# Enterprise Architecture Management Pattern Catalog

**Version 2.0**
**November 2015**

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### About sebis

*Software Engineering for Business Information Systems (sebis)* is a research chair at the Institute for computer science of the Technische Universität München. Sebis has been established in 2002 with funding of the Ernst Denert-Stiftung and is headed by Professor Dr. Florian Matthes. Main research areas of sebis are:

- *Enterprise Architecture Management:* Development of methods that support the strategic planning, analysis, and enactment of holistic models for business processes, information systems, and IT infrastructure with their relationships.
- *Social Software Engineering:* Development of social software solutions that improve the collaborative organization of information and processes.

# Abstract

There ist no denying that the Enterprise Architecture Management (EAM) function is gaining increased attention in today's organizations: Upcoming trends in various branches and the increased focus on the demands of single customers, leads to entire new business requirements, fundamental changes in organizational strategies and thus in the operating IT landscapes. EAM focuses on steering such IT transformation projects by supporting with smart EAM methods, transparent visualizations and fast provisioning of information.

Based on several years of research experience and EAM projects, the sebis chair of the Universität München has a concrete perception of what kind of concepts constitute EAM functions in large organizations: EAM functions address various *concerns* of multiple *stakeholders* by using concrete *EAM methods* and visualize the current state of the respective concern *visualizations*. Moreover *architecture principles*, and branch and organization specific *influence factors* impact the organizational and operational structure and thus the EAM function of the organization.

In 2008, the sebis chair published the *Enterprise Architecture Management Pattern Catalog*, a EAM best practice and pattern collection. After seven years, the EAM function might has changed in today's organizations and thus new EAM patterns have been observed. For this reason, the *Enterprise Architecture Management Catalog V2* (EAMPC V2) picks up this topic again and focuses on identifying new EAM patterns and best practices. We conducted an online survey and single expert interviews with 31 practitioners and identified various new trends in today's EAM functions. This catalog includes our observed EAM patterns.

# Acknowledgments

Since the majority of gathered information originate from practitioners, we thank our industry partners which shared their knowledge and provided useful insights.

Last but not least, we want to thank Daniel Elsner, Ömer Uludag and Simon Pigat for their support in documenting and compiling the catalog's content.

Garching b. München, November 2015

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# CHAPTER 1

# Introduction

## Contents



Organizations are forced to constantly transform due to changing market requirements, increasing digitization of business models as well as restructuring through mergers and acquisitions. Enterprise architecture (EA) matured to a widely accepted discipline in practice that supports decision makers with holistic information about core organizational elements and their relationships for this purpose [Ro03, AGW11, Ro13]. EA management (EAM) seeks to improve the alignment between business and IT, realize cost saving potentials, and increase fault tolerance [LW04]. In this report, we present the second version of the *EAMPC* that aggregates data from 31 organizations to reflect the current status of the discipline in practice. The initial version has been published in 2008 as *EAMPC* v1.0[Bu08] and found much appeal by practitioners and researchers. The second version incorporates our findings from many industry and research projects related to EAM over the last seven years since the initial release. In the second version the underlying pattern language is extended with new concepts and the integration of patterns is improved through more flexible associations. With these improvements organizations can tailor their approach to EAM based on relevant stakeholders and influence factors. The *EAMPC* is primarily developed as reference for practitioners aiming to introduce or enhance EAM initiatives in organizations. In addition, researchers can utilize this report to investigate the evolution of the discipline and develop approaches for EAM that can be iteratively enhanced.

 

## 1.1. Research objectives

The main research objective of the *EAMPC* is to provide the foundation for an approach that allows the **stepwise creation and adaptation of EAM** initiatives that are tailored to the context of an organization, e.g., industry sector, maturity level, size of the organization or organizational culture. Figure 1.1 provides an overview about the most prominent EA frameworks. Our approach distinguishes the *EAMPC* from other EA frameworks, which predefine the entire method in advance and provide no conductable instructions for practitioners. According to a study on issues in enterprise architecting presented in [LKL10], one of the main challenges in this domain is that current frameworks are not rigid enough and no formal steps for defining, maintaining, and implementing an EA exist. Properly used the *EAMPC* can fill this gap by integrating applicable solution building blocks with EA frameworks.

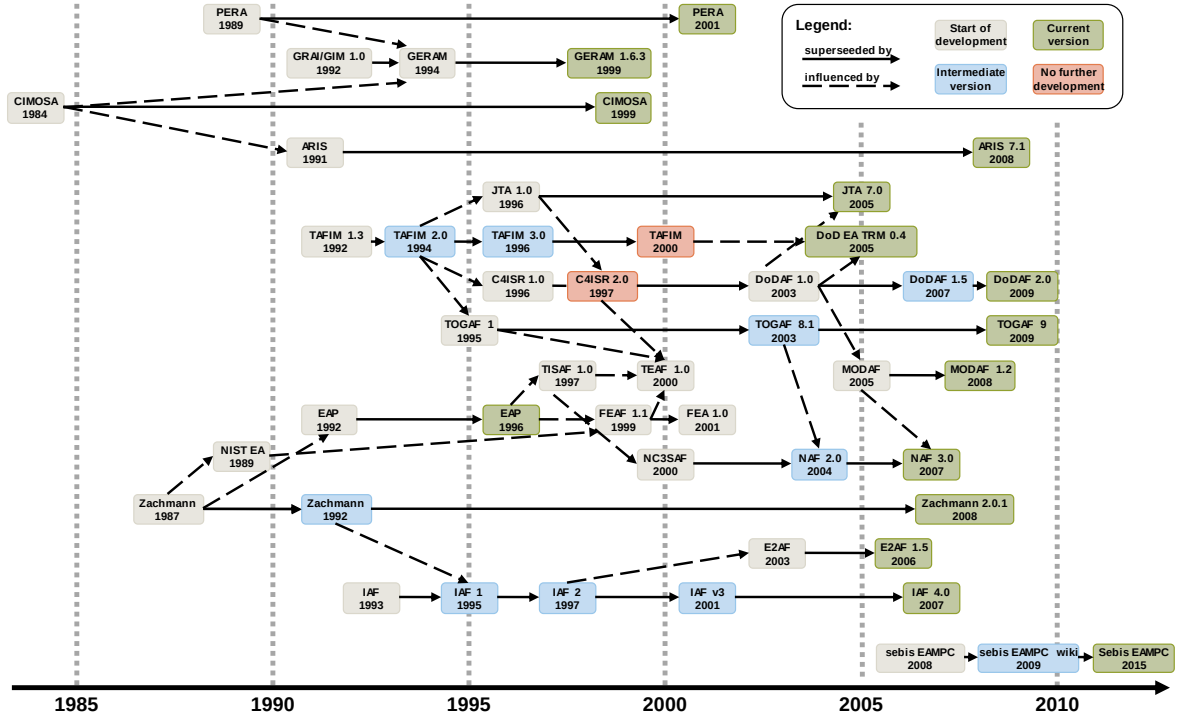


Figure 1.1.: Overview on EA frameworks and the earlier version of the *EAMPC* based on [Er10]

Another research objective of the *EAMPC* is to provide a **consistent terminology** for the integration of patterns. Organizations can document their current process for the management of the EA using this structure. The standardized terminology fosters the exchange and communication of practice proven solutions for recurring problems. These solutions are collected through an established **pattern community** that revolves around the *EAMPC* since 2008. Every pattern candidate is documented with its unique id and can be traced back to its origin, i.e., pattern candidates from the previous release are evaluated again in this version. In the future, the pattern catalog will be expanded and revised with the growing knowledge base in EAM.

 

Fundamental concepts that are common for all EA management processes are illustrated in Figure 1.2. At the core of the figure the EA team is shown that is responsible for the overall EA management process. The EA team applies various **methods** that are illustrated within the surrounding circle. These methods describe recurring activities that we grouped into three categories. The first category summarizes methods that are related to the modeling and description of the EA. Depending on the maturity level of the organization the degree of structure can vary from unstructured documents to more formal languages, e.g., ArchiMate [LPJ09]. The **data collection** processes can be either manual or automated through the integration of existing information sources [Fa13]. The second category contains methods that are related to the communication of the created artifacts. This category is illustrated much larger since we think that this should take up most of the time in the EA management process. The third category captures methods for the adaptation and reflection of the process based on feedback.

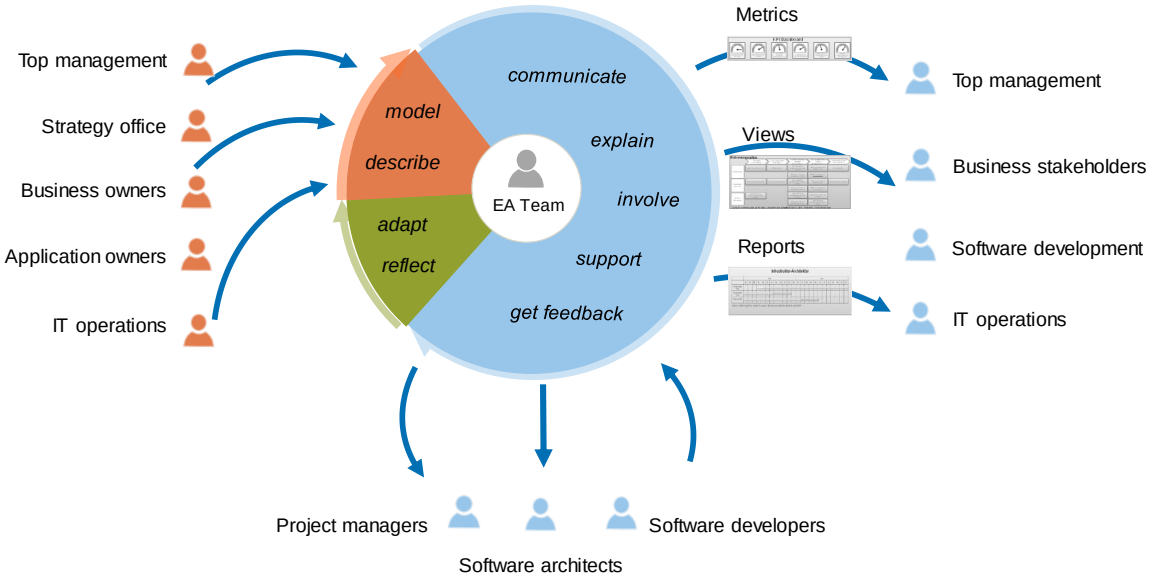


Figure 1.2.: Fundamental concepts that are common for all EA management processes

The EA team uses methods to address **concerns** of **stakeholders** by using specific **visualizations**. Concerns describe information demands of individual stakeholders that are necessary to fulfill management goals. To answers these concerns stakeholders provide input during modeling and description of the EA, e.g., top management, business owners, and application owners. Although existing information sources can be used to collect data about the existing EA, knowledge about relationships and planned states of the EA have to be gathered from information providers. Based on this input the EA team creates specific visualizations for decision makers, i.e., metrics, views, and reports. At the bottom of Figure 1.2 the communication of the EA team with members of project teams is illustrated. The EA team provides architecture blueprints and approves the adherence to architectural requirements. Changes on the architecture made by software developers are communicated back to the EA team. The manifestation of the EA management process needs to be tailored for every organization. **Influence factors** determine which stakeholders, concerns and patterns have to be chosen.

 

## 1.2. Research design

An overview of the applied research design with the steps and deliverables is illustrated in Figure 1.3. The second version of the *EAMPC* has been developed in four subsequent steps started in December 2014. In the first step the pattern language extension has been performed based on experience form industry and research projects form the last seven years. The results of this step with the language extension has been published in [SM15]. Section 1.3 introduces the extension of the language in detail. In the second step, we conducted a preliminary study in February 2015 to evaluate the extension of the language and gather pattern candidates as input for the main study. The pattern candidates are collected from 1,208 presentation slides from 50 companies that we collected during practitioner conferences, which mainly describe how the companies perform EAM. New pattern candidates are created in case that the identified ones from the presentations are not listed in the first version of the *EAMPC* .

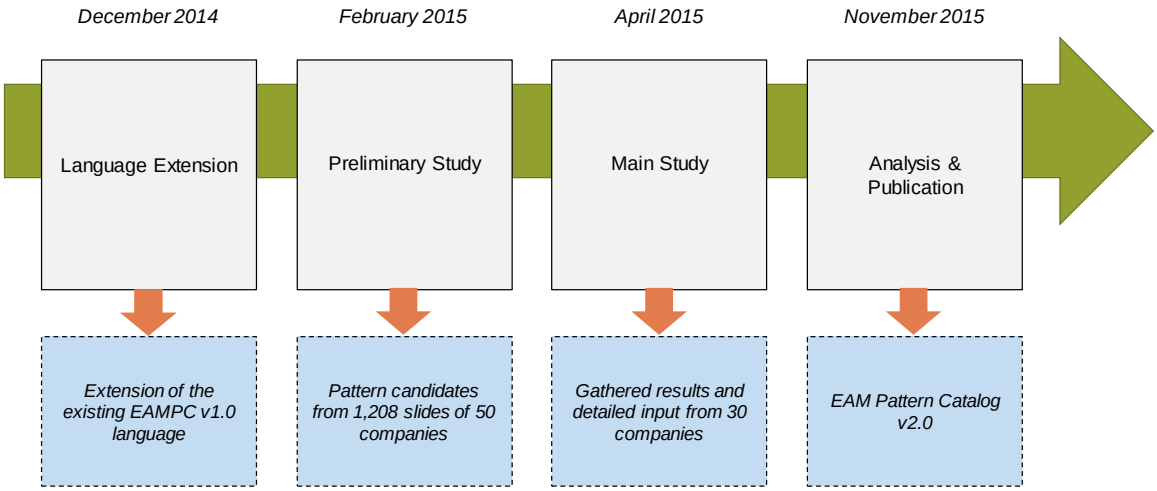


Figure 1.3.: Applied research design for the development of the *EAMPC V2*

The pattern candidates from the preliminary study are the foundation for the subsequent main study. The main study has been performed in April 2015 with an Excel sheet that is sent out to the participating organizations. This sheet already contains the identified pattern candidates and can be extended with new pattern candidates. The participants of the survey can select whether the pattern candidates appear in their organization. Another advantage of predefined pattern candidates is that it fosters the consistent usage of terms. The organizations can also use the Excel sheet as a template to document the current state of their EAM initiative. We received the responses with detailed information from 31 companies. Detailed information about the participants is illustrated in SectionA.1. Due to the complexity of the Excel template most of the participants estimated their time effort between two to three hours.

The final version of the report has been published in November 2015, whereas the analysis of the data started already two months earlier. In the first step of the analysis new pattern candidates are clustered based on their name and description. In the second step, we identified the relationships between the pattern candidates manually since it was not possible to retrieve all of them from the Excel sheet.

 

## 1.3. Extending the language of the EAMPC

The extended language of the *EAMPC V2* is illustrated with examples in Figure 1.4. None of the previously presented concepts have been removed from the first version in 2008. This allows to analyze the evolution of the discipline in practice, e.g., to identify new patterns that were not used before. Main differences to the first version are the introduction of four new concepts and more flexible associations between some patterns. All concepts with their relationships are explained in the following.

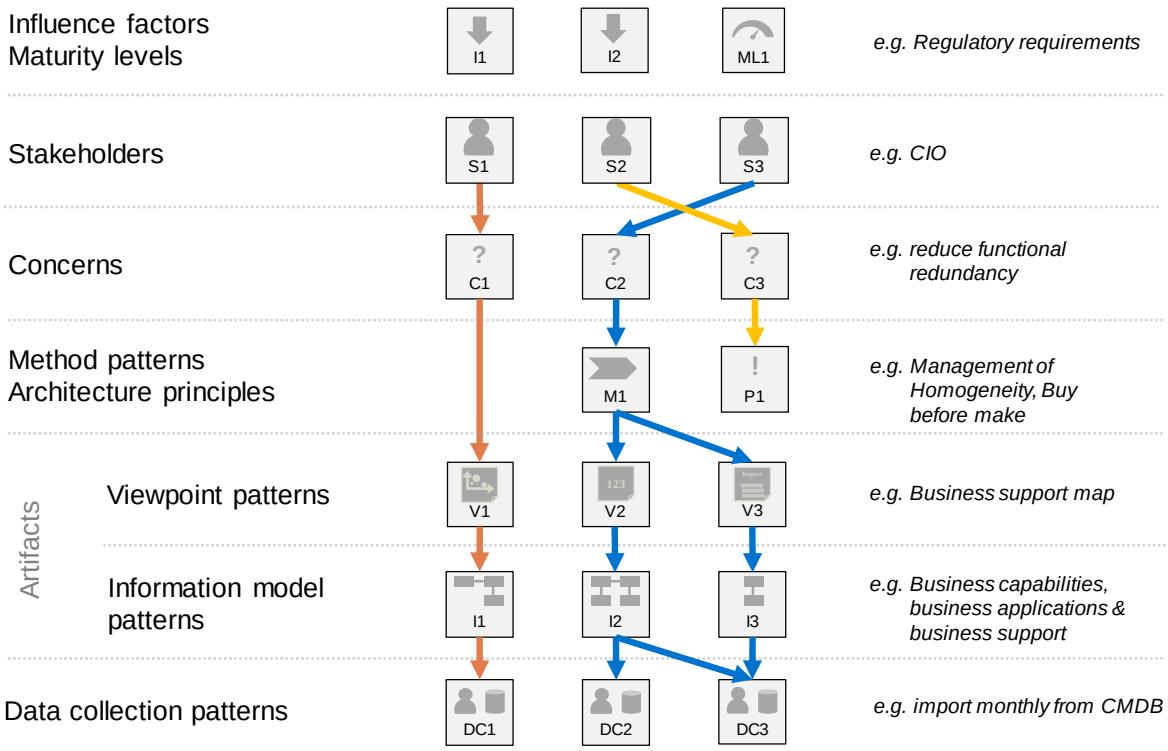


Figure 1.4.: Extended language of the *EAMPC* with several examples

- **Influence factors (new):** This concept describes the context of an organization which can have an impact on the EAM process. Depending on the influence factors some EAM patterns might be more or less relevant for an organization. More mature organizations can select much more sophisticated EAM patterns, while organizations that are in an early stage can be focused on a small set of simple patterns to create value quickly.
- **Stakeholders (new):** Managing an EA is a highly collaborative effort and it is important to know the most important stakeholders that have an interest in the EA. In practice we experienced that many practitioners struggle to identify key stakeholders although their concerns should be the foundation for the EAM process. The concrete stakeholders also depend on the influence factors for the organization. Knowing the key stakeholders with their concerns is the baseline for an effective EAM.
- **Concerns:** Describe interests of stakeholders that have certain goals for the manage-

 

ment of the EA. This concept has been taken from the first version of the pattern catalog. One adaptation in the second version is the association to the new stakeholder concept and more flexible associations allowing direct links to viewpoints.

- **Method patterns:** Describe concrete steps that are performed to address the concerns of stakeholders. Methods can be hierarchically structured to break down high level steps to concrete tasks for the EA team. In the second version we introduce architecture principles which are rather similar to methods, i.e., they are also related to concerns and influence the EA. Methods and architecture principles are not always necessary and it is possible to relate concerns directly to viewpoints.
- **Viewpoint patterns:** Viewpoint patterns illustrate important aspects of the EA to address concerns of specific stakeholders. Similar to the previous two concepts, viewpoint patterns have been taken form the first version of the pattern catalog. Although almost all organizations today use viewpoints for their EA, it is important to identify the most frequently used viewpoints in practice to avoid unnecessary collection of data. Our goal is to identify a core set of viewpoints that are inevitable for a successful EAM.
- **Information model patterns:** Viewpoints require certain data for the visualization of the EA. The information model patterns capture which data is necessary for which viewpoint pattern. Main advantage of this approach is that it avoids one large information model that might be difficult to maintain. Depending on the required viewpoints it is possible to incrementally extend the information model. Nevertheless, all information model patterns are based on a common glossary and can be integrated.
- **Data collection patterns (new):** The provision of data for the information model patterns is a time consuming and error prone effort. Data collection patterns describe how this data can be gathered in an organization efficiently, i.e., by integrating existing information systems that already contain some data about the EA. Data collection patterns also capture best practices about how often certain data needs to be updated.

The underlying conceptual model for the documentation of these concepts is illustrated in Figure 1.5. The V- and I-patterns are summarized since both represent artifacts that are created by the EA team. For the sake of brevity not all associations are presented in the model, e.g., the immediate association from concern to v-pattern. An approach how EAM processes can be supported is described in the PhD thesis of Hauder in [Ha16].

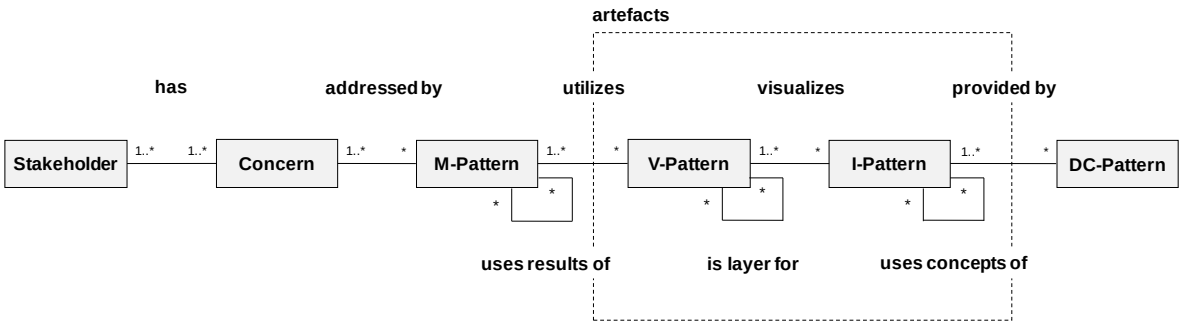


Figure 1.5.: Conceptual diagram describing the extended language of the second version

 

## 1.4. Miscellaneous information

The *EAMPC* V2 has an own homepage with further information about the project. It also contains the Excel template for the documentation of the EAM patterns. Organizations that want to contribute to the knowledge base of EAM patterns are cordially invited to provide us their data. More information how to participate and contribute can be found on this page. The homepage is available under the following link:

- `https://wwwmatthes.in.tum.de/pages/ugsyi19wmmvl/EAM-Pattern-Catalog-v2`

New versions of the EAM patterns are published as a technical report for major releases. In the technical report only patterns are considered that appear at least three times in the organizations. The *EAM Pattern Catalog Wiki* is an additional source that contains the latest EAM patterns and pattern candidates. Pattern candidates are not observed three times, but they might still be valuable for some organizations. The *EAM Pattern Catalog Wiki* can be reached through the following link:

- `https://wwwmatthes.in.tum.de/pages/3b4t6l34g936/EAM-Pattern-Catalog-Wiki`

Appropriate tool support is essential for an successful EAM in practice, e.g., for the creation of visualizations and documentation of the EA. The market for EAM tools has been evolving similar to the evolution of the EAM patterns that we observed in practice. Based on our initial EAM Tool Study from 2008, we created an update based on the same methodology with new innovative tool solutions. The *EAM Tool Study 2014* Update is available under the following link:

- `https://wwwmatthes.in.tum.de/pages/lw3g9moh1o0c/Enterprise-Architecture-Management-Tool-Survey-2014-Update`

Due to the importance of visualizations for effective EAM, our group conducted a separate tool survey related to EA visualizations in 2014. This *EA Visualization Tool Survey 2014* captures the visualization capabilities of leading tool solutions and the current practice in industry. For every tool solution the survey provides the supported visualizations with example screenshots. Together with the *EAMPC* it is possible to determine which tool provides the best support for the required viewpoint patterns that are relevant for an organization. The *EA Visualization Tool Survey 2014* is available under the following link:

- `https://wwwmatthes.in.tum.de/pages/6u8f5ki1t2yz/EAVTS2014-Enterprise-Architecture-Visualization-Tool-Survey`

 

# CHAPTER 2

# Using the EAMPC

**Contents**



Main research objectives of the *EAMPC* are (1) the stepwise creation and adaptation of EAM initiatives, (2) the provision of a consistent terminology and (3) the establishment of a pattern community. In this chapter three application scenarios are illustrated that describe how practitioners and researchers can benefit from this research. In the first application scenario the *EAMPC* is used to implement an organization-specific EA management. This scenario is relevant for organizations that want to establish an approach from the scratch or improve an existing effort. Patterns can be selected step by step in order to identify stakeholders and address their concerns. The main advantage of this approach is that the initial data collection effort is reduced and benefits are visible early. In the second application scenario the pattern catalog can be used as foundation for benchmarks, e.g., in order to identify gaps in the current approach. This analysis can also be used to eliminate waste and identify unnecessary data collection efforts that promote a lean EA management. The third application scenario uses the *EAMPC* as basis for academic research. Due to the consistent documentation it is possible to retrace all patterns throughout all versions of the pattern catalog, i.e., it is possible to identify new patterns. This allows researchers and pracitcioners to evaluate scientific considerations like the evolving scope of EA management in practice and differences related to the size, industry sector, maturity etc. of the organization.

 

## 2.1. Implementing an organization-specific EAM

The overall approach for the implementation of an organization-specific EAM based on patterns is illustrated in Figure 2.1. In the first step stakeholders that have an interest in EA artifacts have to be identified. The *EAMPC* provides a list of the most frequently mentioned EA stakeholders to support this step. For these stakeholders concerns that have to be addressed by the EA team are identified. It is important to note that not all concerns of stakeholders have to be addressed from the beginning. Priorities can be used to determine which concerns should be preferred since it is usually not possible to address all of them in sufficient quality. In Figure 2.1 concern 1 and 2 are selected. The concerns of stakeholder 3 are not considered at the moment.

An EAM pattern consists of method patterns that capture what steps have to be undertaken to address the concern. For this purpose method patterns leverage viewpoint patterns to visualize aspects of the EA for specific stakeholders. The usage of method patterns is not mandatory and concerns can be linked directly to viewpoint patterns. Information model patterns describe which information is required for the creation of the viewpoint pattern. The provision of the required data for the information model is supported through data collection patterns. In the second step suitable patterns are selected from the *EAMPC* for the integration in the conceptual model. The selection of the patterns often depends on the maturity of the EAM approach, e.g., although the EAM pattern 3 and 4 address the same concern only one of them is selected since it requires less effort for the data collection.

In the final step the selected patterns are integrated in one conceptual model. During the integration it is important to avoid inconsistencies resulting from the integration with the existing EAM approach, e.g., due to contradictory definitions of information model concepts. More information about the pattern integration can be found in [Bu08]. Finally, the integrated conceptual model has to be implemented and anchored in the organization. With increasing maturity new stakeholders and concerns are gradually added to the conceptual model.

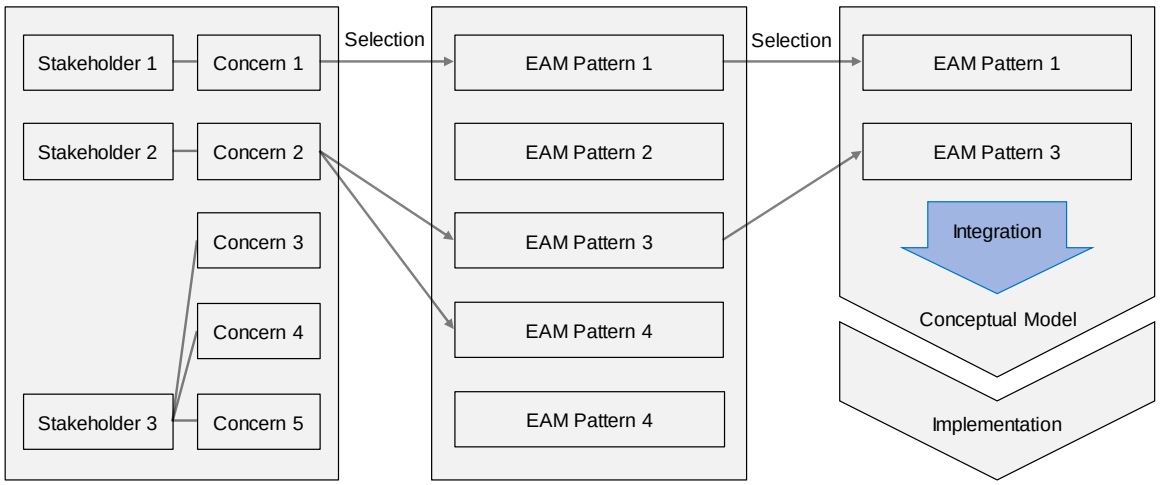


Figure 2.1.: Implementation of an organization-specific EA management with patterns

 

## 2.2. Performing benchmarks with the EAMPC

As outlined before, a spreadsheet-based practitioner survey has been conducted, to document the current practices in the field of EAM. Given the resulting patterns as well as their relations documented in this catalog, the survey can now be used by practitioners to assess the gap between their current EAM function and the observed EAM patterns. Such a gap analysis cannot only provide a confirmation in cases where the benefits of a particular EAM design are doubted. In addition, it can also provide hints to currently unaddressed but maybe relevant concerns, unconsidered stakeholders or complementary visualizations.

By submitting the spreadsheet used for this self assessment to the researches of the sebis chair, such a benchmark can be used to extend the foundation of the *EAMPC* as well. The spreadsheet can be downloaded via the *EAMPC* project website:

`https://wwwmatthes.in.tum.de/pages/ugsyi19wmmvl/EAM-Pattern-Catalog-v2`

The completed assessment can be sent via Email to one of the involved research assistants named on the project's web page. Thereby, a continuous extension of the *EAMPC* can be realized.

## 2.3. The EAMPC as basis for academic research

In addition to the application of the *EAMPC* in practice, it may also be seen as a basis for future academic research. The plethora of EAM frameworks and methodologies (see [Bu11] for a comprehensive list) is still a challenge on the track towards a commonly agreed-upon terminology as well as a corresponding theory. To develop a theory about how to design an EAM function researchers need to account for both, rigor and relevance [He04]. Following the idea of pattern-based theory building [BMS10], the pattern-based design research method proposes a research approach balancing rigor and relevance [Bu13]. Therefore, the pattern-based approach to EAM is especially suitable if rigor and relevance should be addressed simultaneously. The *EAMPC* forms an intermediate step by documenting a pattern language from which design theories can be derived. In addition, if knowledge available in practice should be used to develop design theories, research activities are subject to special requirements. If research should be conducted in close cooperation with industry, results need to be delivered timely and understandable by practitioners. Both can be achieved by the documentation of EAM patterns. In addition, the pattern based approach to EAM offers the possibility to improve single EAM patterns without having to create a completely new approach. Likewise, new patterns concerning new topics can be added easily.

Although common solutions to recurring problems can be observed in the EAM field, the actual impact of the organizational and the enterprise context on the selection of specific patterns has not been assessed properly yet. Moreover, the information from practitioners gathered in course of the development of this catalog shows further demands regarding the design of EAM methods to handle upcoming issues, such as the definition of a business capability map. In addition to that issue, practitioners are looking for meaningful KPI's to steer EA's more efficiently. The sebis chair already published a collection of EAM KPI's (see [Mo14]), whereby the definition of more sophisticated KPI's to measure the complexity of EA's is still at the

 

very beginning and requires further analysis. The interested reader should also refer to the *Enterprise Architecture Visualization Tool Survey* describing how typical EAM visualizations are implemented by different tools [RZM14].

Given these research challenges, we are currently establishing a community which will govern the future development of the *EAMPC*, by performing reviews, improvements, extensions, etc.

## 2.4. How to read the EAM pattern graph

As illustrated in Figure 1.4, we extended the EAM pattern graph with further concepts in order to identify further trends and patterns in the EAM practice. The pattern graph used in this catalog to illustrate the relationships between different EAM patterns includes also the novel stakeholder and data collection concepts. Figure 7.35 illustrates this graph for viewpoint V-113.3.

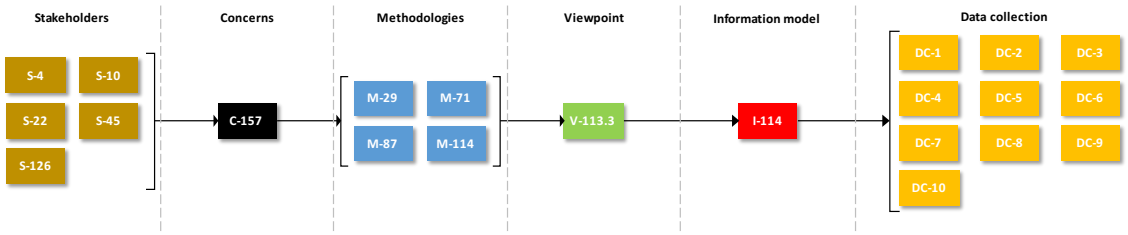


Figure 2.2.: Viewpoint V-113.3 graph

The EAM pattern graph in the *EAMPC V2* includes six concepts. The methodologies, stakeholders and data collection patterns are not mandatory: A concern can be related to various stakeholders, whereby a connection between one particular stakeholder and a concern is only documented if it has been observed more than three times. Otherwise, the respective connection cannot be regarded to be a pattern and is not included in the graph. However, most of the observed and documented pattern graphs in this catalog include all six concepts. The same principle can be adapted for the relationship between information model patterns and data collection patterns as well as the relationship between concerns and methods.

The concern, viewpoint and information model concepts are included in every EAM pattern graph. In case of a missing methodology, the concern is addressed directly by a viewpoint and the respective EAM pattern graph includes and edge between the concern and the viewpoint. The EAM pattern graph does not include different varieties of edges: All edges reveal that one concrete manifestation of the respective concept is addressed by one or more other concept manifestations (*Concern C-157 is addressed by stakeholders S-4, S-20, S-22, etc.*). To omit redundancies, the EAM pattern graphs are only documented within the viewpoint patterns in Chapter 7.

 

# CHAPTER 3

# Influence Factors

**Contents**



In this chapter, we provide an overview of the influence factors mentioned by the industry partners. Influence factors have the distinction of having a comprehensive impact on the organizational and operational structure of the whole organization, including strategic decisions, prioritized projects within the organizational units and also on EAM activities. We asked the participants, what kind of influence factors are relevant for their respective organization and present an aggregated view on the results within Section3.1 whereas the figure only includes the predefined influence factors within the online survey. The predefined influence factors were gathered from the preliminary study, illustrated in figure 1.1 and includes 17 entries.

We also received 10 further influence factors by the selected industry partners, whereas these information represent individually mentioned influence factors and thus are not representative for further statistical evaluations. A list of all influence factors, also including influence factors, mentioned by single participants are illustrated within A.2.

 

## 3.1. Overview of influence factors

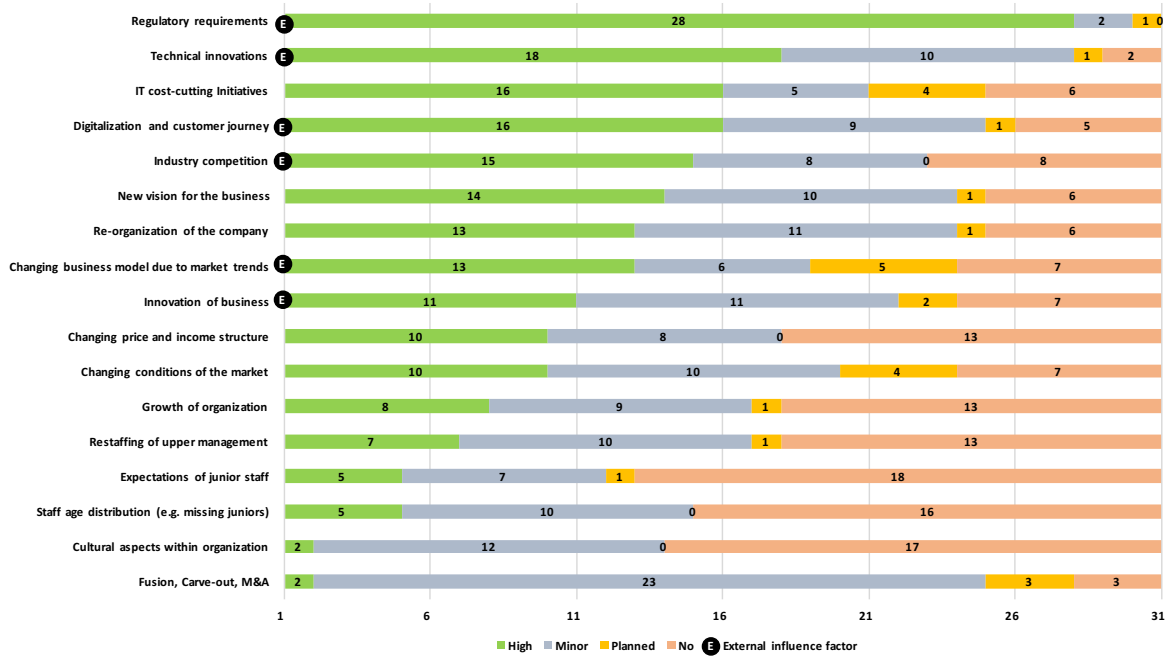


Figure 3.1.: Statistic of mentioned influence factors sorted by relevance

The mentioned influence factors are illustrated in Figure 3.1 as a bar chart. Each bar represents one influence factor including a separation of the mentioned relevance (high, minor, planned, no relevance). We distinguish influence factors in external and internal driven influence factors:

- **External influence factors** have a distinction of being mainly dominated by factors outside the organization. The respective organization does not have a major impact on these influence factors and have to adapt it's strategy, organizational / operational structure etc. to handle these influence factors. An example of such external influence factor might be regulatory requirements within the financial sector, such as Solvency II or the Sarbanes-Oxley Act: In this case, the supervisory of the industry demands for comprehensive solvency and financial information. The provision of such information consumes much effort and asks for new reporting solutions within the company. However, the respective organization have to provide the asked information to the supervisory and does not have any impact on this influence factor. Further external influence factors might be upcoming market trends within the respective industry.
- **Internal influence factors** can be dominated actively by the respective organization with the respective capabilities and resources. An example for internal driven influence factors might be cultural conflicts within an organization: In this case, the respective organization is able to avoid such conflicts by taking organizational initiatives.

We marked external influence factors with a small bubble, including an *E* (Ⓔ) within the bubble. The influence factors include 7 external and 10 internal driven influence factors. The

 

separation of mentioned relevance for a specific influence factor is realized by using different colors within every bar. Every influence factor was assessed by 31 participants. The statistic considers all answers of the participants, regardless of further organization characteristics such as the operating industry, the maturity of the EAM or the number of employees.

## 3.2. Interpretation of results

As mentioned in Section 6.1, each influence factor where marked, whether it illustrates an external or internal driven influence factor. The statistic of the mentioned influence factors shows that external driven influence factors have a higher relevance in today's organization: Especially **regulatory requirements** have an major impact on 90% of the participated organizations. Due to the fact that the results within Figure 3.1 includes the mentioned influence factors, regardless of any industry or further organization characteristic, it turned out that regulatory requirements influence organizations across all industries. Moreover, the issue of **digitalization and customer journey** is mentioned as an assessed influence factor by over 50% of the participants: Requirements by single customers attract a major attention in today's organizations and demands for the implementation of digitalization strategies and solutions. Major cooperation activities including the EAM function of the respective organization might get an major success factor in the next years.

On the other hand the statistic shows that social aspects, such as **cultural aspects within an organization** do not influence today's organizations in their strategic planning and commonly on their EAM activities. Also further internal influence factors, such as the **restaffing of the upper management** or the **staff age distribution** do not have a high impact within today's organizations. Furthermore, the statistic shows that a majority of influence factors are not clearly marked as an influence factor with high or no relevance: Major influence factors were marked with a *minor* relevance, such as **fusion, carve-out and M&A** (over 70% of participants) activities. Moreover, only a minority of the influence factors were assessed as planned. This shows that today's organizations evaluate, whether an influence factor might impact their corporate strategy and EAM: Organizations pay attention on influence factors with high or minor relevance or exclude the influence factors from their strategy and EAM planning activities.

The results of the survey show clearly that specific influence factors, such as regulatory requirements or the customer journey, have a major impact in organizations, regardless on their industry. However, to handle these influence factors, organizations have to consider increased EAM activities, including the definition and refinement of the respective methods and capabilities. [Ha13c] already evaluated influence factors and challenges on EAM functions in today's organizations, such as missing understanding of EAM by other organizational units or the difficulty of oversized EAM models. For further information about these influence factors and challenges, we refer to the respective publication.

 

# CHAPTER 4

# Stakeholders

**Contents**



As mentioned in Section 1.1, the EA team uses methods to address concerns of stakeholders by using specific viewpoints. Every of these provides the opportunity to present the current status and progress of one or multiple concerns (see Section 5 for further information about the concerns). In the domain of EAM, a stakeholder represents a specific party or a staffed role, which is interested in the success or failure of the EAM activities within the respective organization [Ha13a]. A stakeholder does not need to be employed within the respective organization: Further external parties, such as external auditors or the supervision of a respective industry might also be interested in specific EAM topics.

In this section, we provide an overview of the mentioned stakeholder by the industry partners in terms of EAM. Moreover, we highlight identified patterns of stakeholder in terms of mentioned concerns. We identified 23 stakeholders within the preliminary study, whereas the list of entries includes IT related and business related stakeholders. We also received four further stakeholders by selected industry partners, whereas these information represent individually mentioned stakeholders and thus are not representative for further statistical evaluations. A list of all stakeholders, also including stakeholders, mentioned by single participants are illustrated within A.3.

 

## 4.1. Overview of stakeholders

When proceeding the online survey, participants were asked to answer, whether specific EAM concerns receive attention in the respective organization. The participants were also asked to map relevant stakeholders to interested / responsible stakeholders, whereas the survey provides the opportunity to select three different stakeholders for every concern. Figure 4.1 illustrate the amount of the mentioned stakeholder for one or multiple concerns by the participants.

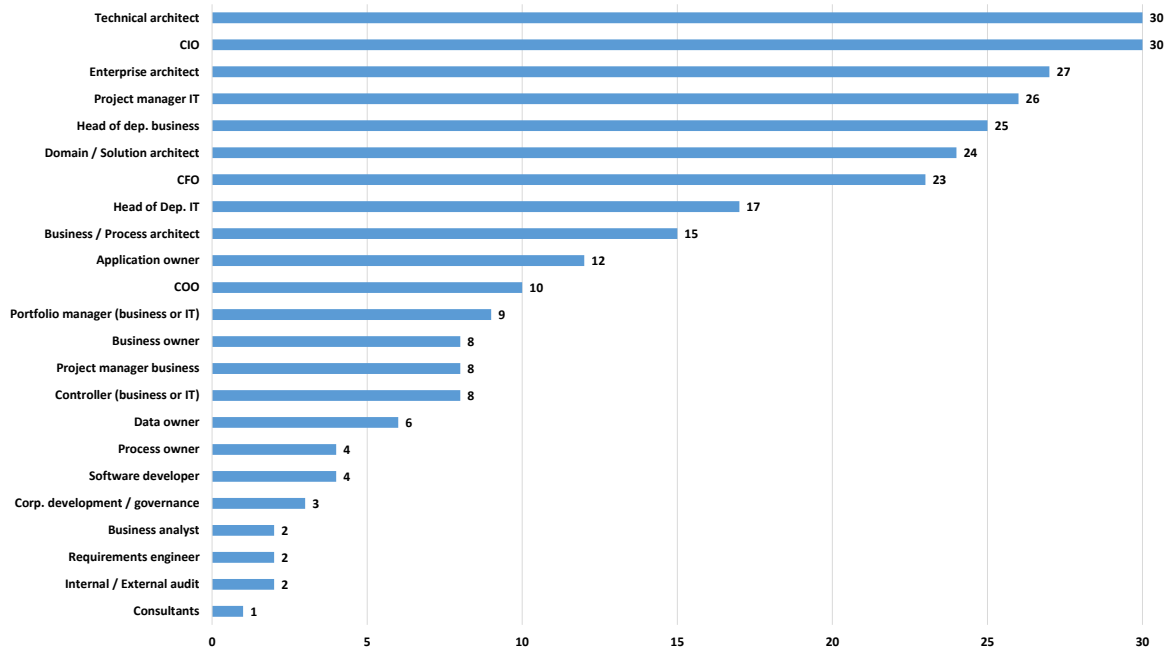


Figure 4.1.: Mentioned stakeholders for concerns sorted by incidences

The illustrated statistic in Figure 4.1 shows that nowadays EAM receives increased attraction by the upper management of organizations: The CIO, CFO as well as the COO appears in the statistics. Even business related stakeholders such as the head of dep. business (25 matches) and the CFO (23 matches) get involved in EAM activities, which shows that nowadays EAM does not only relate to IT functions of organizations, but also business functions identified the added value of EAM for their business. The statistic also shows that EAM illustrate an organization intern related topic: External parties, the auditors or consultants, have less touch points with EAM activities.

 

## 4.2. Amount of mentioned concerns for each stakeholder

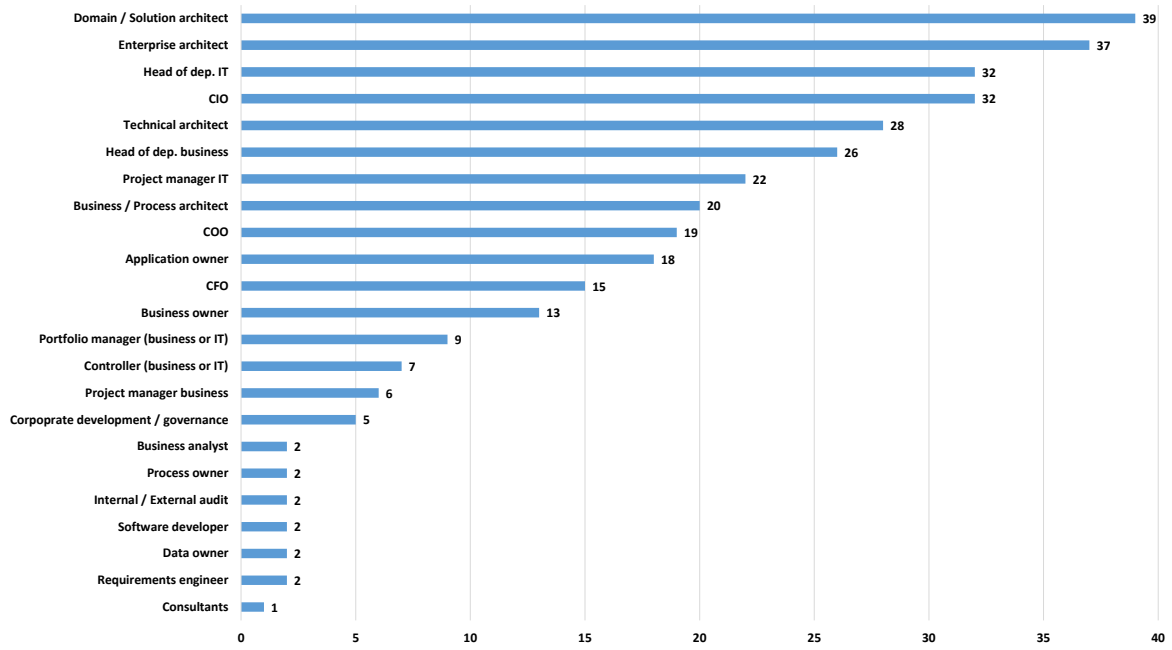


Figure 4.2.: Amount of mentioned concerns for every stakeholder

The amount of allocated concerns for each predefined stakeholder is illustrated in Figure 4.2. It turned out that, beside the architectural related stakeholders, executives such as the head of dep. IT, the CIO or IT related project managers are confronted with EAM concerns. Also business related executives, such as the head of dep. business or business / process architects focus on EAM topics in today's organizations: EAM topics come up in various departments of today's organizations, but mainly ending up to executive stakeholders and rarely to operative staff, such as requirements engineers (4 matches to concerns), software developer (4 matches to concerns) or business analysts (4 matches to concerns). However, architectural related stakeholders still have a larger focus on EAM topics. Domain / Solution architects, enterprise architects and technical architects were mentioned by most of the participated organizations (see figure 4.1) and take care about a huge range of concerns.

Further research might evaluate, whether organizations in specific industries, or with a specific size provide further patterns. Especially regulatory requirements within the financial sector, such as Solvency II or Basel III are characterized by the fact that the respective supervisory demands for comprehensive information of the IT-architecture landscape and the implemented accounting related information systems. Especially external stakeholders, such as auditors might be interested in such informations, provided by specific EAM viewpoints such as viewpoint 7.26.

 

# CHAPTER 5

# Concerns

**Contents**



As mentioned in section 1.1, the EA team uses methods to address concerns of stakeholders by using specific viewpoints and each of them provides the opportunity to present the current status and progress of one or multiple concerns (see section 4 for further information about the stakeholders). In case of EAM, In accordance with the ISO Standard 42010 concerns are defined as those areas of interests which pertain to the system's enterprise development, its operation or any other aspect that are critical or otherwise important to one or more stakeholders [Int07]. [Bu10] provide a more pragmatic definition of concerns: "A concern can be understood as the **area of the enterprise** that the **respective stakeholder** is interested in." We also state that a concern focus on interest of respective stakeholder, but concretize the *area of the enterprise* to specific architecture related issues and interests, such as architectural standardization, KPI measurement or further topics that have an direct impact to the EAM of an organization.

In this section, we provide an overview of the mentioned concerns by the industry partners in terms of EAM. Moreover we highlight identified patterns of concerns in terms of mentioned stakeholders. A pattern is characterized by the fact that the respective constellation were mentioned at least three times; in this case a specific stakeholder were named not less than three times combined with a specific concern. We identified 37 concerns within the preliminary study. We also received three further concerns by single industry partners, whereas these information represent individually mentioned concerns and thus are not representative for further statistical evaluations.

 

## 5.1. Overview of concerns

As aforementioned, we identified 37 concerns within the preliminary study. The participants were asked, whether a specific concern is relevant for the EAM function of the respective organization, including a statement regarding it's relevance (high, minor, planned, no relevance). Figure 5.1 illustrates the results of the survey. The bar charts includes the results of the TOP 10 and LOW 10 mentioned concerns by the industry partners. The complete evaluation of the mentioned concerns is illustrated in Section A.4. Every concern was assessed 31 times.

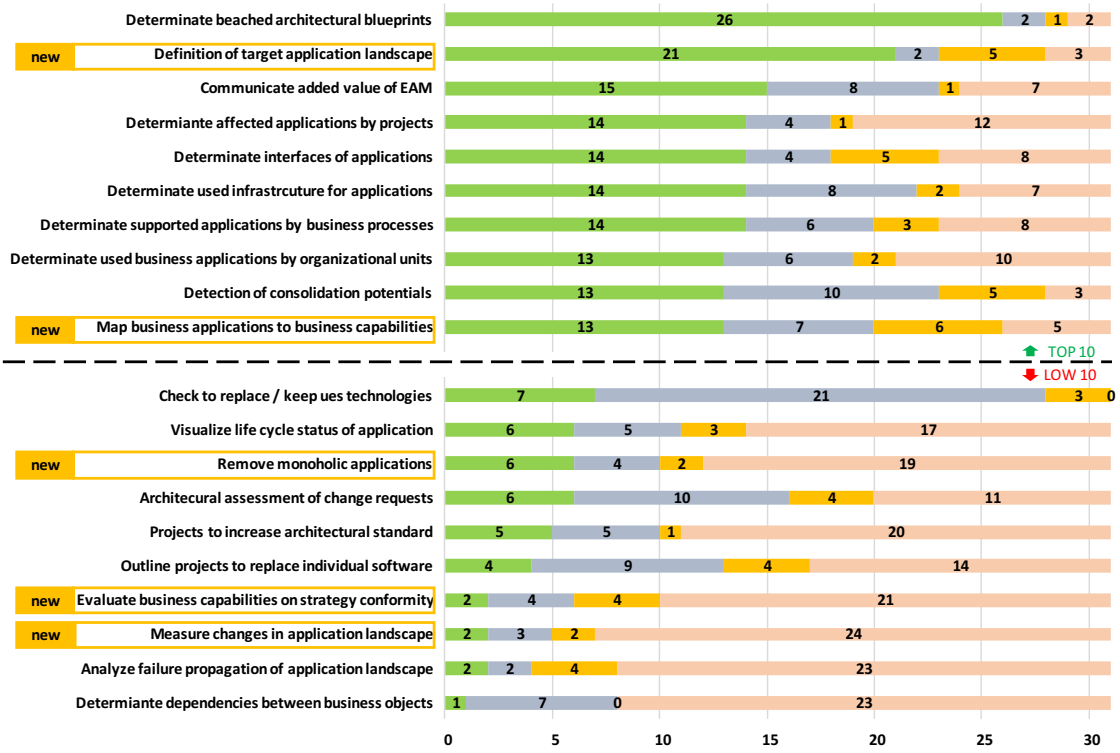


Figure 5.1.: Amount of mentioned concerns by industry partners sorted by relevance

The identified concerns within the preliminary study includes elements that we already identified within the EAMPC 2008 [Bu08], but also new concerns that emerged in the last seven years. It turned out that the significance of concerns from 2008 does not decreased or disappear in the last decades and even new concerns have been added to the EAM function in today's organizations, such as the **definition of target application landscape** and the task to **map business applications to business capabilities**. The statistic also shows that concerns with a strong transparency related focus are finding increased attention in today's organizations and are planned for the future, such as the mapping of business applications to business capabilities (6 times planned) or the definition of a target application landscape (5 times planned). Moreover, the results show that concerns with a string relation to technical issues, such as **analyze the failure propagation of application landscape** or the **architectural assessment of change requests** do not attract high attention, which emphasizes the fact that EAM focuses strongly on IT-strategy related topics in today's organizations.

 

## 5.2. Amount of allocated stakeholders for every concern

When proceeding the online survey, participants were asked to answer, whether specific EAM concerns receive attention in the respective organization. The participants were also asked to map relevant stakeholders to interested / responsible stakeholders, whereas the Excel survey provides the opportunity to select three different stakeholders for each concern. Figure 5.2 illustrate the amount of relevant stakeholders for every concern.

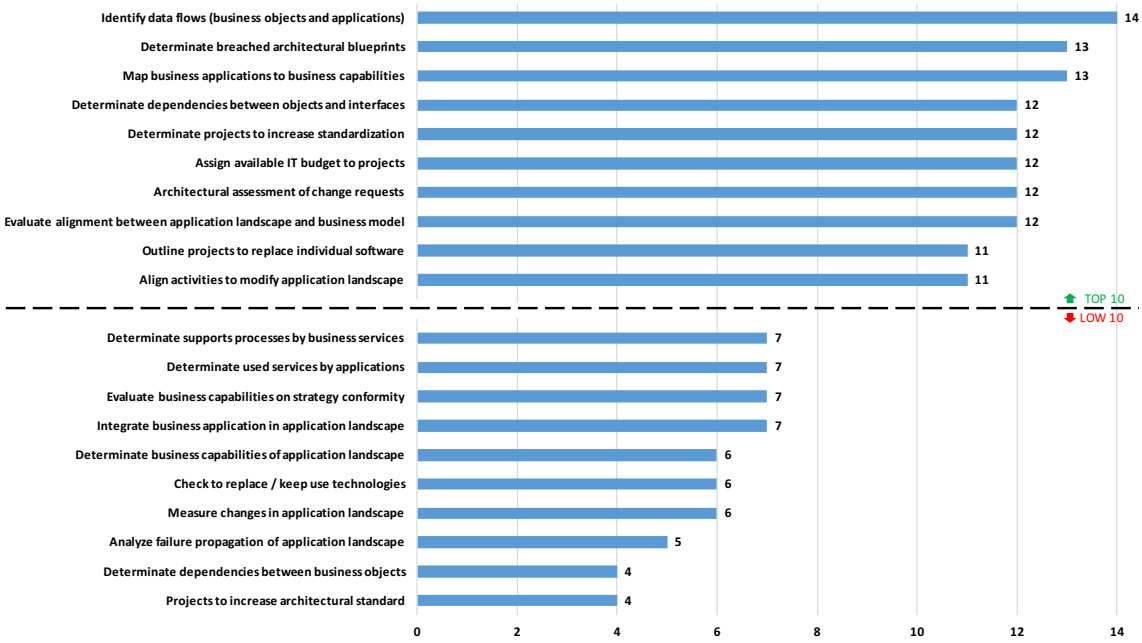


Figure 5.2.: Amount of allocated stakeholders by industry partners to every concern

The bar charts include the results of all predefined concerns, but only the TOP 10 and LOW 10 mentioned concerns by the industry partners. What attracts attention is, that the results of Figure 5.2 do not match to the results of Figure 5.1: For instance, the **definition of a target application landscape** represents a concern that attracts a highly relevance attention in most of the organizations (21 out of 31 participants marked this concern with a high relevance), but does not attract attention by a wide range of stakeholders and is missing in the TOP 10 of Figure 5.2. The same case can be observed for the **determination of projects to increase the standardization** or the **determination of interfaces in applications**: It turned out that organizations allocate concerns with a high relevance to dedicated stakeholders, especially concerns with an increased strategic reference.

Further research might refine the allocation of stakeholders to specific concerns, expanded with further organization specific characteristics, such as operating industry or organization size to identify upcoming trends in patterns in different kind organizations.

 

# CHAPTER 6

# Methodology Patterns and Principles

**Contents**



In this section, we provide an overview of architecture principles, mentioned by the industry partners and explain the methodologies, which are used to provide the viewpoints as illustrated in Section 7.

Architecture principles and methodologies have in common that both constructs are used to control EAs in organizations, whereas architecture principles provide foundational directions of impact on a strategic level. They represent the essence of architectures and can be seen as a glue between high-level strategic intentions and concrete design decisions [GP11]. Methodologies are used on an operational level to align the EA to these architectural principles and impact how far a concrete architectural solution fits to the defined architectural principles. In the first part of the section, we provide a statistical overview of the mentioned architecture principles, including an interpretation of the results. In the second part of the chapter, we explain the used methodologies in detail. The single methodologies were grouped to *methodology topics*.

 

## 6.1. Overview of architecture principles

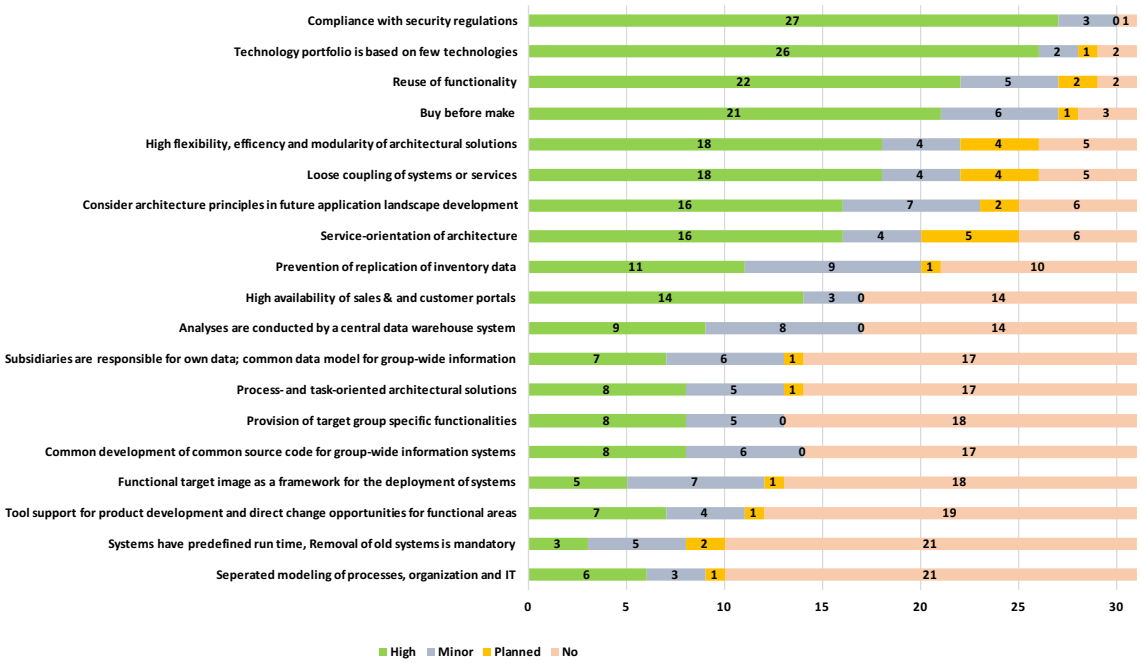


Figure 6.1.: Statistics of mentioned architecture principles, sorted by relevance

Figure 6.1 illustrates an overview of the mentioned architecture principles as a bar chart and includes the results of all predefined architecture principles within the online survey, sorted by relevance. The architecture principles were gathered from the preliminary study (see Figure 1.1) and includes 19 entries. The relevance of architecture principles is marked by using different colors in each bar. According to [GP11] architectural principles can be allocated to architectural sets. A set of architectural principles is a collection of principles that share similar characteristics, such as *organization* related (applicable to all architectural domains of an organization) or *division* related architecture principles (applicable to a specific architectural domain of an organization). We allocated the architecture principles to the suggested architectural set of [GP11], whereas designated principles cannot allocated to one specific set. Example: Some companies define the architecture principles *Loose coupling of systems or services* for the whole organization, whereas other companies define this principle for a single division. Further information about the allocation of the principles is illustrated in Section 6.2. Every architecture principle were assessed by 31 participants. The statistic considers all answers of the participants, regardless of further organization characteristics.

## 6.2. Identification of architecture principle sets

Proper defined five architecture sets, illustrated in the following enumeration, including a suggested allocation of the mentioned architecture principles by the industry partners.

 

- **Organization:** Applicable to all architectural domains of the organization
  - Technology portfolio is based on few technologies
  - Buy before make
  - Loose coupling of systems or services
  - Service-orientation of architecture
  - Prevention of replication of inventory data
  - Analyses are conducted by a central data warehouse system
  - Process- and task-oriented architectural solutions
  - Common development of common source code for group-wide information systems
  - Systems have predefined run time, removal of old systems is mandatory
  - Seperated modeling of processes, organization and IT
  - Subsidiaries are responsible for own data; common data model for group-wide information
  - Loose coupling of systems or services
  - Consider architecture principles in future application landscape development
  - Provision of target group specific functionalities
  - Functional target image as a framework for the deployment of systems divison
- **Division:** Applicable to a specific architectural domain of the organization
  - Loose coupling of systems or services
  - Consider architecture principles in future application landscape development
  - Provision of target group specific functionalities
  - Functional target image as a framework for the deployment of systems divison
  - Tool support for product development and direct change opportunities for functional areas
- **Solution:** Applicable to a specific architectural solution of the organization
  - High flexibility, efficiency and modularity of architectural solutions
  - High availability of sales & and customer portals
- **Industry:** Applicable for a specific industry
  - Compliance with security regulations
- **Everyone:** Applicable to all employees of the organization
  - Reuse of functionality

It turned out that today's organizations mostly define architectural principles that relate to the complete organization (15 out of 19 architectural principles). Principles that focus on specific elements within the organization, such as a concrete architectural solution, attract less attention, (e.g. *Bulk Data Exchanges Rely on ETL Tools*, *Data Are Exchanged in Real-Time*) [GP11]. Moreover, architectural principles are well defined in today's organizations. The amount of responses with a *planned* status is very small: 27 out of 589 responses (4,9%) have the status planned, which shows that today's organization have a clear choice on their architectural principles.

 

## 6.3. Overview of used methodologies

### 6.3.1. Methodology M-2: Analysis of standard conformity of the application landscape

| **Methodology overview** | |
|---|---|
| Id | M-2 |
| Name | Analysis of standard conformity of the application landscape |
| Summary | This M-Pattern provides a procedure to analyze, whether the application landscape of the respective organization corresponds to the defined IT standards. |
| Methodology topic | Technology Homogenity |
| Addressed concerns | C-4, C-5, C-44, C-101, C-110, C-120, C-124, C-141, C-169 |

As already mentioned within the EAMPC 2008, today's organizations address the issue of application landscapes of growing complexity, including various technologies, architectures, platforms, etc.: The complexity of application landscapes is characterized by various facts, such as missing transparency of the used infrastructure and applications, the increased number of transitive interfaces, etc. Moreover, an increasing number of different technologies provide fundamental security issues in terms of possible outages, vulnerability by external users and increased regulatory requirements. Thus, larger organizations attempt to define clear standards within the application landscape regarding approved technologies.

**Process steps**

1. **Provide initial overview:** The scope of application landscape standardization might have a wide range: Some organization might consider only the standardization of databases and platforms, whereas further organizations might also define standards for interface technologies, application platforms or programming languages. Before starting to define the scope of the standardization, organizations should gather further IT application landscape information to determine commonly used elements within the application landscape and exclude rarely used elements. Roth already evaluated EA information collection strategies and it turned out that the typical practice in today's organizations is the **manual collection of information** from databases and repositories or the conduction of interviews and workshops with various stakeholders [Ro13].
2. **Scoping and selecting standards:** Based on the acquired information about the EA, organizations have to define, what kind of architecture elements have to be considered within the standardization scope. Moreover, organizations have to choose standard technologies within their IT portfolio. Scope and selection of standards might depend on the following characteristics:
    - *Amount of specific elements:* Organizations should consider largely used elements within the standardization scope. Example: When running 250 database systems within the organization on 19 different database technologies, the databases should be considered within the standardization scope. On the other hand, databases might be excluded from the standardization scope, when running only 23 databases

 

on 3 different technologies.

- *Business and security requirements:* Depending on the business requirements of the respective departments, the applications need to run on a respective infrastructure. For instance, the choice of the database might depend on the required performance (e.g. high performance needed, when analyzing huge data packages). Moreover, the supervisory of the respective organization demands for increased security and documentation requirements.
- *Current use:* Especially large organizations have to consider, what kind of technologies are currently running within their application landscape. Example: when already running 80% of the database systems on Oracle solutions, it might be reasonable to define Oracle database products as a standard solution.

3. **Prioritize, roll-out and measure:** The used information systems are servant of two masters: On the one hand, the executive board of large organizations demands for cost cutting initiatives in terms of IT operations and projects, but also asks for innovative IT solutions to support the respective business requirements and to enable innovative products. The prioritization of standardization initiatives has to be **discussed between various stakeholder** (business and IT), including different aspects, such as market trends, customer demands and regulatory requirements. The roll-out of standardization initiatives is realized by respective project proposals, including a clear defined blueprint process. Specific **viewpoints**, such as viewpoint V-107.1 (Section 7.1.1) to measure the success of standardization initiatives.

 

### 6.3.2. Methodology M-58: Interpretation of architecture KPIs over time to make application landscape changes visible

| **Methodology overview** | |
|---|---|
| Id | M-58 |
| Name | Interpretation of architecture KPIs over time to make application landscape changes visible |
| Summary | This M-Pattern provides an overview of KPI's to provide an overview of changes within the application landscape |
| Methodology topic | Application Landscape Planning |
| Addressed concerns | C-4, C-5, C-44, C-101, C-110, C-120, C-124, C-141, C-169 |

Key Performance Indicators (KPI) illustrate an upcoming trend in case of EAM methods: Over 70% of the participants plan to implement EA specific KPIs within their organizations to measure the performance and complexity of application and infrastructure landscapes. When defining EAM KPIs, organizations have to choose, what kind of EA layer and topic should be measured and what kind of stakeholder should be addressed with the respective KPI. Possible layers are:

- Strategies & projects
- Principles & standards
- Business capabilities
- Organization & processes
- Business-IT alignment
- Application & information
- Infrastructure services
- Infrastructure & data

Moreover, each KPI should include a *measurement frequency*, a *target*, *planned* and *tolerated value* and clear *escalation rules*. The enterprise architect has to provide the needed information from the available data sources to realize the implementation of the KPI.

The chair for Software Engineering for Business Information Systems already published a comprehensive **EAM KPI Catalog**, including various KPIs for each EAM layer / topic and already filled out best practices.

`https://wwwmatthes.in.tum.de/pages/19kw70p0u5vwv/EAM-KPI-Catalog`

 

### 6.3.3. Methodology M-69: Management of application landscape complexity

| Methodology overview | |
|---|---|
| Id | M-69 |
| Name | Management of application landscape complexity |
| Summary | This M-Pattern provides a summary of how to manage the complexity of application landscapes in today's organizations |
| Methodology topic | Application Landscape Planning |
| Addressed concerns | C-4, C-5, C-44, C-101, C-110, C-120, C-124, C-141, C-169 |

One of the fundamental problems to be addressed in this method is the growing complexity of the application landscape induced by several different reasons. This might include local decision making, the inherent complexity of the business, technological progress, legal requirements and short-term optimization [SM14]. Controlling this growth is thereby supposed to decrease costs, incidents, skill dependence and shadow IT while agility is increased [SM14].

A typical solution to this problem is based on a three-stage process:

1. **Define complexity:** In the first stage, relevant aspects of complexity need to be defined and brought into agreement with all stakeholders. Thereby, aspects related to single applications should be considered in addition to aspects related to the whole application landscape. Furthermore, business complexity needs to be defined as well or declared to be out of scope. If possible, target directions for complexity evolution should be defined for each domain individually.
2. **Implement measures:** In the second stage, measures to increase or decrease application landscape complexity need to be implemented. This includes, for example, the retirement of business applications, a simplification of the architecture and the definition of an appropriate target architecture.
3. **Measure progress:** In the third stage, organizational learning should be enabled by quantifying application landscape complexity and assess, whether the previously implemented measures take the intended effect. Therefore, it is essential that regular snap-shots of the enterprise architecture description are stored separately to generate time-line charts.

Managing application landscape complexity is a continuous task due to the constant implementation of changes within the application landscape. Therefore, stages two and three need to be carried out iteratively. To measure application landscape complexity, the following metrics can be used [Sc15]: number of applications (V-117), number of information flows (V-115), standard conformity (V-118), number of infrastructure elements (V-119), functional scope (V-120) and functional redundancy (V-116). In addition, scientific indicators can also be used [Mo09, SWK13]. If more than one metric is used, a comprehensive overview can be provided by using a complexity dashboard to visualize all metrics next to each other.

 

### 6.3.4. Methodology M-71: Elimination of functional redundancies

| **Methodology overview** | |
|---|---|
| Id | M-71 |
| Name | Elimination of functional redundancies |
| Summary | This M-Pattern provides a procedure of how to analyze functional redundancies in large application landscapes |
| Methodology topic | Application Landscape Planning |
| Addressed concerns | C-2, C-4, C-124, C-157 |

Large organizations often tackle the problem of running redundant applications in their current application portfolio. This issue does not represent a risk for the executability of the respective daily business, but rather causes avoidable additional efforts. However, the removal of redundant applications within the application portfolio asks for high transparency within the enterprise architecture as a prerequisite.

**Process steps**

1. **Definition of a capability map:** Before starting to remove redundant applications within the application portfolio, the EA team has to provide an overview of the used applications for each business process. It turned out, that the definition of a *capability map*, including an allocation of each business application to a defined business capability represents an appropriate method. Each business capability comprises a specific amount of skills or resources to support dedicated business functions [Ha14a]. After the definition of a capability map and the allocation of the productive business applications to one business capability, the EA team is able to evaluate each business application on it's support function for the respective business capability. The definition of the capability map and the identification of functional redundancies demands for high collaboration between various stakeholders including EA, business and IT departments. Further information about the definition of capability maps can be found in [Ha14b].
2. **Prioritization of initiatives:** After the definition of the capability map and the identification of functional redundancies, the EA team has to prioritize potential removal candidates within the application landscape. This prioritization has to consider **defined standard technologies**, **needed effort and potential cost savings** and further **requirements from the business stakeholders**.
3. **Monitoring function:** To make sure that the performed activities were on no purpose, the respective organizations have to define transparent governance principles in order to keep the application landscapes free from functional redundancies. When implementing new applications within IT landscape, this governance principles should consider the conformance of standard technologies, the sign-off from the respective business capability responsibility and continuous maintenance of the business capability map.

 

### 6.3.5. Methodology M-114: Analysis of which capability is supported by which business application

| **Methodology overview** | |
|---|---|
| Id | M-114 |
| Name | Analysis of which capability is supported by which business application |
| Summary | This M-Pattern provides a parameters and hints that should be considered, when allocating business applications to an existing business capability map |
| Methodology topic | Application Landscape Planning |
| Addressed concerns | C-4, C-51, C-62, C-87, C-119, C-122, C-127, C-142, C157 |

After defining a business capability map for the organization and the initial allocation of the productive business applications to appropriate business capabilities, the EAM team has to provide clear principles of how to allocate business applications that are implemented afterwards to appropriate business capabilities. One industry partner already conducted a business capability map definition and provided us detailed information of what kind of parameters has to be considered when allocating a business application to the business capability map:

- **Challenge of fitting:** When defining a business capability map, organizations already considered the range of functions within the productive business applications: the EAM team aimed to define the business capability map in a way that all business applications can be allocated to one exclusive business capability. However, the business capability map illustrates the building blocks of an organization and have to fit to the respective business strategy. Thus, the respective organization faced the challenge of aligning the business capabilities to the respective business strategy, but also defining the business capabilities in a way that all business applications can be allocated to one exclusive business capability. It turned out that the organization extended the amount of business capabilities: in this case, the business capability map fits to the business strategy and provided enough flexibility to allocate all business applications to one respective business capability. When implementing a new business application, the respective organization considers the defined business capability map within the software solution selection process: The chosen solution should fulfill the business requirements and also be assignable to one respective business capability. A double occupancy of business applications to capabilities should only be applied in exceptional cases.
- **Communicate and sign-off:** The final choice of allocation has to be communicated to an architectural board within the organization. All concerned persons have to sign-off the respective allocation. The suggestion for the allocation is provided by the EAM team.

 

### 6.3.6. Methodology M-102: Identification of core business capabilities

| **Methodology overview** | |
|---|---|
| Id | M-102 |
| Name | Identification of core business capabilities |
| Summary | This M-Pattern provide further insides of how to define core business capabilities within an organization |
| Methodology topic | Application Landscape Planning |
| Addressed concerns | C-34, C-62, C-119, C-122, C-142 |

To be competitive in an industry, organizations have to define and operate various strategic decisions in addition to the daily business. This includes the acquisition of further companies and the integration their EA of into own organization, the development of innovative products and thus the integration of new technologies within the technology portfolio, interactions with outsourcing partners and further strategy related activities. To handle such actions, companies need to have a transparent and logical overview of their organization. They need to have a transparent and effective viewpoint on the organizational and operational structure to evaluate the impact of such strategic decisions on the organization. It turned out that today's organizations visualize their organizational and operational structure in *building blocks*, or in so called *business capabilities*. A business capability comprises a specific amount of skills or resources to support dedicated business functions [Ha14b], capture the business interests and is completely independent from each other.

It turned out that a top-down approach, starting from the company strategy and breaking down to the necessary competencies to operate the defined strategy suits best in today's organizations.

When defining a business capability map by the EAM, the strong collaboration with the single business departments is a mandatory. Otherwise there is the risk that the defined capability model does not capture the interests of the business departments and does not visualize the organizational and operational structure of the respective organization. Moreover, the definition of governance principles and responsibilities in terms of updating and maintaining the business capability map should be defined to hinder data quality issues in future.

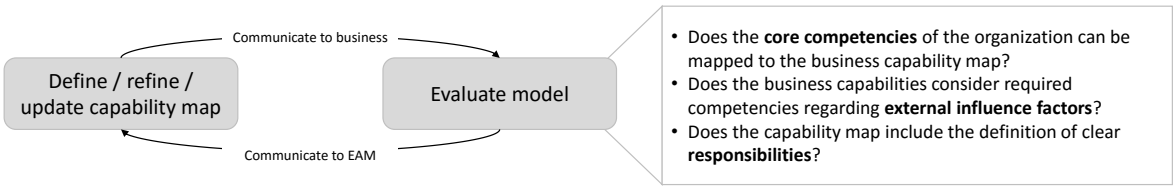


Figure 6.2.: Definition of a business capability map

For further information about the definition of business capabilities in practice, possible abstraction layers within a capability model etc. we refer to [Ha14b], [Re11].

 

### 6.3.7. Methodology M-116: Development of the planned and target EA models

| **Methodology overview** | |
|---|---|
| Id | M-116 |
| Name | Development of the planned and target EA models |
| Summary | This M-Pattern provides further information and hints that need to be considered when defining a planned or target EA model |
| Methodology topic | Application Landscape Planning |
| Addressed concerns | C-2, C-34, C-52, C-62, C-87, C-91, C-119, C-132, C-171 |

In line with [Ha13b] we distinguish between three types of EA models in term of it's time horizon, is illustrated in Table 6.1.

Moreover, we differentiate between three layers in terms of EA models (based on [Ha13b]):

- *Technical architecture:* Includes database systems, servers, routers, etc.
- *Information architecture:* Includes business applications and interfaces
- *Business architecture:* Includes business processes, business departments, business objects, projects, stakeholders, etc.

When defining the planned and target EA model of an organization, the EAM team should consider the following topics in the planning activities:

- *Architecture principles:* The defined principles provide a framework for architectural decisions and planning. Thus, the planned EA models should correspond to these principles and not breach fundamental decisions, such as **buy before make** or **service-orientation of architecture**.
- *Standardization:* The reduction of the heterogeneity issue within todays IT landscapes leads to decreased efforts. Thus, the consideration of defined standards has an important role within the EA planning activities.
- *Business strategy:* Requirements from business stakeholders ask for innovative IT solutions, such as big data platforms for digitalization requirements. Thus, the EA model should also provides the necessary capabilities and information to handle upcoming business requirements. When increasing the time horizon of the respective EA model, the business strategy is gaining more significance within EA planning purposes.
- *Information provision:* Usually, large organizations make use of an EA repository so-

| **Characteristics** | **As-is** | **Plan** | **Target** |
|---|---|---|---|
| **Time horizon** | reality | intermediate term | vision |
| **Accuracy** | precise | planned | unclear |
| **Integrity** | completely | approximate | outline |

Table 6.1.: Types of planning horizons in EA modeling

 

lution to document the productive instances, including detailed attribute information of the defined EA models. When planning future EA models, the amount of used attributes and classes of the EA meta model might change. Thus, enterprise architects have to consider the preparation of the necessary information. [Ro13] and [Fa13] already evaluated best practices in EA documentation and information provision.

Enterprise architects are the responsible stakeholders for EA model planning and documentation purposes. However, EA models should not only support IT-related stakeholders, but also serve information for use cases from business departments, such as regulatory requirements and the included IT report for the supervisory. Thus, the definition of EA models should take place in strong **collaboration with business stakeholder**. The definition of the EA model illustrates an iterative optimization process, similar to business capability definition in Figure 6.2.

 

### 6.3.8. Methodology M-13: Analysis of current EA model

| Methodology overview | |
|---|---|
| Id | M-13 |
| Name | Analysis of current EA model |
| Summary | This M-pattern provides best practices and guidelines to analyze the as-is EA model regarding existing gaps compared to the target EA model. |
| Methodology topic | Application Landscape Planning |
| Addressed concerns | C-2, C-34, C-41, C-51, C-52, C-61, C-62, C-65, C-66, C-67, C-132, C-171, C-172 |

As mentioned in Section 6.3.7, EAM functions define three types of EA models: The as-is, the planned and the target EA model. The transformation of the as-is EA model to the target EA model is one major objective and challenge of today's organizations. The definition of concrete initiatives requires the identification of gaps between the as-is and the target EA model. One of the survey participants already defined concrete EA methods to analyze the as-is EA model regarding existing gaps. Figure 6.3 provides an overview of the process steps and the key initiatives to conduct a gap analysis of the as-is EA model.

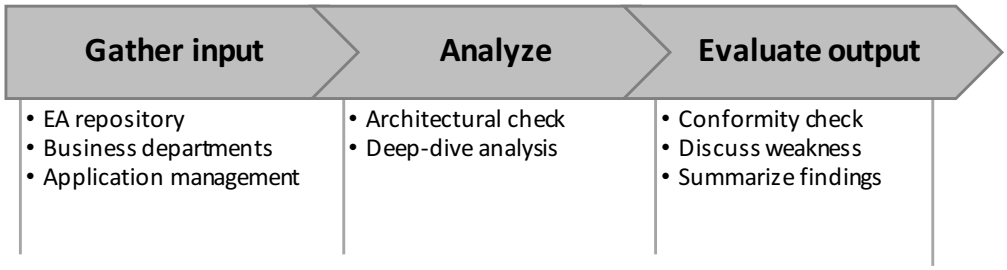


Figure 6.3.: Gap analysis procedure of as-is EA model regarding the target EA model

Before starting the concrete analysis phase of the as-is EA model, the respective EAM function has to gather various information regarding the operative information systems, the upcoming requirements of the business departments, and the current issues of the application landscape.

- *EA repository:* The EA repository provides information about the implemented platforms, physical components, business applications, the respective instances etc. of the EA. This information should be evaluated by the EAM team to identify upcoming trends and to identify breached standards within the EA. For further best practices of EA documentation, we refer to [Ro13] and [Fa13].
- *Business departments:* Various business requirements, such as digital products, upcoming regulatory requirements etc. have to be considered when defining a target EA model.

 

Moreover, business departments might provide further information about the satisfaction of the used business applications. The EAM team has to consider these information within the gap analysis of the as-is EA model.

- *Application management:* The application management of an organization provides information about error-prone business applications, consolidation potentials within the application landscape and concrete KPI's to measure the efficiency of the EA.

After gathering comprehensive information about the application landscape, EAM starts with it's analysis to identify weaknesses and gaps by conducting architectural checks and selective deep-dive analyses.

- *Architectural checks:* The EAM team has to evaluate how far the as-is EA model deviates from the target EA model. This deviations arise when single components are missing to fulfill concrete business requirements, architectural standards are breached or business applications do not correspond to business capability map policies. The EAM team should also analyze, which business applications support which business processes within the organization to identify redundancies.
- *Deep-dive analysis:* Business applications and business components that breaches architectural standards represent redundant components or occur a high amount of incidents, and have to be evaluated in terms of concrete initiatives.

After analyzing the as-is EA model and the operative information systems, the EAM team conducts a conformity check regarding the target EA model. The findings and issues are marked within the as-is EA model (by using different colors) for concrete initiatives, such as *replace*, *keep*, *remove* and *renew*. The identified weaknesses and findings should be discussed with further stakeholders, especially with the application management team and the users of the information systems (business stakeholders).

 

### 6.3.9. Methodology M-112: Definition of a transformation roadmap for the EA

| Methodology overview | |
|---|---|
| Id | M-112 |
| Name | Definition of a transformation roadmap for the EA |
| Summary | This M-Pattern provides best practices for defining a transformation roadmap for a specific topic |
| Methodology topic | Project Portfolio Management |
| Addressed concerns | C-4, C-5, C-34, C-91, C-101, C-89, C-127 |

As mentioned in Section 6.1, today's organizations face various influence factors, such as *digitalization and customer journey* or *regulatory requirements* that demand for large transformations of the EA. Depending on the respective business requirement, transformation initiatives might change. Digitalization issues ask for integrative information of customer characteristics and concrete analytics solutions to bring the organization closer to the customers, whereas regulatory requirements ask for reporting solutions, including information about the solvency or risk issues of the organization. However, all of these business requirements ask for concrete transformation activities. [Ni09] provides a framework for transformation activities, independent from any business requirement or specific industry. The suggested framework includes suggestions to setup an enterprise transformation roadmap and an architecting framework.

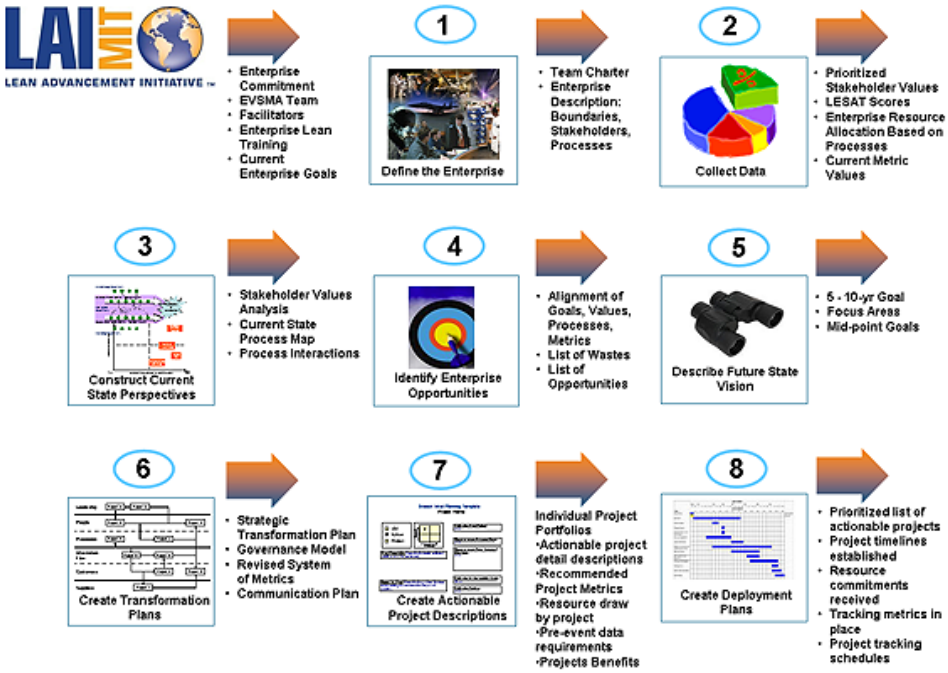


Figure 6.4.: Enterprise strategic analysis for transformation [Ni09]

Figure 6.4 shows the analysis steps to define a concrete transformation plan. As already mentioned, these steps could serve as a blueprint for transformation roadmap definitions. For

 

detailed information about the steps and further information about the framework, we refer to [Ni09].

 

# CHAPTER 7

# Viewpoint Patterns

**Contents**



In this section, we provide an overview of the observed viewpoint patterns. Each pattern visualizes the current state of one or multiple concerns (see A.4), including an EAM pattern graph and information model (see section 8). A viewpoint might illustrate the current state of concerns that differ in their content. Thus, a viewpoint can include different variations, all documented in the respective section of the viewpoint. We identified 14 new viewpoints illustrated in 25 different variations. The used examples for the information model attributes make use of the repository of the SyCa store [Ma]. Each illustrated example is independent in its logical structure from other visualizations.

 

## 7.1. Viewpoint V-107

| Viewpoint overview | |
|---|---|
| Id | V-107 |
| Name | Business application status |
| Summary | This viewpoint visualizes the technical or business status of a business application |

The base map of this pattern consists of two information model dimensions: The organizational unit is used to model the various clusters of the viewpoint. Business applications can be assigned to a specific organizational unit. Business departments, locations or related classes that represent possible organizational structure elements can be used to model the clusters as well. A business application can be allocated to multiple clusters.
The third dimension illustrates a business related or technical related status of a business application. Possible status are illustrated in the different variations of this viewpoint.

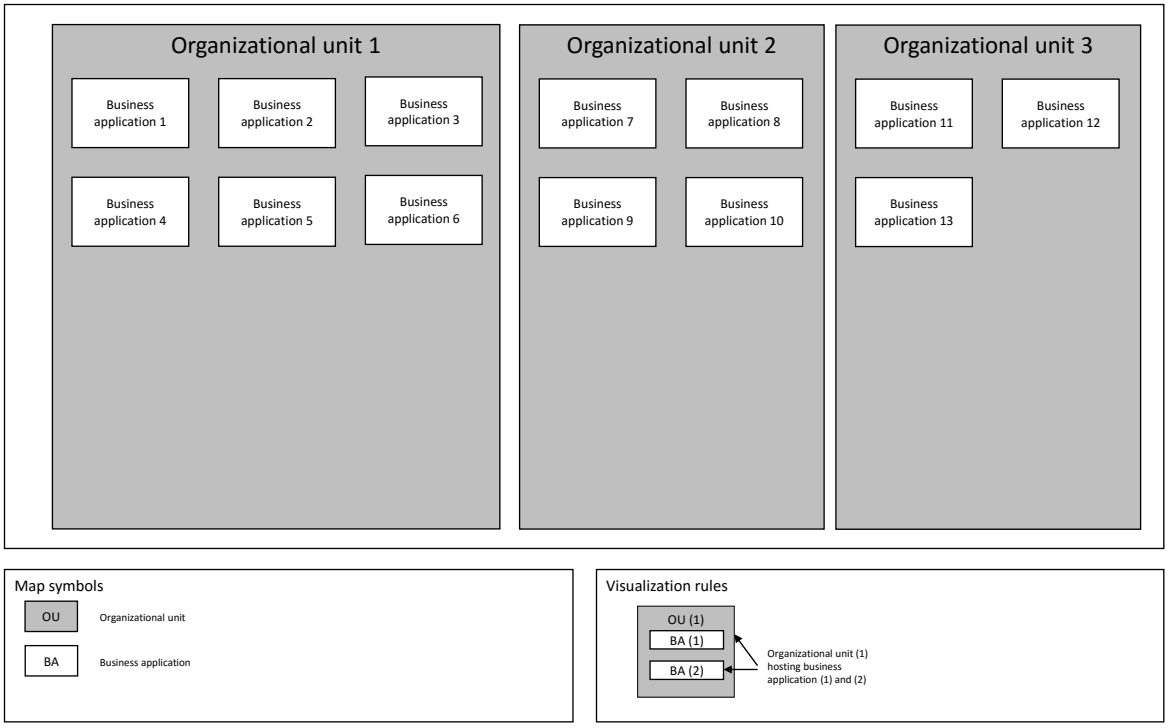


Figure 7.1.: Viewpoint V-107

 

### 7.1.1. Viewpoint V-107.1: Complexity of business applications

The status represents the complexity of a business application. The complexity of an business application can provide information about the agility of a business application or the complexity in term of code quality, amount or quality of interfaces, standard conformance of the used technology etc. [Mo14] provide various EAM related KPI's that can be used to illustrate a complexity dimension of an EA.

The degree of a business application complexity is illustrated by using a specific color:

- Green: Low complexity
- Yellow: Medium complexity
- Red: High complexity
- White: Complexity is unknown

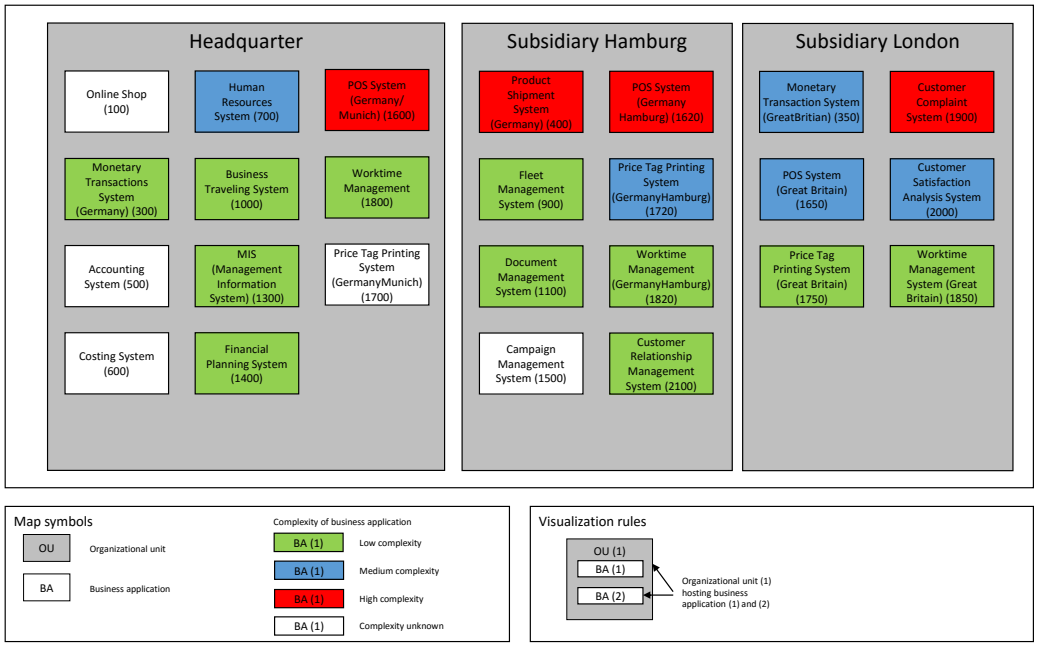


Figure 7.2.: Viewpoint V-107.1

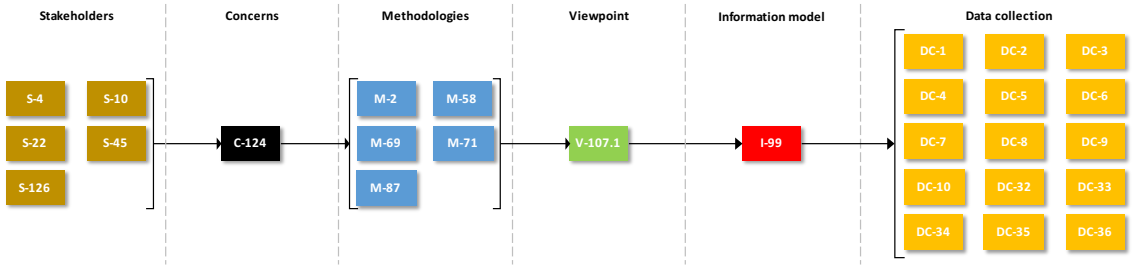


Figure 7.3.: Viewpoint V-107.1 graph

 

### 7.1.2. Viewpoint V-107.2: Architectural fit of application landscape

The status illustrates how far the current business application landscape fits to the target architecture landscape. Influence factors that might impact the architectural fit of a business application can be the used technology within the business application in terms of standardization or the amount of open tasks within an business application to get closer to the target state.

The degree of the architectural fit is illustrated by using a specific color:

- Green: Strong architectural fit
- Yellow: Medium architectural fit
- Red: Weak architectural fit
- White: Architectural fit is unknown

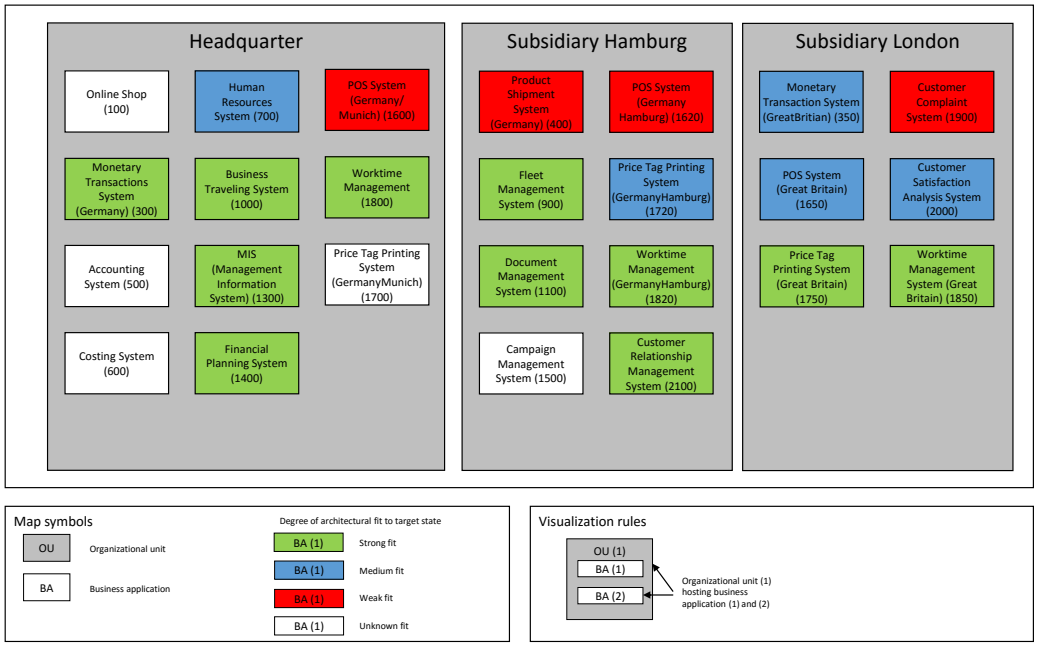


Figure 7.4.: Viewpoint V-107.2

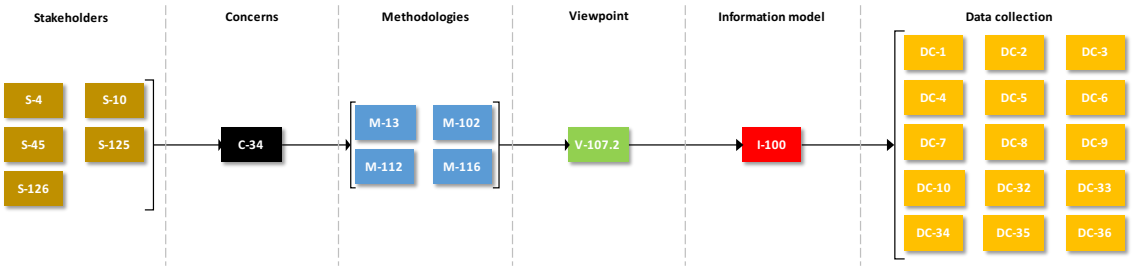


Figure 7.5.: Viewpoint V-107.2 graph

 

### 7.1.3. Viewpoint V-107.3: Architectural health of business applications

The architectural health of a business application illustrates how much effort is necessary to lift the quality of the business application to an appropriate maturity level. The health of a business application can be represented by e.g. the amount of incident or change tickets, the measured performance of the used technology or the implemented security mechanism and controls.

The degree of the architectural health is illustrated by using a specific color:

- Green: Good architectural health
- Yellow: Medium architectural health
- Red: Weak architectural health
- White: Architectural health is unknown

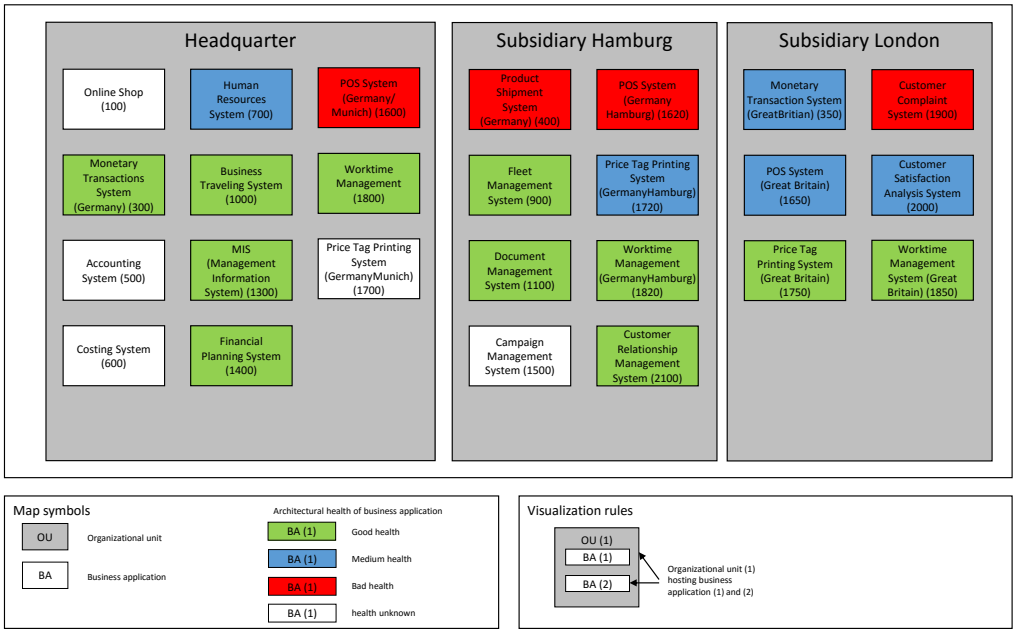


Figure 7.6.: Viewpoint V-107.3

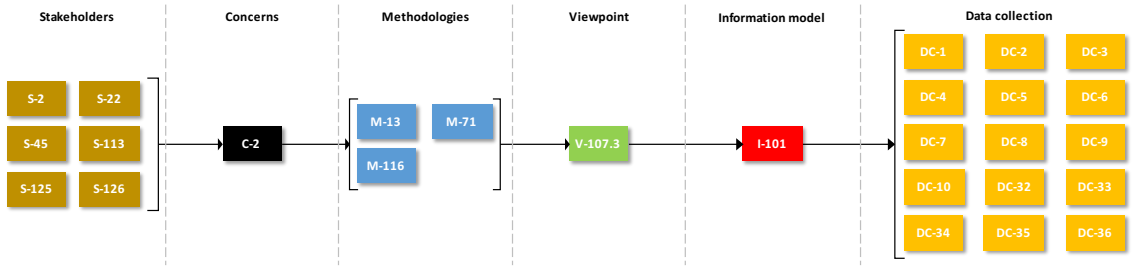


Figure 7.7.: Viewpoint V-107.3 graph

 

## 7.2. Viewpoint V-108

| Viewpoint overview | |
|---|---|
| Id | V-108 |
| Name | Physical Component Status |
| Summary | This viewpoint visualizes the status of a physical component |

The base map of this pattern consists of three information model dimensions: Business capabilities are used to model the various clusters of the viewpoint, whereas functional domains can also be used instead of business capabilities. Business applications can be assigned to a specific business capability and physical components can be assigned to a specific business application.
The third dimension illustrates a technical status of a physical component. Possible status are illustrated in the different variations of this viewpoint.

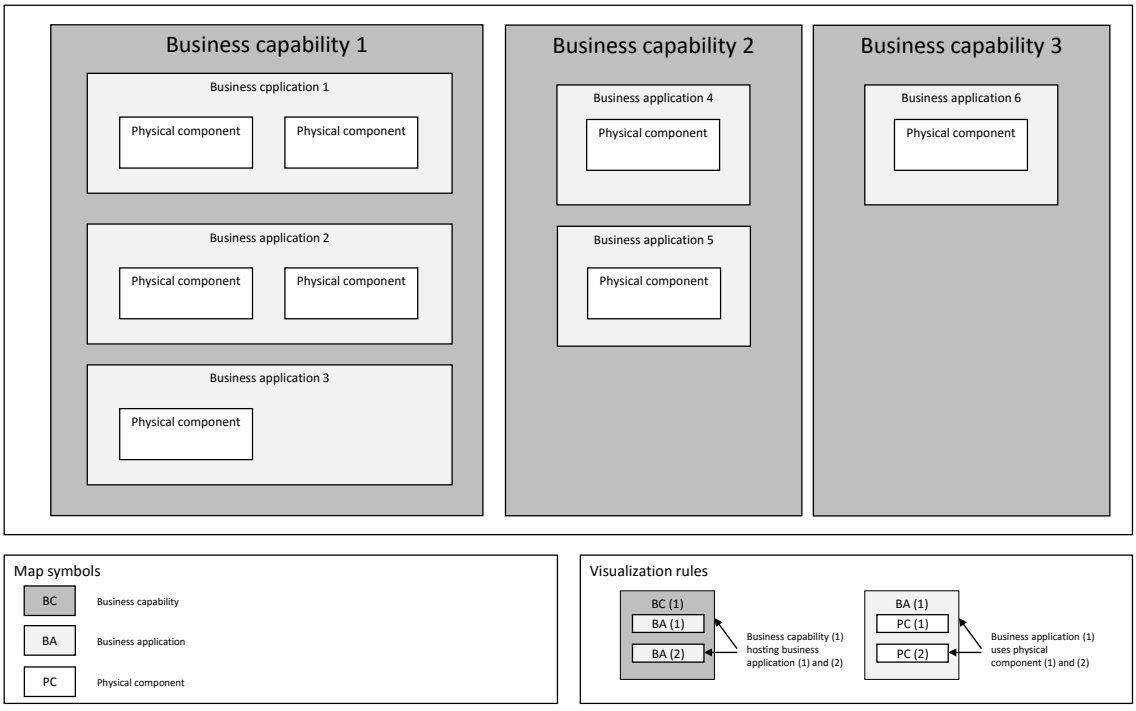


Figure 7.8.: Viewpoint V-108

 

### 7.2.1. Viewpoint V-108.1: Conformance to architectural standard

This viewpoint illustrates, whether a physical component corresponds to the defined standard technology portfolio of the respective organization.

The architectural standard conformance is illustrated by using a specific color:

- Green: Corresponds to architectural standard
- Red: Does's not correspond to architectural standard

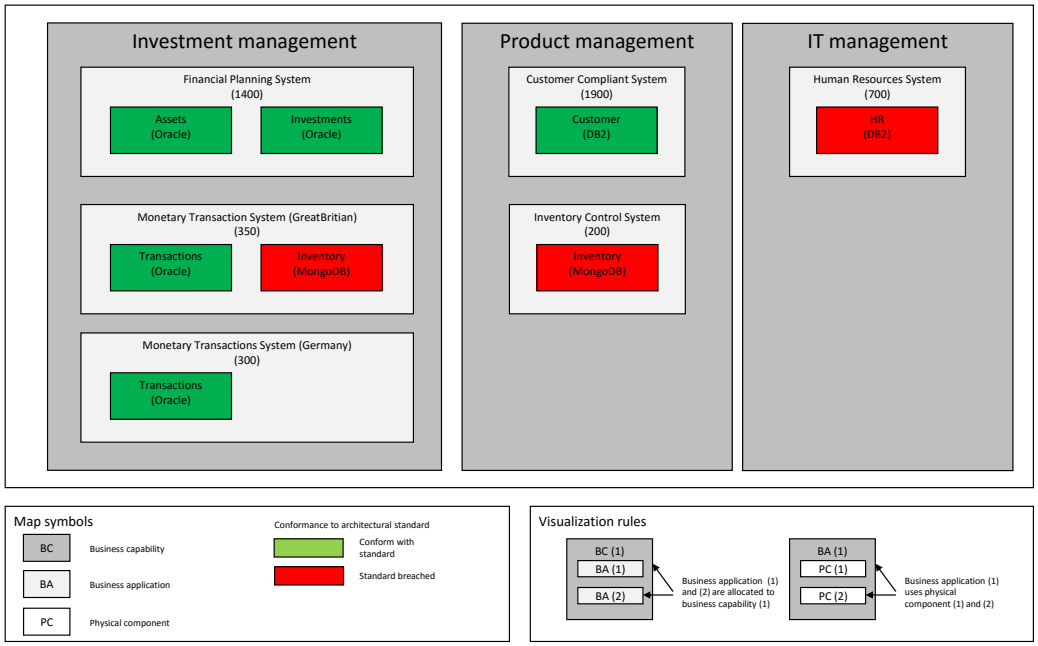


Figure 7.9.: Viewpoint V-108.1

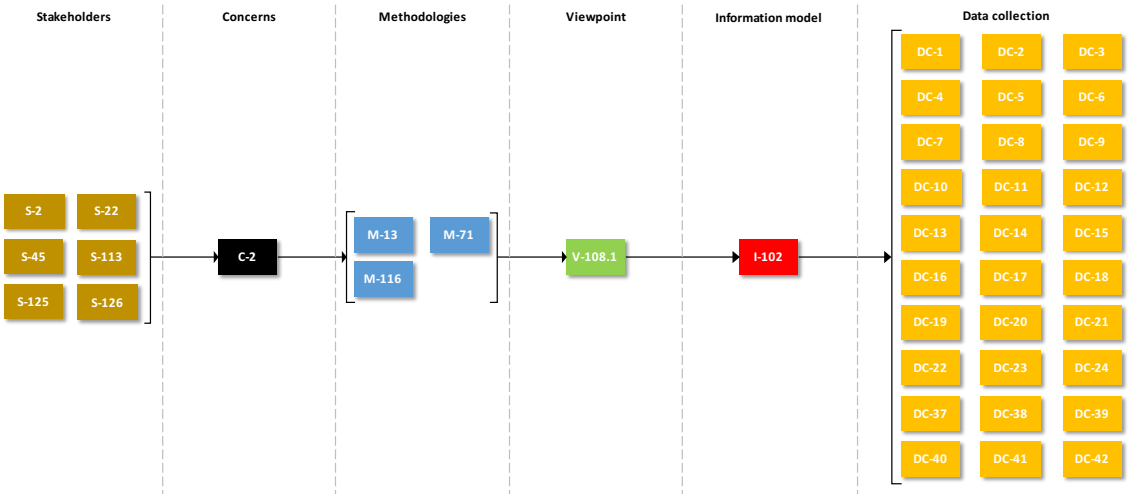


Figure 7.10.: Viewpoint V-108.1 graph

 

### 7.2.2. Viewpoint V-108.2: Evaluate potential removal candidates

This viewpoint provides transparency about what kind of business applications or physical components illustrate an adequate removal candidate within the application landscape. These candidates may include complete business applications and / or dedicated components of the respective business applications.

Removal candidates are colored in red.

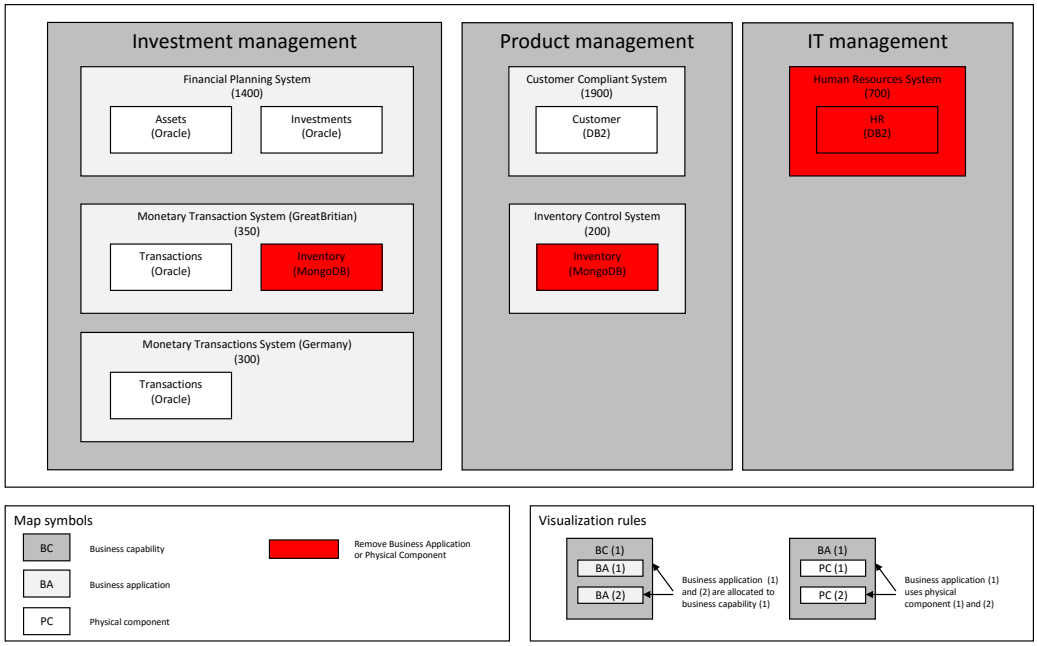


Figure 7.11.: Viewpoint V-108.2


Figure 7.12.: Viewpoint V-108.2 graph

 

### 7.2.3. Viewpoint V-108.3: Evaluate consolidation candidates

This viewpoint provides transparency about what kind of business applications or physical components illustrate a consolidation candidate. These candidates include complete business applications and / or dedicated components of the respective business applications.

Consolidation candidates are colored in green.

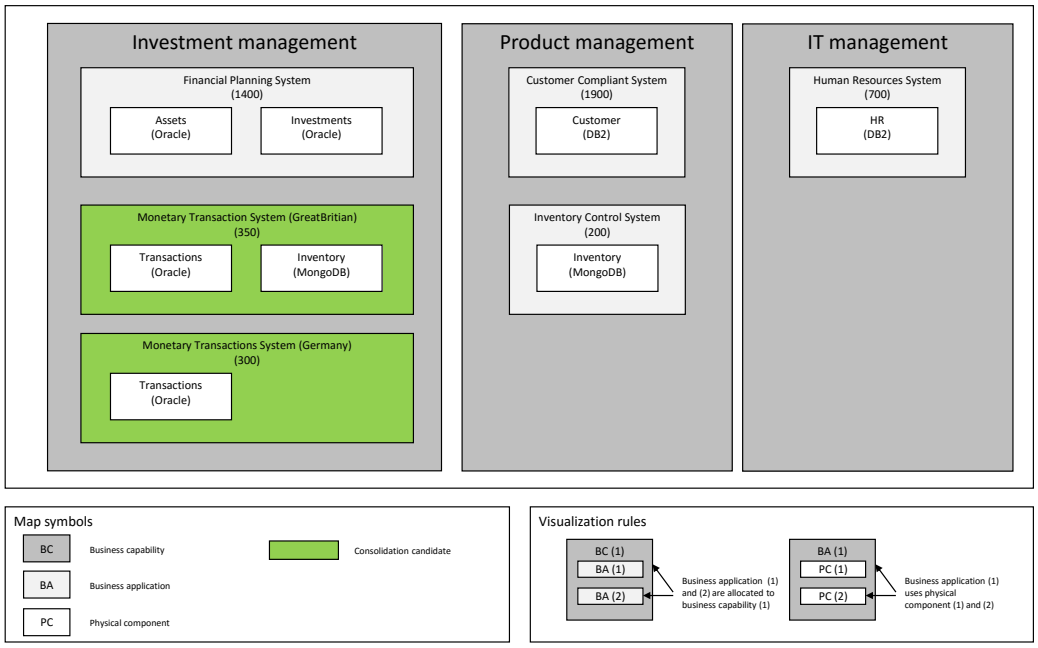


Figure 7.13.: Viewpoint V-108.3

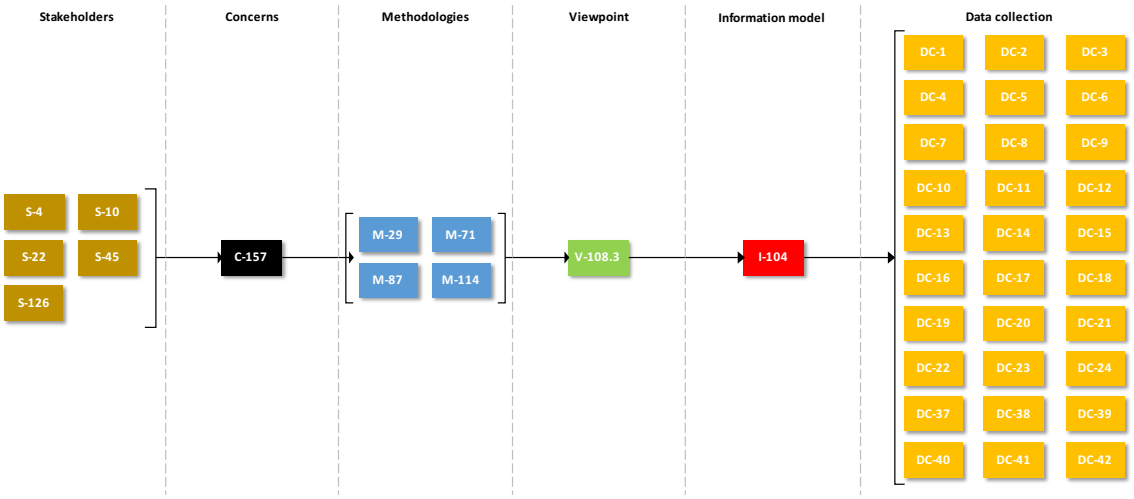


Figure 7.14.: Viewpoint V-108.3 Graph

 

### 7.2.4. Viewpoint 108.4: Increase transparency of application landscape

This viewpoint does not include further attributes and aims to increase the transparency about the implemented application landscape. The visualization of this viewpoint corresponds to the base map of V-108.

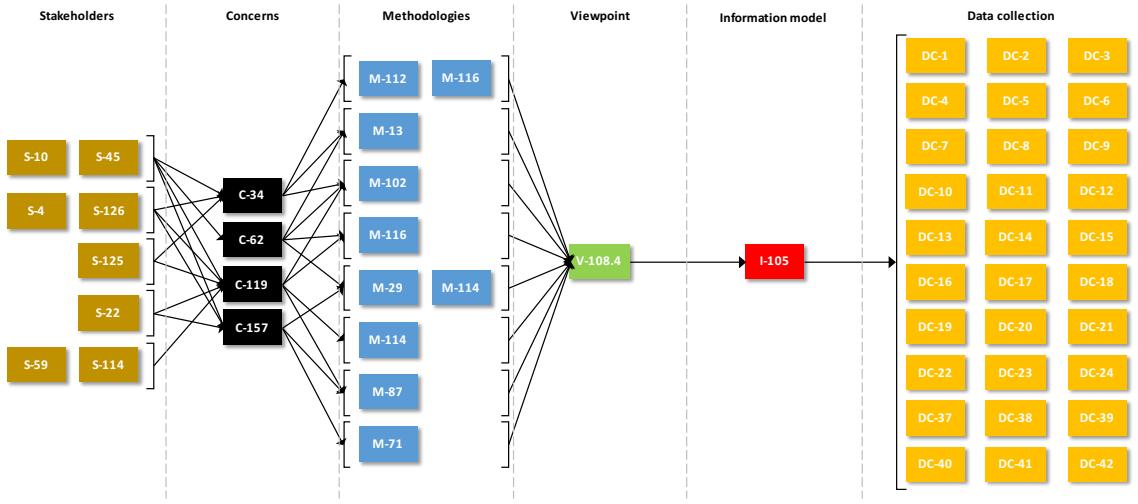


Figure 7.15.: Viewpoint V-108.4 graph

 

## 7.3. Viewpoint V-109

| Viewpoint overview | |
|---|---|
| Id | V-109 |
| Name | Transparency about used physical components for business applications |
| Summary | This V-Pattern visualizes what kind of Physical Components are used by which Business Application |

This viewpoint illustrates what kind of physical components are used to run specific business applications within the IT landscape. Thus, only two information model dimensions are necessary to visualize this layer diagram: The physical component and the business application.

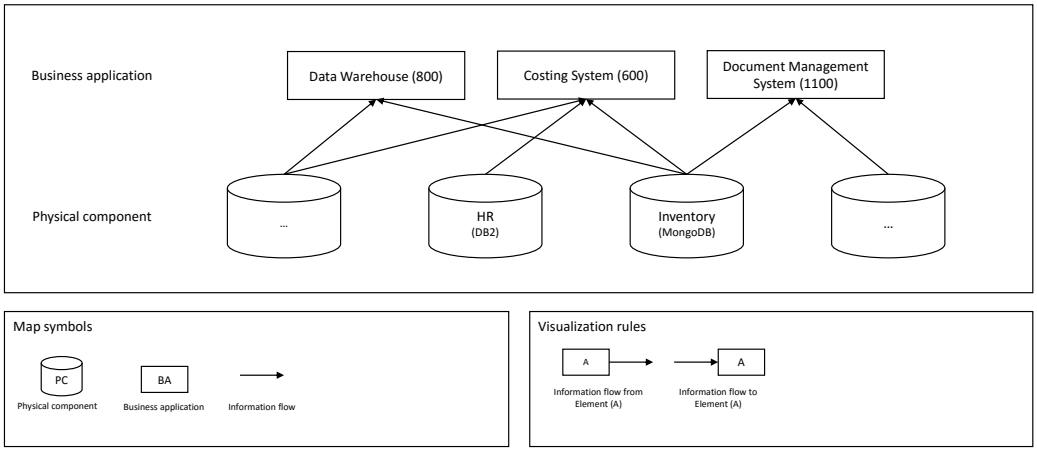


Figure 7.16.: Viewpoint V-109

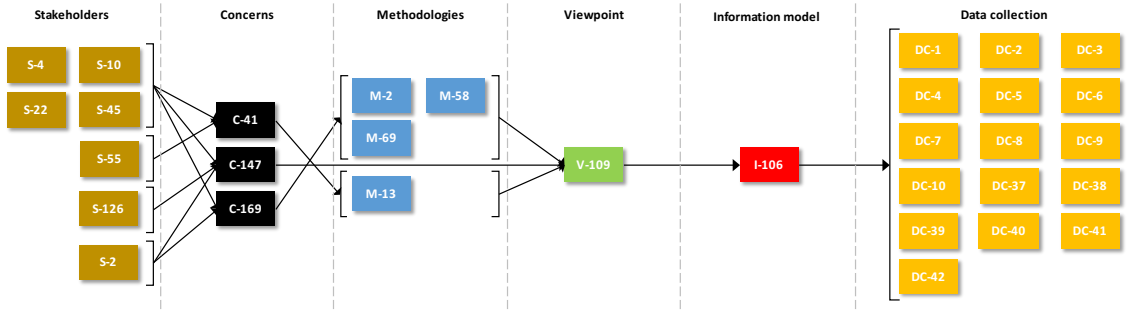


Figure 7.17.: Viewpoint V-109 graph

 

## 7.4. Viewpoint V-110

| Viewpoint overview | |
|---|---|
| Id | V-110 |
| Name | Business application usage |
| Summary | This V-Pattern illustrates which business applications are allocated to the defined business capabilities and used by which organizational units. |

| Business capability / Organizational unit | Headquarter | Subsidiary Hamburg | Subsidiary London |
|---|---|---|---|
| Investment management | Financial Planning System (1400) | Monetary Transactions System (Germany) (300) | Monetary Transactions System (Great Britain) (350) |
| Product management | Customer Compliant System (1900) | Inventory Control System (200) | |
| IT management | Human Resources System (700) | | |

Figure 7.18.: Viewpoint V-110

The V-Pattern is illustrated in a tabular format and consists of three classes within it's information model: Business capabilities are listed in the rows and organizational units in the columns of the table. Depending on what kind of business application is used by which organizational unit and it's defined allocation to the specific business capability, the respective business application is placed in it's related table cell.

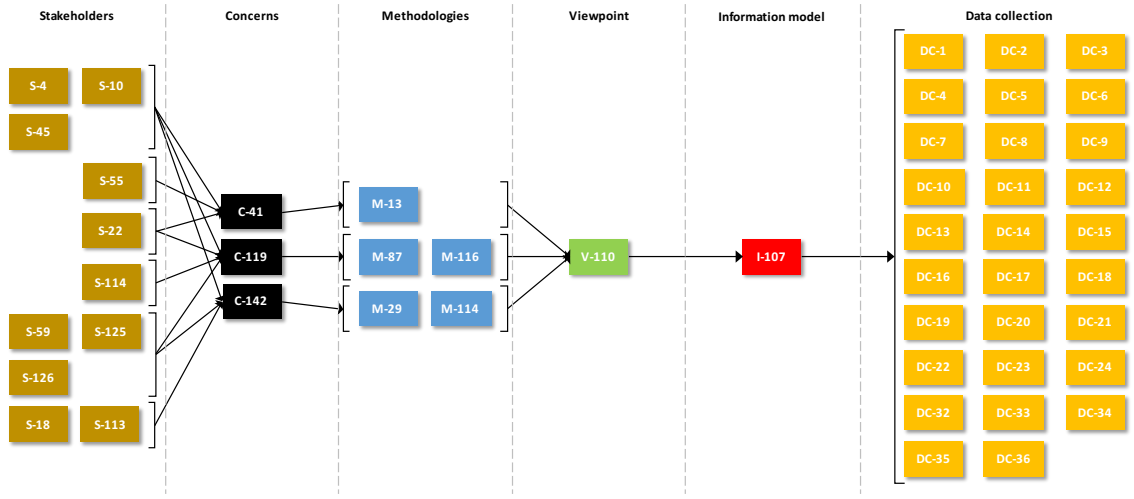


Figure 7.19.: Viewpoint V-110 graph

 

## 7.5. Viewpoint V-111

| Viewpoint overview | |
|---|---|
| Id | V-111 |
| Name | Business application status within a specific business capability |
| Summary | This viewpoint visualizes the technical or business related status of a business application related to a specific Business Capability. |

The base map of this pattern consists of two information model dimensions: The business capability are listed in the rows of the table. Business applications are listed in the columns. The third dimension illustrates a business related or technical related status of a business application, but related to a specific business capability. Possible status are illustrated in the different variations of this viewpoint.

| Business capability / Business application | Business application 1 | Business application 2 | Business application 3 | Business application 4 |
|---|---|---|---|---|
| Business capability 1 | | | | |
| Business capability 2 | | | | |
| Business capability 3 | | | | |
| Business capability 4 | | | | |
| Business capability 5 | | | | |
| Business capability 6 | | | | |

Figure 7.20.: Viewpoint V-111

 

### 7.5.1. Viewpoint V-111.1: Use of business applications

This viewpoint provides transparency about what kind of business applications are used by the business capabilities within the organization. Used business applications within a business capability are marked within the respective table cell. There is the possibility to allocate one business application to one dedicated or multiple business capabilities, depending on the business capability principles and policies of the respective organization.

| Business capability / Business application | Accounting System (500) | Online Shop (100) | Customer Compliant System (1900) | POS System (GermanyHamburg) (1620) | POS System (GermanyMunich) (1600) | POS System (Great Britain) (1650) |
|---|---|---|---|---|---|---|
| Investment management | x | | | | | |
| Product management | | | | | | |
| IT management | | x | x | | | |
| Warehouse management | | | | x | x | x |
| Marketing management | | | | | | |

Figure 7.21.: Viewpoint V-111.1

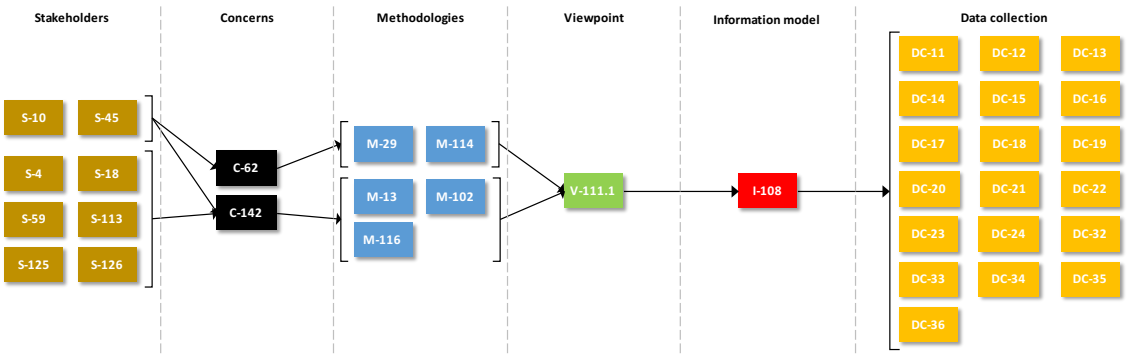


Figure 7.22.: Viewpoint V-111.1 graph

 

### 7.5.2. Viewpoint V-111.2: Relation between business capability and business application

This viewpoint provides transparency about the relation between a business application and a business capability within an organization. Depending on the functionality of the respective business application and its strategic importance for a certain business capability, the relation between a respective business application and a business capability might be low, medium or strong.

The degree of the relation is illustrated by a specific color:

- Green: Strong relation between business application and business capability
- Yellow: Medium relation between business application and business capability
- Red: Low relation between business application and business capability
- White: Degree of relation is unknown

| Business capability / Business application | Accounting System (500) | Online Shop (100) | Customer Compliant System (1900) | POS System (GermanyHamburg) (1620) | POS System (GermanyMunich) (1600) | POS System (Great Britain) (1650) |
|---|---|---|---|---|---|---|
| Investment management | x | | | | | |
| Product management | | | | | | |
| IT management | | x | x | | | |
| Warehouse management | | | | x | x | x |
| Marketing management | | | | | | |

Visualization rules

Degree of relation between capability and business application

Strong Low

Medium Unknown

Figure 7.23.: Viewpoint V-111.2

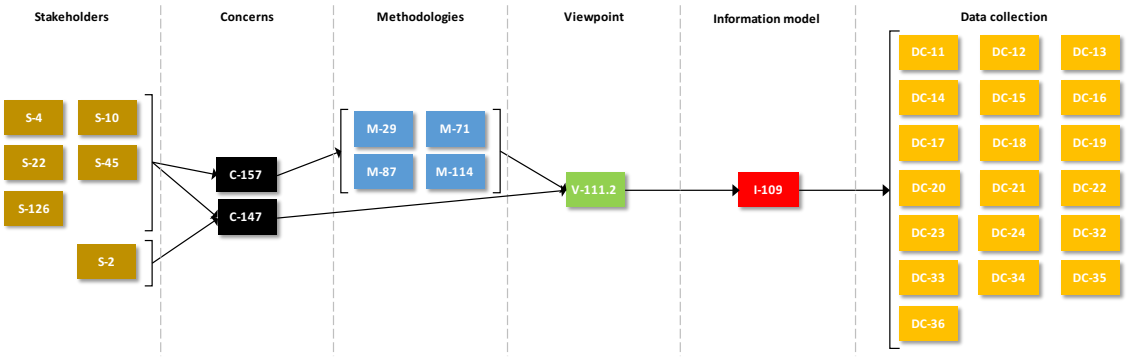


Figure 7.24.: Viewpoint V-111.2 graph

 

### 7.5.3. Viewpoint V-111.3: Regulatory issues

This viewpoint provides transparency about the regulatory issues of a business capability, illustrated within an specific business application. Regulatory issues might represent business related regulatory requirements (e.g. reporting requirements within the financial sector) or technical related regulatory requirements (e.g. data privacy).

The amount of breached regulatory issues by using a specific color:

- Green: Less then "10%" of regulatory issues are breached
- Yellow: Less then "40%" of regulatory issues are breached
- Red: Over then "10%" of regulatory issues are breached
- White: Amount of regulatory issues is unknown

| Business capability / Business application | Accounting System (500) | Online Shop (100) | Customer Compliant System (1900) | POS System (GermanyHamburg) (1620) | POS System (GermanyMunich) (1600) | POS System (Great Britain) (1650) |
|---|---|---|---|---|---|---|
| Investment management | Reg. Issues: 8 | | | | | |
| Product management | | | | | | |
| IT management | | Reg. Issues: 3 | | | | |
| Warehouse management | | | | Reg. Issues 22 | Reg. Issues 21 | Reg. Issues 28 |
| Marketing management | | | | | | |

Visualization rules

Amount of regulatory issues

Less then 10% of regulatory issues

Less then 40% of regualtory issues

Over 40% of regulatory issues

Issues Unknown

Figure 7.25.: Viewpoint V-111.3

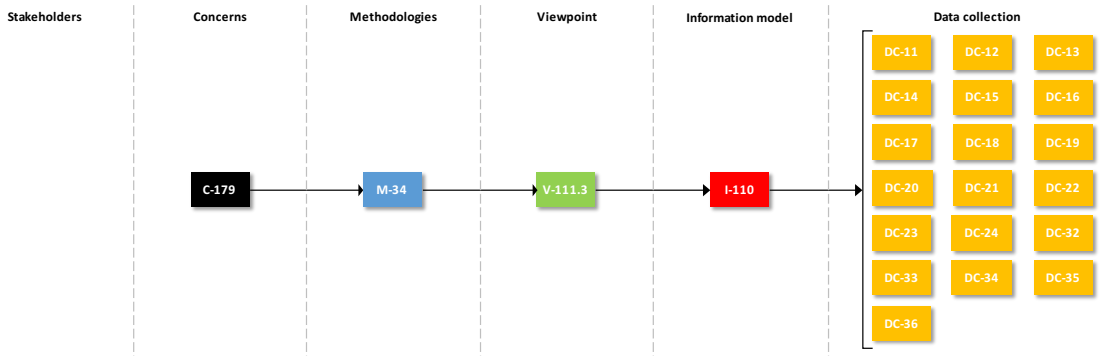


Figure 7.26.: Viewpoint V-111.3 Graph

 

## 7.6. Viewpoint V-112

| Viewpoint overview | |
|---|---|
| Id | V-112 |
| Name | Application costs |
| Summary | This V-Pattern illustrates occurred costs of a business application, allocated to it's business capability and it's organizational unit |

This V-Pattern lists all occurred costs of a business application, enriched with further information about the type of cost and organizational specific information. Depending on the addressed concern or the usage of this viewpoint for a specific project, the table might be enriched with detailed information about the responsible organizational unit, further information about the date of a specific activity, etc.

| Organizational unit | Business capability | Business application | Type of costs | Costs |
|---|---|---|---|---|
| Headquarter | IT management | Online Shop (100) | Operating | 4000 ,- |
| Headquarter | Investment management | Accounting System (500) | Operating | 5674 ,- |
| Subsidiary Hamburg | Warehouse management | POS System (GermanyHamburg) (1620) | Release upgrade | 13.000, - |
| Subsidiary Munich | Warehouse management | POS System (GermanyMunich) (1600) | Change 1 | 286 ,- |
| Subsidiary London | Warehouse management | POS System (Great Britain) (1650) | Maintenance | 4322 ,- |

Figure 7.27.: Viewpoint V-112

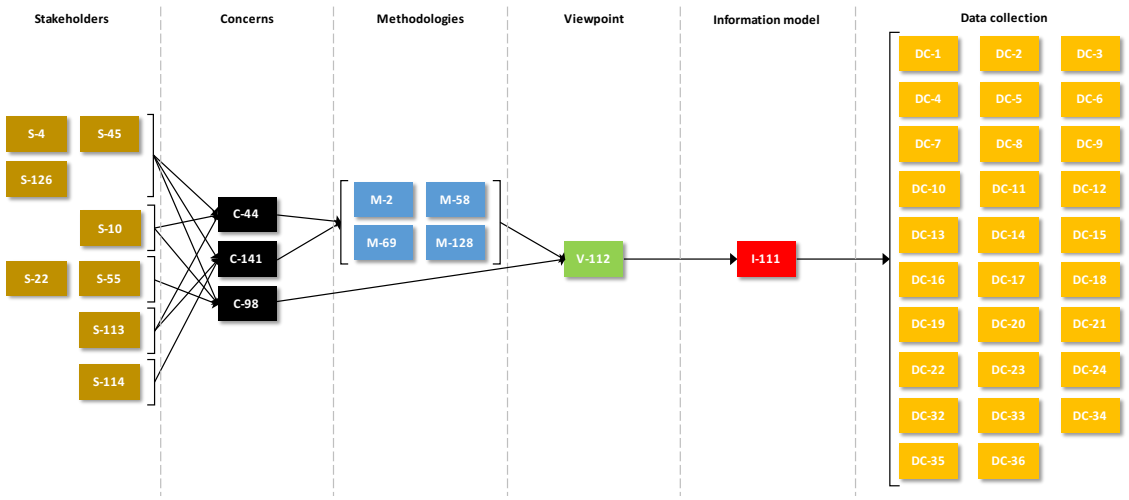


Figure 7.28.: Viewpoint V-112 graph

 

## 7.7. Viewpoint V-113

| Viewpoint overview | |
|---|---|
| Id | V-113 |
| Name | Status of business application |
| Summary | This V-Pattern visualizes the technical or business status of a business application |

The base map of this pattern consists of one information model dimension: The business applications are listed in a tabular format.
The second dimension illustrates a business related or technical related status of a business application. Possible status are illustrated in the different variations of this viewpoint.

| Business application | Status |
|---|---|
| Business application 1 | |
| Business application 2 | |
| Business application 3 | |
| Business application 4 | |
| Business application 5 | |
| Business application 5 | |
| Business application 7 | |
| Business application 8 | |
| Business application 9 | |

Figure 7.29.: Viewpoint V-113

 

### 7.7.1. Viewpoint V:113.1: Complexity of business applications

The status represents the complexity of a business application, whereas the complexity of a business application can provide information about the agility of a business application or the complexity in term of code quality, amount or quality of interfaces, standard conformance of the used technology etc.

The degree of a business application complexity is illustrated by using a specific color:

- Green: Low complexity
- Yellow: Medium complexity
- Red: High complexity
- White: Complexity is unknown

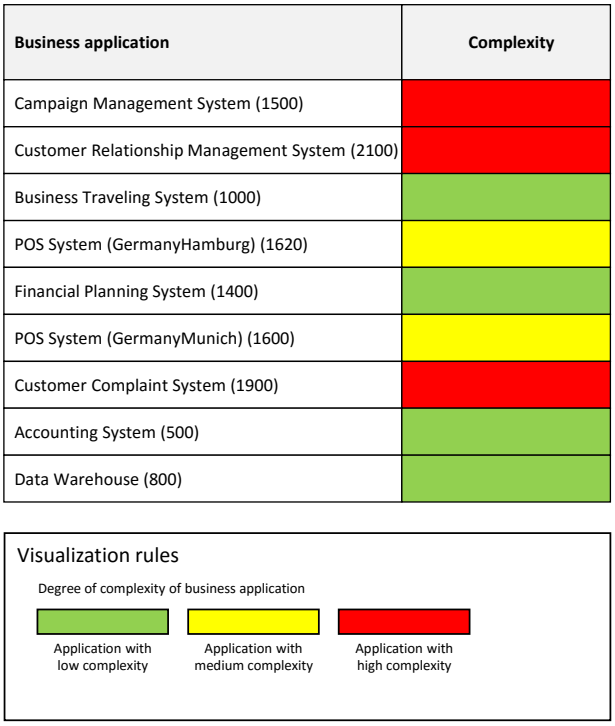


Figure 7.30.: Viewpoint V-113.1

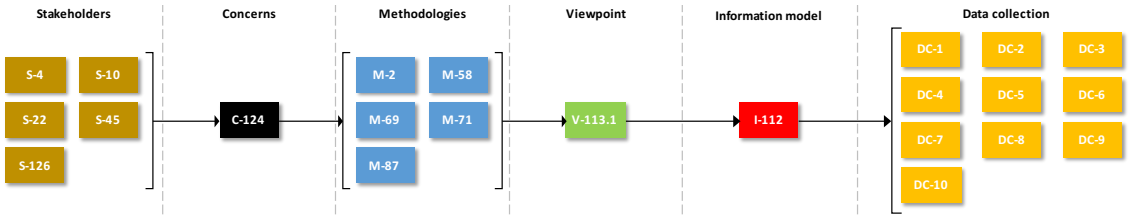


Figure 7.31.: Viewpoint V-113.1 graph

 

### 7.7.2. Viewpoint V-113.2: Business application alignment to business model

The status represents the alignment of a business application to the respective business model.

The degree of a business model alignment is illustrated by using a specific color:

- Green: Strong alignment to business model
- Yellow: Medium alignment to business model
- Red: Weak alignment to business model

| Business application | Alignment to business model |
|---|---|
| Campaign Management System (1500) | |
| Customer Relationship Management System (2100) | |
| Business Traveling System (1000) | |
| POS System (GermanyHamburg) (1620) | |
| Financial Planning System (1400) | |
| POS System (GermanyMunich) (1600) | |
| Customer Complaint System (1900) | |
| Accounting System (500) | |
| Data Warehouse (800) | |

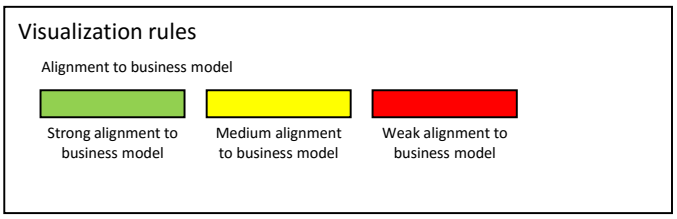


Figure 7.32.: Viewpoint V-113.2

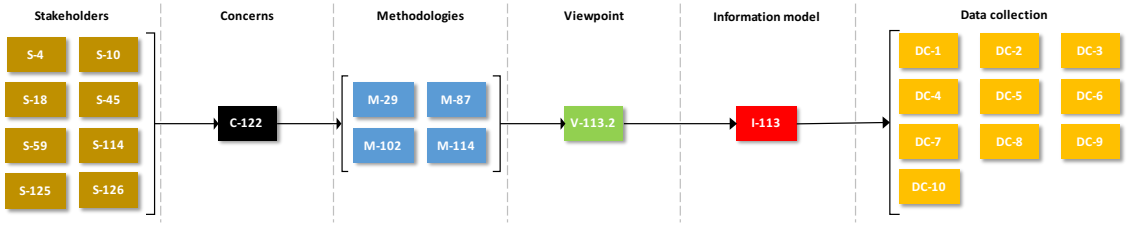


Figure 7.33.: Viewpoint V-113.2 graph

 

### 7.7.3. Viewpoint V-113.3: Consolidation potential and priority

The status illustrates consolidation potentials, whereas business applications that might be consolidated to one business application are colored in the same way. Moreover, priorities of consolidation projects might be added to the colored cells.

| Business application | Priority |
|---|---|
| Campaign Management System (1500) | Prio 1 |
| Customer Relationship Management System (2100) | Prio 1 |
| Business Traveling System (1000) | -- |
| POS System (GermanyHamburg) (1620) | Prio 3 |
| Financial Planning System (1400) | Prio 2 |
| POS System (GermanyMunich) (1600) | Prio 3 |
| Customer Complaint System (1900) | Prio 1 |
| Accounting System (500) | Prio 2 |
| Data Warehouse (800) | -- |

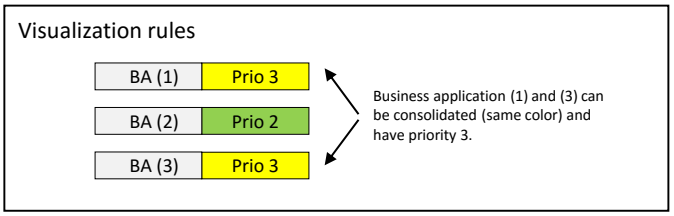


Figure 7.34.: Viewpoint V-113.3

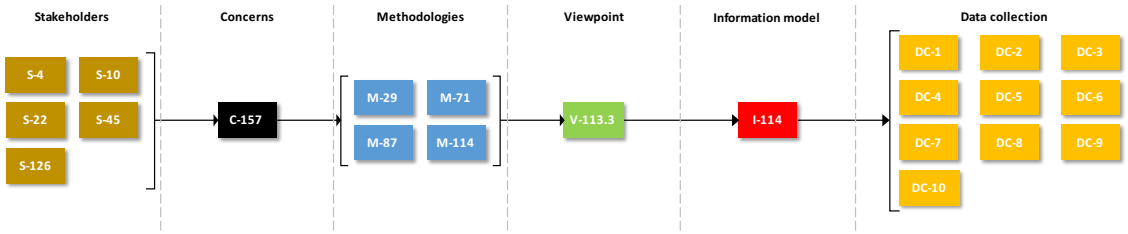


Figure 7.35.: Viewpoint V-113.3 graph

 

## 7.8. Viewpoint V-114

| Viewpoint overview | |
|---|---|
| Id | V-114 |
| Name | Layer diagramm to visualize IT landscape status |
| Summary | This V-Pattern visualizes a technical related status of an IT landscape by using a layer diagram. |

The base map of this pattern consists of three information model dimension: Business processes are illustrated at the top of the layer digram. These are supported by various business applications, illustrated at the middle layer. The used physical components are visualized at the bottom of the diagram.

The different variations include a further information model dimension, illustrating a technical status of the IT landscape.

The basemap of V-114 embodies an own pattern as well, without any further information model elements to provide a transparent overview of the IT landscape.

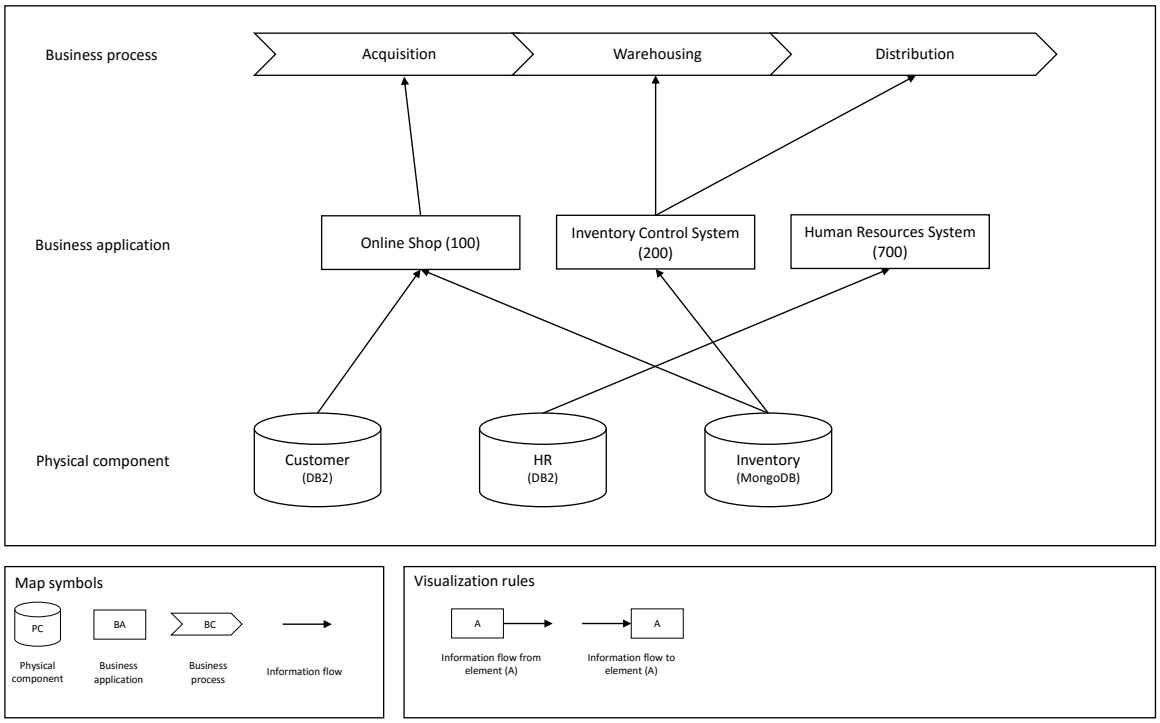


Figure 7.36.: Viewpoint V-114

 

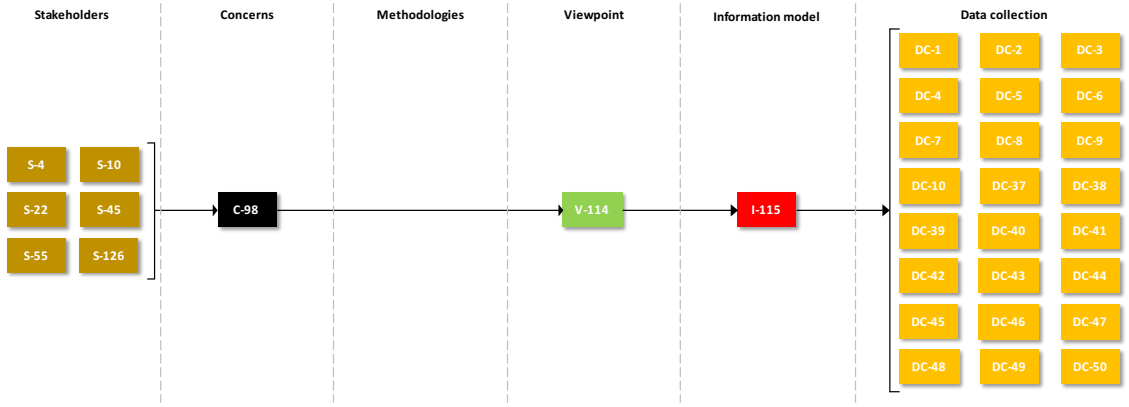


Figure 7.37.: Viewpoint V-114 graph

 

### 7.8.1. Viewpoint V-114.1: Evaluate consolidation candidates

This viewpoint provides transparency about what kind of business applications or physical components illustrate an adequate consolidation candidate in terms of increasing the efficiency and transparency of the application landscape.

Consolidation candidates are colored in green and can refer to business applications or single physical components.

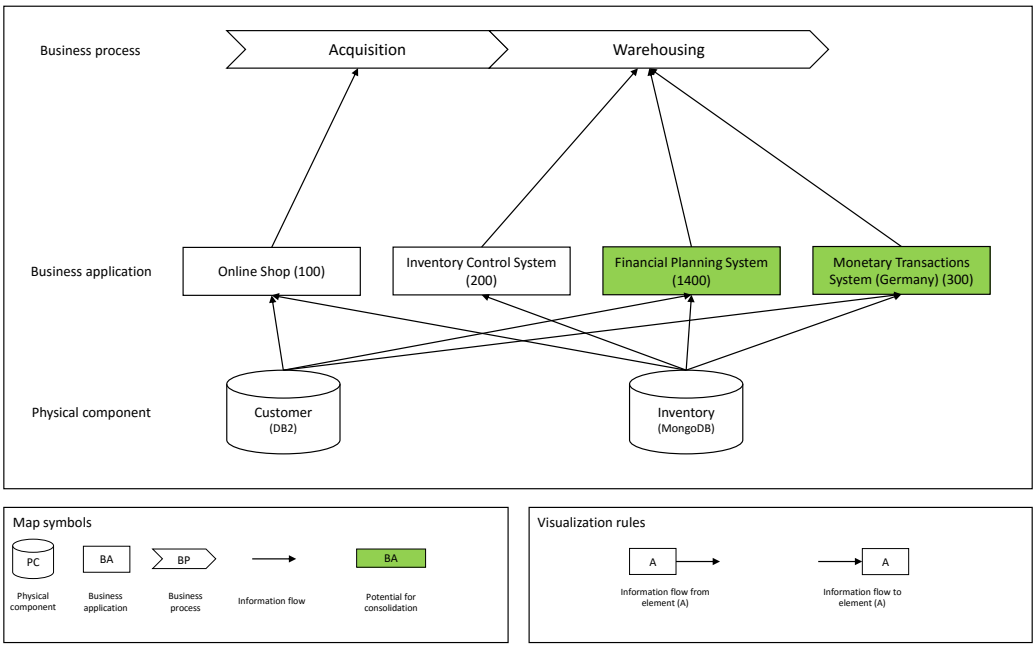


Figure 7.38.: Viewpoint V-114.1

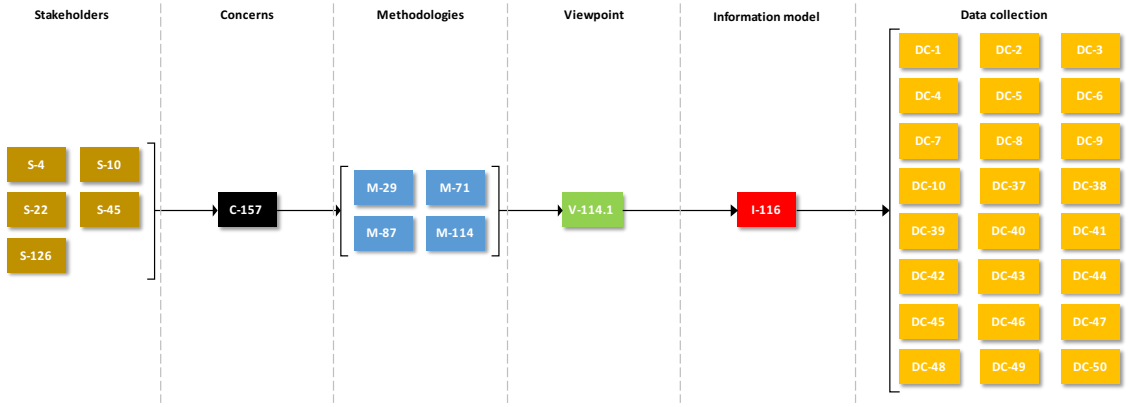


Figure 7.39.: Viewpoint V-114.1 graph

 

### 7.8.2. Viewpoint V-114.2 Transparency about compliance to standards

This viewpoint provides transparency about what kind of business applications or physical components corresponds to defined standards within the organization.

Elements corresponding to a defined standard are colored in green.

Elements breaching a defined standard are colored in red.

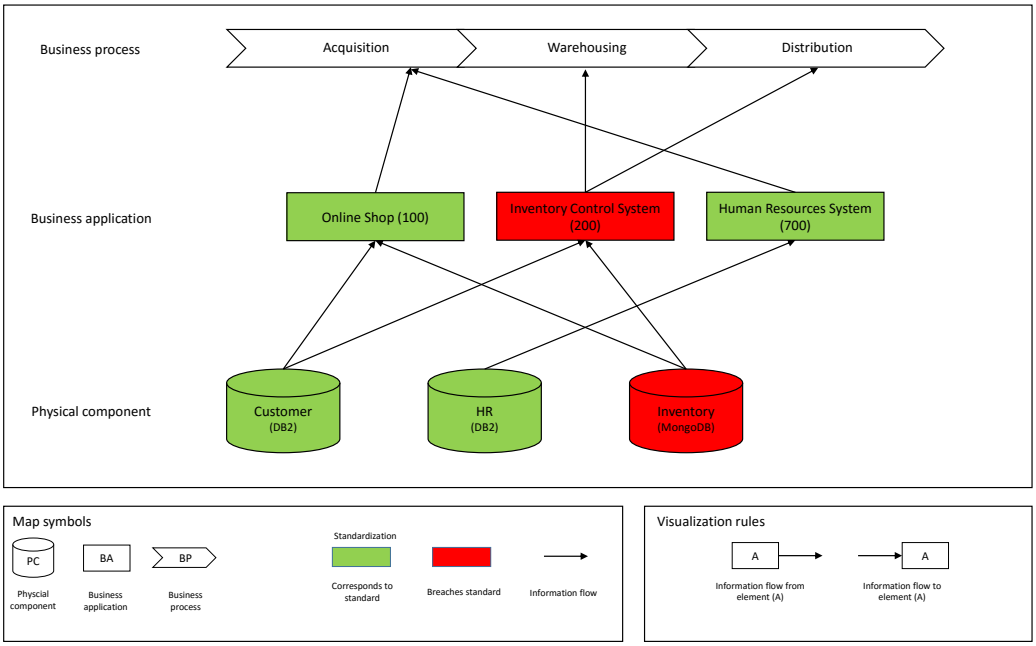


Figure 7.40.: Viewpoint V-114.2

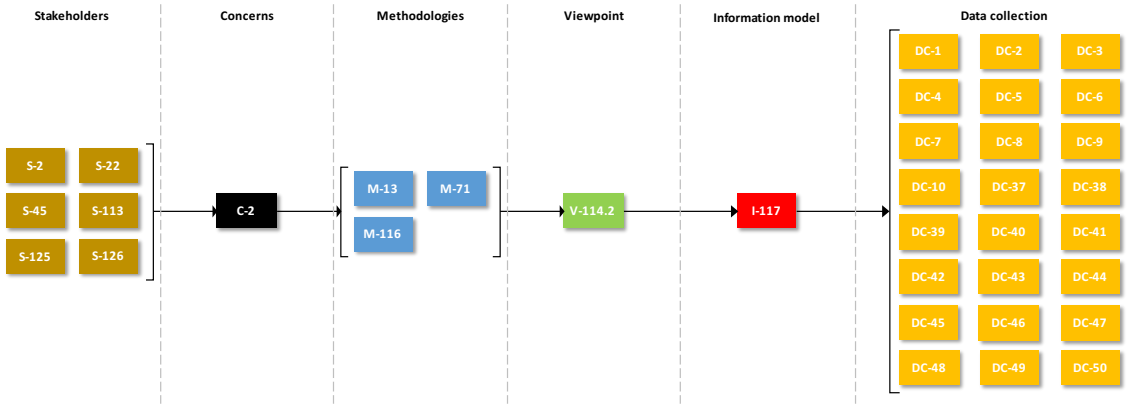


Figure 7.41.: Viewpoint V-114.2 graph

 

## 7.9. Viewpoint V-115

| Viewpoint overview | |
|---|---|
| Id | V-115 |
| Name | Number of interfaces per business application |
| Summary | Identifies the most interrelated business applications. |

This measure ($NI$) indicates the number of incoming ($I_a$) and outgoing ($O_a$) interfaces or information flows of a certain business application ($a$) to other business applications. Thereby, the structural complexity of a single business application is assessed by considering its interdependency. A higher value is associated with a higher application complexity.

**Calculation:** Sum of numbers of information flows that are either incoming to or outgoing from the respective business application.

**Mathematical representation:** $NI_a := |I_a| + |O_a|$

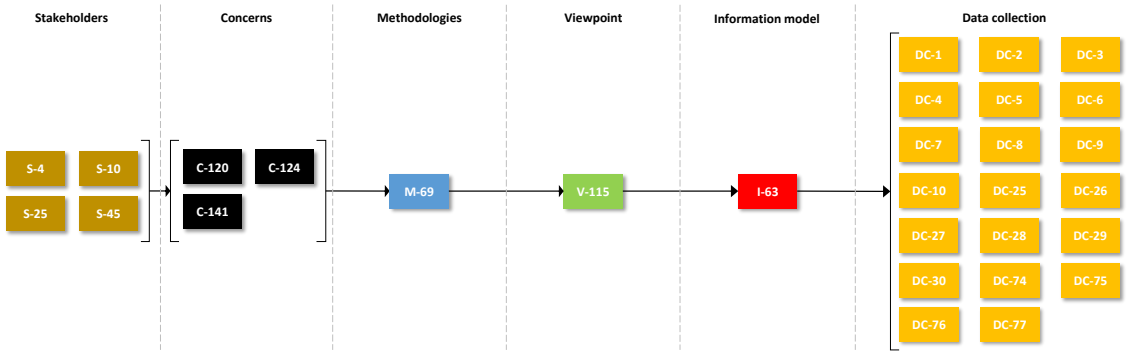


Figure 7.42.: Viewpoint V-115 graph

 

## 7.10. Viewpoint V-116

| Viewpoint overview | |
|---|---|
| Id | V-116 |
| Name | Number of redundant business functions per business application |
| Summary | Identifies the most redundant business applications. |

This measure ($NRBF$) indicates the number of business functions ($F$) supported by a certain business application ($a$) that are also covered by another business application ($b$). Thereby, the structural complexity of a single business application is assessed by considering its redundancy. A higher value of redundancy is associated with higher complexity since single changes then affect multiple applications.

**Calculation:** Counting the number of business functions of a business application that are also supported by another business application.

**Mathematical representation:**
$NRBF_a := |\{f | f \in F \wedge supports(a, f) \wedge supports(b, f) \wedge a \neq b\}|$

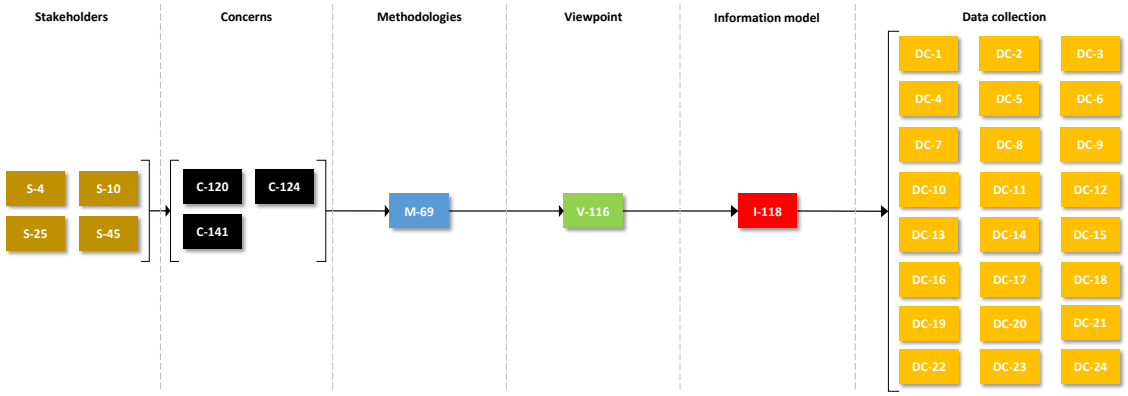


Figure 7.43.: Viewpoint V-116 graph

 

## 7.11. Viewpoint V-117

| Viewpoint overview | |
|---|---|
| Id | V-117 |
| Name | Number of business applications used within a functional domain |
| Summary | Calculates the extent of IT support per domain. |

This measure ($NBA$) indicates the number of business applications ($A$) used within a specific functional domain ($d$). Thereby, the structural complexity of a functional domain or business capability is assessed by considering its extent. A higher number is associated with a higher application landscape or domain complexity.

**Calculation:** Sum of business applications used within a functional domain of a company.

**Mathematical representation:** $NBA_d := |\{a | a \in A \wedge used(a, d)\}|$

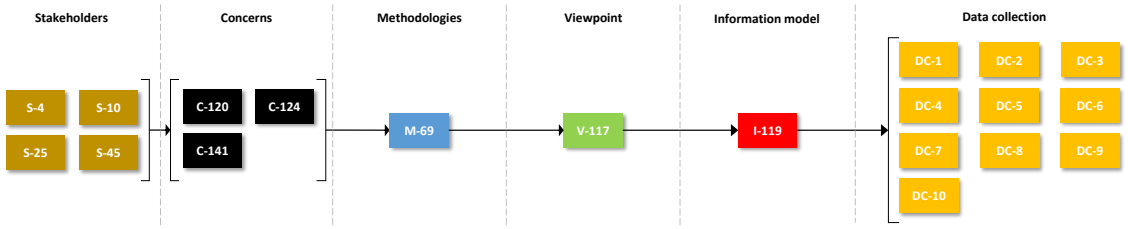


Figure 7.44.: Viewpoint V-117 graph

 

## 7.12. Viewpoint V-118

| Viewpoint overview | |
|---|---|
| Id | V-118 |
| Name | Standard conformity of business applications |
| Summary | Indicates whether business applications conform to some general standard or if they are organization-specific. |

This measure indicates the standard conformity ($SC$) of business applications by classifying business applications ($A$) according to their customization level. The customization level of a business application can be either *buy*, *make* or *buy and customize*. The maximum value of this metric indicating a complex application landscape (or domain) consisting only of customized business applications is 5. The minimum value indicating a lest complex application landscape (or domain) is 1.

**Calculation:** For calculating the standard conformity for a specific domain, transform each business application's customization level to 1 (buy), 3 (make), or 5 (buyAndCustomize) and take the average.

**Mathematical representation:** $SC := \frac{\sum_{a \in A} customization(a)}{|A|}$

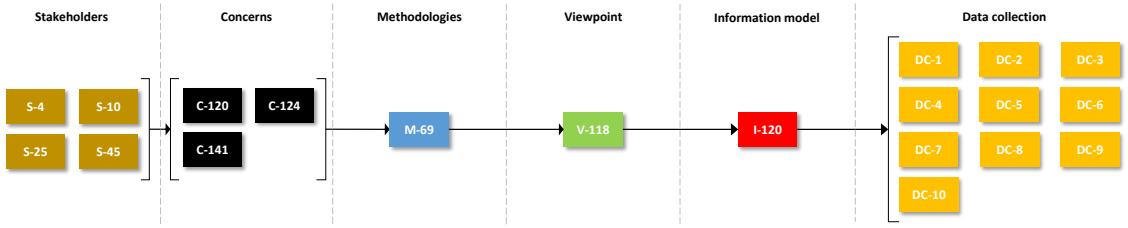


Figure 7.45.: Viewpoint V-118 graph

 

## 7.13. Viewpoint V-119

| Viewpoint overview | |
|---|---|
| Id | V-119 |
| Name | Number of infrastructure components used by business application |
| Summary | Indicates the extent of technical components used within a business application. |

This measure indicates the number of infrastructure components ($IE$) used by a specific business application ($a$). Thereby, the structural complexity is assessed regarding the amount and variety of components. The higher this number, the higher the application's complexity.

**Calculation:** Sum of infrastructure components used by a certain business application.

**Mathematical representation:** $NIE_a := |\{i | i \in IE \wedge uses(a, i)\}|$

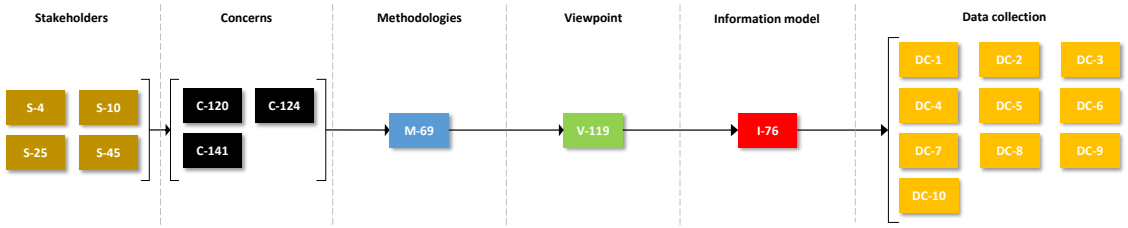


Figure 7.46.: Viewpoint V-119 graph

 

## 7.14. Viewpoint V-120

This measure indicates the amount of functionality ($FS$) provided by a certain business application ($a$). The higher this amount, the higher the application's complexity.

| **Viewpoint overview** | |
|---|---|
| Id | V-120 |
| Name | Functional scope of a business application |
| Summary | Measures the extent of support a business application offers. |

**Calculation:** The functional scope can be assessed either by summing up the function points of a business application or by counting business functions ($F$) supported by a certain business application.

**Mathematical representation:**
$FS1_a := functionPoints(a)$
$FS2_a := |\{f|f \in F \wedge supports(a, f)\}|$

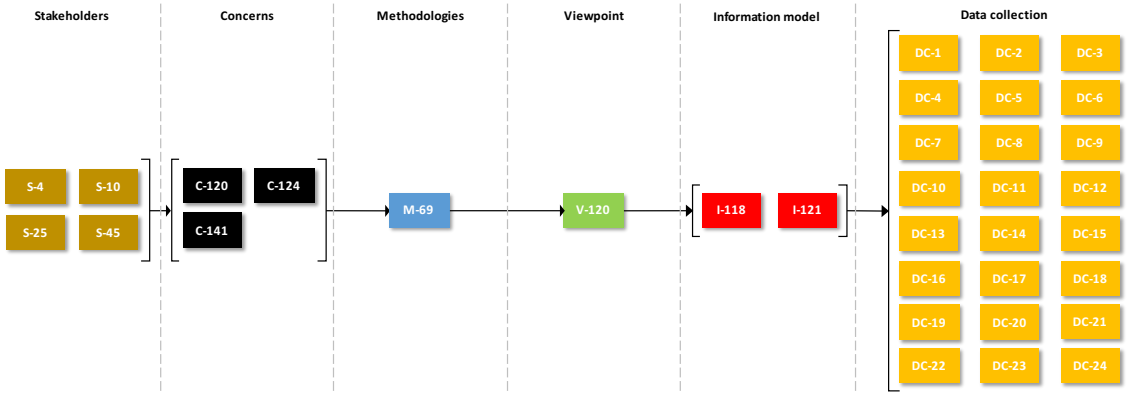


Figure 7.47.: Viewpoint V-120 graph

 

CHAPTER 8

# Information Model Patterns

**Contents**



 

## 8.1. Information model I-99

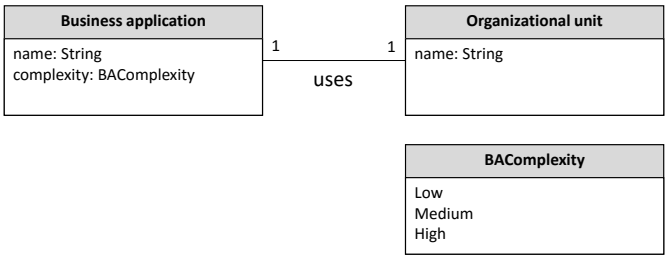


Figure 8.1.: Information model I-99

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is not only a software system, but also made up of infrastructure the software system is based on. Additionally a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.
*BAComplexity* indicates to a complexity measure or value for the respective business application instance. Methodology M-69 (Section 6.3.3) provides further information to the complexity management of application landscapes.

**Organizational unit:** An organizational unit represents a subdivision of the organization according to its internal structure, whereas the organization can be organized in geographical subsidiaries, core business process steps, etc.

 

## 8.2. Information model I-100

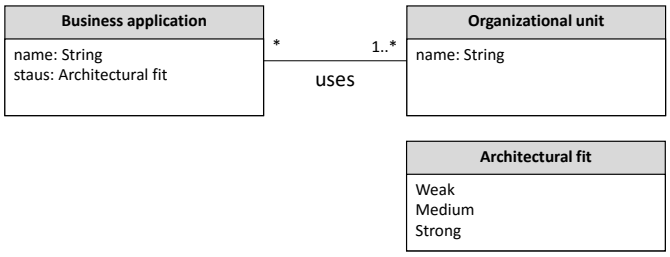


Figure 8.2.: Information model I-100

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is not only a software system, but also made up of infrastructure the software system is based on. Additionally a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.
The *status* attribute provides further information, whether the business application aligns with the architectural blueprint of the organization.

**Organizational Unit:** An organizational unit represents a subdivision of the organization according to its internal structure, whereas the organization can be organized in geographical subsidiaries, core business process steps, etc.

 

## 8.3. Information model I-101

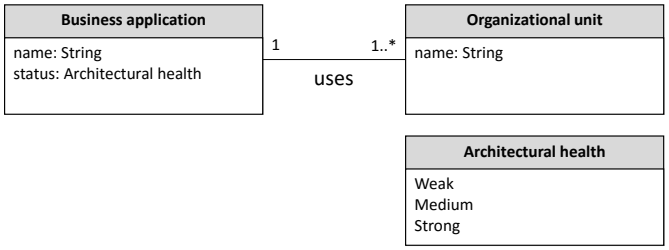


Figure 8.3.: Information model I-101

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is not only a software system, but also made up of infrastructure the software system is based on. Additionally a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.
The *status* attribute provides further information about the architectural health of the business application.

**Organizational unit:** An organizational unit represents a subdivision of the organization according to its internal structure, whereas the organization can be organized in geographical subsidiaries, core business process steps, etc.

 

## 8.4. Information model I-102

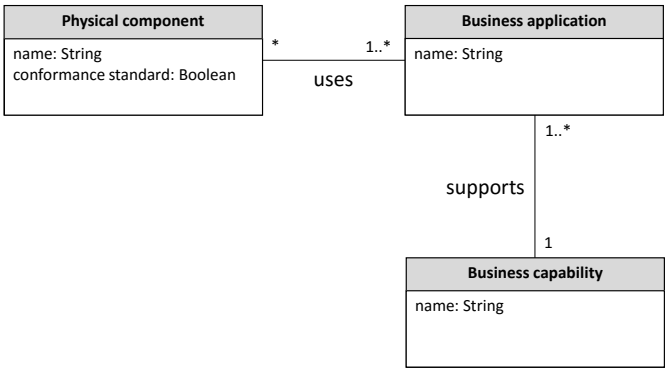


Figure 8.4.: Information model I-102

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is not only a software system, but also made up of infrastructure the software system is based on. Additionally a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.
The *conformance to standard* attribute indicates, whether the physical component corresponds to an organization's standard.

**Physical component:** A physical components represents a hardware component, used to deploy one are various business applications. Examples for physical components are database management systems, server, router etc. In this case, physical components do not include further business logic out of the box. Information systems that include hardware and software in one information system, such as SAP or HOST systems, do not represent physical components.

**Business capability**: Larger organizations have to provide a specific amount of skills or resources to support dedicated business function to achieve an organization objective [Ha14a]. The sum of skills to support a specific business function is defined as a business capability. Example: Insurance companies have to provide specific skills and resources to handle upcoming claims, such as claims management information systems, accounting skills, actuarial knowledge, etc.

 

## 8.5. Information model I-103

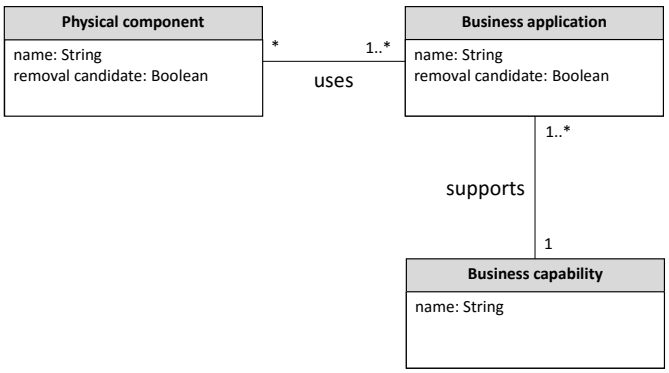


Figure 8.5.: Information model I-103

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is not only a software system, but also made up of infrastructure the software system is based on. Additionally a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.
The *removal candidate* attribute indicates, whether the physical component / business application indicates a redundant or not used component and thus, illustrates a potential removal candidate.

**Physical component:** A physical components represents a hardware component, used to deploy one are various business applications. Examples for physical components are database management systems, Server Racks, etc. In this case, physical components do not include further business logic out of the box. Information systems that include hardware and software in one information system, such as SAP or HOST systems, do not represent physical components.

**Business capability**: Larger organizations have to provide a specific amount of skills or resources to support dedicated business function to achieve an organization objective [Ha14a] The sum of skills to support a specific business function is defined as a business capability. Example: Insurance companies have to provide specific skills and resources to handle upcoming claims, such as claims management information systems, accounting skills, actuarial knowledge, etc.

 

## 8.6. Information model I-104

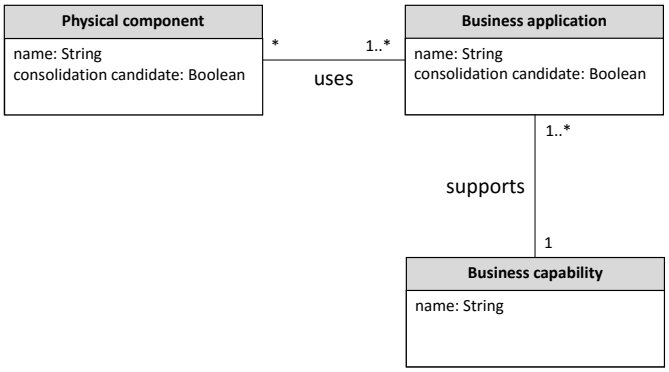


Figure 8.6.: Information model I-104

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is not only a software system, but also made up of infrastructure the software system is based on. Additionally a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.
The *consolidation candidate* attribute indicates, whether the physical component / business application can be consolidated with a further business application / physical component.

**Physical component:** A physical components represents a hardware component, used to deploy one are various business applications. Examples for physical components are database management systems, Server Racks, etc. In this case, physical components do not include further business logic out of the box. Information systems that include hardware and software in one information system, such as SAP or HOST systems, do not represent physical components.

**Business capability**: Larger organizations have to provide a specific amount of skills or resources to support dedicated business function to achieve an organization objective [Ha14a] The sum of skills to support a specific business function is defined as a business capability. Example: Insurance companies have to provide specific skills and resources to handle upcoming claims, such as claims management information systems, accounting skills, actuarial knowledge, etc.

 

## 8.7. Information model I-105

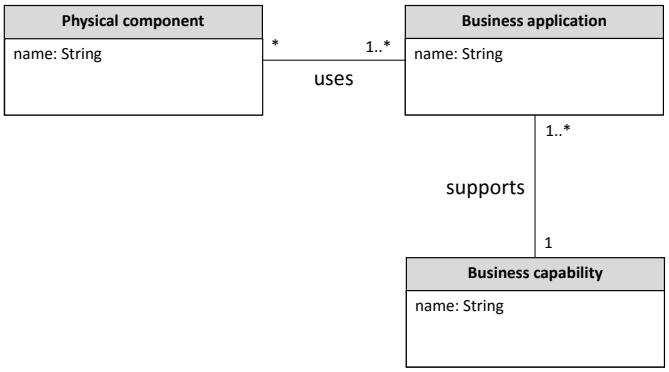


Figure 8.7.: Information model I-105

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is not only a software system, but also made up of infrastructure the software system is based on. Additionally a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.

**Physical component:** A physical components represents a hardware component, used to deploy one are various business applications. Examples for physical components are database management systems, Server Racks, etc. In this case, physical components do not include further business logic out of the box. Information systems that include hardware and software in one information system, such as SAP or HOST systems, do not represent physical components.

**Business capability**: Larger organizations have to provide a specific amount of skills or resources to support dedicated business function to achieve an organization objective [Ha14a] The sum of skills to support a specific business function is defined as a business capability. Example: Insurance companies have to provide specific skills and resources to handle upcoming claims, such as claims management information systems, accounting skills, actuarial knowledge, etc.

 

## 8.8. Information model I-106


Figure 8.8.: Information model I-106

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is not only a software system, but also made up of infrastructure the software system is based on. Additionally a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.

**Physical component:** A physical components represents a hardware component, used to deploy one are various business applications. Examples for physical components are database management systems, Server Racks, etc. In this case, physical components do not include further business logic out of the box. Information systems that include hardware and software in one information system, such as SAP or HOST systems, do not represent physical components.

 

## 8.9. Information model I-107

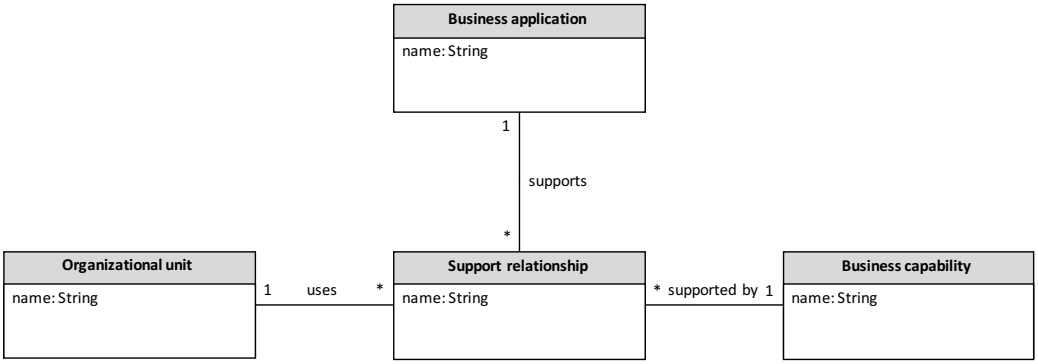


Figure 8.9.: Information model I-107

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is not only a software system, but also made up of infrastructure the software system is based on. Additionally a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.
A business application can be used in by various organizational units and support different business capabilities. Thus, the information model of I-107 illustrates the business application as an association class.

**Organizational unit:** An organizational unit represents a subdivision of the organization according to its internal structure, whereas the organization can be organized in geographical subsidiaries, core business process steps, etc.

**Business capability**: Larger organizations have to provide a specific amount of skills or resources to support dedicated business function to achieve an organization objective [Ha14a] The sum of skills to support a specific business function is defined as a business capability.

 

Example: Insurance companies have to provide specific skills and resources to handle upcoming claims, such as claims management information systems, accounting skills, actuarial knowledge, etc.

**Support relationship**: Represents the support of a business application in a business capability at a specific organizational unit. Basically, it constitutes, together with its three associations, a ternary relationship between business application, organizational unit, and business capability. This is necessary in order to be able to tell exactly which business capability is supported by which business application for which organizational unit.

 

## 8.10. Information model I-108

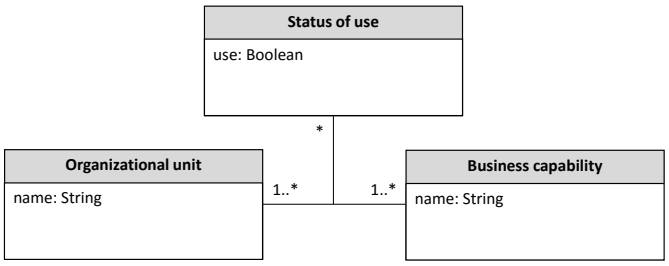


Figure 8.10.: Information model I-108

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is not only a software system, but also made up of infrastructure the software system is based on. Additionally a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.

**Business capability**: Larger organizations have to provide a specific amount of skills or resources to support dedicated business function to achieve an organization objective [Ha14a] The sum of skills to support a specific business function is defined as a business capability. Example: Insurance companies have to provide specific skills and resources to handle upcoming claims, such as claims management information systems, accounting skills, actuarial knowledge, etc.

**Status of use**: This association class illustrates, whether a business application supports a specific business capability.

 

## 8.11. Information model I-109

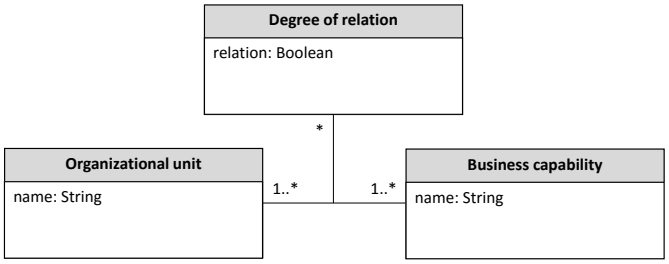


Figure 8.11.: Information model I-109

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is not only a software system, but also made up of infrastructure the software system is based on. Additionally a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.

**Business capability**: Larger organizations have to provide a specific amount of skills or resources to support dedicated business function to achieve an organization objective [Ha14a] The sum of skills to support a specific business function is defined as a business capability. Example: Insurance companies have to provide specific skills and resources to handle upcoming claims, such as claims management information systems, accounting skills, actuarial knowledge, etc.

**Degree of relation**: This association class illustrates the degree of relation between a business application and a specific business capability. The degree of relation can find its expression by various factors, such as the business impact analysis or the implemented business requirements within a specific business application.

 

## 8.12. Information model I-110

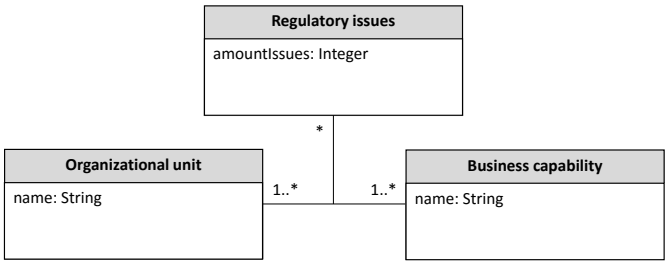


Figure 8.12.: Information model I-110

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is not only a software system, but also made up of infrastructure the software system is based on. Additionally a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.

**Business capability**: Larger organizations have to provide a specific amount of skills or resources to support dedicated business function to achieve an organization objective [Ha14a] The sum of skills to support a specific business function is defined as a business capability. Example: Insurance companies have to provide specific skills and resources to handle upcoming claims, such as claims management information systems, accounting skills, actuarial knowledge, etc.

**Regulatory issues:** This association class illustrates the amount of regulatory issues of a business application within a specific business capability.

 

## 8.13. Information model I-111

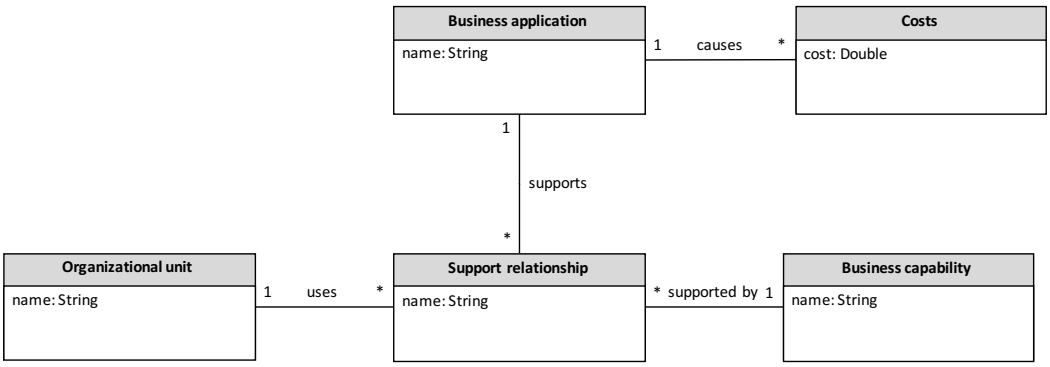


Figure 8.13.: Information model I-111

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is not only a software system, but also made up of infrastructure the software system is based on. Additionally a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.

**Organizational unit:** An organizational unit represents a subdivision of the organization according to its internal structure, whereas the organization can be organized in geographical subsidiaries, core business process steps, etc.

**Business capability**: Larger organizations have to provide a specific amount of skills or resources to support dedicated business function to achieve an organization objective [Ha14a] The sum of skills to support a specific business function is defined as a business capability. Example: Insurance companies have to provide specific skills and resources to handle upcoming claims, such as claims management information systems, accounting skills, actuarial knowledge, etc.

**Costs:** A business application causes various costs, such as operating, maintenance, change management or problem ticket solving costs. Every cost is modeled in one instance of a cost class.

**Support relationship**: Represents the support of a business application in a business capability at a specific organizational unit. Basically, it constitutes, together with its three associations, a ternary relationship between business application, organizational unit, and business capability. This is necessary in order to be able to tell exactly which business capability is supported by which business application for which organizational unit.

 

## 8.14. Information model I-112

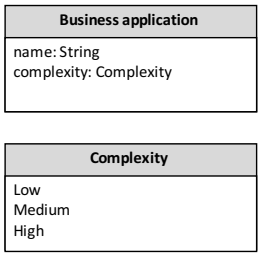


Figure 8.14.: Information model I-112

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is not only a software system, but also made up of infrastructure the software system is based on. Additionally a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.
The *complexity* attribute indicates to a complexity measure or value for the respective business application instance. Methodology M-69 (Section 6.3.3) provides further information to the complexity management of application landscapes.

 

## 8.15. Information model I-113

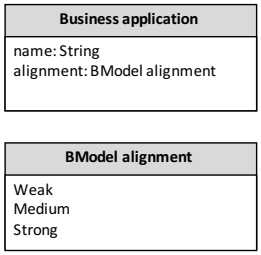


Figure 8.15.: Information model I-113

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is, besides the software system, made up of the infrastructure the software system is based on, and a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.
The *alignment* attribute provides further information, whether the business application aligns with the defined business model, named **BModel** in the information model, in terms of the IT \strategy.

 

## 8.16. Information model I-114

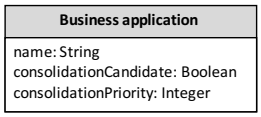


Figure 8.16.: Information model I-114

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is not only a software system, but also made up of infrastructure the software system is based on. Additionally a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.
The *consolidationCandidate* attribute indicates, whether the business application can be consolidated with a further business application.
The *ConsolidationPriority* attribute refers to the priority of the plannend consolidation activities for the specific business application.

 

## 8.17. Information model I-115

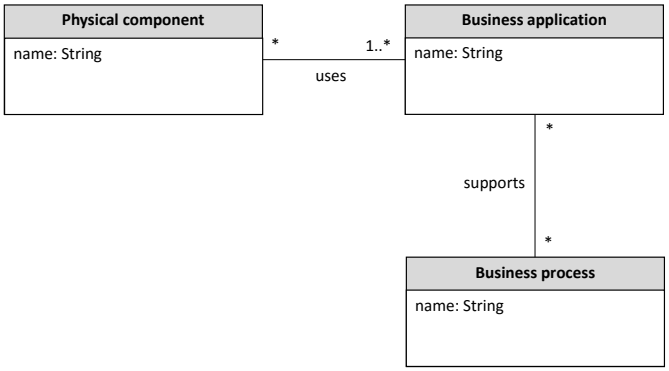


Figure 8.17.: Information model I-115

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is not only a software system, but also made up of infrastructure the software system is based on. Additionally a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.

**Physical component:** A physical components represents a hardware component, used to deploy one are various business applications. Examples for physical components are database management systems, Server Racks, etc. In this case, physical components do not include further business logic out of the box. Information systems that include hardware and software in one information system, such as SAP or HOST systems, do not represent physical components.

 

## 8.18. Information model I-116

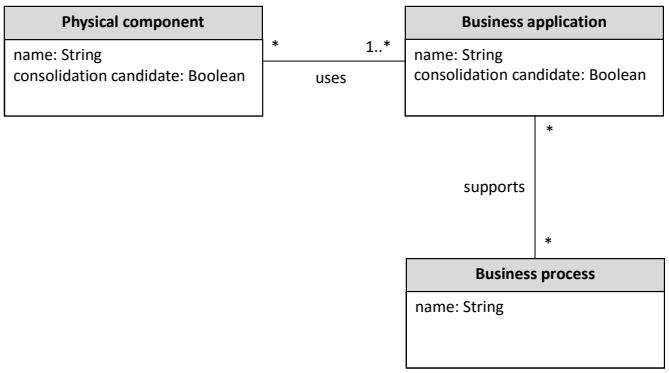


Figure 8.18.: Information model I-116

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is not only a software system, but also made up of infrastructure the software system is based on. Additionally a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.
The *consolidation candidate* attribute indicates, whether the business application instance might be consolidates with one ore various business application.

**Physical component:** A physical components represents a hardware component, used to deploy one are various business applications. Examples for physical components are database management systems, Server Racks, etc. In this case, physical components do not include further business logic out of the box. Information systems that include hardware and software in one information system, such as SAP or HOST systems, do not represent physical components.

**Business process:** According to [Kr15] , defined as a sequence of logical individual functions with connections between them. [DFH03] states in- and output factors and a defined process objective as important characteristics of a business process. The business process should not be identified with single process steps or individual functions, but with high-level processes at a level similar to the one used in value chains.

 

## 8.19. Information model I-117

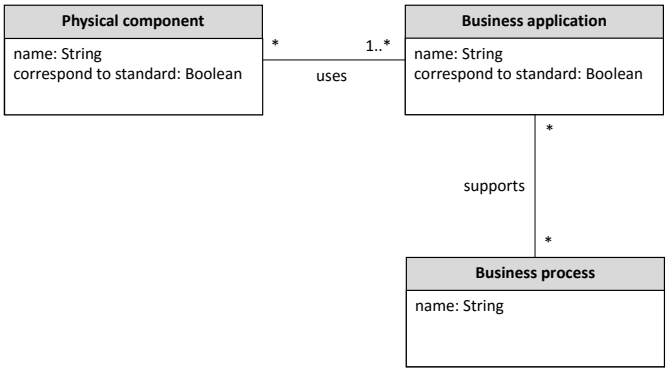


Figure 8.19.: Information model I-117

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is not only a software system, but also made up of infrastructure the software system is based on. Additionally a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.

The *correspond to standard* attribute provide further information, whether the business application in terms of used technology, programming language, or implemented solution corresponds to the defined IT standard of the organization.

**Physical component:** A physical components represents a hardware component, used to deploy one are various business applications. Examples for physical components are database management systems, Server Racks, etc. In this case, physical components do not include further business logic out of the box. Information systems that include hardware and software in one information system, such as SAP or HOST systems, do not represent physical components.

**Business process:** According to [Kr15], business processes are defined as a sequence of logical individual functions with connections between them. [DFH03] states in- and output factors and a defined process objective as important characteristics of a business process. The business process should not be identified with single process steps or individual functions, but with high-level processes at a level similar to the one used in value chains.

 

## 8.20. Information model I-118


Figure 8.20.: Information model I-118

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is not only a software system, but also made up of infrastructure the software system is based on. Additionally a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.

**Business capability**: Larger organizations have to provide a specific amount of skills or resources to support dedicated business function to achieve an organization objective [Ha14a] The sum of skills to support a specific business function is defined as a business capability. Example: Insurance companies have to provide specific skills and resources to handle upcoming claims, such as claims management information systems, accounting skills, actuarial knowledge, etc.

 

## 8.21. Information model I-119

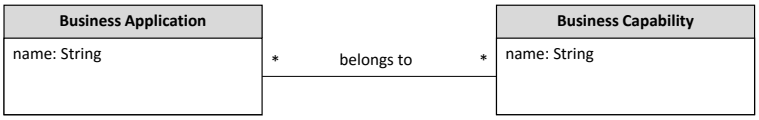


Figure 8.21.: Information model I-119

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is not only a software system, but also made up of infrastructure the software system is based on. Additionally a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.

**Business capability**: Larger organizations have to provide a specific amount of skills or resources to support dedicated business function to achieve an organization objective [Ha14a] The sum of skills to support a specific business function is defined as a business capability. Example: Insurance companies have to provide specific skills and resources to handle upcoming claims, such as claims management information systems, accounting skills, actuarial knowledge, etc.

 

## 8.22. Information model I-120


Figure 8.22.: Information model I-120

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is not only a software system, but also made up of infrastructure the software system is based on. Additionally a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.

**Customization level:** The customization level is used to classify business applications with regard to the extent of individual adaptation. *Buy* is used for business applications available on the market which are used as provided. *BuyAndCustomized* is used for business applications available on the market which are configured or adapted to organizational specifics. *Make* is used for business applications not available on the market but implemented specifically for the using organization.

 

## 8.23. Information model I-121

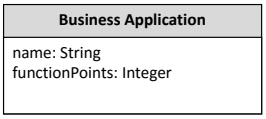


Figure 8.23.: Information model I-121

**Business application:** A business application is a software system, which is part of an information system of an organization. An information system is according to [Kr15] understood as a sociotechnical system, which is not only a software system, but also made up of infrastructure the software system is based on. Additionally a social component, namely the employees or stakeholders concerned with it. Thereby, infrastructure and social component are not considered as belonging to the business application, while the characterization 'business' restricts the term to applications that support at least one process of the respective organization. Thus, business application denotes here an actual deployment of a software.
*functionPoints* are used to assess the functional scope of a business application either a priori or a posteriori.

 

# CHAPTER 9

# Data Collection Patterns

**Contents**



In this section, we provide an overview of the identified data collection (DC) patterns.

We asked the participants of the online survey, to list all classes that are maintained within their respective EAM model. Moreover, we asked the participants to provide further information about the listed EAM classes, such as *responsibility*, *number of instances*, *data source* etc. This information provided us the possibility to identify DC patterns for single EAM classes. Overall, we identified 90 DC patterns for 19 different EAM classes. A detailed list of the DC patterns for each class is documented in A.5.

A DC pattern is valid for one concrete EAM class and provides information about the following dimensions:

- *Responsibility:* Who is responsible regarding the maintenance of the EAM class?
- *Data source:* From what type of data source the information can be extracted?
- *Data format:* What type of data format is used to document the respective information?
- *Refresh frequency:* In which intervals the information will be refreshed?

In Section 9.1 we provide an overview of the identified DC patterns, sorted by the respective EAM classes. Section 9.2 includes a more detailed view on the DC patterns, separated by the characteristics of the single DC pattern attributes.

 

## 9.1. Overview of data collection patterns

We received data collection information for 333 EAM class instances from 31 industry partners. As aforementioned, we identified 90 DC patterns for 19 different EAM classes. Table 9.1 represents the amount of identified patterns for every EAM class.

| Class | Amount of patterns | Detailed list |
|---|---|---|
| Business capability | 14 | A.5.2 |
| Business application | 10 | A.5.1 |
| Business process | 9 | A.5.6 |
| Technology | 8 | A.5.8 |
| Interface | 7 | A.5.3 |
| Project | 6 | A.5.7 |
| Physical component | 6 | A.5.5 |
| Organizational unit | 6 | A.5.5 |
| License | 5 | A.5.6 |
| Data flow | 4 | A.5.9 |
| Service | 3 | A.5.9 |
| Business object | 3 | A.5.9 |
| Architecture principle | 2 | A.5.9 |
| Business driver | 2 | A.5.9 |
| SLA | 1 | A.5.9 |
| IT requirement | 1 | A.5.9 |
| Business function | 1 | A.5.9 |
| Employees | 1 | A.5.9 |
| Business support | 1 | A.5.9 |

Table 9.1.: Amount of identified DC patterns for every EAM class

As illustrates in Table 9.1, today's organizations consider technical oriented (*business application*, *technology*, *interfaces*, etc.) and business oriented (*business capability*, *business process*, etc.) classes in their EAM repositories. However, the observed patterns also shows that organization's consider only a few classes in their EAM repositories to keep their EAM model lean as far as possible. Detailed lists of the identified DC patterns, including granular information about the observed characteristics are documented in the Appendix A.5.

As already defined for the other EAM pattern concepts, a concrete characteristic have to be observed at least three times. Otherwise, the respective DC information cannot be regarded as a pattern. In the case of the DC patterns, every pattern were also observed at least three times, whereas a concrete pattern does not have to include information about all DC pattern dimensions (*data format*, *refresh frequency*, *data source*, *responsibility*): We also observed DC patterns that only includes information about one, two or three characteristics (e.g. (1) responsibility (2) responsibility and data format (3) data source and refresh frequency, etc.). We also evaluated the data quality in terms of *granularity*, *correctness* and *completeness*. Due to the missing amount of gathered information about these characteristics, we did not consider these information within the DC pattern identification process.

 

## 9.2. Interpretation of results

The participants had the opportunity to provide information for predefined EAM classes within the online survey or to define further EAM classes that were not listed in Excel sheet. Moreover, the participants were asked to provide concrete information regarding the data format, refresh frequency, data source and the responsible person of the selected EAM class. In this case, we also provide predefined alternatives, gathered from the preliminary study and past research projects. Figure 9.1 illustrate the distribution of the stated characteristics for every DC pattern dimension.

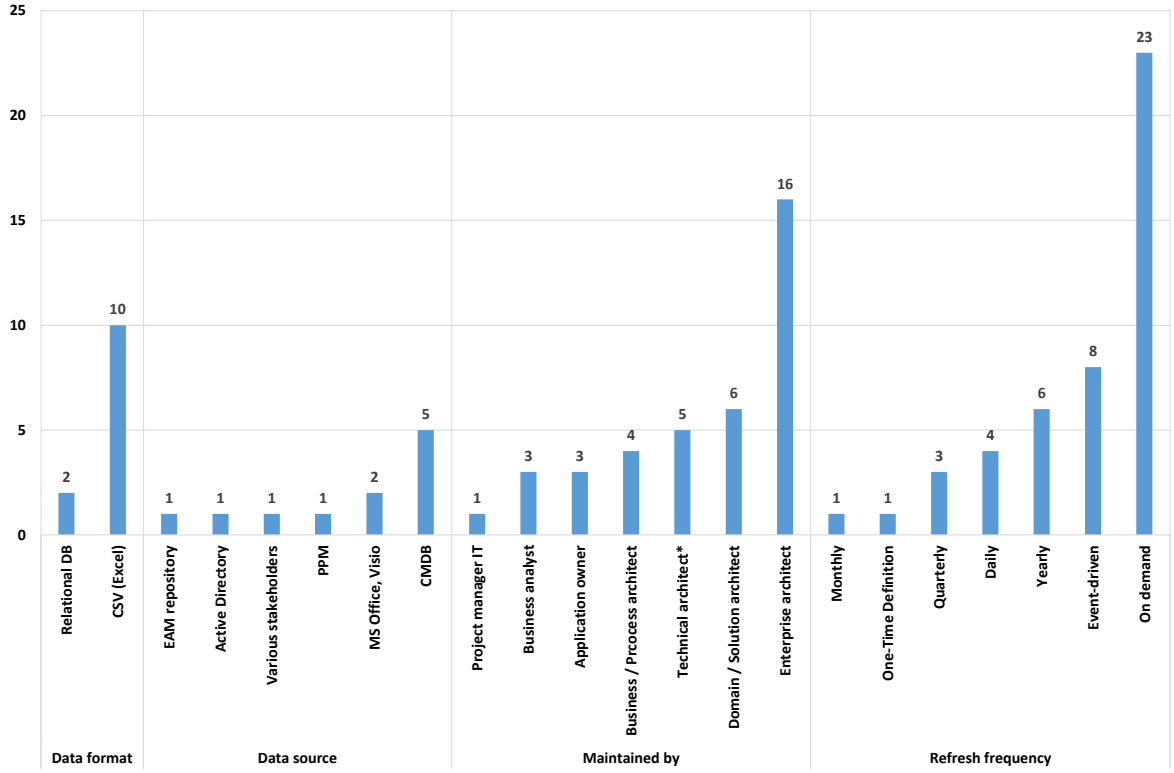


Figure 9.1.: Distribution of stated characteristics of the observed DC patterns for each DC pattern dimension

The results of the DC pattern evaluation show the same findings, already represented by [Ro13]: EAM information are mostly documented on demand and in Excel format. The enterprise architect is the role mentioned most often as being in charge for maintenance activities and documenting EAM information originating from the CMDB. It turned out that the proper documentation of the EAM still lacks a well defined and established process within today's organizations. However, 22 out of 36 observed DC pattern responsibilities define a deviant maintenance responsibility than the enterprise architect. This leads to the conclusion that EAM maintenance activities are getting distributed to respective data owners, such as the domain / solution, technical and business / process architects.

 

# CHAPTER 10

# Summary

 

The *EAMPC V2* aims to unveil best practices and patterns in the EAM domain. As an extension of the *EAMPC 2008* [Bu08], the V2 release of the catalog seeks to identify new EAM best practices and patterns that have emerged after seven years. We adopted the defined concepts of the 2008 (*concerns*, *methodologies*, *information models viewpoints*) but also extended the scope of the evaluation with *data collections*, *stakeholders*, *architecture principles*, and *influence factors*. We identified the EAM patterns by conducting an online survey with 31 industry experts. The participants are illustrated in Appendix A.1. Moreover, we interviewed selected EA experts for additional EAM method input. The listed bullets give an overview of our key findings for each pattern concept:

- **Stakeholders** (*12 identified patterns*)
  - Technical- and business related stakeholder involved in EAM activities
  - Upper management increasing their interest on EAM
  - Architectural roles still in lead
- **Concerns** (*15 identified patterns*)
  - Concerns of *EAMPC 2008* still relevant today
  - New significant concerns came up over the last seven years
  - IT landscape transparency related concerns have significant attention
- **Methodologies** (*13 identified patterns*)
  - EAM focuses on a few dedicated methodologies
  - Development of KPIs to measure complexity of IT landscape illustrates a relevant issue
  - Definition of business capability maps need further attraction
- **Viewpoints / information models** (*25 identified patterns*)
  - Business and IT complexity related viewpoints attract increased attention
  - Various viewpoints rest upon few base maps
  - Visualization of business capabilities illustrates a new V-pattern with increased attention
- **Data collections** (*87 identified patterns; 43 considered for information model*)
  - Manual documentation activities are still common in today's organizations
  - Observations show that a clear defined EAM documentation process is still missing in today's organizations
  - Patterns include mostly definitions for dedicated responsibilities
- **Architecture principles** (*Trends illustrated in Section 6*)
  - Architecture principles illustrate a well defined concept in today's organizations
  - Focus on organizational and less on technical related principles
  - Regulatory issues have an increased role in the definition of architecture principles
- **Influence factors** (*Trends illustrated in Section 3*)
  - External influence factors have a stronger impact than internal factors
  - Regulatory issues have a major impact on the strategy definition of today's orga-

 

nizations
  - Importance of EAM to face these influence factors increased in the last seven years

The observed patterns give clear insights on present challenges in the EAM domain. Further research might focus on:

- **Shaping of EAM KPIs**: The implementation of EAM KPIs has already been evaluated by [Mo14]. However, the further definition of complexity in the EAM domain and the observation of complexity drivers within IT landscapes might increase the focus of IT transformation projects
- **Business capability map:** The definition of business capability maps in terms of increasing the transparency of productive business applications in dedicated business competencies, illustrates a new trend within the EAM domain. However, the insights resented in Section 6.3.5 and 6.3.6 provide information from dedicated industry partners. The further evaluation and the observation of best practices can be useful for the EAM community.
- **Visualization of business and complexity states:** Business related and complexity related viewpoints have found their way to organization's. The definition of viewpoints that address these concepts is not evaluated in deep yet.
- **EAM documentation:** EAM researchers already evaluated best practices and challenges in EAM documentation activities [Ro13], [Fa13]. However, the provision of EAM documentation solutions is not yet fully explored. Further research might provide further solutions on this issue.

Figure 10.1 provides an aggregated view on the observed patterns.

 

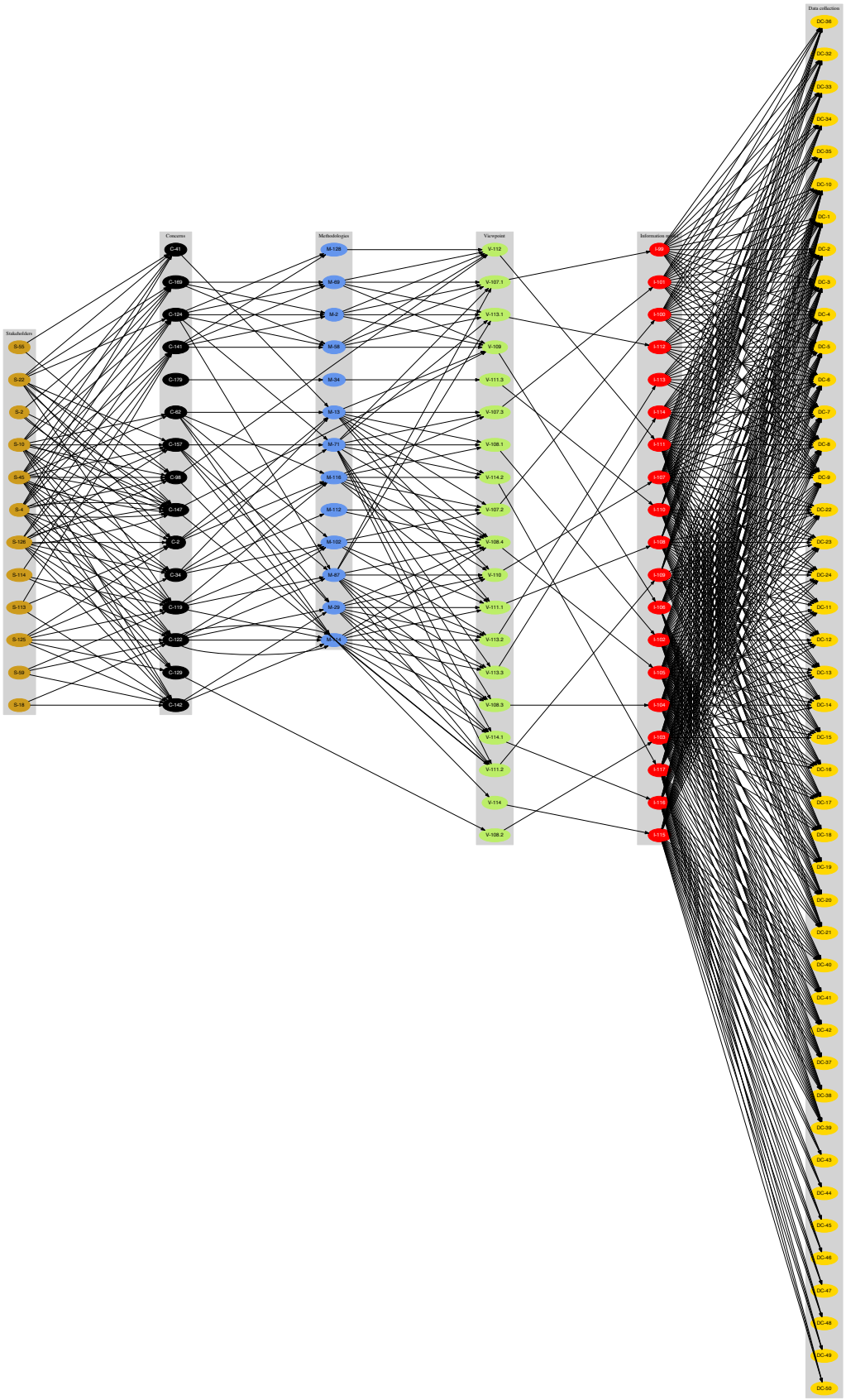


Figure 10.1.: Overview aggregation of identified patterns

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# List of Figures



 

 

 

# APPENDIX A

## Appendix

 

## A.1. General Company Information

Legend for Impact of EAM for the organization

- Option A: Supporting role (IT planning) with no impact on strategic or business decisions
- Option B: Helps to push enterprise integrating issues beyond IT topics
- Option C: Joins in IT, business and strategic decisions and helps to push innovation activities

 

| Organization | Branch | Revenue | Employee | National/ International | IT Distribution | Role EAM | Impact EAM |
|---|---|---|---|---|---|---|---|
| Unt-1 | Manufacturing | > 5 Bil. | > 100.000 | International | Centralized | Major Business Aspects | Option C |
| Unt-2 | Finance, Insurance, Real Estate | 1 Bil. - 5 Bil. | 5001 - 10.000 | National | Centralized | Most of Business Aspects | Option C |
| Unt-3 | Finance, Insurance, Real Estate | > 5 Bil. | 50.001 - 100.000 | International | Federated | Most of Business Aspects | Option C |
| Unt-4 | IT, Technology, Internet | 5 Mil. - 50 Mil. | 50.001 - 100.000 | International | Decentralized | Major Business Aspects | not specified |
| Unt-5 | Communication, Utilities | > 5 Bil. | 2001 - 5000 | National | Federated | Minor Business Aspects | Option A |
| Unt-7 | IT, Technology, Internet | 500 Mil. - 1 Bil. | 11-50 | International | Centralized | Major Business Aspects | Option C |
| Unt-8 | Chemical | not specified | > 100.000 | International | Centralized | Minor Business Aspects | Option A |
| Unt-9 | Finance, Insurance, Real Estate | 5 Mil. - 50 Mil. | 2001 - 5000 | International | Federated | Major Business Aspects | Option A |
| Unt-10 | Services | 5 Mil. - 50 Mil. | > 100.000 | International | Centralized | Minor Business Aspects | Option A |
| Unt-11 | IT, Technology, Internet | 5 Mil. - 50 Mil. | 2001 - 5000 | National | Centralized | Major Business Aspects | Option B |
| Unt-12 | Manufacturing | 5 Mil. - 50 Mil. | 1-10 | National | Decentralized | Major Business Aspects | Option A |
| Unt-13 | Health Care | Nonprofit | 1001 - 2000 | National | Centralized | Minor Business Aspects | Option A |
| Unt-14 | IT, Technology, Internet | > 5 Bil. | > 100.000 | International | Federated | Most of Business Aspects | Option B |
| Unt-15 | Transportation | 1 Bil. - 5 Bil. | 5001 - 10.000 | National | Centralized | Minor Business Aspects | Option A |
| Unt-16 | Manufacturing | 1 Bil. - 5 Bil. | 10.001 - 50.000 | International | Centralized | Minor Business Aspects | Option C |
| Unt-17 | Transportation | 1 Mil. - 5 Mil. | 2001 - 5000 | International | Centralized | Minor Business Aspects | Option C |

| Organization | Branch | Revenue | Employee | National/ International | IT Distribution | Role EAM | Impact EAM |
|---|---|---|---|---|---|---|---|
| Unt-18 | Finance, Insurance, Real Estate | 1 Bil. - 5 Bil. | > 100.000 | International | Federated | Major Business Aspects | Option C |
| Unt-19 | IT, Technology, Internet | > 5 Bil. | 51 - 250 | International | Centralized | Major Business Aspects | Option A |
| Unt-20 | Media | 1 Bil. - 5 Bil. | 2001 - 5000 | National | Centralized | Most of Business Aspects | Option B |
| Unt-21 | Health Care | 1 Bil. - 5 Bil. | 10.001 - 50.000 | National | Centralized | Major Business Aspects | Option A |
| Unt-22 | Communication, Utilities | 1 Bil. - 5 Bil. | 5001 - 10.000 | International | Centralized | Most of Business Aspects | Option C |
| Unt-23 | Finance, Insurance, Real Estate | > 5 Bil. | 10.001 - 50.000 | International | Federated | Major Business Aspects | Option B |
| Unt-24 | Telecommunication | > 5 Bil. | 50.001 - 100.000 | International | Centralized | No, only IT | All options |
| Unt-25 | Finance, Insurance, Real Estate | > 5 Bil. | 10.001 - 50.000 | National | Federated | Minor Business Aspects | Option A |
| Unt-26 | Other | 50.001 -100.000 | 11-50 | International | Centralized | No, only IT | Option A |
| Unt-27 | Finance, Insurance, Real Estate | 5 Mil. - 50 Mil. | 1001 - 2000 | International | Centralized | Minor Business Aspects | Option A |
| Unt-28 | Chemical | > 5 Bil. | 10.001 - 50.000 | International | Federated | Minor Business Aspects | Option A |
| Unt-29 | Finance, Insurance, Real Estate | not specified | 1001 - 2000 | International | Centralized | No, only IT | Option A |
| Unt-30 | Finance, Insurance, Real Estate | 50 Mil. - 500 Mil. | 10.001 - 50.000 | National | Centralized | Major Business Aspects | Option B |
| Unt-31 | Transportation | 1 Bil. - 5 Bil. | 10.001 - 50.000 | International | Centralized | Major Business Aspects | Option B |

Table A.1.: Company Overview

## A.2. Influence Factors Overview

| IF-ID | Influence Factor | Observed in |
|---|---|---|
| Inf-1 | Re-organization of the company | Preliminary study |
| Inf-2 | Changing business model due to upcoming market trends | Preliminary study |
| Inf-4 | Competition with other organizations in your industry | Preliminary study |
| Inf-5 | New vision for the business | Preliminary study |
| Inf-6 | Digitization and Customer Journey | Preliminary study |
| Inf-7 | Regulatory requirements in our industry | Preliminary study |
| Inf-8 | Business innovations that lead to new sale markets | Preliminary study |
| Inf-9 | Technological innovations that lead to IT significant IT transformation | Preliminary study |
| Inf-10 | Staff age distribution (e.g. missing juniors) | Preliminary study |
| Inf-11 | Expectations of junior staff | Preliminary study |
| Inf-12 | Changing conditions of the market | Preliminary study |
| Inf-13 | Changing price and income structure | Preliminary study |
| Inf-16 | Fusion, Carve-out, M&A | Preliminary study |
| Inf-17 | Generating attractive and sustainable returns for shareholders | Main study |
| Inf-18 | Capital strength/efficiency | Main study |
| Inf-20 | Relevance and benefits of EA for an organization | Main study |
| Inf-22 | Strategies of preferred software suppliers | Main study |
| Inf-23 | Harmonize group-wide capabilities in cloud | Main study |
| Inf-26 | Thinking of local / functional silos and their benefits vs. comprehensive benefits for the company | Main study |
| Inf-31 | Interoperability with partner organizations | Main study |
| Inf-32 | Employee Productivity | Main study |
| Inf-33 | Increased social engagement platforms | Main study |
| Inf-34 | Restaffing of upper management (CEO, CIO, CFO, etc.) | Preliminary study |
| Inf-35 | IT cost-cutting initiatives | Preliminary study |
| Inf-35 | Common language for specialized parts of the IT organization | Main study |
| Inf-36 | Increasing market share (growth of the organization) | Preliminary study |
| Inf-37 | Change of cultural aspects within the organization | Preliminary study |

Table A.2.: Influence Factors

 

## A.3. Stakeholders Overview

| S-ID | Stakeholder | Observed in |
|---|---|---|
| S-2 | Project manager IT | Preliminary study |
| S-4 | CIO | Preliminary study |
| S-6 | Process owner | Preliminary study |
| S-10 | Domain architect / Solution architect | Preliminary study |
| S-18 | Business architect / Process architect | Preliminary study |
| S-20 | Software developer | Preliminary study |
| S-22 | Technical architect (Security architect, Software architect, Infrastructure architect) | Preliminary study |
| S-25 | Portfolio manager (business or IT) | Preliminary study |
| S-34 | Internal audit / External audit / Revision | Preliminary study |
| S-45 | Enterprise architect | Preliminary study |
| S-55 | Application owner | Preliminary study |
| S-59 | Business owner | Preliminary study |
| S-73 | Business analyst | Preliminary study |
| S-91 | Controller (business or IT) | Preliminary study |
| S-113 | CFO | Preliminary study |
| S-114 | COO | Preliminary study |
| S-116 | Corporate development / Corporate governance | Preliminary study |
| S-121 | Head office | Main study |
| S-122 | IT security and compliance | Main study |
| S-123 | IT incident manager / IT service desk | Main study |
| S-124 | Head of information and integration architecture | Main study |
| S-125 | Head of department business | Preliminary study |
| S-126 | Head of department IT | Preliminary study |
| S-127 | External partner / Consultants | Preliminary study |
| S-128 | Requirements engineer | Preliminary study |
| S-129 | Project manager business | Preliminary study |
| S-130 | Data owner | Preliminary study |

Table A.3.: Stakeholders

 

## A.4. Concerns Overview

| C-ID | Concern | Relevance | | | Observed in |
|---|---|---|---|---|---|
| | | High | Medium | Planned | |
| C-2 | Determinate breached architectural blueprints | 26 | 2 | 1 | Preliminary study |
| C-4 | Check to replace / keep ues technologies | 7 | 21 | 3 | Preliminary study |
| C-5 | Determinate projects to increase standardization | 11 | 7 | 3 | Preliminary study |
| C-8 | Outline projects to replace individual software | 21 | 2 | 5 | Preliminary study |
| C-29 | Assign available IT budget to projects | 12 | 9 | 5 | Preliminary study |
| C-33 | Determinate used business applications by organizational units | 13 | 7 | 6 | Preliminary study |
| C-34 | Look of long-term application landscape | 10 | 10 | 5 | Preliminary study |
| C-36 | Determinate dependencies between applications and projects | 10 | 9 | 4 | Preliminary study |
| C-41 | Determinate used infrastructure for applications | 13 | 10 | 5 | Preliminary study |
| C-44 | Reduce operations and maintenance costs | 10 | 10 | 4 | Preliminary study |
| C-51 | Identify data flows (business objects and applications) | 14 | 6 | 3 | Preliminary study |
| C-52 | Determinate dependencies between business objects | 10 | 7 | 3 | Preliminary study |
| C-61 | Determinate dependencies between objects and interfaces | 14 | 8 | 2 | Preliminary study |
| C-62 | Determinate business capabilities of application landscape | 12 | 8 | 3 | Preliminary study |
| C-65 | Determinate used services by applications | 6 | 10 | 4 | Preliminary study |
| C-66 | Determinate supported processes by business services | 10 | 6 | 2 | Preliminary study |
| C-67 | Determinate interfaces of applications | 9 | 3 | 5 | Preliminary study |
| C-87 | Determinate supported applications by business processes | 8 | 7 | 3 | Preliminary study |

 

| C-ID | Concern | Relevance | | | Observed in |
|---|---|---|---|---|---|
| | | High | Medium | Planned | |
| C-89 | Determinate affected applications by projects | 4 | 9 | 4 | Preliminary study |
| C-91 | Align activities to modify application landscape | 13 | 6 | 2 | Preliminary study |
| C-98 | Determinate shut-down impact of infrastructure component | 8 | 8 | 5 | Preliminary study |
| C-101 | Projects to increase architectural standard | 11 | 2 | 4 | Preliminary study |
| C-108 | Visualize life cycle status of application | 14 | 4 | 5 | Preliminary study |
| C-110 | Analyze failure propagation of application landscape | 6 | 4 | 2 | Preliminary study |
| C-119 | Definition of target application landscape | 12 | 6 | 1 | Preliminary study |
| C-120 | Measure changes in application landscape | 12 | 5 | 2 | Preliminary study |
| C-122 | Evaluate alignment between application landscape and business model | 7 | 4 | 2 | Preliminary study |
| C-124 | Reduce application landscape complexity | 5 | 5 | 1 | Preliminary study |
| C-127 | Integrate business application in application landscape | 2 | 2 | 4 | Preliminary study |
| C-128 | Communicate added value of EAM | 2 | 3 | 2 | Preliminary study |
| C-129 | Remove monolithic applications | 2 | 4 | 4 | Preliminary study |
| C-132 | Evaluate business capabilities on strategy conformity | 1 | 7 | 0 | Preliminary study |
| C-141 | Get transparency about IT costs | 10 | 8 | 0 | Preliminary study |
| C-142 | Map business applications to business capabilities | 14 | 4 | 1 | Preliminary study |
| C-147 | Merge two different application landscapes | 6 | 5 | 3 | Preliminary study |
| C-157 | Detection of consolidation potentials | 9 | 6 | 0 | Preliminary study |
| C-169 | Architectural assessment of change requests | 15 | 8 | 1 | Preliminary study |
| C-171 | Determinate which business capabilities are support by applications | 1 | 0 | 0 | Main study |
| C-172 | Determinate which applications are supported by organizational units | 1 | 0 | 0 | Main study |
| C-179 | Determinate regulatory issues | 1 | 0 | 0 | Main study |

Table A.4.: Concerns

 

## A.5. Data Collection Patterns

### A.5.1. Business application patterns

| DC-ID | Maintained by | Refresh frequency | Data source | Data format | Observations |
|---|---|---|---|---|---|
| 1 | Application owner | - | - | - | 7 |
| 2 | - | On demand | - | - | 7 |
| 3 | Domain/ Solution architect | - | - | - | 6 |
| 4 | - | Event-driven | - | - | 6 |
| 5 | Enterprise architect | - | - | - | 5 |
| 6 | - | - | - | Relational DB | 4 |
| 7 | Enterprise architect | On demand | - | - | 3 |
| 8 | - | Daily | - | - | 3 |
| 9 | - | Yearly | - | - | 3 |
| 10 | - | - | CMDB | - | 3 |

Table A.5.: Data collection patterns for business applications

 

### A.5.2. Business capability patterns

| DC-ID | Maintained by | Refresh frequency | Data source | Data format | Observations |
|---|---|---|---|---|---|
| 11 | Business analyst | On demand | - | - | 23 |
| 12 | - | On demand | - | - | 15 |
| 13 | Enterprise architect | - | - | - | 14 |
| 14 | Business/ Process architect | - | - | - | 7 |
| 15 | - | - | - | CSV (Excel) | 6 |
| 16 | Domain/ Solution architect | - | - | - | 5 |
| 17 | - | Yearly | - | - | 5 |
| 18 | - | Quarterly | - | - | 4 |
| 19 | - | - | MS Office, MS Visio | - | 4 |
| 20 | Enterprise architect | On demand | MS Office, MS Visio | - | 3 |
| 21 | - | Yearly | - | CSV (Excel) | 3 |
| 22 | Domain/ Solution architect | On demand | - | - | 3 |
| 23 | Business/ Process architect | Yearly | - | - | 3 |
| 24 | - | - | EAM repository | - | 3 |

Table A.6.: Data collection patterns for business capabilities

 

### A.5.3. Interface patterns

| DC-ID | Maintained by | Refresh frequency | Data source | Data format | Observations |
|---|---|---|---|---|---|
| 25 | - | On demand | - | - | 7 |
| 26 | Domain/ Solution architect | - | - | - | 4 |
| 27 | Application owner | - | - | - | 4 |
| 28 | - | Event-driven | - | - | 4 |
| 29 | Application owner | On demand | - | - | 3 |
| 30 | Enterprise architect | - | - | - | 3 |
| 31 | - | - | - | Relational DB | 3 |

Table A.7.: Data collection patterns for interfaces

 

### A.5.4. Organizational unit patterns

| DC-ID | Maintained by | Refresh frequency | Data source | Data format | Observations |
|---|---|---|---|---|---|
| 32 | - | On demand | - | - | 7 |
| 33 | - | - | - | CSV (Excel) | 5 |
| 34 | Enterprise architect | Quarterly | - | CSV (Excel) | 4 |
| 35 | Enterprise architect | On demand | - | - | 4 |
| 36 | - | Event-driven | - | - | 3 |

Table A.8.: Data collection patterns for organizational units

 

### A.5.5. Physical component patterns

| DC-ID | Maintained by | Refresh frequency | Data source | Data format | Observations |
|---|---|---|---|---|---|
| 37 | - | - | CMDB | - | 5 |
| 38 | Enterprise architect | - | - | - | 4 |
| 39 | - | Daily | - | - | 4 |
| 40 | - | Daily | CMDB | - | 3 |
| 41 | Technical architect* | - | - | - | 3 |
| 42 | - | On demand | - | - | 3 |

Table A.9.: Data collection patterns for physical components

 

### A.5.6. Process patterns

| DC-ID | Maintained by | Refresh frequency | Data source | Data format | Observations |
|---|---|---|---|---|---|
| 43 | - | On demand | - | - | 27 |
| 44 | Business analyst | - | - | - | 24 |
| 45 | Business analyst | On demand | Various stakeholders | - | 20 |
| 46 | Business/Process architect | - | - | - | 7 |
| 47 | Enterprise architect | - | - | - | 4 |
| 48 | - | - | - | CSV (Excel) | 4 |
| 49 | Business Process | On demand | - | - | 3 |
| 50 | - | Event-driven | - | | 3 |

Table A.10.: Data collection patterns for processes

### A.5.7. Project patterns

| DC-ID | Maintained by | Refresh frequency | Data source | Data format | Observations |
|---|---|---|---|---|---|
| 51 | Enterprise architect | - | - | - | 4 |
| 52 | Project manager IT | - | - | - | 4 |
| 53 | - | On demand | - | - | 4 |
| 54 | - | Monthly | - | - | 3 |
| 55 | - | - | PPM | - | 3 |
| 56 | - | - | - | CSV (Excel) | 3 |

Table A.11.: Data collection patterns for projects

 

### A.5.8. Technology patterns

| DC-ID | Maintained by | Refresh frequency | Data source | Data format | Observations |
|---|---|---|---|---|---|
| 57 | Enterprise architect | - | - | - | 9 |
| 58 | Technical architect* | - | - | - | 8 |
| 59 | - | Event-driven | - | - | 6 |
| 60 | - | On demand | - | - | 4 |
| 61 | Enterprise architect | Event-driven | - | - | 3 |
| 62 | Technical architect* | On demand | - | - | 3 |
| 63 | - | Quarterly | - | - | 3 |
| 64 | - | - | - | CSV (Excel) | 3 |

Table A.12.: Data collection patterns for technologies

### A.5.9. Other patterns

Table A.13 summarizes the remaining data collection patterns.

* Technical architect (Security architect, Software architect, Infrastructure architect).

 

| DC-ID | Class | Maintained by | Refresh frequency | Data source | Data format | Observations |
|---|---|---|---|---|---|---|
| 65 | Architecture principle | | Yearly | - | - | 4 |
| 66 | Architecture principle | - | On demand | - | - | 3 |
| 67 | Business driver | - | Yearly | - | - | 4 |
| 68 | Business driver | - | - | - | CSV (Excel) | 3 |
| 69 | Business function | - | On demand | - | - | 3 |
| 70 | Business object | Enterprise architect | - | - | - | 5 |
| 71 | Business object | - | On demand | - | - | 5 |
| 72 | Business object | - | One-Time definition | - | - | 3 |
| 73 | Business support | Enterprise architect | - | - | - | 3 |
| 74 | Data flow | - | Event-driven | - | - | 5 |
| 75 | Data flow | - | On demand | - | - | 4 |
| 76 | Data flow | Enterprise architect | - | - | - | 3 |
| 77 | Data flow | Domain/ Solution architect | - | - | - | 3 |
| 78 | Employees | - | - | Active Directory | - | 3 |
| 79 | IT requirement | - | On demand | - | - | 3 |
| 80 | License | Technical architect* | - | - | - | 24 |
| 81 | License | - | - | CMDB | | 24 |
| 82 | License | - | - | - | CSV (Excel) | 24 |
| 83 | License | Technical architect* | Daily | CMDB | CSV (Excel) | 23 |
| 84 | Service | Enterprise architect | - | - | - | 3 |
| 85 | Service | Domain/ Solution architect | - | - | - | 3 |
| 86 | Service | - | On demand | - | - | 3 |
| 87 | SLA | - | Event-driven | - | - | 3 |

Table A.13.: Data collection patterns for other classes