Extending Enterprise Architecture Management into an Enterprise-Wide Coordination Service

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Abstract. In this paper, we lay the foundation towards extending Enterprise Architecture Management (EAM) into a support service for enterprise transformation. In a first step, we develop a theoretical framework consisting of three dimensions of transformation projects. From this framework, we deduct eight types of transformation projects. In a second step, we take a practitioner’s perspective by conducting a focus group with EAM representatives from twelve companies. In this focus group, we identify three patterns of EAM in the course of enterprise transformation. We finally map these patterns to our theoretically derived classification of transformation projects and discuss, with respect to each project type, where EAM may assist and which requirements it must meet to coordinate enterprise transformation.

Keywords: enterprise architecture management, enterprise transformation, coordination

1 Introduction

Enterprises are dynamic systems which are constantly changing and evolving. There is a distinction, though not always a clear one, between what constitutes routine change or optimization and what can be regarded as transformation. Hammer and Champy [1] characterize transformation as fundamental change regarding an enterprise’s products, markets or cost structures, whereas Winter [2] concludes that the distinction between optimization on the one hand and “small” transformation on the other hand is fluent. Optimization is regarded as a gradual, continuous process that refines existing structures step-by-step. Transformation, on the other hand, is seen as taking place in unique and context-specific projects and being wider in scope, e.g. affecting several organizational units [2].

For the purpose of this paper, we regard enterprise transformation as trans-forming, i.e. fundamentally changing, an entire enterprise or significant parts thereof. Enterprise transformation is being performed through a number of concurrent transformation projects, taking place in different dimensions and on different abstraction layers across the enterprise. Taken individually, these projects would not be transformative to the organization, but taken together, they are. Rouse [3] asserts that defining at which point an enterprise has been transformed is difficult and points out minimal, locally isolated changes and the dissolution of the enterprise as two extremes, with enterprise transformation being achieved in between.

This paper’s goal is to lay the foundation towards building a corporate support service for coordinating enterprise transformation. The principal motivation of this effort is to prevent costly non-coordination of transformation throughout the organization. The goal is to provide management with means to purposefully steer the enterprise towards a desired state.

A discipline that has been proposed to support the coordination of enterprise transformation is Enterprise Architecture Management (EAM) [4, 5, 6]. EAM provides a sound basis of models and methods to support analysis, planning and design of organizations from a “business-to-IT” perspective [7, 8, 9, 10]. The intention of EAM is to provide a high-level overview of an enterprise, addressing both business and information technology (IT) aspects and particularly the interdependencies between them [11].

In this paper, we aim to leverage EAM capabilities to address the challenge of coordinating enterprise transformation from a holistic perspective. A corporate function performing analogous services to decision makers can be seen in management accounting. However, where management accounting strongly concentrates on the monetary dimension, the richness of EAM models is capable of providing a multi-dimensional view (which should be seen as a complement to management accounting, not a replacement).

Our research questions are the following:
(1) In what dimensions can enterprise transformation be structured?
(2) In which types of transformation projects can EAM support the coordination of enterprise transformation?

Answering those questions should provide the conceptual basis for building an EAM-based artifact to coordinate transformation.
In a first step, we discuss three dimensions of enterprise transformation and deduct eight transformation project types from them. In a second step, we take a practitioner’s perspective into account by conducting a focus group. We discuss which transformation support services are required from a practitioner point of view, with special emphasis on how EAM may be further developed in order to support the coordination of enterprise transformation. We end up with three types of EAM patterns, which are eventually mapped to the theoretically derived transformation project types.

The remainder of the paper is organized as follows. Section 2 discusses foundations and related work; section 3 provides a multi-dimensional structure of enterprise transformation, resulting in eight transformation project types. The results from the focus group are discussed in section 4. Section 5 proposes a mapping between transformation project types and the EAM patterns that resulted from the focus group. The paper ends with a conclusion, discussing limitations and suggesting directions for further research.

2 Foundations and related work

In this section, we review work from the field of EAM as well as literature discussing enterprise transformation in general. These contributions are most likely to form a foundation for our research.

Different stages of enterprise transformation are supported by existing disciplines. Enterprises may analyze their current environment using a variety of strategic planning methods which may be supported by an EA function [12]. Modeling methods from EA can be used to represent both an enterprise’s current state and a desired state or a number of alternative development options [13, 14, 15]. Examples include Spewak and Hill [16] or the wedding cake model by Spewak and Tiemann [17], moreover [18, 19, 20], who present a transformation planning approach and elaborate on different levels of decision making.

Aier and Gleichauf [4, 21] as well as Buckl et al. [15] argue that enterprises tend to change also during transformation efforts and therefore take temporal aspects into account. While these contributions mostly support planned, top-down driven enterprise transformation, Aier et al. [22] aim to integrate planned top-down transformation with evolutionary change originating from bottom-up initiatives.

Taking a theoretic perspective, Rouse [3] presents a theory of enterprise transformation which focuses on the reasons and triggers of enterprise transformation. Purchase et al. [23] extensively discuss the concepts of transformation and the notion of an “enterprise”, with special regard to cross-organizational cooperation to address increased customer needs. A case study from the defense sector is presented to illustrate how several organizations cooperate to fulfill the demands of their customer (i.e. the military in this case).

While modeling aspects of and rationales behind enterprise transformation are already addressed in literature, coordination and implementation aspects of enterprise transformation have received little attention yet.

3 Dimensions and project types of transformation

This section introduces several dimensions of enterprise transformation in order to provide a framework for classifying transformation projects.

3.1 Transformation dimensions

Transformation is going on simultaneously in multiple parts of an organization, (1) caused by different triggers, (2) performed in various modes and (3) initiated by either top management or by individual domains within the enterprise. This subsection suggests three dimensions from literature, which may be used to structure transformation projects.

Mode

Transformation projects may be performed in a proactive or a reactive way: In the proactive case, an enterprise actively pursues transformation efforts, e.g. in order to develop new products or expand into new markets. In the reactive case, enterprises are forced to react to external influences and pressures like upcoming regulatory requirements or a competitor’s increasing advantage. Reactive transformation projects typically have higher time pressures due to a shorter reaction time, whereas in the proactive case, the need to undergo transformation or possible opportunities have been recognized earlier [3]. This is why Rouse [3] also concludes that reactive transformation projects have a higher risk of failure than proactively driven ones.
Source
Another distinction is whether the trigger for the transformation project is internal or external to the enterprise [3, 24]. Commonly identified triggers for enterprise transformation in literature include business- and technology-driven transformation, IT-Business-alignment, networkability and the creation of new potential [2]. Baumöl [25] lists political, economic and legal conditions as well as business and technology as triggers of enterprise transformation and looks at the latter two from both an enterprise-internal and -external perspective. One trigger may cause different types of transformation projects in different enterprises: When an enterprise develops a new product that is innovative and leads to a competitive advantage, this may be seen as an internally motivated transformation project. On the other hand, when a new product is developed to catch up with increased customer demands [23] or a competitor’s advantage, this transformation project can be characterized as externally motivated.

Direction
Transformation should not be seen as unidirectional or purely hierarchically driven. While there are top-down driven (i.e. initiated by top management out of strategic considerations and then propagated throughout the organization) transformation projects, bottom-up transformation originating in various domains all across the organization is at least equally important. Indeed, some scholars such as Beer et al. [26] question the results of top-down driven transformation and instead opt for a bottom-up approach, with change starting at an organization’s periphery and then moving towards its centre. In his work on organizational learning, Senge [27] also stresses local autonomy and sees a main role of top management in coordinating transformation efforts originating from local units.

Top-down- and bottom-up driven transformation projects also differ in scope: Top-down driven initiatives tend to be wider in scope than bottom-up transformation efforts starting from single domains. A large-scale top-down transformation project or program may already be transformative to the enterprise, its scope is global. Bottom-up initiated projects have local scope individually, but regarded collectively, they are transformative to the enterprise and thus global in scope. In the context of scope and particularly when considering top-down initiatives, it is worth noting that before transformation on the enterprise level can be achieved, significant investments and transformation efforts will have to be done on domains in the organization and technology layer [2, 3]. For example, exploiting new legal opportunities to expand into new markets will also require the transformation of processes and supporting technology.

3.2 Transformation project types
Having identified three transformation dimensions source, mode and direction, with two characteristic values each, we propose the following eight archetypes of transformation projects as seen in table 1. A short example is given for each transformation project type:
Table 1. Transformation project types

<table>
<thead>
<tr>
<th>mode: proactive</th>
<th>direction: bottom-up</th>
<th>source: internal</th>
<th>Type 1: domain-driven project, eventually spreading across the enterprise. E.g., devising an improved production process</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>direction: top-down</td>
<td>source: external</td>
<td>Type 2: domain-driven project, caused by outside influences and eventually spreading across the enterprise. E.g., using technology to devise new products or services.</td>
</tr>
<tr>
<td>mode: reactive</td>
<td>direction: bottom-up</td>
<td>Type 3: enterprise-wide transformation project. E.g., bringing an innovative product to the market or major reorganizations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>direction: top-down</td>
<td>Type 4: enterprise-wide transformation project. E.g., exploiting new legal opportunities</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Type 5: continuous optimization, running the business: E.g., updating a database system, locally isolated process optimizations</td>
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<tr>
<td></td>
<td></td>
<td>Type 6: continuous optimization, running the business: E.g., updating a database system, locally isolated process optimizations</td>
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<tr>
<td></td>
<td></td>
<td>Type 7: enterprise-wide transformation project. E.g., optimizing internal cost structures or replacing core legacy application systems</td>
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<tr>
<td></td>
<td></td>
<td>Type 8: enterprise-wide transformation project. E.g., modifying processes and information systems in order to comply with new legal requirements</td>
<td></td>
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</tbody>
</table>

4 Empirical Grounding

In order to analyze which services for coordinating enterprise transformation are needed from a practitioner’s point of view, we chose to conduct a focus group. Focus groups are a research method capable of measuring the level of consensus in a given community [28]. This research method therefore seemed appropriate to analyze which coordination services are commonly asked for in a group of peers concerned with enterprise transformation.

The focus group consisted of enterprise architects from 12 large companies based in either Switzerland or Germany. It was conducted on September 9, 2011 in Zurich, Switzerland. All of the companies had a several-year track record in EAM. In this community of EAM practitioners, we discussed which role EAM can play in transformation projects, and how it interfaces with other disciplines that also address enterprise transformation.

The focus group first identified three major drivers that cause a need for enterprise transformation and supporting services:

1. External requirements. Examples are (de-) regulation, political and social pressure (like the acceptance of nuclear energy) or technological pressure (like the maintenance of legacy systems or “omnipresence” of mobile devices like the iPhone or iPad)
2. Strategic decisions by top management. Examples include mergers & acquisitions, reorganization, changes in the product portfolio or increasing ties with other enterprises in the value chain.
3. Ongoing optimization or transformation. This includes transformation projects resulting from internal processes reaching limits of growth or scalability, or from the constant necessity to optimize cost structures by means of consolidating processes and systems.

In terms of the role EAM plays in supporting enterprise transformation, the discussion resulted in three patterns. Each of these patterns primarily addresses one of the major transformation drivers identified by the group in the earlier step:

1. Classic EAM. In this case, EAM is perceived in a documentation-oriented, reactive fashion. The transformation projects primarily supported by this pattern are those triggered by ongoing optimization or transformation efforts. In this pattern, EAM is predominantly located in IT departments and provides services like the provision of roadmaps, the propagation of principles and guidelines, or the creation and maintenance of models.

The focus group also pointed out the following transformation-supporting disciplines commonly encountered in the context of classic EAM: project management, project portfolio management, change leadership, business analysis, business process management and sourcing management. Overall, the focus group perceived classic EAM as predominantly reactive and documentation-oriented. It pointed out a possible evolution towards a design- and planning-oriented EAM by increasing the use of EAM principles and guidelines for steering the enter-
prise or providing a better documentation of the financial value of EA planning, coordination and implementation.

(2) *EAM as Strategic Decision Support*. The transformation projects primarily supported by this pattern are those triggered by strategic top management decisions. Thus, EAM is actually used to provide strategic decision support to top management outside its native IT department. However, whereas classic EAM has achieved considerable maturity, EAM is not yet widely established as a strategic support discipline. This may also be caused by EAM’s roots in the IT departments and its limited integration of other stakeholders’ concerns, i.e. stakeholders outside the IT department. Consequently, focus group members pointed out that enterprises where EAM was located as a corporate function were better able to leverage its capabilities for strategic decision support. It was also stated that EAM currently has little interfacing with disciplines like strategic planning and control, financial planning and management accounting, strategic human resource management, competency management or innovation management. However, all of these disciplines serve as important information providers to support decision makers. If EAM is to support transformation projects driven by strategic top management decisions, it must address these new stakeholder needs outside its traditional scope. Therefore, as a further evolution step, panelists called for a better integration of EAM with the above-mentioned disciplines to provide leadership support for enterprise transformation.

(3) *Lean EAM*. This is actually not a pattern by itself, but rather a variant existing in addition to either classic or strategic EAM. The transformation projects primarily associated with this pattern are those triggered by external requirements. A frequently mentioned downside of EAM in the focus group was its perceived lack of speed and agility: Especially in the case of transformation projects arriving at short notice, when time is a critical factor, EAM runs a high risk of being bypassed. It is frequently considered a hindrance to achieving transformation results quickly. The focus group panelists pointed out two possible approaches: First, stripping down existing EAM instruments and processes in order to increase agility. For example, architectural review processes might be sped up, or enterprise architects could actively support time-critical transformation projects. However, in doing so, there is a trade-off between agility on the one hand and architecture consistency on the other hand.

Second, offering a mechanism to detect environmental developments that are likely to influence an enterprise’s architecture at an early point in time (like an early warning system). This could increase the available reaction time, thereby mitigating EAM’s speed and agility issues.

5 Discussion

Having theoretically derived eight transformation project types, we try to match those with the three EAM patterns that resulted from our focus group. In table 2, we propose a mapping of EAM pattern to transformation projects.

<table>
<thead>
<tr>
<th>mode: proactive</th>
<th>direction: bottom-up</th>
<th>source: internal</th>
<th>Type 1: Classic EAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>direction: top-down</td>
<td>Type 3: EAM as Strategic Decision Support</td>
<td>source: external</td>
<td>Type 4: EAM as Strategic Decision Support</td>
</tr>
<tr>
<td>mode: reactive</td>
<td>direction: bottom-up</td>
<td>Type 5: Classic EAM</td>
<td>source: internal</td>
</tr>
<tr>
<td>direction: top-down</td>
<td>Type 7: Lean EAM</td>
<td>source: external</td>
<td>Type 8: Lean EAM</td>
</tr>
</tbody>
</table>

Type 1 and type 5 projects are a primary reason for introducing EAM. Enterprises aim at reducing redundancies in their architectures resulting from unknown dependencies of parallel projects. The main challenge here is to introduce transparency and effective governance structures to enforce EA principles and standards. The aim is to manage the tradeoffs between local and global optimization and thus prevent several domains competing for a shared resource (“tragedy of the commons”) [27]. Coordination is especially complex in aligning multiple, domain-driven transformation projects towards enterprise goals. However, several scholars stress the need of change evolving from within an enterprise and slowly spreading throughout the organization instead of being prescribed by top management [26, 27]. The focus group also saw the classical EAM’s pattern potential to play a more active role in coordinating such primarily internally driven transformation projects (in that case, classic EAM would blend into strategic EAM, and transformation projects would move from type 1 to type 3), but stressed that classical EAM’s methods must be further developed to provide a more proactive planning and coordination support.
In the case of bottom-up driven transformation projects as in type 5, a main challenge may be the integration of EAM with disciplines like project management or business process management. Type 5 projects may be categorized as routine change rather than transformation. Since those activities are continuously performed in various domains throughout an enterprise, a safeguarding mechanism as provided by EA principles and guidelines may be feasible to ensure coherence with overall enterprise architecture and strategy. However, due to the typically local scope of these projects, enterprise-level coordination support is not required or at least such additional coordination efforts will not pay-off.

Type 3 and type 4 projects are characterized by top-down driven, proactive transformation efforts. In these scenarios, stakeholders come from a more diverse background, as is evident from the focus group’s listing of related disciplines (e.g., strategic planning, financial planning, and corporate human resource management). An integration of EAM tools with other strategic disciplines is required according to the focus group members in order to support enterprise transformation. However, only a few enterprises that have positioned EAM as a corporate function outside their IT departments appear to be able to use EAM tools to indeed support strategic decision making. The focus group noted that if classic EAM is to evolve towards strategic decision support, it must be integrated with disciplines and tools requested by its new stakeholders.

Type 7 and type 8 projects may be mapped to the lean EAM type as proposed by the focus group. Top-down, reactive transformation caused by external events such as new legislation or competitor’s initiatives call for quick transformation efforts, e.g. to comply with new legal requirements or to improve own cost structures or product quality.

Type 2 and Type 6 projects cannot currently be mapped with the focus group data currently available. Type 2 projects may also require classic EAM to support coordination of multiple independent projects and maintain overall architectural consistency. Type 6 projects may actually be an example of routine change instead of transformation, depending on their scope. Thus, transformation and coordination support may not be required. However, these two project types should be subjected to further investigation.

6 Conclusion

In this paper, we have in a first step proposed a theoretical framework to classify transformation projects in the three dimensions of source, mode and direction. In a second step, we have conducted a focus group that established three patterns of EAM for the support of enterprise transformation: IT-driven, classic EAM as well as EAM as strategic decision support by extending EAM’s tools to address more diverse stakeholder needs in the case of strategically driven transformation projects. Finally, offering a lean EAM variant complementing the above-mentioned basic patterns to provide quick reaction support.

An important contribution of our research is the structuring of transformation approaches and thus especially the explication of EAM as strategic decision support as well as a lean EAM pattern. Both of these patterns have only little or no maturity in practice today. However, we and others [29] consider these two patterns as a necessary development of the EAM discipline.

Recognizing our selection of transformation dimensions as potential limitations of our approach, we aim to provide additional theoretical or empirical grounding in further work. Especially the proposed classification approach for transformation projects and the mapping of EAM patterns should be further tested with industry partners for validity.

Nevertheless, this paper’s contribution lies in proposing an initial structure and classification of the transformation problem, with special regard to pointing out areas where EAM may support enterprise transformation and which requirements it must meet to do so.

Further research is necessary to develop a deeper understanding of the interdependencies between the identified dimensions. Coordination situations that may arise in both single, large-scale transformation projects and the orchestration of local transformation efforts mandate a more thorough investigation as well.

References