A Reassessment of Enterprise Architecture Implementation

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Abstract. Aside of day-to-day business in some organizations Enterprise Architecture (EA) seems to be successful while it is not in others that also have notations, models, methods, and even dedicated EA tools. In order to understand these differences we have analyzed the development of EA in six companies over the last eight years. Our analyses showed, that apart from formal structure and processes (i) training and education of architects and non-architects, (ii) improving architects' communication skills, (iii) intensifying EA representation in projects, and (iv) tool support (not replacements with tools), significantly contribute to long term EA success.

1 Introduction

Enterprise Architecture (EA) is a still developing discipline. It includes rich modeling approaches as well as procedure models and tools. Both contributions from practitioners [see e.g. 1] and research [see e.g. 2] are numerous and show both progress and growing maturity. From a research point of view the scope of EA and EA management seems to be well-defined by now [2], although terminology is still varying. For practitioners it seems to be a unique opportunity to get a grip on the ever growing complexity of their application landscapes.

Standardization efforts like TOGAF [3] offer means to establish EA processes. Corresponding efforts e.g. like CobIT [4] increase governance maturity and ensure well defined interfaces to related IT management fields—governance, IT strategy, business/IT alignment etc. However, although EA is spreading among practitioners, it still seems to be immature in practice. With all processes set up according to the standards and modeling and maintaining most artifacts as recommended by EA management approaches: does EA work and will it survive in any company? Some of the companies, which established EA and EA management processes in the past, are now facing obstacles when practicing EA and are struggling to redefine their EA management in a way making it more sustainable.

Therefore the research question in this contribution is: What are factor combinations for successful EA implementation beyond the mere notion of maturity? As a basis of our analysis we will employ a description framework which has been developed in the course of various practitioners' workshops over the last eight years. Based on this description framework we will analyze six cases and discuss why certain companies have been rather successful in implementing EA while others did not leverage

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their EA invest. The analysis will show that EA success is not necessarily a matter of maturity of a number of EA functions but a complex set of factors that have to be observed for implementing EA. Also there is no perfect set of EA factor combinations guaranteeing successful EA because EA always is part of a complex socio-technical network. However, we will identify successful factor combinations as well as common patterns prohibiting EA success.

2 State of the Art

Following the architecture definition of ANSI/IEEE Std 1471-2000 EA can be understood as the "fundamental organization of a government agency or a corporation, either as a whole, or together with partners, suppliers and/or customers ('extended enterprise'), or in part (e.g. a division, a department, etc.) as well as [...] the principles governing its design and evolution"[5]. EA is positioned 'between' business and IT and has to serve both; and it is regarded as a mechanism for contributing to agility, consistency, compliance, efficiency, and sustainability [6].

In their extensive literature review covering both academic and practitioner EA frameworks [2] identified seven major EA research groups with four of them covering nearly all EA artifacts, providing procedure models, having their framework implemented in a tool, and have cases at hand where companies used their framework to configure their EA frameworks. See [2] for a detailed discussion of all approaches and a tabular overview.

Four approaches can be considered to represent the state of the art in EA research, which stem from Telematica Institute Enschede (The Netherlands), University of St.Gallen (Switzerland), TU Berlin (Germany), and KTH Stockholm (Sweden). The remaining three projects are from University of Lisboa (Portugal) [e.g. 7], Federal Technical University in Lausanne (Switzerland) [e.g. 8], and TU Munich (Germany) [9]. These three are less evolved than the other four approaches in terms of EA artifact coverage, procedural models, tool support, and application in practice.

The ArchiMate project [e.g. 10] is a Dutch research initiative comprising participants both from academia and practice. It is led by Telematica Institute with links to the University of Twente and the University of Nijmegen, The Netherlands. ArchiMate is a method to manage and communicate EA issues between the different involved stakeholders. It is based on an analysis of existing architecture frameworks and uses views and viewpoints as its core method, closely following the IEEE 1471 standard [11]. The derived modeling language is clearly defined and is used to develop an EA toolset. A procedure model is developed in order to employ a modeling language and a modeling tool in EA communication and EA decision processes. Its roots being conceptual, several case studies have been documented [e.g. in 12] which show the applicability of the different aspects of the method.

At University of St.Gallen, the Business Engineering Framework was developed since the early 1990ies [13]. While the focus was on business process engineering in the beginning, in 2003 publications start to extend the Business Engineering Framework to EA. Explicit meta-models and procedure models exist. The method is developed using conceptual, case study and empirical foundations. The method components are developed in cooperation with companies which are employing the resulting method chunks. A toolset based on the meta-model has been developed and deployed in practice.

Another EA approach has been proposed by a group at the TU Berlin [e.g. 14]. Based in the enterprise application integration (EAI) discussion, they develop a method to establish an EA model. The documentation of the meta-model and the procedure model in the publications is spare, but the meta-model is used to develop an EA modeling tool. The development approach is conceptual, but uses case studies and some surveys as well.

At KTH Stockholm, an EA framework has been developed which is rooted in views and viewpoints [e.g. 15]. The language work is made explicit very thoroughly, as well as the procedure model. Most of the publications are conceptual with extensive literature analysis, but case studies can be found as well.

With a set of publications from each group, the terminology with these approaches has been widely standardized. Discussions with representatives from these groups show that glossaries are defined or are currently in development stage in some groups. Some deviations in terminology between individual publications of a group can be assigned to the progress of knowledge gained in the ongoing research process, some minor deviations to the usual clutter introduced by review processes forcing the authors to apply e.g. terminology changes. Regarding scope, most groups have their EA language (i.e. architectural layers, elements included in models, relationships etc.) defined, some to an extent that a corresponding tool could be developed.

All analyzed approaches present EA frameworks comprising EA description languages; some include procedure models for EA management as well. The research methodology employed is essentially design research.

Both meta-models and procedure models define an important part of the terminology used in EA research projects. At least six of the seven approaches covered in this study, sufficiently define their language to make it adaptable by others.

Unfortunately, none of the existing (major) EA approaches stemming from academia is providing a framework to assess the long term success of EA within a company. Therefore we cannot build upon existing literature on this topic, but have to set up a description and research framework.

3 Structure of Analysis

The terminology of our discussion framework is based on the St. Gallen approach, which is rather comprehensive and covers all architectural levels and artifacts that can be identified in companies. Furthermore some of these companies observed are using the framework to structure their architecture and glossaries. Therefore the translation loss can be reduced by adhering to this framework.

The description framework we use to structure our analysis has been developed in a series of research projects and has been challenged by EA practitioners involved in these projects. We conduct three workshops per year with participants from all companies involved in the research projects. In these workshops EA characteristics and factors influencing EA success have been discussed or could be derived as a side result of other EA topics discussed. The participants are employees from the companies involved, most of them either enterprise architects or business analysts, or at least partially involved in corporate architecture topics by having a partial architecture role.

Four groups of factors could be identified over time: (a) Contextual factors describe the general corporate environment. (b) Structural factors describe the architectural power and its impact in the companies. (c) Process characteristics describe the working mode of architectural influence in the companies. (d) Finally we discuss factors influencing the architectural leverage over time.

From the *contextual factors* the size of the enterprise and the resulting number and size of the architecture models is the most obvious. Bigger companies require more and larger models to be described, which translates in larger and more complex EA activities. The market orientation of the IS department—being either a cost center or a profit center—results in a different stance on supplemental activities like architecture. The economic pressure the company is facing adds to this: Cost cutting exercises often influenced the growth of EA activities, or their shrinking respectively. Having a dedicated architecture budget was considered to be relevant as well: it determines if corrections in architecture can be driven by the architecture group or if they are dependent on finding a sponsor within the organization. Furthermore overall strategic alignment, e.g. as discussed in [16], was expected to be relevant for the standing of (enterprise) architecture with the company. Finally overall corporate culture was considered important, especially when change occurs.

Structural factors describe the architectural power and its impact within a company. Parts of the formal power can be derived from overall governance structures. But the architectural power can be influenced by some more architect centric perspectives as well: Architects may have a formal network. For example in a matrix structure central lead architects may define (strong) or coordinate (weak) what domain architects do. Furthermore they have their personal network in a company, which gives them additional insight in ongoing developments relevant for architecture. The EA organization alone does not describe the formal mode of "selling" EA sufficiently. Enterprise architects can be characterized as EA evangelists or EA police in any organizational structure. Their impact depends on their recognition as an ivory tower or on being credible. This may depend on the individual architect's history, their peers within the organization, and the architecture education. The later can be distinguished in the architectural knowledge and the architecture skills of architects [17] and non-architects. The willingness to adapt to architecture depends on the visibility and perception of architecture outside the EA department—or the IS department respectively. To structural factors we add both tool support and coverage. EA tools are helpful to foster EA communication by providing (potentially) easy to use models, which are consistent and up-to-date. EA coverage—which architectural levels and artifacts are covered—influences range and number of architecture contacts in an organization.

Process factors describe the kind of enterprise architects' involvement in projects as well as their impact. Changes in architecture are considered to be implemented by projects—either architectural projects or any other kind of projects. Architects' involvement may be determined by the number of projects, their size and duration and the amount and type of architects' activities within a project: being involved in some or all projects, being involved in quality gates only or permanently as a project member (with architectural and/or other activities assigned). These factors result in a different impact in projects, which is supported by the instruments available to enact architecture. This factor does not address overall or EA governance instruments (see structural factors), but architectural rules and EA processes defined.

Finally factors could be identified which are relevant for the *architectural influence and impact over time*. First of all amount and frequency of architectural training (further education and training) is to be mentioned. This again can be differentiated in training and education of architects and non-architects. Furthermore EA marketing has to be considered. This includes all activities, which aim at raising awareness for architectural issues, side effects on architecture and effects of architectural deficits.

Table 1 sums up potential EA factors which are used as the description framework when analyzing the case studies in the next section.

Table 1. Potential EA factors for EA implementation success

Factor group	Individual factor	Description
Contextual factors	size of company/architecture	size of company; number and size of resulting architecture models used
	market orientation	cost center or profit center
	economic pressure	Are there cost cutting exercises?
	budget	Is there a dedicated (E)A budget?
	strategic alignment	What kind of business/IT alignment exists?
	culture	How does the corporate culture influence change?
Structure	governance	Is there an EA governance and how is it anchored?
	architectural power	How strong are formal and informal architectural power and the resulting impact?
	skills of architects	What skills do architects have?
	skills of non-architects	What are the architectural knowledge and architectural skills of non-architects?
	EA visibility outside the EA department	Are any architectural efforts visible outside the architecture department?
	tools	Is there any EA tool support?
	coverage	What is covered by EA?
Process	project support	How are architects involved in projects in general?
	impact in projects	How do they contribute to projects?
	rules and EA processes	What are the instruments to enact architecture within projects?
EA over Time	training of architects training of non-architects	frequency and amount of architectural training and further education
	EA marketing	"marketing" measures to raise architecture attention and architecture sensibilization

4 Case Studies

In the following subsections the case studies of six companies are outlined. These companies have introduced EA functions several years ago and made experiences with the evolution of these architectures. In each case the general situation as well as an outline of the position regarding our structure of analysis is presented. If necessary comparability is provided by translating the individual companies' terms into the architectural levels defined in [5] covering the entire "business-to-IT" stack.

Data for the case studies have been collected with three of these companies since 2002/2003 and with the remaining three since 2006. Key stakeholders in IT management, architecture management (i.e. IS and business architects), and business/IT relationship management have been interviewed. In addition to the interviews regular review meetings have been set up to observe state, development, and architectural

issues in the companies involved. Two of the companies described participated in long term collaborative research projects in IS integration and enterprise architecture involving ten companies in the period of 2002–2009. The companies chosen for this study have a long term EA experience and have mature architecture management structures in place. Data presented in the case studies below aggregate research results gained with these companies until summer 2009. Due to company request case studies have been made anonymous.

4.1 Company A

Company A is a major financial service provider in Switzerland primarily focusing on standardized retail banking and transaction processing. Regarding architectural levels all levels mentioned in [5] can be found with broad, defined architecture management processes on IS side. All business related architecture artifacts are managed by an organizational unit directly reporting to the CEO. Alignment of business and IS architectures is explicit and facilitated by personal interweavement by having former IS architects included in the business architecture unit.

Due to the "experimental" positioning of EA on business side, the EA function had a passive role. Their main task was to host the EA repository and to support the integration of existing partial enterprise models (e.g. process models, application landscapes etc.). Also the EA meta model was strictly focused on stakeholder needs and thus was very lean. However, over time this passive set-up also revealed its weaknesses, namely poor coordinative power on interfaces of different stakeholders as well as poor performance in leveraging synergies among various business and IT projects. Therefore the EA function developed a more and more active role, e.g. by being involved in all major change projects by design. Especially the relationship between the EA department and the still existing IT architecture however, became an issue. Both departments address overlapping parts of the EA. While they may have different concerns they redundantly start to define EA processes, functions and also tools.

4.2 Company B

Company B is one of the top five globally operating pharmaceutical companies. Its structure is dominated by its divisions and partially influenced by the respective countries. Some of the divisions are big and thus very powerful in terms of financial power and resources and are thus independent. Other divisions are rather small and often have to buy resources/services from bigger divisions. In order to leverage the benefits of potential reuse of services or the standardization of platforms and processes an international unit spanning all divisions has been introduced.

EA management understood as leveraging synergies by reusing services, processes and/or platforms is not well implemented on enterprise level, since at least for big divisions there is hardly any economic pressure forcing these divisions into enterprise wide consolidation programs. While big divisions have a fundamental EA management for certain countries in place, the smaller divisions hardly have enough capacity to invest in "housekeeping" projects.

While formal governance structures exist on enterprise level they hardly have any impact on inter-division consolidation. This is mostly due to the fact that budgets are

earned in and allocated to the divisions instead of the global headquarter. As a consequence the entire company has a high level of redundancy in processes and systems resulting in a highly complex EA which makes change projects (which rarely influence only one division) risky and expensive. However, the company has started a number of reengineering projects consolidating at least typical support processes.

4.3 Company C

Company C is a globally operating telecommunications service provider with a large, complex and heterogeneous application landscape. At the end of the last century, corporate management decided to structure the group into four rather independent divisions representing the four strategic business areas. The new structure reduced the overall complexity by reducing the interdependencies between the four divisions on a business layer as well as on a technology layer by definition. At the same time, however, the heterogeneity as well as redundancy between the divisions grew as a result of their new independence. This independence resulted in e.g. inconsistent information about customers where different divisions served the same customer segments with different, division-specific products. As a consequence, divisions have been continually integrated again in order to leverage synergies among them.

Company C primarily focuses the entire stack from business models to questions of low-level technologies (e.g. network infrastructure). As a control instance company C has implemented an EA function on group level. The primary means of alignment is a capability model with about 90 top-level capability definitions which are structured in twelve group-wide domains. The EA function provides governance services with rules and processes for the introduction of EA as well as EA compliance assessments for projects. Projects are guided by EA information and expertise to improve compliance. Delivery processes support the actual IT implementation of business concepts. The group wide EA board ensures EA consistency on very aggregated level addressing major change and/or infrastructure projects.

4.4 Company D

Company D is a Swiss financial IS solution provider focusing on both developing and running banking software. The company's application portfolio is in a transition from mainframe to a client/server-based service oriented architecture.

Company D has to differentiate two distinct EA perspectives. On the one hand side there is company D's EA ranging from business to infrastructure architecture. On the other hand there are the business and organization architectures of the customers, which have to be mapped to the application architecture provided by company D and the corresponding software and infrastructure architectures.

In the previous year efforts have been started to redesign both architecture teams and architecture processes. Now there is a dedicated EA team defined and business and organization architectures are being rebuilt. The key members of the redesigned architecture teams (both EA and domain architecture teams) have a common (team) background. This is helpful during the organizational redesign phase, because there is a common understanding of the architectural goals and the underlying software and infrastructure architecture. During the organization's redesign EA won a more prominent position with the chief architect being a member of the executive board.

Although organizational changes are not completed, EA is receiving more attention. Furthermore tool support is being rebuilt as well, changing the architecture tool landscape from being more software development focused to an EA oriented tool approach, which is focusing less on software details, but on supporting cross architectural questions—as recommended in [e.g. 18, 19].

4.5 Company E

Company E is a major transportation and logistics service provider in Switzerland. It offers both cargo and passenger transportation and provides rail infrastructure.

A couple of years ago the inauguration of a new CIO resulted in renewed architecture efforts including the foundation of a central EA team. The EA team is complemented by domain architecture teams, which are changing their focus from a domain and software centered perspective to an EA perspective. EA processes have been set up altering existing development processes to reflect architectural issues, e.g. by defining quality gates, which projects cannot surpass without fulfilling strict architectural requirements. This change in processes is fostered by a broad range of efforts to enhance architecture attention, knowledge, and skills throughout the company. Therefore a broad training program was set up. This program spans over twelve days and is focused on EA. More than 60 architecture stakeholders participated in this program by now. From these only parts are central or domain architects. The others are business analysts, (internal) customer, development, or infrastructure representatives.

In addition to the training program further measures were set up. For example (i) architecture communication has been advanced by an EA tool providing a broad set of EA artifacts in an easy-to-use web interface, (ii) all information required to meet architectural guidelines in the quality gates is available through a well-organized intranet web application.

4.6 Company F

Company F is a medium sized insurance company in Switzerland. The market conditions are still comfortable, although competition is increasing, as the local market is saturated. Architecture has a long history in this company, therefore one of the oldest EA teams can be found with company F. EA team size is about 20 architects; with an overall IS staff of about 200.

Architecture is well received in the company. Architects have to spend half of their time in IS projects, and can only spend the other half on pure architectural tasks. All IS projects are facing strict architectural quality gates. However, they are supported from the early design stages on by an architecture bureau, which offers any support required to enhance architecture in a project. Furthermore all projects have to spend a certain percentage of the project budget on architectural issues. But they are free to choose the architect to participate in their project. Company F is investing in architectural training as well. On the business side the reception of business architects is very high: Although being part of IS some business architects are considered to be part of the business side. Although the quality gates are strict, overall formal architectural power is not that strong. With company F they are very influential due to personal expertise and focus on communication skills. Furthermore EA team members are creative in initiating and spinning architectural concepts outside the EA department. The focus is on keeping architectural attention and awareness high.

5 Analysis of Cases

Cases A and D have to be handled carefully in the subsequent analysis. These companies participated actively in the research project, in which the factors were identified. Although companies A and D joined the project after the factors have been shaped, their contributions had influence in the adjacent discussions within the research project. Using cases A and D in this paper could be seen critical, because the framework could be considered not to be independent of these two cases. However, it is, and we will respect this issue in the discussion below.

Table 2. Contextual factors influencing the EA implementation

Contextual facors	Company A	Company B	Company C	Company D	Company E	Company F
size of company/ architecture	medium	large	large	medium	large	medium
market orientation	profit center	cost center	cost center	moving to profit-center	cost-center	profit-center
economic pressure	medium	low	medium	high	medium	medium
budget	available with business case	distributed over divisions	fixed budget + project related	fixed budget + project related	project-related	project-related
strategic alignment	explicit coverage of business and IT	only with limited focus on divisions, products, countries	explicit coverage of business and IT	changing due to market changes	weak	business driven architecture
culture	strong business focus on EA	strong focus on marketing of products	affinity to IT	strong affinity to IT	strong technical affinity	Strong acceptance

From the contextual factors (table 2) the combination of strategic alignment and culture seems interesting. Those companies with higher (more explicit) alignment and either an EA aware culture or some technical affinity in the overall staff, EA awareness seems to be higher. A high economic pressure as with company D is, as usual, fostering changes; in this case in favor of EA.

The impact of EA in the organization seems mostly influenced by architectural skills of non-architects and their reception of architects. Central governance for instance is important for aligning the different EA activities; however, governance only seems to work effectively if EA becomes more than a central service of the headquarter. High credibility of architects and continuous training of and/or communication to non-architects proved to be important for EA impact with companies E and F.

Tool support per se is not helpful, but making access easy and selecting EA artifacts carefully for web publication with stakeholders in mind proved to be very successful with company E. Company D learned this lesson by using tools targeted to meet software engineering requirements and had failed with the business side. Now they are making huge progress by using a dedicated EA tool.

Table 3. Attributes of structure describing the EA implementation

Structure	Company A	Company B	Company C	Company D	Company E	Company F
governance	well established, but misalignment in EA/IT arch.	central governance is ineffective	established with growing impact	is being re-established	established with growing impact	established with high impact
architectural power	high credibility, informal network no formal power	business driven projects are dominating	different impact among bus. units	high with established architects	growing credibility and thrust	high credibility
skills of architects	well established	available in large divisions	well established	partly high and growing	partly high and overall growing	High and well-established
skills of non-architects	well established	hardly available	very heterogeneous	heterogeneous	heterogeneous, growing	heterogeneous
EA outside EA unit	well established	hardly available	very heterogeneous	heterogeneous	growing	established
tools	various tools consolidated into EA repository	heterogeneous tool landscape	central EA platform + specialized tools	central EA tool with growing impact	central EA tool with high impact	different tools, but high impact
coverage	few relevant artifact types ranging from business to IT	very heterogeneous level of EA coverage in the divisions	all major artifact types covered; strong capability model	small but growing	major artifact types and growing	major artifact types and growing

Table 4. Attributes of Processes describing the EA implementation

Process	Company A	Company B	Company C	Company D	Company E	Company F
project support	introduced only recently	introduced in a major division	available as an EA service	available via domain architects	medium, growing	high
impact in projects	introduced only recently	in major divisions	in most major projects	being re-established	strong	strong
rules and EA processes	established	in major divisions	established	being re-established	established	established

For all cases active support of projects is a major success factor for EA. This becomes especially visible in case B where the central architecture group is hardly connected with the change projects happening almost exclusively within the divisions. When looking into details EA architects have the biggest impact in company F. Although the benefit of easier communication in a medium sized company has to be discounted, the local arrangements foster both EA acceptance and impact: The inventive incentive structure—projects have to spend on architecture, but can choose the architect, architects have to earn half of their budget in projects—pays off.

Again the education of employees outside the EA department plays a major role for EA success. This becomes obvious in company E where a large EA education program has been started. Company F is stressing communication skills of EA architects, which is addressed in company D as well.

Table 5. Factors concerning time describing the EA implementation

EA over Time	Company A	Company B	Company C	Company D	Company E	Company F
training of architects	done occasionally	in major divisions only	done occasionally	done occasionally	regular and extensive	regular
training of non-architects	implicitly only	hardly any	implicitly only	implicitly only	regular and extensive	implicitly only
EA marketing	done informally	hardly any	regularly done	informally	formally and informally	formally and informally

When assessing long term success of individual EA efforts in companies A to F, company F has clearly the best record: Steady education of architects, inventive incentive structures, and ongoing communication has made EA successful for a couple of years now. Therefore it might be realistic to expect—ceteris paribus—continuous EA success in company F. With the other companies an outlook is less easy: Company E invested in training and education, which can lay the foundation for future EA success, but efforts are too young, to be judged. With company D changing market conditions are reviving EA again, but similar to company E future success is difficult to judge. With both companies' additional EA efforts—forming/extending of EA groups, (re)building EA processes and governance—are important. With company E training and education will be beneficiary. With company D this cannot be done directly due to company D being a software vendor. Company C as a large international company has a very complex EA. However, they have managed to establish a group wide domain and capability model which have become a central reference for all kinds of major change projects. Their challenge is to continuously promote the benefits of additional models (since they represent abstract elements only) like these. Company B is also a large international company that, however, does not have a comparable culture in EA. The dominant reason seems to be the low economic pressure which did not put the strong divisional separation into question. Company A finally has been a very successful case for several years, because they have been one of the first and still are one of the few companies that have located EA on the business side of the organization. Therefore they have implemented some rather innovative EA use cases like project assessment and achieved a high acceptance rate outside the IT department. However, today they struggle with exactly this separation from IT since IT has developed overlapping architecture services.

To sum up observations regarding long term success of EA, we recognize that additional efforts beyond formal structures and processes are required. Especially it seems to be important to stress communication and training/education: Communication skills of architects have to be enhanced and regular training and education of architects is most important. Training and education of non-architects fosters the acceptance of architectural issues and reduces barriers.

To improve EA impact a continuous representation in projects is required. Especially incentive structures fostering this on both architecture and project side might be helpful. In addition, tool support can enhance communication, but it cannot replace it. For an EA being appreciated by business and IT additional abstract models like domain models and capability models provide a strong benefit, since these are the only models that have relations to either side and that are very stable compared to e.g. business process models. Finally all cases show, that there is hardly any "best way" to

implement EA but rather a number of successful combinations of factors describing EA implementation. These successful factor combinations, however, are not unchanging, but they have to be continually adapted to the organizations needs and maturity. This on the other hand means, an organization should not necessarily start with an "optimal" EA implementation but with maybe less powerful options like company A which in the beginning has chosen a very passive and therefore not very powerful approach. Now, however, they slowly expanded EA's active impact as the organization learned to understand the value und associated costs of EA.

6 Conclusion and Further Research

Over the previous years we have developed a research framework to observe EA success in companies. When applying this framework to the six cases at hand, we can see some support for the hypothesis that EA success can only partly be assigned to formal EA structures and processes. We assume that—especially with long term success in mind—(a) training and education of architects and non-architects, (b) improving architects' communication skills, (c) intensifying EA representation in projects, and (d) tool support (not replacements with tools), can significantly contribute to long term EA success. Based on these results the next step in our research is to design a questionnaire and distribute it among EA practitioners on a bigger scale to test these preliminary results empirically.

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