Introduction to the course

PREFACE

Before you start the course Enterprise Architecture, we advise you to carefully read this introductory chapter of the workbook. It highlights and informs you of the course's purpose, its objectives, the course structure and (reading) material. It also informs you on how to study for the course, and how your work will be graded. This workbook provides you with insights, practical and technical information, guides you through the course and helps you study for it successfully.

1 BACKGROUND

1.1 Organizations as complex, adaptive socio-technical systems

Organizations (also often referred to as ' enterprises') that want to be more competitive need to align their business operations and Information Systems and Information Technology (IS/IT) resources (Wegmann, 2002) and take into account the dynamics of the changing environment (Brown & Eisenhardt, 1997; Eisenhardt & Martin, 2000; Teece, Pisano, & Shuen, 1997).[1] In addition, they need to lever intangible resources to build competences (Wernerfelt, 1984). Effective use of flexibility and adaptability in IS/IT is one way in which large enterprises can maintain a competitive edge (Duncan, 1995; Wilkinson, 2006). It is, however, neither IS/IT nor business models or any organizational arrangement viewed in isolation that creates competitive advantage. Organizations can in essence be viewed as complex, adaptive socio-technical systems. As such, they include interrelated entities such as people, processes, resources, information and systems. Competitive advantage is therefore the result of an integrated, consistent and coherent business, organizational, informational and technological design (Hoogervorst, 2004). That is where the concept of 'Enterprise Architecture' comes into play.

1.2 The concept of Enterprise Architecture

This course's subject is Enterprise Architecture (EA). Since its conception in the late eighties (Cf. Zachman, 1987), the EA domain has received substantial interest both from theorists, government EA initiatives, consultants and IT practitioners. John F. Zachman was one of the first to develop an EA framework, the Zachman Framework for Enterprise Architecture, that is nowadays still widely used in both private and public organizations around the globe. EA practices enable organizations to achieve strategies through orchestrated and aligned organizational processes, governance and organizational structures, using holistic perspectives, models and views (Bernard, 2012; Ross, Weill, & Robertson, 2006). In this process, EA provides insights, enables communication among stakeholders and guides complicated change processes (Jonkers et al., 2004). EA enables organizations to add value across all business units, operations, technology, and human resources and align this with the use of resources (Bernard, 2012). In practice, understanding and demonstrating the value of EA remains an enduring challenge (Tamm, Seddon, Shanks, & Reynolds, 2011).

Until recently, academic and theoretical discussions on EA remained scarce (Tamm et al., 2011) and the extant literature has stumbled upon fundamental problems. These problems include a lack of uniformity in definitions and dimension (Greefhorst, Koning, & Van Vliet, 2006) and a lack of explanatory theory and publications, delivering only tentative views on how EA yields benefits. The focus has also been rather from a technical

[1] You are not obliged to read any of the included references if they are not included in Appendix A.

baseline (Ren & Lyytinen, 2008). Another important issue is the lack of empirical findings on how EA delivers benefits (Foorthuis, van Steenbergen, Brinkkemper, & Bruls, 2015; Wegmann, 2002).

Over the past decade or so, there has been increased attention in IS/IT research and management practice on the adaptive and co-evolutionary nature of IS/IT (Benbya & McKelvey, 2006a, 2006b) and on dynamic, multi-faceted and non-deterministic processes to align IS/IT and the business in constantly-changing business environments (Chan & Reich, 2008; Van de Wetering, 2016; Van de Wetering & Batenburg, 2014; Vessey & Ward, 2013). To date, however, very little research has been done on fitness and efficacious adaptation in the context of EA. The need for an integral understanding of dynamic architectural complexity, adaption and enterprise transformation is also stressed by Zimmermann, Jugel, Schmidt, Schweda, & Möhring (2015) and systematically addressed by Van de Wetering & Bos (2016) and Vessey & Ward (2013).

EA's models and frameworks generally guide design decisions across the enterprise, specify how information technology is related to the overall business processes and outcomes of an organization and ensure that the relationships and dependencies among architectural components are managed (Janssen, 2009). EAs are commonly represented in different layers to describe a set of cohesive or related elements in order to create structure in a chaotic environment (Janssen, 2009; Winter & Fischer, 2006). This is also recognized by service-oriented approaches, e.g. Service-Oriented Architecture (SOA) developments (Bell, 2010).

EAs – or Enterprise systems architectures, as they are sometimes called (Nightingale & Rhodes, 2004) – come with many definitions (Bernard, 2012; Ross et al., 2006; Schekkerman, 2004). For the purpose of this course, we define enterprise architecture as the:

> *'fundamental organization of an enterprise as a socio-technical system, along with the principles governing its design and development.'*

Following this definition, an EA embodies all relevant components for describing an enterprise, including its operating model, organizational structure, business processes, data, applications and technology. Principles and design rules provide guidance for the (re)structuring of enterprise components, as well as a means to ensure consistency in the use of components and in their relationships.

1.3 Enterprise Architecture Management

In this course we address entrepreneurs' or executives' questions about enterprise architecture management (EAM). Much of the extant literature concerning EA focuses on engineering techniques such as modeling (tools), design patterns, (reference) architectures, (knowledge) repositories and so on. However, if we want to unleash EA's full potential and benefits within the enterprise, we need to better understand its broader management context. That is to say, EAM needs to be a top priority and management topic (Simon, Fischbach, & Schoder, 2014). In this course you will learn how executives, business and IT managers can use EAM to leverage strategic planning and controlling processes, as well as how this contributes to the enterprise's competitive advantage. EAM will therefore be the main focus of this course.

As a discipline, EAM emerged over the past 25 year or so as a way to deal with organizational change, business challenges and complexity management in an increasingly turbulent business environment.

Early EA initiatives, models and methods (in the early 1980s) primarily focused on the basic documentation and modeling of architectures (*phase* 1: 'EAM as advanced IS engineering'). Frameworks created during this phase influenced many other frameworks and almost all current frameworks are based on principles formulated back then. It was not until the beginning of the 90s (*phase* 2: 'EAM as advanced IS management') that EAM professionals realized that focusing solely on the modeling of architectures alone was not enough to contribute to competitive advantage. Owing to the changing business and IS/IT landscape, advanced EAM frameworks emerged. Usually, these frameworks not only provided the means to develop architectural artefacts and/or models. These advanced frameworks, e.g. TOGAF, also contained guidelines for EAM planning, implementation and controlling.

Nowadays (see *phase* 3: 'EAM for strategic business management'), EAM is a mature field and has become a discipline that provides organizations with a philosophy, methodologies and associated tools to develop, realize and operate flexible enterprise architectures. Doing so, EAM assists enterprises in maintaining the A) flexibility, B) cost-efficiency and C) transparency of their technical infrastructure, information systems, business processes and organizational structures closely linked strategic planning (i.e. business strategies, goals and objectives). EAM can therefore be seen as an enabler for implementing and managing corporate change and the alignment of business and information systems architectures. EAM is now on the CxO agenda and, as a discipline, it has become a strategic function attached to board members.

Using the textbook 'Strategic Enterprise Architecture Management. *Challenges, Best Practices and future development*', by Ahlemann, Stettiner, Messerschmidt and Legner (*Eds.*) and various scientific articles and white papers, we describe how businesses can exploit EAM's full potential. We do this from a non-technical, business-related perspective, and explore EAM's capacities by discussing its success components successively in different learning units.

EAM in academic and business literature also comes with a wide range of definitions. Therefore, we follow the textbook's definition of EAM:

> *'EAM is a management practice that 1) establishes, maintains and uses a coherent set of guidelines, architecture principles and governance regimes that 2) provide direction for and practical help with the design and the development of an enterprise's architecture in order to 3) achieve its vision and strategy.'*

To conclude this introduction, we provide you with an overview of what EAM is and is not, to elaborate a bit on what the characteristics are of EAM as a management discipline. As can be gathered from Table 1, in relation to EAM, tooling, the documentation of models and technical expertise only play a supporting role, for instance. What EAM truly is, is a way of thinking about the organization's architecture and how to understand, plan and control it. EAM will therefore support strategic planning, improve quality of decision-making and contribute to establishing consensus among managers.

TABLE 1. Characteristics of EAM

Characteristics	*What is EAM (Yes/No)*
Tooling	No
Modeling approach	No
Technical expertise/competence	No
New management process	No
Strategy development	No
Management philosophy	Yes
Organizational function	Yes
Management practice method	Yes
Culture	Yes

2 LEARNING OBJECTIVES

After studying this course you should be able to:

- Describe the key building blocks of successful EAM initiatives
- Describe the EAM life cycle within organizations
- Know the main principles of modeling approaches with regard to EA
- Compare the various EA frameworks and approaches
- Explain how to successfully introduce and embed EAM practices, artifacts, and roles within an organization
- Use EAM in a real-life research case/project

Eventually, you should be able to apply the obtained knowledge, insights and skills to a business context, i.e. by delivering a full research paper/report. On the course site (yOUlearn) you will find a standard template that you (and your team mates) will use to document results systematically throughout the entire course. The final format and associated criteria for the paper will be published at the start of the course (see also section 5.2).

3 PLACE OF THE COURSE WITHIN THE CURRICULUM

The course Enterprise Architecture is part of the Master's in Business Process Management and IT and Computer Science program of the Faculty of Management, Science & Technology. For IS/IT and business professionals, this course offers a good way to understand, in a structured way, what EAM involves and how to apply EAM in real-world practice.

4 PREREQUISITE KNOWLEDGE

The course Enterprise Architecture requires no additional prior knowledge beyond what is basically required to start any course within the Master's program in Business Process Management and IT or Computer Science programs. In this course, students will be working on a research project (see section 5.2). Hence, students do need to have some basic skills and competences to manage and control a project (e.g. planning, budgeting, forecasting, work breakdown, capacity/resource planning, quality management, documentation etc.).

5 COURSE STRUCTURE

5.1 Course overview and study load

This course consists of three *blocks*, ten *learning units*, including various (weekly) individual exercises, a large course project (i.e. research project, see next section) and a final presentation of your (collective) work during the final exam week. Each block takes about three to four weeks to complete. Each learning unit focuses on *assigned readings* from the textbook and various scientific articles on enterprise architecture management and related topics (see Appendix A). Also, there are various a) individual *practical assignments* (see Appendix B for a complete overview) and b) project instructions and tips and tricks (i.e. '*Course project parts'*) as part of the larger course project that will guide you through the research project; see next section and Appendix C for a complete overview. The weekly assignments need to submitted through yOUlearn *individually*.

Individually submit weekly assignments!

To pass for this course, you will have to submit *all* the individual assignments through yOUlearn at the end of the course. The originality of the work will be checked.

At the end of this course, all students will also have to write and hand in an individual reflection on this course. A standard template will be made available on yOUlearn.

This course has a total workload of about *165 hours*. Each learning unit will indicate what the associated study load will approximately be; see also Table 2 for a complete overview per block and learning unit. For a complete overview of the workload per activity (type), see Appendix D.

You will study the course material and apply acquired knowledge and insights to various assignments and a comprehensive course project during the span of the course, i.e. eleven weeks.

TABLE 2. Study load Enterprise Architecture

Course part	*Study load (hours)*
Course orientation	**8**
Block I: Basic terms, strategic alignment and EAM	**40 (total)**
Learning Unit 1: Enterprise Architecture Management	10
Learning Unit 2: Aligning EAM with the CxO agenda	15
Learning Unit 3: EAM governance, maturity and organization	14
Block II: EAM process integration	**47 (total)**
Learning Unit 4: Strategic planning and the IT architecture competence	15
Learning Unit 5: Project life cycle and EA practices and benefits	16
Learning Unit 6: EAM operations, monitoring and EA co-evolution	16
Block III: Modeling, adoption and EAM developments	**56 (total)**
Learning Unit 7: EA frameworks, modeling and tools	16
Learning Unit 8: People, adoption and implementation challenges	15
Learning Unit 9: EAM developments (divided over two weeks)	25
Learning Unit 10: Presentation meeting	15

5.2 Course project

An important part of this course is applying enterprise architecture management knowledge and skills in practice. This is done through the course (research) project. A small team of students (see yOUlearn for further instructions) will explore various aspects of enterprise architecture management within an organization. More specifically, all teams will systematically investigate what the impact is of a large strategic project (e.g. large-scale IT implementation and organizational transformation that addresses a real-life business problem) on the EA of the organization. This organization can potentially be your own organization or for instance that of a current or past client. Doing so, you will be using various complementary research methods (e.g. desk research, focus groups, interviews, surveys, etc.).

At the end of the course, each team will write a full research paper. This research paper will determine 75% of your passing grade (the other 25% comes from the presentation, see next section).

The paper will be written in English, should approximately be 12 pages long (single-spaced). The 12 pages must include all text, tables, figures and appendices (if needed). The front page, abstract, keywords, and references are excluded from the 12 pages. The paper should contain at least 15 (max. 30) scientific references. You may use the articles (and chapters of the book) that we read throughout this course; see also Appendix A. In managing your references, you will be using EndNote reference software (the OU provides you with a free student license).[2] In general, the paper follows a common conference/journal paper style (beginning with an introduction and ending with conclusions/discussions). A format and additional guidelines for structuring the research paper will be provided on yOUlearn at the beginning of the course. The minimum requirements (and grading conditions) will also be specified and explained in more detail.

We will provide various example (case) studies (from peer reviewed journals or conferences) at the start of this course. You may use these examples as an inspiration (copying is not allowed) to extend and enhance your own work.

All submissions (i.e. the full research papers) should be original. This means that all content should not have been previously published in a journal/conference proceedings (or any other outlet) nor presented (at a conference or elsewhere). We will check all articles using automated software. Papers should be submitted as a '.docx' file.

A research article that violates any of the above guidelines (and the requirements specified on yOUlearn) will be (temporarily) eliminated from the review process by the lecturers.

Based on experience with previous runs of this course, we advise you to start as soon as possible with (team) preparations. E.g. make a planning, divide tasks and responsibilities among team members, make contact with a potential organization, identify an interesting and relevant strategic project, request documents, plan interviews with (IT) managers and advisors involved in the architecture process, etc. See Appendix C for an overview of the various course project parts, main suggested activities and the associated work load for each part.

It is also important to note that the lecturers might use outcomes of the research cases (or a subset) anonymously for research purposes. Therefore, when you contact a company or start working on the project, we advise you to address this topic, ask for their formal approval and archive it. We elaborate on this topic in one of the instructions of the course project part and we will probably also address it during one of the online sessions.

Getting project approval!

Each team needs to get approval from one of the lecturers before carrying out the research project. This means that you have to email a brief description of the identified project including project goals/objectives and a SMART formulation of the project.

5.3 Presentation

During the exam week (week 11) we organize a mini-conference (see yOUlearn for the exact schedule). All teams will present the outcomes of the research project and participate in interesting discussions on project cases, EA and related topics. All team members should be present and actively participate during the presentation/discussion. The lecturers will grade the team presentation during the mini-conference. It will determine 25% of your final grade.

5.4 Course content

In this course, you will study all chapters from one textbook:

[2] You can only use Endnote at home (desktop / laptop) or at a designated work station at the Open University. See www.ou.nl/studieplaza for a short instruction video.

'Strategic Enterprise Architecture Management. *Challenges, Best Practices and future development*', by Ahlemann, Stettiner, Messerschmidt and Legner (*Eds.*).

You will also be studying various scientific articles and white papers (established and recent work) concerning enterprise architecture and/or management (see Appendix A for a complete overview).

This course's *workbook* structurally outlines (on a weekly basis) which chapters of the book and/or articles you will need to read. It also introduces weekly assignments and briefly introduces the course project you will be working on.

6 SUPERVISION AND GUIDANCE

Supervision during the entire course is done primarily through the course website, yOUlearn. This is the platform we will use to provide you with all the necessary course information, news, web links, assignments, reading material, the exact course schedule, etc. You can also participate and ask questions on the discussion forum. In addition, we also use yOUlearn for two planned online sessions. During the first online session, the kick-off, we will go through all sorts of practicalities, and discuss some basic terms and definitions of enterprise architecture management. Also, we will briefly discuss what we expect you (and your team) to do during the larger research project. The second online session (somewhere halfway) mainly is about discussing some preliminary course project results and tips and tricks. In addition, the lecturers will give students some general feedback (based on what they have seen so far). Up-to-date information about these meetings can be found on the yOUlearn site.

7 STUDY INSTRUCTIONS

This course is divided into three blocks and associated learning units. This workbook guides you through the course and briefly outlines what to read from the textbook and/or articles for each distinctive learning unit. In addition, each block and learning unit contains a brief introduction to the main content. Also, each learning unit presents learning objectives that indicate what you should be able to do after studying the respective unit, presents practical assignments and introduces (sub)assignments of the course project.

For the online sessions (or virtual classes) we make use of a Collaborate plug-in within yOUlearn. In order to actively participate during these session, you will need (1) a good internet connection (plugin your UTP-cable, wireless sometimes interrupts the connection), (2) a headset and (3) a webcam, although the latter is not always necessary. We make recordings of each online session, so that you can review it once more if needed.

8 ABOUT THE COVER

On the cover of this workbook you will find a night shot of the Friedrichstraße in Berlin. You are looking through a structure of building blocks (a term often used within the field of enterprise architecture). The block structure is a basic architectural principle for the entire Friedrichstraße. On top of this you will find various technical IT-architectural elements (as used by the Dutch Tax and Customs Administration).

Planning an EA for an organization is similar to planning a city. In general, city planning includes the process of designing the city's development, covering land use, streets, utilities and waste disposal, etc. This design is multi-faceted, highly interwoven, interdisciplinary and above all, complex. This is also due to the fact that the design should meet several – sometimes conflicting – design objectives. The same holds for EAM. Instead of the usual elements of a city design, such as buildings, streets, rivers, dams and all sorts of utilities, EA's consists of many interrelated components that make up the fundamental structure of an organization: business processes, organizational structures, information systems and technological infrastructure. EAM also includes developing, implementing and controlling these different structures of the organization.