

# THE MATURITY OF ENTERPRISE ARCHITECTURE CAPABILITY AND THE EVOLVING BENEFITS OF ENTERPRISE ARCHITECTURE

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## INTRODUCTION

Enterprise architecture (EA) is becoming an important practice for organizations to create the operational backbone that supports digital strategy (Iansiti and Lakhani, 2019; Ross and Quaadgras, 2012). However, for its importance, EA is also difficult to implement. For some, it is a practice that brings order, clarity, and value, while for others, it is a draining and expensive nuisance (Ross, Weill, & Robertson, 2006). Enterprise architects struggle to show clear benefits of EA and to provide justification for sustained spending on EA (Tamm, Seddon, Shanks, Reynolds, & Frampton, 2015). The result is that EA programs tend to be closed prematurely before they can deliver compelling value (Gong and Janssen, 2019; Ross and Quaadgras, 2012). A reason behind the controversial nature of EA benefits may reside in the limited understanding of EA benefits (Niemi & Pekkola, 2016) and how they change over time (Lange, Mendling, and Recker, 2016). The literature on EA benefits is fairly recent (e.g., Foorthuis, van Steenberg, Brinkkemper, & Bruls, 2016; Gong & Janssen, 2019; Shanks, Gloet, Someh, Frampton, & Tamm, 2018) and the results have been contradictory (Niemi & Pekkola, 2016). A possible reason may be that the different EA value frameworks do not take a dynamic perspective that recognizes that EA benefits depend on the maturity that an organization has accrued with EA. On this basis, we seek to answer the following research question: *How do the perceived benefits of EA evolve with the maturity of EA capabilities in organizations?*

To contribute to the ongoing debate about dynamics of the business value of EA, we have conducted a longitudinal case study at GMEM, a global electronics manufacturer where we followed the evolution of the EA practice. Our analysis shows that EA capability produces benefits that go hand in hand with the maturation of the capability itself hence proving that benefit expectations for EA need to be timed according to the maturity of the EA capability.

## TOWARD A DYNAMIC MODEL OF EA CAPABILITY BENEFITS

EA definitions focus on three points: what EA does, how to achieve a working EA, and the outcomes of EA. In a nutshell, EA offers a high-level overview of an enterprise's business

and IT systems (Gong & Janssen, 2019). EA is a plan for how processes need to be designed, technologies need to be implemented, and data need to be organized to support the strategic objectives of the organization (Ross et al., 2006). Organizations attempt to achieve these objectives using roadmaps derived from EA. These roadmaps may be simple EA principles (Greefhorst & Proper, 2011; Haki & Legner, 2013) or complex investments plans that guide the execution of a series of projects that, over time, allow organizations to have an architecture that approximates the planned one (Fonstad & Robertson, 2006). As decisions are made, projects are executed, and EA takes shape, organizations expect benefits from the investments and efforts in EA. “Achieving the expected benefits from EA is often the main motivation ... for establishing an architectural function within an enterprise” (Gong & Janssen, 2019, p. 1).

Niemi and Pekkola (2016) identified nine EA benefit realization models published in the period 2007–2016. All models link EA efforts to four type of outcomes: EA product quality (i.e., the actual quality of the realized EA), EA process quality (i.e., the experience with the process of creating the EA), EA use results (i.e., the direct results of having an EA), and EA benefits (i.e., the impacts of the EA results on the business). Despite this focus on results and benefits, EA activities are still notoriously complicated endeavors (Lange et al., 2016). Both Rodriguez and Amaral (2010) and Tamm et al. (2015) found that EA practitioners struggle to justify investments and efforts in EA, and EA initiatives are often stopped because of lack of perceived value. A possible explanation for these complexities was identified by Aier (2014), who found that EA success is strongly mediated by culture. Studies such as Aier’s (2014) indicate that the key to obtaining benefits may reside in EA practice and use. If EA is not anchored in organizational practices (Aier, 2014), if enterprise architects are not invited to projects (Toppenberg et al., 2015), if managers ignore EA principles (Haki & Legner, 2013), if process and data are not integrated as planned (Ross et al., 2006), then EA will fail to deliver benefits. Benefits are a function of practices, and practices need to be honed to become ingrained in the organizational context. As EA capability matures in organizations, the benefits of today will be the seed of the benefits of tomorrow (Ross et al., 2006). EA benefits have a dynamic dimension linked to how much experience an organization has with EA—the EA capability maturity. However, even if an organization’s EA is related to the realization of its benefits and there is evidence of positive causality between EA maturity and EA benefits (Lagerström et al., 2011; Rodriguez & Amaral, 2010), “maturity models do not directly measure the benefits received from EA or specify where the benefits actually arise from” (Niemi & Pekkola, 2016, p. 57). Rodriguez and Amaral (2010) point out that because EA has long timeframe, organizations tend to resist EA programs and therefore organizations should focus on “short-term key projects that have an immediate impact” (ibid, p. 30). Rodriguez and Amaral’s (2010) suggestion is to accelerate EA efforts to obtain benefits earlier. While this is not always possible (or recommendable), this is a further indication that organizations indeed may obtain different outcomes from EA depending on the level of maturity of their EA capability. Indeed, as Winter (2014) observed, developing EA capability not only increases the benefits of EA but also helps achieve totally new benefits for the business. These results suggest that EA benefits, both in magnitude *and* in nature, are linked to EA capability maturity. The overall theory shows however that this link has not yet been investigated, which is what we will do next.

## RESEARCH METHODS

This research was based on a case study of the evolution of the EA capability at GMEM in the period 2000 to 2015. We used a retrospective case study method (Langley and Tsoukas, 2010) to understand the construction of the EA capability at GMEM for substantive and methodological reasons. Substantively, we wanted both to enrich our analysis with findings extensive research on EA, and to benefit from access to a rich and broad qualitative dataset provided by the development of EA capability at GMEM. Methodologically, the development of EA at GMEM spanned almost 15 years; therefore, there was a large amount of data in the form of documents and other materials, which made it possible to extend our research from the current stage of EA development at GMEM to the whole history of EA adoption in the company. Throughout its existence, GMEM has pursued growth through acquisitions and has acquired more than 150 companies during its lifespan. Because every acquisition contributed to increasing the complexity of the IT landscape, the EA initiative was created to keep IT complexity under control. GMEM had gone through three different EA initiatives by the end of our data collection.

### Data collection and analysis

Our study at GMEM includes two related datasets. One, from start 2015 to June 2015, which covers the third attempt of EA, is based on interviews supplemented with internal company documents. The other, which covers retrospectively the first and second attempts of EA at GMEM, is based on internal documents that are complemented with retrospective interviews and press releases (Langley and Tsoukas, 2010; Dutton and Dukerich 1991). We explored how the EA practice had been influenced by the quest for benefits in the organization and how the perception of benefits has changed over time. The interviews were focused on the topic of value creation from EA in the different EA attempts. We conducted a first round of 14 interviews, which lasted between 60 and 90 minutes. A second round of six interviews was organized to clarify emerging elements from the analysis. The interview guide included questions about the evolution of EA capability in GMEM over the three attempts. All transcriptions were coded using open coding (Eriksson & Kovalainen, 2008) to identify the benefits at the different stages mentioned by the interviewees. We used data to build a timeline of the implementation of EA at GMEM. We divided this timeline into the three different attempts that people at GMEM used to classify and partition their experience with EA. We then built a detailed narrative of each of these three attempts, and the transitions. These narratives incorporated multiple and different perspectives from different participants, gathered from interviews and documents, and changes to policy and technology gathered from internal documents and press releases.

## DATA ANALYSIS

Our analysis shows that as GMEM matured its EA capability, the perception of the value created changed. In particular, we show that over time GMEM perceived three types of effects that appeared and changed in magnitude over time as the capability with EA accumulated. The first-order effects are oversight capability, decision-making capability, and communication capability. The second-order effects were: prioritization of investment, execution of projects and programs, management of interdependencies, risk management, management of reusable

components, improved strategy execution. The third order effect were IT cost, IT quality, business agility, and business-IT alignment. In the following we provide some insights into these three orders of effects. For brevity, we will prioritize the evolution of the effects connected to the maturity of the EA capability rather than the single effect.

### First-Order Effects

As EA evolved at GMEM, there was a change in IT managers' ability to monitor and review the IT systems and IT practices in the company. The extent to which managers have such an overview has an impact on the everyday management of IT and on the company's ability to make decisions about managing its IT infrastructure.

As the EA capability matured, they went from a situation where *"we had the IT organization, and then we had all of the shadow ITs everywhere else"* to a situation where they developed the oversight capability to get *"a common picture ... the ability to zoom in and out on the operations ... and then you can zoom down, and that is actually where the success is."*

The development of EA at GMEM affected the company's capability to make decisions regarding its IT infrastructures and IT projects. The situation before the creation of an EA capability was described like this: *"Back in those days, there was no tool to keep the different systems aligned. EA was our first attempt to guide the choice of technologies."* While after some years of practicing EA the decision-making situation was rather different: *"EA result[ed] in transparency and visibility, which in turn leads to fact-based decisions"*

Finally, improved communication emerged as multiple years of attempting to create common models and frameworks accumulated and enabled a shared way of planning and describing the enterprise. As with other capabilities, GMEM's communication capability changed gradually as EA capability matured from *"The EA models that we developed back then were only used by the IT people. Communication became easier among the IT groups, but it never reached the business people."* to a situation where *"What EA does is that it looks at the space between these and it fosters collaboration and communication across these groups"*

### Second -order effects

First, GMEM's newfound capabilities improved the process of resource allocation in its IT strategy. This is the process of prioritizing which IT investments to make. Linda, a portfolio manager, explained how EA adoption improved this process: *"We started from nothing to first, a clear internal technological overview and second, a linkage between business needs, at least at a functional level."* GMEM used EA to create roadmaps for investments to ensure that future investments would have sufficient funding. Because a roadmap spans across businesses, solutions, and technology architecture, the investment decisions are also better integrated across business areas. Maturing the EA capability gave GMEM the oversight capability that it needed to realize the importance of the interaction between technology and business needs. Enterprise architect Howard F. stated that *"as a result, we think more holistically, and the models allow us to scope individual projects more appropriately."*

During the different EA attempts, GMEM's IT managers realized that they needed an integrated approach to the way that people, processes, and technologies worked together. An enterprise architect explained that during the first two attempts of EA adoption, *"we developed*

*the awareness of the imbrication of technology and business' strategic needs.*” But it was only at a later stage that they got an *“understanding the relationship between the building blocks.”*

Similar dynamics were observed for impacts on IT management and the support for business strategy. For example, for one architect, EA provides a roadmap to how to execute the strategy: *“It is easier to execute the strategy because you have a better overview that helps you to prioritize strategic projects.”*. Clearly, a more sophisticated approach to oversight, decision making and communication (first-order effects), impacted positively the second-order ones.

### **Third -order effects**

The third-order effects move the effects of maturing EA capability towards quantifiable results. While our data does not allow us to check the actual numbers, the interviewees agreed on these results. A first, positive outcome of maturing EA capability was cost reduction. Cost is an umbrella term that encompasses support costs, maintenance costs, and IT acquisition cost. Over time the cost-effect changed. In the first period, the effect was mostly on understanding the nature and sources of cost: *“because EA gives GMEM an overview, it becomes possible to see areas for cost reduction”* then the effect moved towards identifying specific opportunities to lower IT cost. Lately, the effect expanded from IT to the business and GMEM was also able to decrease business-related IT costs. For example, the chief architect explained that thanks to the oversight capability achieved in the third EA attempt, they were able to highlight that 40 business units in GMEM had contracts with a well-known cloud-based CRM system provider. The oversight and planning ability emerged from the maturity of EA capability allowed GMEM to consolidate the 40 contracts into one, decreasing the license cost and giving them access to consolidated customer data (with clear advantages for customer care, cross selling, etc.).

Similarly, GMEM perceived improvements in IT quality, speed, and business-IT alignment. For example, the architects emphasized that as EA capability improved, they got increasingly better overviews, it also became possible to establish best practices, making IT integrations easier and systems lifespan longer. They emphasized the faster reaction of GMEM in mergers and acquisitions, *“which otherwise would have been much more time-consuming.”*

In conclusion, maturing the EA capability led to the creation and improvement of oversight capability, decision -making capability, and communication capability (first -order effects) which led to increasingly better IT planning, IT management, and support for business strategy (second -order effects), which ultimately led to quantifiable values for GMEM in terms of cost, IT quality, speed, and alignment (third-order effects). However, as our analysis show, these benefits appeared and their nature changed from benefits for IT to benefits for the business only as GMEM's EA capability grew over time.

## **DISCUSSION: THE EA CAPABILITY DYNAMIC VALUE FRAMEWORK**

As observed in the literature, the large majority of studies of EA benefits are conceptual and static. In this paper, we investigate empirically the question of whether the value provided by EA changes as an organization matures its EA capabilities. Our analysis shows that while EA is appearing and disappearing at GMEM, the efforts with EA build on increasing EA capabilities. We therefore show that it makes sense to differentiate EA maturity from EA capability maturity. While the actual EA may not deliver the expected benefits, it is important that the EA group increases its EA capabilities to prove its value in the organization. We show that the perceived

benefits of EA capability change along with the EA capability maturity. Each EA capability level has its own benefit contribution that can be achieved and others that cannot. Expecting values that are mismatched with the capability level may be counterproductive and may explain why many EA programs are closed prematurely. Our analysis shows that organizations deploying EA obtain value in two different steps.

First, as organizations engage in EA, they need to develop basic EA capabilities that provide intangible value. We have identified three types of such capabilities—oversight capability, decision-making capability, and communication capability.

Second, organizations can build on these capabilities to provide tangible benefits to the business. Aligned with Tamm et al. (2011), we have identified a variety of these EA benefits: IT quality, cost cutting, alignment, and increased speed. However, our results show that these tangible benefits emerged and increased in magnitude as EA capability maturity increased. In the early attempts, GMEM was mostly focused on IT-related benefits such as IT quality and cost. These benefits may not have been what the business necessarily wanted (hence, the closure of the first EA attempt), but were important to show the value of the EA group. As GMEM moved on with its second EA attempt, business benefits, especially improved alignment between IT and business, became more prominent. In the third EA attempt, the business started to perceive speed and agility benefits, which could now be supported by well-established process improvers. Indeed, improved decision-making and communication are antecedents of speed and agility. By showing the connection between the evolution of the first-order effects (oversight capability, decision-making capability, and communication capability) and the related benefits (the third-order effects), we provide an empirical backing to the classic statement “you cannot jump maturity levels over” (Ross et al., 2006). Indeed, first-order (indicating a high EA capability maturity level) can only be integrated if they have been established first (something that happens at a low EA capability maturity level) and anchored them in organizational practices (middle EA capability maturity level). Likewise, tangible benefits cannot be mandated top-down without the propaedeutic integration of the process improvers in the everyday practices of the organization. Our research shows that the initial attempts at EA can be valuable even if they appear to have failed. At GMEM, these were necessary starting points to achieve two benefits. First, they start the development of the process improvers. Second, they allow an organization to mature its EA capability. We have shown how, in the second and third attempts, GMEM tweaked the structure of the EA group, its scope, and even its governance. This was not the result of a top-down design decision, but rather the result of the experiences accrued in the first EA attempt.

Taken together, the above suggests that failed EA attempts cannot be equated to failure in creating an EA capability. The main advantage in accumulating EA capabilities is that they (may) survive a specific EA attempt. Doing so may mitigate the limitations of EA to deliver value evidenced by Ross and Quaadgras (2012). One question that naturally arises from this discussion is whether organizations, knowing what tools are available and what benefits can be obtained, should willingly slow down. While our data does not allow us to conclude about this, we can definitely say that an organization that embarks upon a conscious EA journey should start by monitoring the evolution of the process improvers. Only when the first-order effects begin to show their effects on oversight, decision-making, and communication, should organizations establish metrics for the tangible benefits of EA. The risk of going the other way is that an EA attempt will be deemed a failure before it has a chance to show its value.

## REFERENCES AVAILABLE FROM THE AUTHORS