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Enterprise Architecture

Creating Value by Informed Governance

 Springer

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Foreword by Frank Baldinger

I feel especially pleased and honored to write the foreword of this book because it is the first book supporting a Master's curriculum on Enterprise Architecture (EA) at Radboud University Nijmegen, the Netherlands. The book is also written for practitioners of EA in end-user organizations, and for IT-suppliers. The book focuses on the needs underlying enterprise architecture. The needs from a business perspective are considered, as well as the needs from the perspective of designers, engineers, and developers.

As you can read in Chap. 3, there are many definitions of "Enterprise Architecture." The authors of this book state: *The variety in these definitions does seem to indicate that the field of enterprise architecture is still in its infancy.* I would rather contribute this variety to growth, evolution, and enrichment within the EA domain, and to the tendency to define EA from the points of view of a variety of stakeholders. Many people (including myself) do still feel an urgent need for a converging EA-discipline, including international standards and acceptance. Sadly, there have only been some weak signs of such a development up to now. Simply put: In my opinion, EA has now evolved from infancy to adolescence.

Twenty years after the first publications and books on enterprise architecture, the domain is evolving slowly, but in a straight line, toward a more business driven approach. It has been transformed from process and technology driven to more business and information driven. In the last few years, it has also evolved from a framework-driven approach to a business-capability approach. This implies that the need for competencies with respect to information science and system engineering is extended with the need for "other" competencies, for example, focusing on business stakeholder management or organizational problem diagnostics. As a result, the activities and competencies of an enterprise architect are increasingly heterogeneous and evolve at least in two directions: toward an architecture engineering discipline and toward a discipline where enterprise architects work more closely to the business.

The authors of this book are lecturers involved in the Master's curriculum on enterprise architecture taught in tandem by Capgemini and the Radboud University Nijmegen. They have a broad and deep experience in both disciplines involved, rooted in their daily work at Capgemini and the University. The resulting chemistry between competencies and mindsets gives a very special flavor to this book: a flavor of enrichment of both sets of competencies. There is, however, also a built-in tension: the tension between the mindsets of the people working in the domains of business engineering versus system/information engineering. As both aspects are integrated in this book in a very natural way, the result has considerable added value for practical use in organizations, where the same tension exists. Therefore, this approach promises to be very useful to both students and experienced enterprise architects working in either domain.

As the Master's course on enterprise architecture at Radboud University is continuously evolving, this book shows that it has certainly the capability to support the need for convergence on EA and help the international EA-community to strive in that direction. This is the common ground for both the Master's curriculum on EA and the Netherlands Architecture Forum (NAF). The NAF community platform for EA is used by several authors of this book to validate and extend their ideas on EA. The NAF has about 70 organizations as members, distributed over three pillars: user-organizations, suppliers (including consultancy organizations), and scientific institutions (including educational institutions). They work together in working groups on mutually interesting EA-subjects, enriching the output with their distinctive views on the world of EA.

Many words have been written on the subject of EA, but I believe this book will stand the test of time and be recognized as a foremost contributor to the evolving body of knowledge of EA.

Ir. A.F. (Frank) Baldinger
Chairman, Netherlands Architecture Forum (NAF)

Foreword by Frank Harmsen

When I first read a draft version of the manuscript of this book, I was proud. Proud of the authors, who spent many, many hours passionately writing one chapter after another. Writing a book about a maturing competence such as enterprise architecture is difficult. The lack of good definitions and the many, many homonyms and synonyms roaming around in the area is one hurdle. Some concepts are still in a stage that they require further research. Some are defined in theory, while in need of much more empirical testing. And, last but not least, as in every scientific discipline, there are various “schools” advocating different paradigms and ways of thinking. Nevertheless, the authors have managed to produce a nice synthesis and overview of the domain. I congratulate them with this!

I was also proud on the collaboration between academia and “the industry.” For a company like Capgemini, such a collaboration is of vital importance. Capgemini continuously needs to innovate in order to help our clients in the best possible way. And we cannot do that on our own. I personally believe that the connection between academia and the consulting industry can be much stronger. There is so much low hanging fruit to be captured if scientists and consultants cooperate, but also on strategic issues requiring years of research; the universities and the consulting firms need to find each other. This is not only important to them, but to society in general. This book is a good example of how academia, in this case, the Radboud University Nijmegen, and the industry can jointly create an outcome that can help our clients to cope with the challenges and opportunities they face.

These challenges and opportunities are manifold. We live in an age in which change is the only constant. Complexity is omnipresent and so is the need to be agile and to transform. Businesses, i.e., our clients, need instruments to transform while their operations need to continue and improve. It is like redesigning and building a rocket that is already on its way to Mars—the term rocket science fully applies to the transformation challenges of our clients! And yet, these instruments are already available. One of the more important ones is architecture, and in particular, enterprise architecture. Enterprise architecture is the instrument that helps organizations in analyzing and structuring their current complexity, and in designing and managing their continuous transformation process to become agile, efficient, and effective.

The mission of Capgemini is: “Enabling Transformation.” It is, therefore, not surprising that enterprise architecture is in the heart of our company. We consider it of strategic importance. We have a long standing tradition that started in the eighties and continued in the nineties with the advent of our Integrated Architecture Framework (IAF), which is currently incorporated in The Open Group Architecture Framework (TOGAF). This tradition has been vital to us and beneficial to our

clients as well. This book is part of this tradition, and I thank the authors for writing it.

Prof. A.F. (Frank) Harmsen
Manager Service Line Architecture, Capgemini Netherlands

Preface

This book is positioned as a first in a series of books on enterprise architecture needed for a Master of Enterprise Architecture program, and is targeted both at university students and practitioners with a drive to increase their understanding of these fields.

As an introductory book, this book aims to explore the concept of enterprise architecture. At first glance, writing such an introductory book might seem as a straight forward task of setting up a structure and filling in “the blanks.” However, writing this book turned out to be a pleasant journey of discovery. Based on our past experiences, each of us had a clear understanding of enterprise architecture, based on several years of experience and insight in the field. However, when we started writing this book, and each of us exposed our individual understandings, it became apparent that our understanding of the field differed in several ways. This prompted several discussions leading to an abundance of new insights. Without exception, these discussions took place in a pleasant and open atmosphere, fueled by our shared drive for understanding and increased insight. We are now even more convinced than before, that the field enterprise architecture is a true multi-disciplinary profession.

In the resulting book, we would like to share our insights, while also hoping to continue our discussions, now also involving you as a reader. We also realise that the journey is still far from complete. While this introductory book provides an overview of the field of enterprise architecture from the perspective of our insights, many aspects need further refinement. In our opinion this also applies to the field as a whole. As we will also conclude in this book, the field needs more maturing, and in writing this book we hope to provide a humble addition to this maturation process.

Utrecht, The Netherlands

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The authors of this book are not the only ones who have contributed toward the creation of this book. Firstly, we would like to thank Cornelly Spier for doing the project management of this book. Without her enduring support, this book would not have been finished.

In writing this book, two much needed bridges needed to be built. One between academia and industry, and one between business and IT. It is our belief that the further development of the field of enterprise architecture requires a strong interaction across these bridges. While sharing this vision, our sponsors provided us with the support needed to create this book. We would, therefore, like to thank Capgemini's architecture service line, in particular, the architecture practices of the financial services, public and products sectors, as well as the Institute for Computing and Information Sciences from Radboud University Nijmegen for their support in creating this book.

Furthermore, we would like to thank the reviewers of earlier versions of this book's manuscript: Jan Achterbergh, Piet Adriaanse, Frank Baldinger, Dave van Gelder, Bas van Gils, André Gronsveld, Frank Harmsen, Wijke ten Harmsen van der Beek-Hamer, Herman Hartman, Jan Hoogervorst, Inderjit Kalsi, Mendel Koerts, Marc Lankhorst, Mieke Mahakena, Ronald Orlemans, Lucas Osse, Arnold van Overeem, Bart and Michal Papegaaij, Bert Sneep, and Anton van Weel for their valuable contributions.

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Chapter 1

Introduction

1.1 Background

This book has been created in an effort to develop a textbook for one of the key courses of a *Master of Enterprise Architecture* program. It is a first in a series of books needed to further underpin this Master's program with textbooks combining a sound theoretical base with practical insights, and has been authored in a close collaboration between industry and academia. In authoring this book, we have been driven primarily by the need for textbooks for the further professionalization of enterprise architects as well as education of students aspiring to become enterprise architects. As such, the books needed for the *Master of Enterprise Architecture* program, will be targeted both at university students, as well as practitioners with a keen interest in gaining a thorough understanding of these fields.

In this book, we explore the concept of enterprise architecture. An enterprise is understood as comprising of at least business, human, and technological aspects. To be more precise, we define enterprise as a *goal oriented cooperative to be implemented by people and means*. In creating, evolving, and/or transforming enterprises, several challenges come to the fore on how to govern such changes. Enterprise architecture is an emerging means of governing these changes. The key drivers for this means therefore are the enabling of informed decision making on these changes, as well as ensuring compliance to these decisions.

This book aims to provide an overview of enterprise architecture including the process of creating, applying, and maintaining it, while taking a fundamental view on the field of enterprise architecture. In doing this, we aspire to create an understanding of the mechanisms underlying enterprise architecture, as well of its role as a governance and decision making instrument bridging the gap between an enterprise's vision, strategy, and change projects. This role is also taken as a starting point to explore the results that may be produced as part of an enterprise architecture, the process in which these are to be produced, and the role the architect will play in this process. As such, this book does not describe a specific method to develop an enterprise (IT) architecture [21, 35, 148], nor does it define a specific modeling language for enterprise architecture [20, 78] or does it subscribe to a specific enterprise architecture framework [30, 45, 139, 154, 155]. As mentioned above, it rather aspires to offer the reader a fundamental way of thinking on enterprise architecture. The field of enterprise architecture still seems rather immature. While this book aspires to take a more fundamental view, we will quite regularly run into situations where insight from practitioners seems to make certain indications about, for example, the potential role/value of enterprise architecture, while scientific evidence is lacking. In this book, we also not provide this much needed underpinning. This remains left as challenges to the scientific community. Such challenges will also be summarized

in the final chapter, where we list a range of research challenges that need to be addressed when maturing the field.

1.2 Outline of the book

In Chap. 2, we start with an overall exploration of the motivations why enterprises turn to *enterprise architecture* to aid them in meeting modern day challenges. Developments such as globalization, the fusion of business and IT, new technologies, the introduction of new business models and new regulations, occur at a higher pace than ever. This requires modern day enterprises to be able to adapt themselves swiftly to these changes. This puts a challenge on managers to make the right decisions at the right time for both short and longer term needs. The increasing complexity of the issues involved, as well as the growing diversity and heterogeneity of the concerns and stakes of the stakeholders involved, render preexisting approaches less adequate. This calls for a new governance instrument, a call that is to be answered by the instrument of enterprise architecture. Chapter 3, therefore, continues by discussing enterprise architecture as a means to meet the needs discussed in Chap. 2. It provides a historical perspective on enterprise architecture, followed by a discussion on the governance paradigm which will be used to underpin our definition of enterprise architecture. In addition to providing the definition of architecture as it will be used in this book, the core concepts of enterprise architecture will be discussed.

Equipped with this understanding, Chap. 4 continues with a discussion of the results that can be produced when architecting an enterprise. In discussing these results, we will distinguish several dimensions along which to classify and position them. Among these dimensions, we will distinguish between:

- **Subject dimensions**—Dealing with the classification of the subject, relative to the enterprise being architected, with which the result is concerned (e.g., business, application, enterprise-wide, system specific, contextual, conceptual, logical, etc.).
- **Purpose dimensions**—Expressing the purposes for which the result is intended (e.g., analytical, collaborative, informative, decisive, etc.).
- **Form dimensions**—Concerned with the forms in which the result may occur (e.g., principles, patterns, graphical models, formal models, textual descriptions, informal sketches, implicit knowledge, attitudes, etc.).

These dimensions will give rise to the so-called architecture frameworks, such as Zachman [155], TOGAF [139], RM-ODP [64], DYA [147], and IAF [30, 45]. The purpose dimension is elaborated in views and viewpoints for specific stakeholders [60].

In Chap. 5, we zoom in on the processes involved in creating, applying, and maintaining enterprise architecture, covering such activities as:

- joint conceptualization of problems, strategies or solutions,
- risk assessment and mitigation,