

# **Architectural Support of Enterprise Transformations: Insights from Corporate Practice**

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## **Abstract**

Enterprise architecture management (EAM) is considered a means to contribute to fundamental change (enterprise transformations) in organizations. Based on qualitative interview data, we investigate how EAM contributes to meeting the information needs of transformation managers during an enterprise transformation (ET). We identify the type of information EAM can provide to ET management. We further identify the activities conducted during ETs that foster information needs. Our results differentiate between information that EAM can provide, can partially provide, or cannot provide, to an ET effort.

## 1 Introduction

Organizations go regularly through major transformations that represent fundamental changes substantially altering their relationships with their key constituencies (e.g., customers, suppliers, regulators). These enterprise transformations (ET) may result in new value propositions, they may provide old value propositions in fundamentally new ways, or they may change the inner structure of the enterprise [38]. Examples for such fundamental changes are transformations of the business model [4], mergers & acquisitions [22], or introductions and replacements of large enterprise information systems [39]. The concept is also known as “business transformation” [3] or “organizational transformation” [20]. However, many transformations fail for a variety of reasons [25, 39]. Flyvbjerg et al. [16] recently found that large IT projects have an average cost overrun of 27%. In addition, one in six IT projects exceeds estimated cost by about 200% for reasons like underestimated technical complexity, or shortcomings in either portfolio or benefits planning.

When transforming an enterprise, a many decisions, some of them with major implications, have to be taken. In order to make such decisions diligently, manifold information needs to be collected and consolidated [23, 43, 48]. Processing information and achieving transparency of organizational dependencies is considered a major task of enterprise architecture management (EAM) [7]. While enterprise architecture (EA) describes the fundamental structures of an enterprise, EAM is concerned with the establishment and coordinated development of EA in order to consistently respond to business and IT goals, opportunities, and necessities [46]. Thus, EAM is often found to support the management of ETs [2, 13] by guiding the necessary efforts [1, 19]. EAM is considered a valuable source for top management information support and for strategy development [2, 49]. EAM is also supposed to support ET decision processes on various hierarchical levels [2].

However, in current corporate practice, there seems to be no regular application of EAM as a leading authority or as a support service for ETs [2, 29]. This mismatch might be a major inhibitor to EAM’s efficacy to support ETs. In order to investigate the interplay between the two disciplines and identify their points of contact, we pose the following research question:

*RQ: How does enterprise architecture management contribute to the management of enterprise transformations?*

To investigate this issue, we employ a qualitative research design. The paper is structured as follows: In the next section we discuss related work about the relation of EAM and ETM. Then, we illustrate our research design, present results, and discuss the findings. Finally, we provide a summary and outlook.

## 2 Related Work

There is little prior work that investigates the relation between ET and EAM in detail. Harmsen et al. [19] propose the use of EAM as a governing function for ET, because a set of transformation steps needs to be well aligned in order to be successful and EAM has the potential to ensure this alignment. The authors see potential in areas such as strategic direction (investigate alternatives), gap analysis, tactical planning (identify intermediate milestones), operational planning, selection of partial solutions e.g. based on standards [7] or solution crafting (identify tasks for projects). Radeke [36] discusses how EAM can contribute to the strategic change process. He claims potentials of EAM to improve the strategic fit with the market environment, business/IT alignment and the preparedness for change by standardization and modularization of parts of the enterprise. Simon et al. [42] also see a high potential of EAM to support transformations, by assessing the organizational transformation readiness. In order

to provide a more holistic overview of the ET support by EAM, Asfaw et al. [2] divide ET into three categories (communications, management support and structure, and process). Within these categories they identify success factors such as communications, stakeholder involvement and guided application development. However, the authors conclude that EAM as such cannot cope with all challenges and that other means such as change management are also needed.

In summary there is evidence that EAM can successfully support ET. However, related work either focusses on very specific parts of EAM and ET or surveys the relationship in an explorative way.

### 3 Research Design

In order to investigate how EAM can contribute to an ET effort, we have conducted a qualitative study that compares information obtained from two groups of experts, with experience in either EAM or ETM.<sup>1</sup> The results from both perspectives are further triangulated using information from the literature. Finally, the two result sets are consolidated into a list of items that detail the fit of what EAM and ETM experts agree on.

#### 3.1 Data Collection

The empirical part of this research contributes to elaborating on existing theory. Participants are included through purposeful selection, rather than through random sampling [32, 41]. The participants were selected for their expertise in EAM and ET, respectively.

We interviewed eight transformation managers in the insurance industry based on personal contacts of the researchers and additional snowball sampling (thus, participants recommended further contacts for interviews that have been included whenever they provided the necessary qualification) [34]. We decided to limit participants to the insurance industry, as this industry currently faces extensive transformation issues, and thus, responses obtained from this industry are based on the most recent experiences, which makes it most suited for our investigation. All informants are located in departments that allow for a broad overview of the transformation and hold positions like strategy coordinator, member of the board or head of business engineering. We refer to these informants with the abbreviations *InETM1* to *InETM8*.

From a supplier perspective, we aim to identify the information that EAM can contribute to ETM from participants working in multiple industries; this inclusive approach ensures that we do not miss those information processing capabilities that EAM can provide, but currently does not provide in the insurance industry, thus allowing for new insights. The EAM experts were identified by searching social business networks (XING and LinkedIn) using the search terms “Enterprise Architect” and “Transformation Architect”. After analyzing the profiles, 68 potential informants in German speaking countries remained, ten agreed to participate in the study. Our informants hold positions such as enterprise architect, business architect, and IT architect. We refer to these experts with the abbreviations *InEAM1* to *InEAM10*.

Two semi-structured interview questionnaires (one for the EAM experts and one for the ET experts) comprised of open-ended questions have been developed. The design of the questionnaires was informed by related literature. While basing a questionnaire on existing literature may be contradicting

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<sup>1</sup> Results that were derived based on interviews with a part of the ETM experts are also published in [26]. Results that were derived based on the interviews with EAM experts are also published in [27]. The full literature review is published in [28]. The original contribution of this paper is to analyze qualitatively, how both perspectives fit together.

the early practice in grounded theory research [18], more recently, this clean slate approach to theory-building research has been succeeded by the understanding that prior theory should inform the interview questions [14, 44]. Hereby, the use of open ended questions and a flexible interview questionnaire that permits the interviewees to contribute additional themes to the results, allows for additional findings to emerge that were not part of prior literature [14]. Participants were assured confidentiality of their own and their company's identities in order to allow for honest answers. More than 16 hours of interviews were recorded and transcribed.

### **3.2 Coding**

Two researchers independently coded the EAM experts' and the ETM experts' responses into two separate lists: Potential contributions of EAM, and the needs of ETM, with each distinct item on these lists representing one code. Codes were not defined in advance, but they emerged based on the information provided in the interview data (open coding) [32, 44]. After the two researchers had completed the coding step, they consolidated their results by resolving any differences in their coding. Occurring discrepancies were resolved after one round of discussion, resulting in agreement between the two coders. This process resulted in two separate lists representing potential EAM contributions to ET, as viewed by the EAM experts, and information that is needed in order to conduct ETs, as viewed by the ETM experts. Only those codes were added that occurred in at least two interviews of the respective group (ET or ETM experts).

### **3.3 Literature Validation**

In the next step, the results were triangulated with findings from the ETM and EAM literature. We have included this step to ensure that the ET as much as the EAM codes are consistent with a common understanding of both disciplines. Such consistent terminology is important, since we are interested in investigating the common fit between both. Further this ensured to reduce potential biases that might have been induced by focusing our investigation on the insurance industry. Thus, we have conducted a systematic literature search. In line with Elliot [15] we had to be strict concerning our search terms since a large body of literature from academic and non-academic sources is available in both of the topic area of EAM and ET. Hence, we focused our search on well-regarded journals in information systems, management and organizational science. We further conducted a database search in the major management databases (Web of Knowledge, Springerlink, Ebsco) to include more recent or practice-based sources. We further added specific journals and conferences (e.g. "Journal of Enterprise Transformation" or the ICIS and ECIS conference proceedings) to the survey. We identified articles based on the title keyword "transformation" and in the databases based on the title search term "(organizational OR strategic OR business OR enterprise OR corporate OR large-scale) AND transformation AND management". Based on the abstract we decided if the article was relevant concerning the research goal. Our search revealed 561 articles in total and 85 articles for further analysis. In addition, we have conducted a literature review in the topic area of EAM. We considered the same sources like in the ET literature review (including additional EAM specific journals) but applied the keywords "(enterprise or business) and architecture" in the journal title search and "Abstract: (literature or survey or review) and Title: (enterprise or business) and architecture" in the database search. In the latter we focused on literature surveys on EAM in order to efficiently identify relevant concepts. The search revealed 55 relevant articles for further analysis. We used the identified ET and EAM articles for a triangulation with the empirical data [21] in a later step.

Whenever we could match a code from either the list of EAM and ET with at least two sources from this literature pool, we considered it as a common and well-known part of the discipline.

### 3.4 Aggregation and Mapping

In order to keep the mapping manageable, the ET and EAM codes were grouped based on their semantic similarity [5]. This grouping was again conducted by two independent researchers and consolidated in the first iteration. Based on the codes within the groups and the underlying statements of the informants, the two researchers independently mapped the EAM inputs to the ET information needs. The results were almost identical; two of the groups needed further discussion. After one iteration, an agreement among the researchers was achieved.

### 3.5 Response Saturation

In qualitative research with multiple respondents that incrementally contribute towards one result set, it must be determined whether a sufficient number of responses were collected, so that all important information has been captured. While it is impossible to ensure that every potential response has been obtained, such research seeks to include enough responses to reach a point at which it is unlikely that additional responses would yield additional results [14]. We achieved such saturation with both expert groups. After processing two thirds of the interviews in each group, additional interviews added almost no new codes. Thus, both coders independently concluded that the set of codes was saturated.

## 4 Results

### 4.1 The EAM Perspective

Figure 1 summarizes the results of the EAM interviews. The information that EAM experts process or provide to ET have been grouped into eight categories using the process described earlier.

<p><b>EAM1: IT Transparency</b></p> <ul style="list-style-type: none"> <li>• Data [8]</li> <li>• Applications [7]</li> <li>• IT Infrastructure [7]</li> <li>• Security [45]</li> </ul>	<p><b>EAM2: Governance</b></p> <ul style="list-style-type: none"> <li>• Principles [9]</li> <li>• Standards [8]</li> <li>• Governance [45]</li> </ul>	<p><b>EAM3: General Target Description</b></p> <ul style="list-style-type: none"> <li>• Target Architecture [40]</li> <li>• Roadmaps [45]</li> </ul>	<p><b>EAM4: Specific Target Description</b></p> <ul style="list-style-type: none"> <li>• Business Requirements [7]</li> <li>• Solution Design [45]</li> <li>• Costs [17]</li> </ul>
<p><b>EAM5: Cross Cutting Transparency</b></p> <ul style="list-style-type: none"> <li>• Redundancies [40]</li> <li>• Dependencies [40]</li> </ul>	<p><b>EAM6: EA Method Competence</b></p> <ul style="list-style-type: none"> <li>• EA Methods [35]</li> <li>• Sourcing Support [50]</li> </ul>	<p><b>EAM7: Business Transparency</b></p> <ul style="list-style-type: none"> <li>• Business Processes [45]</li> <li>• Capabilities [8]</li> <li>• Business Strategy [8]</li> </ul>	<p><b>EAM8: Lateral Coordination Services</b></p> <ul style="list-style-type: none"> <li>• Stakeholder Coordination [40]</li> <li>• Common Language [35]</li> </ul>

**Figure 1: Information Provision by EAM**

*IT transparency* that EAM provides to ET is one group. This includes information about data, applications, IT infrastructure and security aspects. The second information group is *governance*. The third group provides the *general target description*. The *specific target description* in the fourth group covers details, such as business requirements, solution designs, and cost. The fifth group provides *cross-cutting transparency*, i.e. information about redundancies and dependencies. This is usually considered one of the strengths of EAM. The sixth group highlights the *method competences* that architects have. Architects can provide insights on the application of EA methods (e.g. process modeling) or can apply such methods e.g. in order to allow for sourcing support. However, this information cannot be provided ad-hoc but needs processing beforehand. EAM can further provide

business transparency (EAM7) and thus information about business processes, capabilities and the business strategy. It is important here to mention that architects agree that EAM is not developing the strategy but has a profound knowledge about strategy. The last block highlights the communicative nature of EAM. Often EAM is able to provide information about acting stakeholders and can provide them to ETM. It further is able to establish a common language by providing artifacts that are used by many stakeholders (e.g. process models, capability maps, etc.).

## 4.2 The ETM Perspective

Similar to the EAM groups, we identified nine groups of activities that ET is comprised of and that need different information inputs. These are summarized in Figure 2

<p><b>ETM1: Transformation Planning</b></p> <ul style="list-style-type: none"> <li>• Target State [30]</li> <li>• Priorities [23]</li> <li>• Goal Clarification [11]</li> <li>• Requirements [43]</li> <li>• Legal Requirements [33]</li> </ul>	<p><b>ETM2: Change Management</b></p> <ul style="list-style-type: none"> <li>• Stakeholder Analysis [47]</li> <li>• Change Management [3]</li> <li>• Cultural Change [48]</li> <li>• Common Language [15]</li> <li>• Communication Strategy [6]</li> <li>• Training [47]</li> </ul>	<p><b>ETM3: Project Management</b></p> <ul style="list-style-type: none"> <li>• Stakeholder Coordination [43]</li> <li>• Projects [11]</li> <li>• Dependencies [30]</li> <li>• Ownership [15]</li> <li>• Roles [30]</li> <li>• Skills [11]</li> </ul>
<p><b>ETM4: Design of IT Components</b></p> <ul style="list-style-type: none"> <li>• Data [3]</li> <li>• Applications [10]</li> </ul>	<p><b>ETM5: Analysis of Design Options</b></p> <ul style="list-style-type: none"> <li>• Outsourcing Potentials [3]</li> <li>• Technology Assessment [37]</li> <li>• Consolidations [12]</li> </ul>	<p><b>ETM6: Design of Business Components</b></p> <ul style="list-style-type: none"> <li>• Design of Organizational Structure [20]</li> <li>• Business Processes [12]</li> <li>• Products [33]</li> </ul>
<p><b>ETM7: External Relations Management</b></p> <ul style="list-style-type: none"> <li>• Partnering [3]</li> <li>• Customer [33]</li> </ul>	<p><b>ETM8: Controlling</b></p> <ul style="list-style-type: none"> <li>• Benefits Measurement [48]</li> <li>• Costs [43]</li> </ul>	<p><b>ETM9: Governance</b></p> <ul style="list-style-type: none"> <li>• Standards [11]</li> <li>• Governance [43]</li> </ul>

**Figure 2: Information Inputs needed by ETM**

A major part of ET is *transformation planning*. This includes necessary information about the intended target state, the priorities, clear goals, requirements and legal requirements. The second important group is *change management* – thus, focusing on the individual's perspective of the transformation. This includes stakeholder analysis, change management in the narrower sense, change in the culture, an established common language, a detailed communication strategy and training, e.g. of changed tasks. *Project management* (ETM3) includes all aspects of actually conducting the transformation in form of a project portfolio. This includes coordination of the stakeholders, the projects, dependencies between them, ownership definitions, roles and skills that employees in the projects need. In order to *design IT components*, ETM is interested in data as much as applications. Another part of ETM is the *analysis of design options*. This is comprised of outsourcing potentials, technology assessments and potential for consolidations. The next group is the actual *design of business components*, which includes the design of the organizational structure, the business processes and the products of the enterprise. *External relations management* describes cooperation with partners and dealing with customers. Group eight describes the *controlling* of transformations, including benefits measurement and cost control. The last group is *governance*, which includes governance in its

narrower sense (like decision boards) and standards that need to be followed during the transformation.

### **4.3 Fitting EAM and ETM**

Based on the groups introduced above and the statements of our informants, we have analyzed the fit between the provided information of EAM and the needed information of ETM. This analysis yields three classes of fit: information needs that EAM fulfills, information needs that EAM partially fulfills, and those that EAM does currently not fulfill.

#### **4.3.1 Fit 1: Design of IT Components**

The analysis shows that EAM is very capable to provide necessary transparency when it comes to IT topics and new IT components that need to be designed (F1). The concerns that ET managers most frequently pointed out are related to applications and data. Transformation managers in the business departments also see the complexity that these impose, e.g. in a complex application landscape with many applications it can happen that dependencies are not completely visible.

Enterprise architects can provide almost perfectly fitting solutions, be it in form of a documentation of the application landscape (*InEAM4*), the status of data flows and data stores (*InEAM7*), further information about the IT infrastructure (*InEAM3*), or IT security (*InEAM2*). For that reason, we consider the information demand for the design of IT components as fulfilled by the IT transparency part of EAM.

#### **4.3.2 Fit 2: Governance**

A second fit is prevalent between the governance groups on both sides. Experts in both groups considered standards as a necessary means in order to ensure appropriate governance (*InEAM1*, *InEAM2*, *InETM2*). For some transformations, standardization is even the most important reason to actually conduct the transformation and establish cost-savings. Our informant *InETM2* was involved in a large software standardization project where processes and procedures needed to be standardized. Many stakeholders were involved in order to develop the common standards. On the EAM side, the informant *InEAM1* was involved in a similar transformation where EAM supported the achievement of a global audit standard. These examples illustrate that the information processing need concerning governance can be fulfilled by EAM.

#### **4.3.3 Fit 3–5: Transformation Planning**

Further fits occur between ETM and EAM about transformation planning. Architects consider planning as one of their core competences. For that reason two subgroups emerged during the coding and consolidation procedure: General (F3) and specific target description (F4). Also involved is cross cutting transparency realization by EAM (F5). From our informants in the ET area, we learned that planning of the transformation is a very important first step. For example, needs to clarify goals and other strategic issues (*InETM6*). Furthermore, having rough ideas of the target state in the beginning is necessary in order to see, how single projects contribute to its achievement (*InETM8*). The architects used different wording but referred to the same task by discussing roadmaps (*InEAM9*).

EAM can also provide necessary information for detailed planning. The topic area is especially concerned with requirements. On the ET side these are seen as major drivers for success and need to be handed in early (*InETM4*). Especially legal requirements need to be considered (*InETM3*). For the enterprise architects, requirements are a well-known artifact. Requirements are seen as a means to overcome misunderstandings between business and IT (*InEAM7*). Another part of EAM is the

provision of cross cutting transparency. This means to illustrate, where dependencies or redundancies in the IT systems but also in processes and capabilities of different units occur (*InEAM2*, *InEAM3*, *InEAM10*). This is important for the former mentioned draft of the target state and the priority setting and goals. The architect *InEAM2* could support the ET by investigating systems and practices that already existed in other subsidiaries and could be reused.

Based on the statements of our informants and the evidence given above, we can conclude that ET planning can be also well supported by the architects.

#### **4.3.4 Partial Fit 6: Project Management**

The cross-cutting transparency is also valuable in order to fulfill parts of the information needs that project management has. Especially when transformations are not locally bounded but globally (*InETM8*), it is important that interaction occurs and dependencies as much as redundancies get eliminated. However, project management cannot fully be supported by EAM since further aspects are necessary. These are for example ownership clarification (*InETM1*) or staffing options concerning the needed skills (*InETM2*).

#### **4.3.5 Partial Fit 7–8: Analysis of Design Options**

In the group “analysis of design options” we summarize the ETM activities like assessing outsourcing potentials or technology options as much as potential consolidations of organizational units or systems. Such activities can be supported by the cross cutting transparency and EA method competence. The information contained in cross-cutting transparency can be directly provided while those prevalent in EA method competence (e.g. methods that provide sourcing support or support the post-merger integration) need further inputs. For example, when first thinking about outsourcing, EAM could provide already valuable information which parts of the IT systems and which organizational units might be affected (*InEAM2*). It can also provide more direct guidance through method knowledge (e.g. by assisting in process modeling (*InEAM5*) or guiding through workshops (*InEAM7*)). Thus, for this area of ETM we can identify partial support by EAM. Further information e.g. about legal issues would be necessary and are out of EAM’s scope.

#### **4.3.6 Partial Fit 9: Design of Business Components**

Once the analysis is completed, new business components need to be designed (including the organizational structure, business processes, and products). The supporting actions of EA can be found mostly in the area of business transparency. Here EA is able to quickly provide information about capabilities (*InEAM4*), business processes (*InEAM3*, *InEAM5*) or the business strategy (*InEAM1*). However, the actual design of new business components requires more than these information artifacts. For example products cannot be designed by EAM (even not in the insurance sector) and further information for that is necessary.

#### **4.3.7 Partial Fit 10: Change Management**

Change management, “including all the soft aspects” (*InETM8*) is another important part of transformation management. It is about influencing the culture (*InETM1*), involving the stakeholders (*InETM4*), explaining the change (*InETM8*), communication (*InETM8*) or training (*InETM7*). Can a discipline like EAM contribute information to this sector? Our data shows, that EAM can indeed contribute. On the EAM side we call the information cluster “lateral coordination services”. This includes information about stakeholders and their areas of expertise. Architects know many people in

the organization and can bring those people together. It is part of the work to make sure that these people talk to each other and move in the same direction (InEAM4).

Further information can be provided by offering a common language, which sometimes is a necessity of EAM. When, e.g., process models are designed that should be valid for the whole organization, common language is necessary to have consistent models (*InEAM4*). Since such language is also a requirement of the ETM, a good fit exists. However, further information that EAM cannot provide is necessary for change management (e.g. knowledge about the culture). Hence, the fit is only a partial one.

#### **4.3.8 Non-Fits: Controlling and External Relations Management**

Two of the ETM groups have no (or almost no) information inputs from EAM. First, is controlling. ETM informants were always very keen about costs (e.g. *InETM5*), in most cases that was the driver for transformations. Some also considered benefits or their measurement (e.g. *InETM2*). However, the EAM informants did not consider this topic. The second group with no inputs is the external relations management. In this group ETM deals with relations with the organization's customers (*InETM1*) and their satisfaction (that should not be affected by the transformation). Further partnering with other companies is a topic in this area (*InETM7*). Again, EAM's focus rather seems to be an internal perspective. Environmental analysis is provided by other disciplines.

## **5 Discussion**

In the previous section we have identified specific information needs that occur during ETs. We further identified areas, where EAM provides this information or supports creating and processing it. Our initial question was how EAM contributes to ET.

We are aware that EAM in practice differs in extent and scope in each individual organization. While some organizations focus their EAM function on IT issues only, others also assign business-related planning and information gathering activities to EAM. In some organizations architects also have authority to give directions without further consultation with other line managers. However, no matter what scope the EAM function has, they all contribute to successful transformations. In general the IT-related architecture can provide the necessary input about applications and data, the business-related one even more to business planning and project management.

There seem to be some areas where EAM could extend its usefulness when it wants to be a transformation oriented discipline. It might be a good idea, to first focus on areas that already have partial fits. In these areas an extension of the service seems to be easier and the risk of collision with other disciplines that are prevalent in each organization is lower. When this extension is done, people responsible for EAM may think about an extension in areas where there is currently (almost) no EAM application. Can EAM contribute to controlling? Can EAM contribute to manage external relations? There may be overlaps, especially concerning modeling techniques or governance experience that could extend the range of EAM.

## **6 Summary & Outlook**

In this paper we have investigated the potential of enterprise architecture management contributing to the management of enterprise transformation. We have conducted a qualitative study to get insights as to how EAM can contribute to the management of ETs. Our results show ten fits between EAM and ET concerning the information needed and the information provided. Three of these fits, those relating

to the design of IT components, governance, and transformation planning are particularly strong. Further, the analysis revealed ET information needs that cannot be met by EAM. These are related to controlling and the management of external relations in particular.

Some limitations of our study need to be addressed. We focused on one direction of information flow: how EAM can contribute to ET. We did not consider the other direction of information flow or other disciplines apart from EAM that contribute to ET (e.g. controlling, financials, etc.). Further, ET experts interviewed for our study all belong to the insurance sector. Other industries might have other practices concerning transformations than the ones our informants stated. However, during our triangulation of the identified codes with literature, no such industry bias became apparent.

In future work, we aim at building design research artifacts based on the findings above. We aim at designing approaches for EAM that explicitly support transformations. In order to conduct such research, it is important to understand, what EAM is currently able to achieve and where the most appropriate potentials for further development are. This study provides a foundation for that.

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