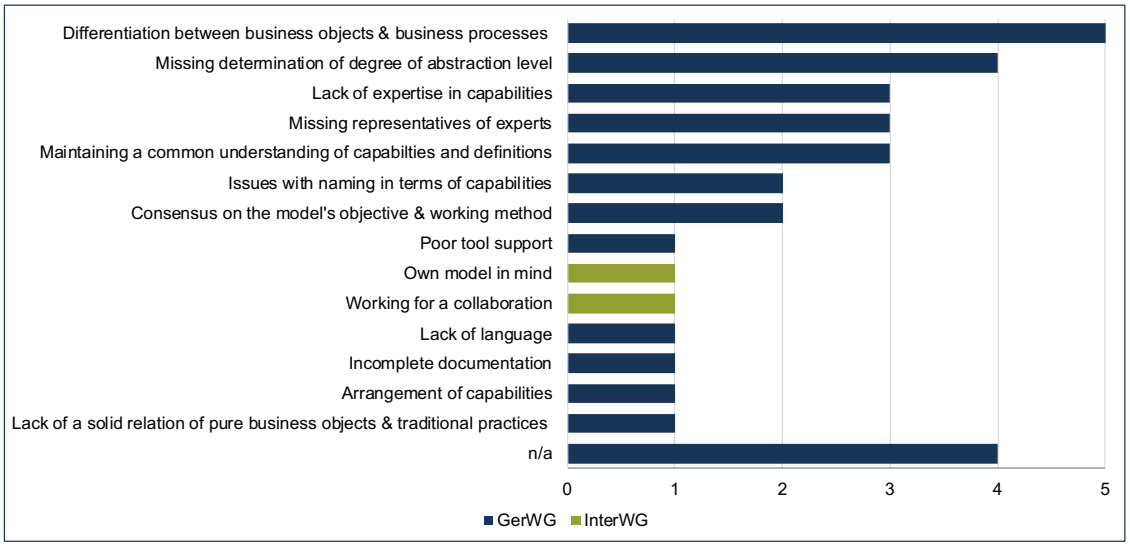


Figure 5.11.: Challenges of developing collaborative a business capability model across GerWG and InterWG

the use of reference models into the company on certain topics (I6, Enterprise Architect, O6). Within the GerWG no application reference model is used. One of the interviewees mentioned that there is a kind of best practice that the members of the group are familiar with and have the knowledge of how certain things are solved in the respective organizations (I1, Enterprise Architect, O1). Another interviewee outlined a master data list as an application reference model. This ensures a consistent documentation of the applications for the members of the working group (I2, Enterprise Architect, O2). The InterWG does not use an application reference model.
Among the reference models, the **data reference model** is the most prevalent model with five companies. One organization, in particular, mentioned its orientation towards a data reference model, which was developed by an association of public service media companies. However, they are not compliant with this standard (I13, Enterprise Architect, O11). Furthermore, a reference model for data is currently not used in both working groups. This is due to the fact that the group GerWG has not yet focused on the topic of data. However, the consortium in which the GerWG is located has developed a reference model for standardized data exchange. Since the working group has also partially dealt with the topic of business objects, a data reference model could be planned for the future (I1, Enterprise Architect, O1; I4, Head of Department for Planning & Software Development, O4; I6, Enterprise Architect, O6).
Likewise the application reference model, the **technology reference model** is currently not applied in most of the companies (seven of eleven organizations). Nevertheless, one organization outlined its usage of a technical guideline rather than a reference model (I13, Enterprise Architect, O10). Since GerWG is rather working on the meta-level, no technology reference model is needed (I2, Enterprise Architect, O2). A similar situation exists in working group InterWG.

	Application reference model	Data reference model	Technology reference model
O1	n/a	n/a	n/a
O2	✓	✓	✓
O3	✗	✓	✗
O4	✗	✗	✗
O5	✗	✗	✗
O6	✓	✓	✗
O7	✓	✗	✓
O8	n/a	n/a	n/a
O9	✗	✗	✗
O10	✗	✓	✗
O11	✗	✓	✗
GerWG	✗	✗	✗
InterWG	✗	✗	✗

✗ = does not exist, ✓ = exists

Table 5.18.: Overview of standards in organizations and working groups

Currently, no further introduction of standards is planned in both working groups.

Architectural principles

The architectural principles were mainly provided by one of the involved companies in the collaboration GerWG. These architecture principles were then jointly adapted and defined for the companies in the collaboration. For the architectural principles, a corresponding questionnaire was also developed as a kind of a checklist, which guides the members through the architectural principles (I1, Enterprise Architect, O1). These 18 defined principles are made available to the involved organizations to use and implement in their individual organizations without an executive force (I5, Project Manager, O5). An overview of organizations that have implemented the architectural principles from the collaboration or do not apply any principles is shown in Table 5.19. Additionally, organizations that use the principles developed in their organization are marked with ”used own”.
The application of the provided architectural principles from the collaboration is conducted in various ways in the organizations. O3 printed the architectural principles on a poster and hung them up in the organization’s offices. On the one hand, this enables reaching the concerned employees and on the other hand, it achieves a high level of

	Architectural principles
O1	✓
O2	✗
O3	✓
O4	✓
O5	✓
O6	✓
O7	✓
O8	✗
O9	✗
O10	✗
O11	✓(used own)
GerWG	✓
InterWG	✗

✗ = does not exist ✓ = exists, ✓(used own) = used the own architectural principles from the organization

Table 5.19.: Overview of architectural principles in organizations and working groups

penetration and sensitivity for this topic (I3, System Architect/Enterprise Architect, O3). Meanwhile, other companies try to provide arguments about why certain principles can not be followed. One company explains that due to circumstances, some principles cannot be respected and that there are also conflicting principles within the provided list of architectural principles. In these cases, an effort is made to understand and rationalize why certain principles cannot be followed, why the principles are violated and whether it can be changed or not (I4, Head of Department for Planning & Software Development, O4). Another organization outlined, that projects with an architectural relevance of medium to high are required to follow the checklist of architectural principles in collaboration with the organization's Project Manager and the Enterprise Architect. This does not mean that if the project does not comply with the principles, it cannot be realized, but should merely raise awareness for the principles (I6, Enterprise Architect, O6). For three of the companies, the introduction, application, and possible adjustments of architectural principles are still on the to-do list (e.g. O2, O9, O10).
For the future, no further architectural principles are planned. The companies are currently in the process of introducing and complying with the defined architectural principles. However, in retrospect, after the members have practiced the architecture principles over a period of time, the list of principles could be updated by adding or removing some of the architectural principles due to unnecessity and non-addressability (I3, Sys-

tem Architect/Enterprise Architect, O3; I1, Enterprise Architect, O1).
One organization of the collaboration InterWG does not use architectural principles in the own company. Although the other organization has defined architecture principles in its own company, these were not shared with the collaboration. There is also no development of common architectural principles in this working group.

Modeling guidelines

Similar to the architectural principles, the modeling guidelines were provided by one of the participating companies from the collaboration GerWG. The modeling guidelines were developed together with the manufacturers of the used EAM tool and adapted to the needs of the company. In cooperation, these modeling guidelines are continuously revised and customized to the requirements of a media industry (I1, Enterprise Architect, O1). For this purpose, the collaboration has a sub-working group which deals with the topic of application modeling (I6, Enterprise Architect, O6). By defining the modeling guidelines, the possibility of exchanging information and data among each other should be given (I2, Enterprise Architect, O2). Further, the guidelines should remain the comparability between the organizations (I3, System Architect/Enterprise Architect, O3; I6, Enterprise Architect, O6).

	Modeling guidelines
O1	✓
O2	✓(used own)
O3	✓
O4	✓
O5	✓
O6	✓
O7	✗
O8	n/a
O9	✗
O10	✓(used own)
O11	✓(used own)
GerWG	✓
InterWG	✗

✗ = does not exist ✓ = exists, ✓(used own) = used the own modeling guidelines from the organization

Table 5.20.: Overview of modeling guidelines in organizations and working groups

Even similar to the architectural principles, the InterWG has not defined common modeling guidelines. However, both interviewees mentioned that there is no need currently to define modeling guidelines (I9, Lead Broadcast Architect Enterprise, O8; I13, Enterprise Architect, O11):

> *"No. Because there was not really a need to do so."*(I13, Enterprise Architect, O11)

Table 5.20 provides a detailed overview of the application of modeling guidelines in the interviewed organizations. Similar to Table 5.19, companies are presented if they have or have not adopted the modeling guidelines from the collaboration or use their own guidelines from the company ("used own"). Most of the organizations use modeling guidelines to visualize complex information. Five organizations follow the guidelines provided by the cooperation, while three organizations use the guidelines developed by their organization. However, it should be noted that those three companies are associated members and one member from InterWG.
In the companies of the GerWG, the modeling guidelines are made available for the employees (e.g. via a collaboration tool or a presentation) so that they can comply with them, base their models on those guidelines and to be able to point out flaws or the noncompliance to them while presenting each other with the models (I4, Head of Department for Planning & Software Development, O4; I7, Enterprise Architect, O6). Four of the organizations have not yet implemented the collaboration's modeling guidelines in their companies. The reason for this is that they already created modeling guidelines in their own company and currently, there is no need to change the defined guidelines (I12, Enterprise Architect, O10). However, this concerns the associated members. Another reason is the complexity associated with the modeling, including the lack of good data quality as a basis (I10, Portfolio Manager, O9).
The introduction of further modeling guidelines is not planned. Instead, refining the modeling guidelines given to the industry is in progress (I6, Enterprise Architect, O6).

Quality assurance

Neither in both cooperation nor in the individual organizations is any proper quality assurance indicated. However, in regard to the artifacts, provisions are made in the collaboration and companies to check the accuracy of the delivered results.
Concerning the results provided in the GerWG, they will be reviewed and discussed together in the group as well as feedback will be given (I1, Enterprise Architect, O1; I2, Enterprise Architect, O2). In particular, the application landscape of the other organizations was consolidated by four members in the working group. Thus, a review was made of whether the modeling conventions were considered, so that the models are consistent and comparable (I10, Portfolio Manager, O9; I7, Enterprise Architect, O6). Another interviewee described the process of the quality assurance as iterative, and whose learning results from the meetings and training can be applied to certain topics afterwards to change or adapt, e.g a model (I2, Enterprise Architect, O2). As already mentioned in the section of architectural principles, a checklist with the principles is provided. This is intended to verify the compliance with the architecture principles in

the company (I3, System Architect/Enterprise Architect, O3). A rather comparable approach is also taken by the InterWG. They do not have an explicit process to verify the quality of the results, but the members of the collaboration put down the outcomes, provide feedback and revise the created deliverables (I13, Enterprise Architect, O11).
The following activities were mentioned in the companies to ensure the quality of the results and work: reviews and discussions (e.g. in EAM boards (I4; Head of Department for Planning & Software Development; O4)) (I2, Enterprise Architect, O2), supervisor/management (as the first/last contact point for certain actions) (I3, System Architect/Enterprise Architect, O3; I5, Project Manager, O5), and the employees' compliance to the standards, naming and rights (I3, System Architect/Enterprise Architect, O3; I5, Project Manager, O5; I6, Enterprise Architect, O6; I10, Portfolio Manager, O9).

5.3.4. Role of Enterprise Architect

Responsibilities of an enterprise architect in own organization vs. responsibilities of an enterprise architect within a collaboration

In order to get a deeper insight into the responsibilities and activities of the role of the enterprise architect in the context of collaboration, the respondents were asked about their responsibilities in their company. Afterwards, they were asked to identify additional responsibilities that arise from the cooperation and are added to the role. The following Figure 5.12 depicts the responsibilities of an enterprise architect and the additional required responsibilities within the context of collaboration in descending order by relevance.
In overall ten responsibilities and activities could be identified within the own organization. As already mentioned in Section 2.2.1, the interviewees also named with five interviewees the most mentioned responsibility, to support the company as consultant, coach and moderator in the architectural area and in the decision making process. However, as also explained in Section 2.2.1 it was noted explicitly that this role has no decision-making power and no budgetary responsibility (I1, Enterprise Architect, O1). This responsibility is followed by the activities of implementing EAM, determining the strategic planning of EAM and responsibility for stakeholder management (mentioned by two interviewees). It is not surprising that the task of implementing EAM in their own company is a further important task of the interviewees. This is due to the fact that the interviewed companies are currently in the process of introducing EAM and are still at the beginning of their EAM initiatives in their company. Furthermore, the results also confirm the findings from the literature that the responsibility of an enterprise architect also includes the determination and definition of strategy (see Section 2.2.1). Only two of the interviewees mentioned that their tasks include coordinating and planning across IT, application landscape and technologies, responsibility for the methodological competence of EAM, and support in processes. Another tasks of enterprise architects in the own company, which was stated by one interviewee, is the establishment and the implementation of EAM tools, which includes also the briefing and training of employees regarding the use of the tool (I6, Enterprise Architect, O6), the responsible to lead the architecture board (I1, Enterprise Architect, O1), translate business capabilities into

portfolio of applications or tools by considering companies strategy and to identify synergy effects, with a view to improvement (I13, Enterprise Architect, O11). Two of the interviewees could not specify any responsibilities regarding the role of the enterprise architect, as the role of the enterprise architect is not yet established as such in their companies. The activities they currently perform can be attributed to their position rather than to the tasks of an enterprise architect.
When the participants were asked whether the cooperation led to additional responsibilities and tasks for them, three participants did not mention new activities or negated the question. However, as Figure 5.12 shows, six additional responsibilities are added to the role of an enterprise architect in the context of a collaboration. An often mentioned responsibility was the activity to work on concrete tasks for the collaboration by six interviewees. This includes providing input, exchanging data and working in sub-groups on specific topics in order to make progress in the collaboration (I7, Enterprise Architect, O6; I5, Project Manager, O5; I11, Portfolio Manager, O9). Compared to the responsibilities and activities apart from the collaboration, the communication into the cooperation and playing back the decisions into the own company gain an important aspect here, which was mentioned by four interviewees. The role of an enterprise architect acts as a contact point between both collaboration and individual organization. Two interviewees mentioned as further tasks the management of the collaboration/group including the responsibility to drive the initiative in other companies and not only in their own, and to ensure that the goals will be achieved (I1, Enterprise Architect, O1). In addition, responsibilities and activities regarding participation in the collaboration such as participation in physical meetings, exchange of knowledge and mutual support in case of questions and problems were noted by one interviewee.
To summarize an enterprise architects is

> "*[...] a communicator, driver, knowledge mediator, systematizer and transparency maker, [...] who has a systematic in his head and gives others who are looking for order and sorting in this confusing IT landscape [...] a sense of stability [...]*"(I10, Portfolio Manager, O9).

> "*and security*"(I11, Portfolio Manager, 09).

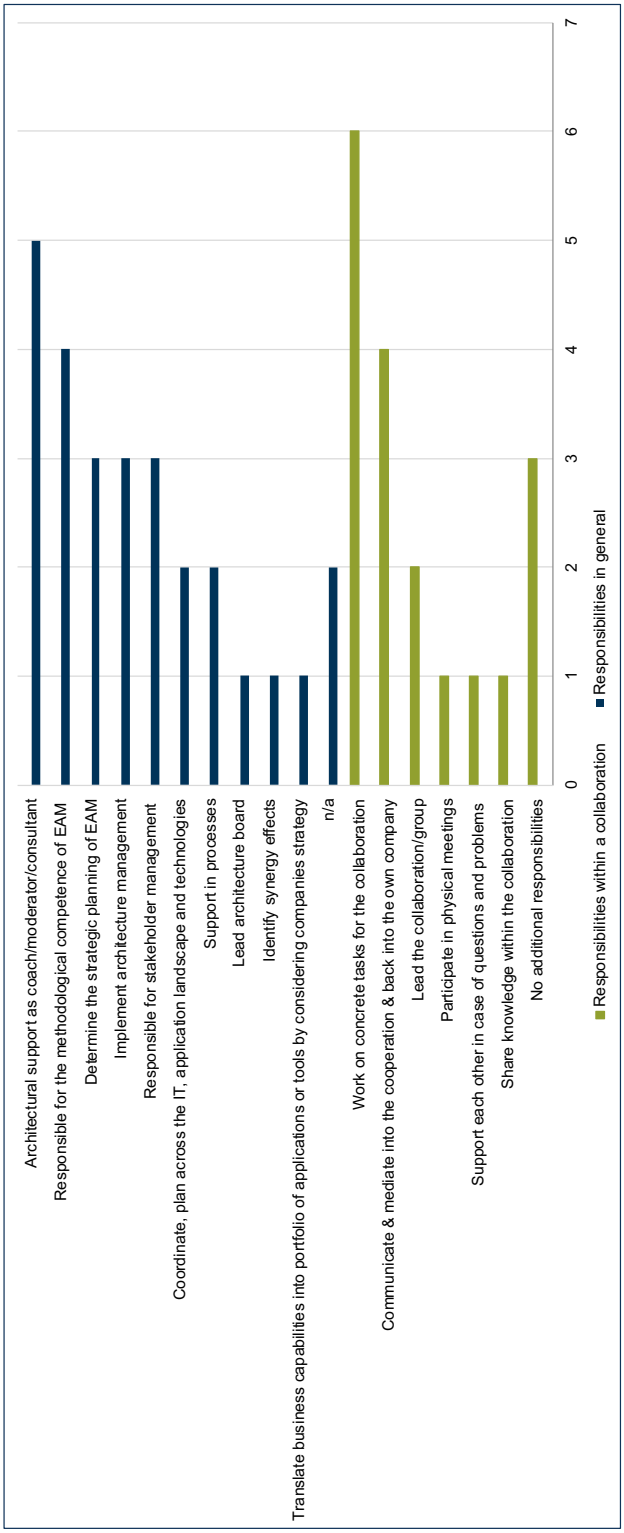


Figure 5.12.: Overview of responsibilities in general and within a collaboration of an enterprise architect

Skills of an enterprise architect vs. skills of an enterprise architect within a collaboration

Besides the responsibilities, the interviewees were asked about the skills of an enterprise architect. Again, the skills of an enterprise architect are first questioned in general and then a comparison is made with the additional skills required in a collaboration.
For this purpose, Figure 5.13 illustrated needed skills to fulfill the tasks and activities of an enterprise architect in general and the additional required capabilities of an enterprise architect with the aspect of collaboration. Even here, the figure is sorted by relevance in descending order.
Ten of the interviewees identified communication as the most required skill of an enterprise architect. In this context, an enterprise architect, for example, need to be very convincing, present well and encourage exchange between different stakeholder (I2, Enterprise Architect, O2; I7, Enterprise Architect, O6). This skill is followed by technical knowledge considered by six interviewees. The technical knowledge concern to an understanding of IT and also to some extent of business (I7, Enterprise Architect, O6). Although it is, in fact, the most obvious required skill of an enterprise architect, and perhaps for that very reason, only five of the interviewees mentioned the expert knowledge related to EAM. Another important skill is the ability to abstract complex subjects. This is followed by methodical knowledge, analytical skills, perseverance, and patience, since managing enterprise architecture is a long process (I3, System Architect/Enterprise Architect, O3). These skills were identified by four interviewees. Moreover, two interviewees named rational and structured thinking as well as collegial behavior and team spirit as required skills for an enterprise architect:

> *"I find conciliatory very important in the sense of communicating not out of an ivory tower but in a friendly way."*(I10, Portfolio Manager, O9)

The following skills were merely specified once: (1) ability to listen to different stakeholder from different levels and to understand them (I13, Enterprise Architect, O11), (2) quick comprehension of topics (I6, Enterprise Architect, O6), (3) visionary thinking, (4) project management skills and (5) empathy towards the different perspectives (I3, System Architect/Enterprise Architect, O3).
As a next step, the interviewees were asked if the collaboration with others require additional capabilities. Eight of the interviewees did not name any new skills or think that no new skills are needed when working together. However, some of the interviewees could identify additional new skills. As shown in Figure 5.12 two interviewees named the willingness to acquire further training. The cooperation creates impulses for further training and certification in certain areas in order to be up to date and to be able to contribute to discussions (I3, System Architect/Enterprise Architect, O3; I6, Enterprise Architect, O6). Also mentioned by two interviewees is the ability to convince and motivate the members of a cooperation. This result from the fact that the members of the cooperation come from different individual organizations (I7, Enterprise Architect, O6). From the perspective of the group leader, the challenge of motivating the members arises as the group leader has no authority over the members (I1, Enterprise Architect, O1). In

this context, the moderation skill was explicitly mentioned by one interviewee. Because of the exchange between the members, the enterprise architect should have the ability to learn from the collaboration, which was also specified by one respondent. Another skill, that was mentioned by one participant is the ability to make decisions. This includes to reaching collaboratively a conclusion (I9, Lead Broadcast Architect Enterprise, O8).

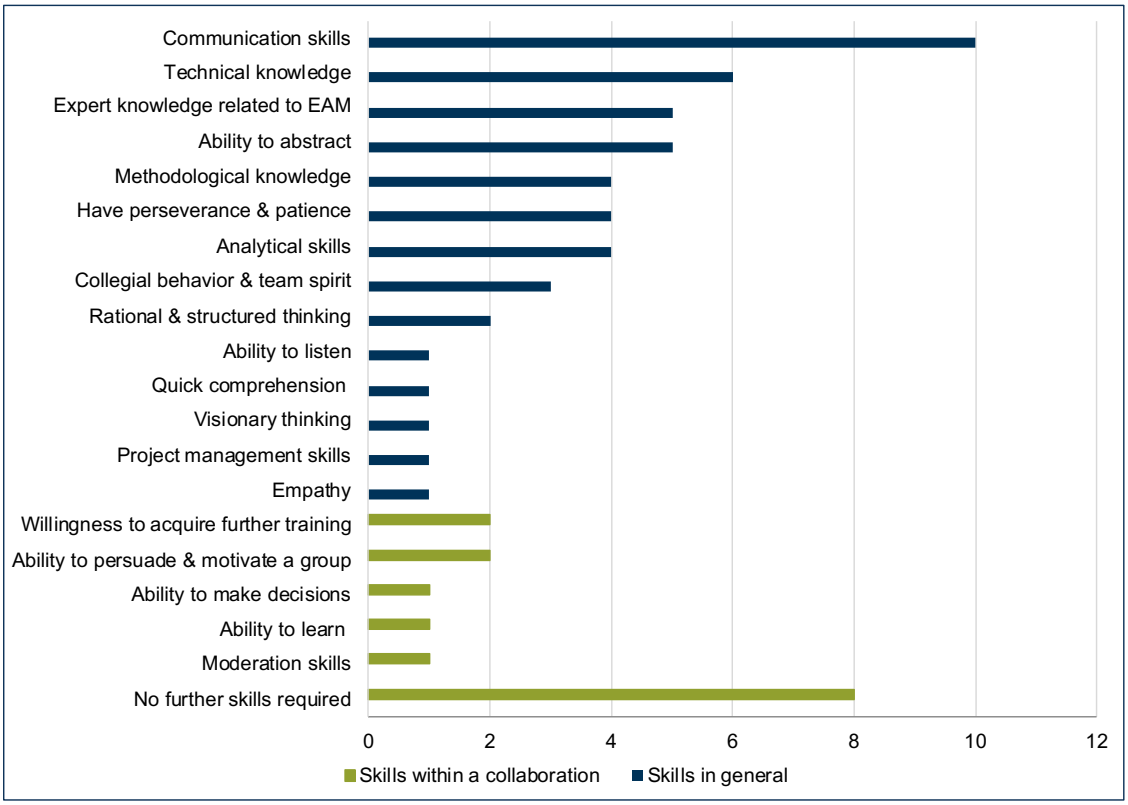


Figure 5.13.: Overview of skills in general and within a collaboration of an enterprise architect

Need for additional roles in collaboration

The collaboration consists of members who mainly perform the role of an enterprise architect in different areas like media systems, projects, project lead and program processing in their organizations (I10, Portfolio Manager, O9). Five of the interviewees are of the opinion that no further role is needed in the cooperation GerWG (see Figure 5.14). Two interviewees mentioned that it is important to include other roles of individual organizations through knowledge sharing, to provide an understanding of EAM and to communicate it in the direction of the roles in their own organizations. (I5, Project Manager, O5; I7, Enterprise Architect, O6). Both interviewees aim to include further roles in order to enable an understanding of EAM in the direction of their organization, rather than cooperation. Therefore, this answer is considered as no further roles needed.
However, in addition to the role of the enterprise architect, six of the interviewees would

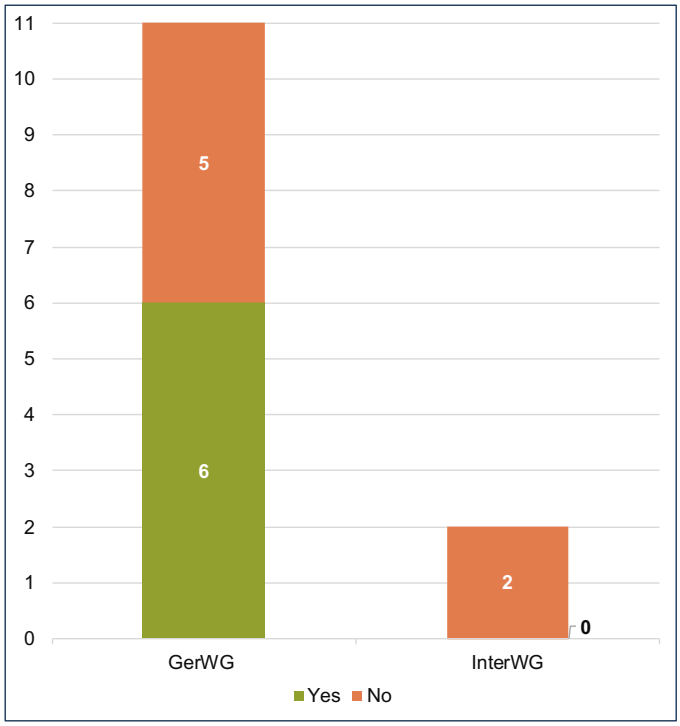


Figure 5.14.: Need of additional roles in the collaboration across GerWG and InterWG

prefer to have more of an exchange with other roles rather than including them in the collaboration. These roles are (see Table 5.21):

- **Domain Architect** as support for special technical or business topics for instance regarding infrastructure, technologies and multimedia planning (I6, Enterprise Architect, O6; I10, Portfolio Manager, O9; I4, Head of Department for Planning & Software Development, O4; I2, Enterprise Architect, O2),
- **Process Owner** as support for the establishment of the business capability map, to ensure that the process map and the business capability map match in the end (I1, Enterprise Architect, O1),
- **Business Analyst** as support with the know-how for the establishment of the business capability map (I10, Portfolio Manager, O9),
- **Solution Architect** as support for providing information (I6, Enterprise Architect, O6),
- **Technical Manager/Person in charge** as support by providing input and takes full responsibility for the cooperation within the management (I2, Enterprise Architect, O2).

Compared to the collaboration GerWG, InterWG's interviewees agree that the mix and experience of the members in the cooperation are quite good and thus no further roles

are needed (I9, Lead Broadcast Architect Enterprise, O8, I13, Enterprise Architect, O11). In this context, the following statement was made:

> *"So I think we have probably good mixture of experience and viewpoints [...]. So I think it is a quite good mixture."*(I9, Lead Broadcast Enterprise Architect, O8)

Required roles	Mentioned by no. interviewees
Domain Architect	5
Process Owner	2
Business Analyst	2
Solution Architect	1
Technical Manager / Person in charge	1

Table 5.21.: Required roles in the collaboration GerWG

Way of working

The interviewees were asked whether their way of working within the collaboration with enterprise architects had changed compared to their way of working without the collaboration.

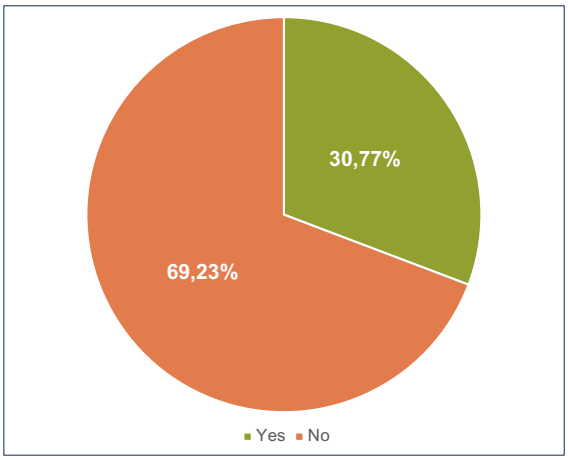


Figure 5.15.: Changes in the way of working of the interviewees

Figure 5.15 shows clear that more than half of the interviewees, namely 69,23%, could not perceive any changes or explicit changes in their way of working that resulted from the cooperation. Statements like

> *" I would tend to say no, not the way I work, but it's obviously because I'm doing the*

> *same activities, only now I have the chance to take the exchange beyond the boundaries of the company."*(I2, Enterprise Architect, O2)

were given. Nevertheless, the figure also presents, that 30,77% of the interviewees (only GerWG members) were able to identify changes in their way of working that is caused by the cooperation. These changes concern the use of the results of the cooperation, especially the business capability model, the coordination with the working group regarding the shared EAM tool, disciplining (I1, Enterprise Architects, O1), professionalization in the field of EAM (I3, System Architect/Enterprise Architect, O3), a more consciously handling with the topic (I4, Head of Department for Planning & Software Development, O4) and the implementation of experiences gained from the collaboration in projects (I12, Enterprise Architect, O10).

6. Discussion

This chapter outlines the key findings of this master's thesis related to each unit of analysis of the case study in Section 6.1. In addition, the limitations are presented and discussed in Section 6.2.

6.1. Key Findings

Based on the results of the case study, the key findings for each unit of analysis are presented. In the following, the key findings of **reason for the collaboration** are listed:

- **Both working groups emerged as a result of different principals.** Compared to the GerWG, which has an official assignment from the Top-IT Management, the InterWG was created from the voluntariness and initiative of individual employees.

- **Both working groups share different motivations for collaboration.** The GerWG is mainly driven by revealing cost-saving opportunities, while the InterWG is merely oriented towards the achieving of an accepted model in the media industry.

- **The aim of both working group provides key models for the media industry.** Both working groups strive to develop common models and architectures across the organizations. In particular, these should serve as a reference model for organizations in the media industry.

- **Transparency and comparability among organizations matters in GerWG.** In order to identify cost-saving opportunities and consequently to initiate possible cooperation projects, the establishment of transparency and comparability between the individual organizations is an essential aspect of the cooperation.

- **Both working groups have no tough opponents.** Even if the potentials and benefits of EAM are not clearly understood at all levels of the company, both working groups are not confronted with serious opposing opinions.

The second topic encapsulated the key findings of **collaboration process:**

- **No hierarchy exists in both working group.** Neither in the GerWG nor in the InterWG exists a hierarchy structure in the meetings and collaboration. All members are treated equally. However, only one member of the collaboration coordinates and organizes the meetings.

- **Both working groups agree on the challenge of consensus finding.** Although the two working groups have mainly identified divergent challenges, they agree that finding a consensus in cooperation is a difficult task. This is due to the fact that different interests are represented and thinking outside the known environment (organization) requires tolerance.
- **Cooperation is perceived as supportive instead of obstructive.** The fact that some of the interviewees could not identify any challenges but only benefits so far indicate that the collaboration across the organization is perceived as more valuable than hindering.
- **There are no explicit practices to manage and overcome challenges.** At the current status, there are no defined practices to deal with challenges in both working groups. In order to handle challenges, attempts are made to minimize obstacles with open communication by providing additional training and creating subgroups with same interests.
- **There is no measurement of success.** In both working groups, there is no measurement of success by KPI's. However, the interviewees considered that it is difficult to measure the success of a cooperation by numbers.
- **A high transparency among the companies exists.** Due to the exchange of information including presentation slides, documentation, technical information, and topics related to resources, both working groups have an open attitude towards each other.
- **The cooperation has both a direct and an indirect impact on the individual organizations.** The decisions, in particular, the determination of the methodical approach and the use of certain tools have a binding character for most of the organizations in the cooperation GerWG. Nevertheless, for reasons of economic inefficiency, individual companies can make the decisions themselves. However, in the GerWG, a direct influence is observed on staff, processes, structures, the usage of the shared EAM tool, and the reputation as well as the approach of EAM. Indirect impacts are noticed in the InterWG and in the organizations of the associated members from the GerWG. The cooperation can have indirect effects mainly on elaborated works in the organizations with the background of knowledge and experience from the collaboration.
- **Both working groups do not face rigor conflicts of interest.** There were no potential conflicts between the working group and individual organizations that threatened the cooperation. This indicates the interest of the organizations in collaboration and the agreement of the mission.

Further, the key findings of **EAM** including the enterprise architecture artifacts are as follows:

- **Both working groups collaborate mainly on the business, organization and application layer.** Due to the fact that the first step involves the identification of

similarities and differences between the companies, the GerWG operates mainly on the first two layers of enterprise architecture. The InterWG focuses on the development of a business capability model, which implies the need to engage on the business organization layer.

- **There exist no defined IT strategy in both working groups**. Although most companies have an IT strategy in their organization, no common strategy was defined in the working groups.

- **Both working groups develop a common business capability model.** More than half of the companies have developed a business capability model or a similar descriptive model before it was addressed in the collaboration. The InterWG aims to create a business capability model as a reference for organizations from the media industry, while in the GerWG, the business capability model serves as a supportive tool to establish an as-is application landscape. However, the developed collaborative model is used to implement it in the own organization or justify the own created models in the organizations.

- **Only the GerWG defined architectural principles and modeling guidelines.** In order to create comparability between the organizations, shared architectural principles and modeling guidelines were defined in the GerWG. In total, 18 architectural principles are determined and provided with a checklist to the members. Six of the nine organizations adapted the architectural principles, whereas only five of the organization use the afforded modeling guidelines.

- **Barely to little use of standards in the organizations.** The majority of the organizations do not use standards like application, data and technology reference model. This can be reasoned by the fact, that some of the interviewees had little knowledge of the term or were not in the position to make a statement. This also indicates that the EAM initiatives in the individual organizations are at the beginning and the different artifacts are scattered over several departments.

- **No mechanism for quality assurance used.** In both working groups as well as in the companies there is no defined quality assurance of the created deliverables. Only parts of works are checked by some members at a time, but the correctness of the established works is based on trust and own verification.

Finally, in the following the key findings of the **role of enterprise architect** are outlined:

- **Collaboration has little to no impact on the responsibilities and skills of the traditional role of an enterprise architect.** The traditional role of an enterprise architect is not undergoing fundamental changes in the collaborative context with enterprise architects. Additionally to the responsibilities of a traditional enterprise architect, only tasks related to the collaboration have to be taken into account. These responsibilities are not directly attributable to the role of the enterprise architect. A similar aspect can also be observed concerning the skills.

- **There is no need for additional roles in the collaboration.** Both working groups see no need to include further roles in the working group. However, they would support the exchange to the Process Owner, Domain Architect, Solution Architect, Business Analyst and Technical Manager/Person in charge.
- **There is no change in the way enterprise architects operate.** No significant changes in the working practices resulting from the cooperation could be identified. Only the inclusion of the provided materials from the cooperation used in the own company was noted. However, these are aspects that are inherently implied in the creation of the collaboration.

6.2. Limitations

This master's thesis includes several limitations, which can be divided into two main parts. The first part describes the limitation concerning the literature review of Chapter 4, while the second part focuses on the case study. In the following, the limitations regarding the literature review are summarized:

- In order to provide a holistic view on the types and characteristics of cooperation, the research question one and research question two are based on the literature review according to Webster and Watson [117] and vom Brocke et al. [114]. In doing this, four well-known databases with a focus on the business field were selected. Consequently, it cannot be excluded, that further relevant literature is missing, which might be identified by the inclusion of further databases.
- A similar approach is followed for the keywords and search strings in the search process. The three different search strings with identified relevant keywords were obtained by the conceptualization of the topic. Although the creation of the search strings takes time and effort, it cannot be entirely certain that further relevant keywords were not taken into account and cannot warrant that the arrangement of the boolean operators was optimal.

The second part mainly encompasses the validity aspects of the case study provided by Runeson and Höst [96], which are as follows:

- **Construct validity:** This includes the validity of the investigated operational measures related to the objective that the researcher wanted to maintain with the study or research question [96]. For ensuring that the quality of construct validity is maintained, the following three countermeasures have been taken: (1) the review of the interview guideline by a second researcher to avoid misunderstanding of questions, (2) the conduction of semi-structured interviews with different employees from different position in different organizations with necessary background, and (3) the coding of the interviews by the master's thesis author and review by a second researcher.
- **Internal validity:** The internal validity is related to researches of causal relations under consideration of influencing factors [96]. This validity can be ignored, due

to the fact, that the master's thesis does not include exploratory research or hypothesis testing.

- **External validity:** This aspect describes to what extent the obtained results can be generalized. Further, it also determines whether the results are of interest to people outside the case study. The underlying intention of the case study was to create an analytical generalization [96]. The case study focuses on providing a deeper understanding of collaboration in the area of EAM across individual organizations. Organizations will be able to use it to gain an idea of how a collaboration in the field is created, executed, and prepare for potential challenges.
- **Reliability:** The reliability addresses the dependency of the data and analysis on the specific researchers. Thus, same results should be achieved with another researcher [96]. In order to minimize this aspect of threat four main factors were considered. Firstly, the interview questions were reviewed by the author and by a second researcher, which allows for clear and understandable questions. Secondly, to achieve unambiguous and representative results, the number of respondents was expanded to 13. Further, a case study protocol, which describes the data collection and analysis, as well as a case study database including the recordings and transcripts was developed as recommend by Yin [123].

However, the review of the literature as well as the conduction and coding of the interviews were only carried out by the author of this master's thesis. This could led to a biased view at some point. Yet, as described, attempts have been made to keep this to a minimum by taking countermeasures.

7. Conclusion

This chapter summarizes the master's thesis in Section 7.1 and provides an overview of further possible investigation in Section 7.2.

7.1. Summary

Motivated by the fact that a changing business encourages companies to cooperate with other companies in their environment, the importance of inter-organizational enterprise architecture is becoming increasingly important (see Chapter 1). Based on this motivation, an investigation in inter-organizational collaboration between two working groups in the field of EAM was made. This master's thesis is divided into two main parts: The first part includes the research question one and the research questions two, while the second part comprises the research question three. The **research question one** and the **research question two** address the types of inter-organizational cooperation and their characteristics (see Chapter 4). By conducting an extensive literature review, 43 types of inter-organizational cooperation and 30 characteristics with further specifications were identified and analyzed from 37 sources. After analyzing and reviewing the identified inter-organizational cooperation types, they were grouped into 14 types of cooperation based on their term and description. These types are enterprise networks, strategic alliance, joint venture, cooperation based on contracts and non-contractual cooperation, franchising, supply chain and value-adding partnership, research and development, consortia/working group, community of interests, cartel, concern, business ecosystems, cluster, and other forms of cooperation. As a second step characteristics of cooperation types were retrieved from the literature. However, the literature mediated that a strict classification, characterization and coverage of all inter-organizational cooperation type is almost impossible. For the purpose of this master's thesis, the concept of a morphological box, as frequently used in the literature, was taken. Based on the identified characteristics provided as morphological box, the two case study partners were classified in Section 5.1. Thus, both case study partners are assigned to the inter-organizational cooperation type of working group, as they represent the characteristics of a working group. These characteristics are horizontal direction of cooperation, including at least two cooperation partners with a low interdependence, limited in time and objective, and aim to gain synergy potential. The second and the main part of this master's thesis is the case study, which answers the **research question three** (see Chapter 5). The multiple embedded case study was conducted with 13 interviewees form eleven organizations of two working groups. By conducting 13 semi-structured interviews, this master's thesis contributed to a deeper understanding of inter-organizational collaboration in the field of enterprise architecture. In particular, it provided very promising results in four units

of analysis, which are the reason for collaboration, the collaboration process, the EAM including enterprise architecture artifacts, and the role of an enterprise architect in a collaborative environment. The findings showed that both working groups, the GerWG and InterWG, were formed as a result of different causes and factors. The GerWG has the Top-IT Management as principal in order to identify cost-saving opportunities, while the InterWG was created out of a voluntary exchange of knowledge and experience of individuals with common interests. Further, both working groups are still at the initial phase with their collaboration in the area of EAM. With no existing hierarchy, the cooperation is seen by the members of the collaboration as a valuable and supportive initiative as rather a hindering work. However, the impact of the cooperation on the individual companies is restricted to the extent that it is still the responsibility of each organization to decide whether the decisions taken jointly are implemented in the companies. However, it should be noted here that the realization of the resolutions in the individual companies encourages and facilitates better cooperation. Concerning the artifacts and methods of EAM, the results indicate that organizations in the GerWG are at the beginning of their introduction of the EAM initiative, while the organizations of the InterWG have a more advanced EAM initiative. Furthermore, the results reveal that one commonality of the two working groups is that they both work on a shared business capability model. However, a change of the traditional role of enterprise architect could not be identified in the context of a collaborative work across individual organizations.

7.2. Future Work

This master's thesis contributes as a first approach for a deeper understanding of the collaboration of enterprise architects across individual organizations within the context of EAM. As the concept of EAM is initially created for a single organization, there are further investigation needed in the inter-organizational EAM. The following point summarized these possibilities:

- **Evaluation and analysis of the case study findings with a literature research:** The achieved results of each unit of analysis from the case study have not yet been completely compared with findings from the literature. An extensive literature search for each area and possible comparison with other collaboration initiatives may offer new insights and observations. A first approach could be for instance the work according to Paasivaara and Lassenius [81].

- **Focus on business capability model:** This thesis shows that in the context of EAM and including the artifacts, both working groups develop a business capability model collaboratively across the organizations. Due to the fact, that this master's thesis does not intend any further investigation regarding the artifacts, focusing on the business capability model would provide an in-depth insight of a collaborative development of a model.

- **Conduct interviews in the same collaboration:** Since both working groups are in the initial phase of their collaboration, a follow-up interview at the end phase is

recommended. This would lead to the identification of interesting changes in the collaboration as well as organizations and would yield to best practices or recommendations for other organizations.

- **Conduct interviews in similar collaboration initiatives:** This master's thesis investigated in two working groups from the same industry, namely media industry, and in organizations that do not consider each other as direct competitors. The case study could be extended to further industries, across organizations acting in different industries and in organizations with a competitor behavior.

Appendix

A. Appendix

A.1. Semi-structured Interviews

Questionnaire – Inter-Organizational EAM

Data

Company: _____ Date: _____

Interviewer: _____ Questionnaire-No.: _____ - _____ - _____

Background

a) **Which role do you have in your company?**

☐ Dept. Manager (IT) ☐ Dept. Manager (Business) ☐ Area Manager (IT) ☐ Area Manager (Business)

☐ Enterprise Architect ☐ Project Manager (IT) ☐ Project Manager (Business) ☐ Product Owner

☐ Software Developer ☐ Solution Architect ☐ Other: _____

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

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

c) **To which industry does your company belong?**

☐ Media Industry ☐ Construction Industry ☐ Education, University ☐ Agriculture, Mining

☐ Finance, Insurance, Property ☐ Government ☐ Health Industry ☐ IT, Technology

☐ Retail / Wholesale ☐ Service Industry ☐ Transportation, Logistic ☐ Communication, Utility

☐ Production ☐ Other: _____

Technische Universität München
Fakultät für Informatik
Lehrstuhl für Software Engineering
betrieblicher Informationssysteme (sebis)

Univ.-Prof. Dr.
Florian Matthes
Boltzmannstr. 3
85748 Garching

Tel. +49 89 289 17 132
Fax +49 89 289 17 136
matthes@tum.de
wwwmatthes.in.tum.de
www.tum.de

d) **How many employees does your company have?**

☐ < 10 employees ☐ 11 – 50 employees ☐ 51 – 100 employees

☐ 101 – 500 employees ☐ 501 – 1000 employees ☐ > 1001 employees

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betrieblicher Informationssysteme (sebis)

Univ.-Prof. Dr.
Florian Matthes
Boltzmannstr. 3
85748 Garching

Tel. +49 89 289 17 132
Fax +49 89 289 17 136
matthes@tum.de
wwwmatthes.in.tum.de
www.tum.de

Topic: Reason for Collaboration

- Where and how did the idea of collaboration come about?
- Who (which role) instructs you to cooperate with other enterprise architects?
- Do you collaborate with companies from the same industry (A) or with companies from different industries (B)? If A, are these companies your competitors? If B, are these companies your supplier or customer?
- When did the cross-organizational collaborative EAM initiative start?
- Why did you start this initiative? Was there a particular reason for cooperation (Trigger)?
- What is the aim of the initiative? Why is it important to collaborate?
- Who (which role) supports and/or opponents the collaboration?
- What is the top management's view of the collaboration project?
- How are the resulting additional costs (e.g. for regular meetings) covered?
- Have you been informed about similar collaboration projects? If so, which ones?

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Lehrstuhl für Software Engineering
betrieblicher Informationssysteme (sebis)

Univ.-Prof. Dr.
Florian Matthes
Boltzmannstr. 3
85748 Garching

Tel. +49 89 289 17 132
Fax +49 89 289 17 136
matthes@tum.de
wwwmatthes.in.tum.de
www.tum.de

Topic: Collaboration Process

1. Structure of the Meetings

- How often do your meetings with enterprise architects from other companies take place?
- Does a hierarchy exist? If so, how is the hierarchy structured?
- How are these meetings designed (physical meetings, virtual meetings (Telcos), …)?
- Which topics did and do you discuss in these meetings?
- What are the expected outcomes of these meetings?

2. Benefits & Challenges

- What are the benefits for you of the collaboration with other enterprise architects?
- Do you measure the success of the collaboration? If so, how? KPIs?
- Have you observed any problems or challenges within the collaboration? If so, which problems?
- How do you manage these problems or challenges?
- Which information and knowledge of the own organization will be shared? Which not? Why?
- Do you face a trade-off between the interests of the own company and common interests of the community?
- Based on your experience, what recommendations would you make to companies that would like to implement collaborative work between enterprise architects?

3. Impacts

- Do the outcomes have a binding nature? If so, how?
- Does the collaboration have an impact to your independent company (process, structure etc.)? If so, which and how?

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betrieblicher Informationssysteme (sebis)

Univ.-Prof. Dr.
Florian Matthes
Boltzmannstr. 3
85748 Garching

Tel. +49 89 289 17 132
Fax +49 89 289 17 136
matthes@tum.de
wwwmatthes.in.tum.de
www.tum.de

Topic: Enterprise Architecture Management

1. Layers of Enterprise Architecture

- In which of the following layers do you work together?

Business- & Organization- & Business process Layer	☐	If yes, why?	☐	If no, why not?	☐	Planned
Application Layer	☐	If yes, why?	☐	If no, why not?	☐	Planned
Data Layer	☐	If yes, why?	☐	If no, why not?	☐	Planned
IT-Infrastructure Layer	☐	If yes, why?	☐	If no, why not?	☐	Planned

2. Tools

- Did you use and share tools? If so, which did you use and why?
- Are the tools (e.g. EAM tools) connected with each other? If so, how does this work? APIs?
- Is the introduction of further tools planned? If yes, which tools and why?

3. Enterprise Architecture Artifacts

- Which of the following enterprise architecture artifacts do you use and share?

IT-Strategy/Vision	☐	If yes, why and how do you implement them within the community and in your company?	☐	If no, why not?	☐	Planned
Business Capability Models	☐	If yes, why and how do you implement them within the community and in your company?	☐	If no, why not?	☐	Planned
	☐	If developed in collaboration, which problems and challenges did you face during the creation of the common business capability model?				
Roadmaps	☐	If yes, why and how do you implement them within the community and in your company?	☐	If no, why not?	☐	Planned
Value Chains	☐	If yes, why and how do you implement them within the community and in your company?	☐	If no, why not?	☐	Planned
As-is and To-be architecture	☐	If yes, why and how do you implement them within the community and in your company?	☐	If no, why not?	☐	Planned

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Univ.-Prof. Dr.
Florian Matthes
Boltzmannstr. 3
85748 Garching

Tel. +49 89 289 17 132
Fax +49 89 289 17 136
matthes@tum.de
wwwmatthes.in.tum.de
www.tum.de

Application Portfolio	☐	If yes, why and how do you implement them within the community and in your company?	☐	If no, why not?	☐	Planned
Landscape Diagrams	☐	If yes, why and how do you implement them within the community and in your company?	☐	If no, why not?	☐	Planned
Other: _____	☐	If yes, why and how do you implement them within the community and in your company?	☐	If no, why not?	☐	Planned

- How is quality assurance carried out?
- Is the introduction of further enterprise architecture artifacts planned? If yes, which enterprise architecture artifacts and why?

Standards

- Which of the following standards do you use and share?

Application Reference Models	☐	If yes, why and how do you implement them within the community and in your company?	☐	If no, why not?	☐	Planned
Data Reference Models (for standardized data exchange)	☐	If yes, why and how do you implement them within the community and in your company?	☐	If no, why not?	☐	Planned
Technology Reference Models	☐	If yes, why and how do you implement them within the community and in your company?	☐	If no, why not?	☐	Planned
Other: _____	☐	If yes, why and how do you implement them within the community and in your company?	☐	If no, why not?	☐	Planned

- How is quality assurance carried out?
- Is the introduction of further standards planned? If so, which standards and why?

Architectural Principles

- Did you define architectural principles? If so, which did you define and why?
- How do you implement them within the community and in your company?
- How is quality assurance carried out?
- Is the introduction of further architectural principles planned? If so, which architectural principles and why?

6. Modeling Guidelines

- Did you define modeling guidelines? If so, which did you define and why?
- How do you implement them within the community and in your company?
- How is quality assurance carried out?
- Is the introduction of further modeling guidelines planned? If so, which modeling guidelines and why?

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Fakultät für Informatik
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betrieblicher Informationssysteme (sebis)

Univ.-Prof. Dr.
Florian Matthes
Boltzmannstr. 3
85748 Garching

Tel. +49 89 289 17 132
Fax +49 89 289 17 136
matthes@tum.de
wwwmatthes.in.tum.de
www.tum.de

Topic: Role of Enterprise Architect

- What are the responsibilities of an enterprise architect in your own company?
- Does the collaboration with enterprise architects lead to additional responsibilities and tasks? If so, which ones?
- Are there other roles involved besides enterprise architect? If not, are they needed? If so, which ones?
- Which skills do you need to fulfill your tasks (expertise, soft skills …)?
- Does the collaboration with enterprise architects require additional capabilities? If so, which ones?
- In the context of the collaboration with other enterprise architects, how did your way of working change? (compared to your way of working without the collaboration)

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Fakultät für Informatik
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betrieblicher Informationssysteme (sebis)

Univ.-Prof. Dr.
Florian Matthes
Boltzmannstr. 3
85748 Garching

Tel. +49 89 289 17 132
Fax +49 89 289 17 136
matthes@tum.de
wwwmatthes.in.tum.de
www.tum.de

Topic: Discussion

1. Feedbacks, Comments, Suggestions

- Do you have any feedbacks, comments or suggestions?

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Univ.-Prof. Dr.
Florian Matthes
Boltzmannstr. 3
85748 Garching

Tel. +49 89 289 17 132
Fax +49 89 289 17 136
matthes@tum.de
wwwmatthes.in.tum.de
www.tum.de

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