Large organizations depend for a great deal on IT for their information processing. Imagine running a company without the ability to run electronic payment transactions, or running a telecom company without an electronic customer database. And this dependency is only growing larger. For example, take e-government developments like the electronic medical file, or the increasing demand for online self service for customers. To enable new developments, over and over, new technologies are introduced. And with each introduction of a new technology, the complexity of organizations grows. This process has been going on for tens of years and has become one of the reasons why an increasing number of organizations suffer from a complex landscape of legacy information systems. This complexity has a disabling effect on organizational change.

Many organizations are urgently seeking ways to cope with complexity, and regain their flexibility to stay competitive in this fast changing world. About twenty years ago, Enterprise Architecture (EA) started out as a practical means to cope with complexity. During the last ten years, EA rapidly gained acceptance; many organizations employ enterprise architects nowadays. Despite some early fundamental research in the late eighties and early nineties, the research community did not really pick up on this topic until it became a larger phenomenon of increasing importance for organizations during the late nineties and especially during the new millennium.

Although much is achieved in the last twenty years, when I look back at the five years of practical experience I have with EA, I have my doubts about the true effects EA has had thus far. In this thesis I focus on the question: When does EA deliver results? To answer this question, I address several research questions: How is EA perceived and applied in practice? What is an EA Function? How to determine the efficiency of the EA function? How do stakeholders perceive the EA function? How to determine the goal-attainment of the EA function? What is the relation between goal-attainment of the EA function and the satisfaction of its stakeholders? Is there a connection between the performance of the EA function and the attainment of organizational goals?

Based on interviews with a number of architects and managers from a wide range of organizations, we characterize how EA is perceived and applied in practice. The key aspects of how EA is perceived in practice are that EA is: a means of abstraction, a means of communication, and a governance instrument. The key critical success factors for applying EA in practice are: the acceptance of EA driven organizational changes, the availability of efficient EA means, and the proper usage of EA. We identify three groups of organizations that differ with respect to their level of architectural maturity and alignment: organizations where architecture awareness starts with either business management or the IT department, and consultancy firms. Analysis of the interviews indicates that these three groups differ in the architecture aspects and critical success factors they emphasize. Our results provide a starting point for assessing architecture maturity and alignment within organizations, and can be used to help harmonize different architectural tunes being played within organizations. The results presented in this research show that merely focusing on improving EA as a means of abstraction, and developing more efficient EA means is not enough. Other aspects and critical success
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factors are perceived to also play an important role in successfully applying EA as a means in practice. Therefore, we conclude that to be effective with EA, it is essential to have better understanding of all the elements that constitute the organizational function responsible for composing and implementing the EA, the EA function.

The EA community sees EA primarily as a means of abstraction, and focuses mainly on developing efficient architecture means. Other aspects and critical success factors that reach beyond the development of the EA are essential in applying EA effectively. For example, the roles and responsibilities of the non-architect stakeholders responsible for EA decision making and conforming to the EA. To apply EA effectively, we need to have a holistic and integral view on what the organizational function responsible for EA (the EA function) entails. Therefore, we define the EA function as: “The organizational function comprised of all roles and bodies responsible for creating, maintaining, ratifying, enforcing, and observing EA decision-making – established in architectures and EA policies – interacting through formal (governance) and informal (collaboration) processes at enterprise, domain, project, and operational levels.” We describe the objectives, products, structure, activities, process model, outputs, and roles that constitute the EA function. Based on a case study we conducted at a large international company to illustrate and test the model in practice, we provide some lessons learned about the governance and process aspects of building a mature EA function. These lessons learned are that: (1) formal governance and informal collaboration must go hand in hand, (2) no steps in the EA cycle should be omitted, (3) EA decision making and EA conformance reviews should be transparent and consistent, and (4) EA governance bodies must represent all EA stakeholder groups. We conclude that to compare a specific EA practice with our integral EA function reference model and determine the efficiency of the EA function, we require an assessment model.

Although investing heavily in EA, few organizations achieve the desired results, because their EA functions are operating inefficiently. To implement improvements for the EA function, organizations conduct maturity assessments. We present an integral assessment model to determine the efficiency of the entire EA function. We used a case study to improve a preliminary version of our assessment model based on the lessons learned. We found that: (1) making a distinction between architecture awareness and maturity is essential in properly determining the efficiency of the EA delivery function, (2) representing the assessment results using visualization models gives constructive insight in architecture efficiency, (3) there is a difference between the EA delivery function and the non-architect stakeholders of the EA delivery function when it comes to assessing them, (4) the attitude of stakeholders towards EA is a critical success factor in being effective with EA, and (5) aligning IT and business architectures should not always be the aim of the EA delivery function. Based on these findings we constructed a final model, consisting of two assessment models for both the entire EA function, as well as the EA delivery function. The entire EA function is assessed on three essential preconditions for efficiency: (1) a clear and accepted EA function definition, (2) a transparently and consistently operating EA governance model, and (3) proactive collaboration and communication between all functions, bodies, and roles that take part in the EA func-
tion. The EA delivery function is assessed on its: (1) management and organization, (2) communication and PR, (3) work processes, (4) human resources and tools, and (5) products. To illustrate the working of our improved assessment model we present a case study, which shows that our model fits the specific characteristics of the organization assessed well, and that it provides concrete insights to identify points for improving the EA function’s efficiency. We come to the conclusions that it is essential to determine the satisfaction of the EA stakeholders to get them actively involved, and that for an organization to justify its investments in EA it must be able to show positive effects of the EA function’s efforts.

Effectively applying EA is no easy task. Active participation of EA stakeholders is one of the main critical success factors for EA. This participation depends on the degree to which EA helps stakeholders achieve their individual goals. A highly related topic is effectiveness of EA, the degree to which EA helps to achieve the collective goals of the organization. We present our work regarding EA stakeholder satisfaction and EA effectiveness, and compare these two topics. We found that, regarding EA, the individual goals of stakeholders map quite well onto the collective goals of the organization. In two case studies we conducted, we found that the organization is primarily concerned with the final results of EA, while individual stakeholders also worry about the way the architects operate.

Most organizations that currently invest in EA are not getting the desired results. We think this is because EA is either too abstract, or too pragmatic. For example, when EA is only used as a management tool for long-term, strategic decision-making, it remains an abstract, academic exercise. When EA is only used as an implementation decision-making tool for projects it remains a pragmatic solution to solve short-term problems. In both situations, half of the entire EA learning cycle is badly executed or missing. Organizations that want to know whether maintaining a partially operating EA function is worth investing in, ask whether such investment leads to results.

To investigate this, and in essence bring all the topics of this research together, we asked 29 independent, professional assessors, highly experienced in judging organizational processes, to answer the question: Do you think EA contributes to achieving organizational goals? We asked these assessors to judge two situations where the EA cycle was not intact. We found no statistical correlation between how the assessors perceived the performance of the EA function and their perception of the attainment of organizational goals, which suggests that they do not connect these two topics in their judgment. Because we asked the assessors to judge two situations where the EA cycle was not intact, we conjecture that assessors want the EA cycle to be intact before they start relating this to achieving organizational goals. Furthermore, we found that, while assessing the performance of the EA function, assessors judge bad EA decision making more heavily than a faulty implementation of EA decisions.

With this thesis I hope to contribute to the process of increasing the maturity of Enterprise Architecture. The insights gained through the research presented in this thesis offers concrete tools to organizations for assessing and improving their EA function. Based on the lessons learned from this research, I give some advice: make sure that
architects are also responsible for implementing the architecture, make architects act proactively and supportive towards the stakeholders, ensure that all stakeholders are aware of their responsibilities related to EA, let senior management take the ownership of the architecture, and create a complete EA learning cycle.