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# Advances in Enterprise Information Systems

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## Foreword

For many years now Enterprise Information Systems have been critical for businesses in order to successfully navigate the global market. The development that started with design and implementation of integrated systems has evolved into a multitude of perspective and ideas.

The Enterprise Information Systems functionality extends from mainly ERP (Enterprise Resource Planning) system towards a portfolio of standard systems such as: CRM (Customer Relationship Management) systems, SCM (Supply Chain Management) systems and so on.

Practitioners have realized that issues of dealing with modern IT systems goes well beyond just technology and for practitioners implementing and operations standard information systems have been a distinct topic on its own. Likewise the field of Enterprise Information Systems has emerged from a myopic technical implementation discipline towards a field being characterized by being open to new ideas.

This also requires that the field need to investigate premises taken for granted and integrate new ideas into the knowledge base. This is what we intend with this second volume of *Advances in Enterprise Information Systems*.

Most of the papers are extended versions of papers presented at the IFIP WG 8.9 International Conference on Research and Practical Issues of Enterprise Information Systems (CONFENIS 2011), Aalborg, Denmark, October 16–18, 2011. The theme of this conference was to re-conceptualize Enterprise Information Systems.

The book is divided into seven thematic sections each exploring a distinct topic. In “Concepts in Enterprise Information Systems” the authors presents new concept and ideas for the field. The “Cases in Enterprise Information Systems” presents studies of enterprise information systems in an organizational context.

“Business Process Management” is one of the major themes within enterprise information systems and “Designing Enterprise Information Systems” present new approaches to the design of processes and system and also discusses how design can be taken as a specific perspective.

The application of “Enterprise Information Systems in various domains” are generic studies that contributes to advancing the practical knowledge of the field. Also towards “Global issues of Enterprise Information Systems”.

Finally in *Emerging Topics in Enterprise Information Systems* the new technologies and ideas are explored. In particular cloud computing seems to be setting the agenda for future research in enterprise information systems.

The editors wish to acknowledge the work of the many people that were involved in order to make this volume come true. First and not least we recognize the work of the authors who contributed to this volume with their great ideas. Also the many reviewers that were involved in the various stages of the papers should be acknowledged. And finally we wish to recognize the work performed by the people involved in compiling, organizing and printing this second volume of *advances in enterprise information systems*. Enjoy the book!

Sohail Chadhry

Charles Møller



## A comparison of practitioner and researcher definitions of enterprise architecture using an interpretation method

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**ABSTRACT:** The term enterprise architecture has been in use for almost thirty years if the seminal paper (published in 1987) by Zachman is taken as its starting point. As a scientific area of study this time span is relatively short but for the practitioner it could be a time long enough for the original interest to wane. Gartner's research reflects that the practitioner interest is growing and the development of enterprise architecture frameworks, such as the 2009 update of The Open Group Architecture Framework (TOGAF), shows the active development of enterprise architecture frameworks. In this paper two enterprise architecture definitions that is representative of the practitioner and the researcher position are compared to the definitions of the Zachman Framework and TOGAF to determine the agreement between practitioner and researcher thought on enterprise architecture. The comparison is conducted via an interpretation method that is based on hermeneutic phenomenology. The results indicate a correspondence between practitioner and researcher views that opens the way for co-operative research.

**Keywords:** Enterprise architecture, enterprise architecture frameworks, meaning.

### 1 INTRODUCTION

The term enterprise architecture has been in use for almost thirty years if the seminal paper (published in 1987) by Zachman (1987) is taken as its starting point. As a scientific area of study this time span is relatively short but for the practitioner it could be a time long enough for the original interest to wane. However Gartner's research reflects that the practitioner interest is growing and the development of enterprise architecture frameworks such as the 2009 update of The Open Group Architecture Framework (TOGAF) shows the active development of enterprise architecture frameworks.

Banerjee (2010) summarized a popular debate dealing with the topic of the death of enterprise architecture, hosted on the LinkedIn (LinkedIn Corporation 2011) social networking website, with the claim that there was "no disagreement about the proposition that 'Enterprise Architecture IS dying'". Allega (2010) in turn emphasized that Gartner's 2010 hype cycle report (Burton and Allega 2010) for enterprise architecture indicated growth. The blog posting that sparked the debate was based on Zachman's (Zachman 2009) explanation of his statement that "enterprise architecture is relative"<sup>1</sup>. In this article Zachman expresses his dissatisfaction with the arbitrary use and ownership,

<sup>1</sup>The response from Zachman was made to correct a misquotation by Roger Sessions on the issue.

by practitioners, of the term enterprise architecture by exclaiming: "this is what is killing enterprise architecture."

In an attempt to synthesise the variety of practitioner definitions of enterprise architecture a member of a LinkedIn group called Enterprise Architecture Network (Pragmatic EA 2010) posted a challenge to "Describe the purpose of EA in one 160 character SMS message." The aim of this challenge was to explore an explanation of enterprise architecture succinct enough to communicate effectively. The results of this effort indicated participation by 308 members of the group with postings ranging between 1 to 85 comments per participant (Smith 2010). The submissions were synthesized into a definition (Smith 2010) that describes the purpose of enterprise architecture as existing to: "enable an enterprise to realize its Vision through the execution of its Mission, whilst enabling it to respond to change and increasing its effectiveness, profitability, customer satisfaction, competitive edge, growth, stability, value, durability, efficiency and quality while reducing costs and risks by Strategic Planning, Architecture and Governance supported by a Decision Support framework in the context of aligning all parts of the enterprise using Models, Guidance, Processes and Tools."

From an academic research perspective, Dankova (2009) aimed at a synthesized definition of enterprise architecture by analysing a number of established enterprise architecture definitions. The result of this research produced the following description: "Enterprise architecture represents (an approach to developing) a general conceptual plan, which describes the structure of the enterprise with its separate components and links between them; it defines the principles and rules for the design and operation of the organization structure, the processes and information systems in the enterprise, and it synchronizes information technologies in the enterprise with its business goals and processes". From these two efforts we can claim that the issue of defining and describing enterprise architecture is both an academic and practitioner concern. The relative length of each definition suggests that the task of defining and describing enterprise architecture is neither simple nor is it straightforward. What is unknown is the degree to which the practitioner and researcher understanding of enterprise architecture is in agreement on the meaning of enterprise.

The purpose of this paper is to explore the relationship between the practitioner and researcher view of enterprise architecture as illustrated by their respective definitions. This purpose is achieved by an examination of the phenomenon of enterprise architecture definitions as proposed by enterprise architecture practitioners and researchers. The examination is accomplished by making use of a method that interprets the LinkedIn and Dankova definitions against the definitions of the leading enterprise architecture frameworks, namely the Zachman Framework and TOGAF. The result of this interpretation indicates the level of agreement between the practitioner and researcher positions in the light of the leading enterprise architecture frameworks.

Section 2 of this paper provides the background to the research, section 3 describes the research method and its theoretical foundation, section 4 discusses the results and the paper concludes with section 5.

## 2 BACKGROUND

Enterprise architecture has been closely associated with the role of information systems development and information technology management in business. Ross et al (2006) describe an information technology engagement model and designate enterprise architecture as a tool to align the business with information technology. Cast in this alignment role enterprise architecture is further described as a blueprint and a management tool (Jonkers et al. 2006). The Enterprise Architecture Body of Knowledge (EABOK (Hagan 2004)) confirms this view by describing enterprise architecture as the description of "how the elements of an organization fits together" and proceeds to define these elements as business processes and information technology. Zachman (1987) contributed to this understanding of the relationship by casting his framework in its first version as an information systems framework and by insisting that organizations find themselves in an information age (Zachman 1997) where the organization is a kind of information system.

Boh and Yellin (2007) refers to the standardization role of enterprise architecture in information technology management. This management theme is further developed in the concept of the governance of an organization that is inclusive of business and information technology (Boh and Yellin 2007). Finally, it is the increased complexity and embedded role of information technology in the operations of business (Ranganathan and Jouppi 2005) that makes the issues of information technology also the issues of enterprise architecture.

The practitioner, in many cases equipped with an information technology background, in enterprise architecture relies on the availability of tools, methodologies and bodies of knowledge to effectively create architectures for the enterprise. The academic researcher interested in enterprise architecture, on the other hand, labours towards the creation of a knowledge base. The work of the researcher provides the material for the practitioner whilst the work of the practitioner makes the work of the researcher practical for everyday use. A lack of common understanding between the practitioner and the researcher, about the meaning of enterprise architecture, leads to the potential problem of disagreement in their mutual understanding and results in a lack of co-operation. This lack of co-operation hampers the development of enterprise architecture as a research field and its application in the business world.

The interest shown by practitioners and researchers in the definition of enterprise architecture is evident in the LinkedIn and Dankova efforts. These activities, though, are each still part of their own domain namely that of the practitioner and the researcher, with no explicit cross influence or co-operation. The common denominator is the dependence of both practitioner and researcher on the range of existing enterprise architecture frameworks that is used for their separate purposes. What is unknown is the degree to which the practitioner and researcher understanding of enterprise architecture is in agreement on the meaning of enterprise. Therefore in this paper we focussed our attention on comparing the practitioner and researcher definitions by using an interpretation method.

The next section (section 3) discusses the research approach in terms of its underlying theoretical basis as well as the method of interpretation used to analyse the texts that is representative of enterprise architecture research and practice.

## 3 METHODOLOGICAL FOUNDATION: AN INTERPRETATION METHOD

This research consists of a phenomenological examination of the phenomenon of the definitions of enterprise architecture. Hermeneutics (the science of understanding) in partnership with phenomenology (hermeneutic phenomenology) were used as the methodological foundation for the creation of an interpretation method to compare the established definitions of enterprise architecture against the LinkedIn and Dankova definitions. The following sections provide an overview of phenomenology (section 3.1), hermeneutics (section 3.2), hermeneutic phenomenology (section 3.3) and the interpretation method (section 3.4).

### 3.1 Phenomenology

The term phenomenology means the study of the way things appear to the human consciousness (Hammersley 2003), in order to identify the essential structures that characterize experience of the world. Berrios (1989) describes phenomenology as the combination of the Greek words *phainomenon* (which means to appear) and *logia* (which means discourse). Edmund Husserl (1859–1938) is associated with the development of phenomenology as a discipline (Wrathall and Dreyfus 2006) that grew over a period of four decades. Husserlian phenomenology can be described as a descriptive enterprise aimed at clarifying phenomena by way of eidetic and reflective inquiry (Crowell 2006). A number of well-known thinkers and philosopher such as Martin Heidegger, Karl Jaspers and Edith Stein amongst others developed Husserl's original ideas into various new directions to the degree that Husserl called himself a "leader without followers" (Moran 2002).

Martin Heidegger (1889–1976) (Harman 2007) called for a radicalization of phenomenology in its application as a way to think about life. Whereas Husserl argued for a phenomenology

that removed, from the thinker, any preconceived ideas or notions about the phenomena, Heidegger worked towards a phenomenology that was based on an interpretation of phenomena (Cerbone 2008) that included the thinker's experience and own understanding. This allowance made an absolute understanding of the phenomenon impossible and made room for an interpretation that increased understanding as the inquiry proceeds. This increase in understanding proceeded in a circular fashion as the researcher approached the phenomenon with a kind of pre-understanding that was open to being changed as the understanding of the phenomenon developed. The circularity of the process is described as a hermeneutic circle.

### 3.2 Hermeneutics

Demeterio (2001) describes hermeneutics as a "theory, methodology and praxis of interpretation that is geared towards the recapturing of meaning of a text, or a text-analogue, that is temporally or culturally distant, or obscured by ideology and false consciousness". Hermeneutics evolved from the interpretation of religious texts to a scientific method in its own right (Crotty 1998). The meaning of the text as an interpretation is made possible as the reader understands the parts of the text (words) in the context of the whole (sentences and paragraphs) and conversely the whole in terms of the parts (Jasper 2004). This arrangement is called the hermeneutic circle (Jeanrond 1994). Another way to explain this exchange is to consider interpretation as an engagement between a subject (or interpreter) and an object (or text) in order to reach the goal of understanding.

### 3.3 Hermeneutic phenomenology

The philosopher Martin Heidegger's project was to address the question of being that according to Gelven (1989) is more precisely known as *what it means to be*. Heidegger (Heidegger, Macquarrie, and Robinson 2000) described his analysis as a work of ontology that is based on a phenomenological method and is associated with a hermeneutic process of understanding. Subsequent philosophers identified the Heideggerian method as a *hermeneutic phenomenology* (Van Buren 2005). Heidegger argued that the pre-existing understanding of the observer of a phenomenon is an important part of the act of the phenomena's interpretation. This pre-conceptual understanding can (and will) change during the process of interpretation (Inwood 1999). The movement between pre-understanding and the phenomenon is characterised as a hermeneutic circle where the observer of the phenomenon starts the process of interpretation with a basic (if not vague) pre-understanding of the phenomenon that is influenced and made clearer by the process of interpretation (Heidegger, Macquarrie, and Robinson 2000). This is a process that essentially is never complete as the phenomenon will always reveal more of itself as understanding grows in the observer.

### 3.4 An interpretation method

Hermeneutics has over time proved helpful as a method for the development of a methodology to study the human sciences (Gadamer 2004). The areas of its application range from nursing (Annells 1996) and psychology (Sandage et al. 2008) to the management sciences (Lee 1994; Myers 2008) and information systems (Klein and Myers 1999; Cole and Avison 2007; Wang, Lin, and Feng 2008). Due to the close association of enterprise architecture with the world of business and information technology the hermeneutic methods as found in the management sciences and information systems research is of particular interest to the research reported in this paper.

Butler (Butler 1998) argues in favour of an hermeneutic research method for information system studies that aims at interpreting social phenomena. As a result a method is proposed that emphasizes aspects such as the centrality of the hermeneutic circle, language as the universal medium of understanding and the central role of the dialectic in hermeneutic thought.

The hermeneutic circle is an interaction between the whole and the part of an interpreted text (Lee 1994). For example, the words that form part of a text must be understood before the text as a whole can be understood, whilst the words as such can only really be understood in the context

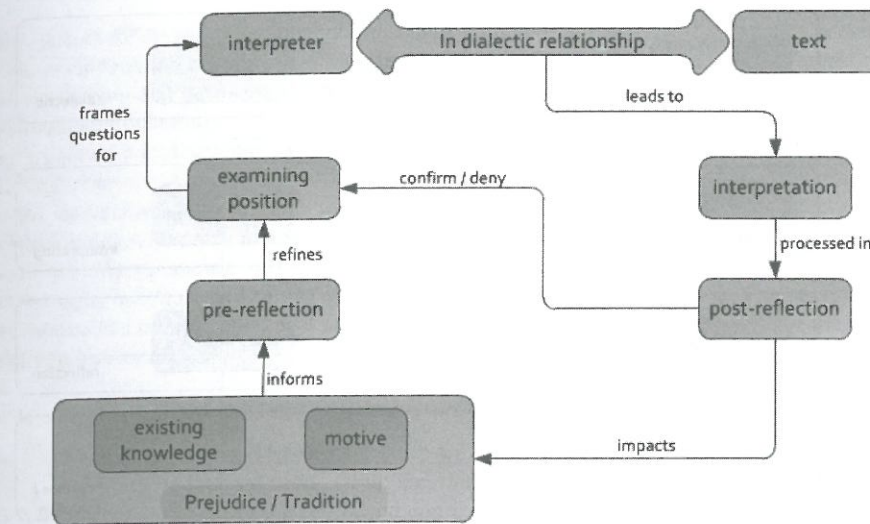


Figure 1. Interpretation method.

of the whole text. Klein and Myers' (Klein and Myers 1999) confirms the fundamental role of the hermeneutic circle by embedding it as the first principle of a set of interpretive principles.

Gadamer (Webb and Pollard 2006) build a case for the role of language in hermeneutic understanding and described the process of interpretation as a dialectic interaction between text and interpreter. Dialogue is put forth as the basic model of reaching an understanding (Gadamer 2006) with language firmly placed at the centre as its medium and interpretation as its activity. Another way to state this relation is to say that the act of interpretation through using language as part of a dialogue leads to an understanding.

The dialectic between the text and interpreter is further described by Gadamer (Gadamer 2004) as a linguistic play (from the German word *spiel*) that characterises the way humans interact with unknown or strange situations. The implication is that in the absence of an understanding the interpreter engages (Outhwaite 1990) with the situation or text until a fusion of horizons marks the moment of understanding.

Taking the above concepts into account a structured and organized approach was developed to guide the researcher in the application of hermeneutics in an interpretive study. As graphically depicted in Fig. 1 the dialectic relationship between the interpreter and the text leads to an interpretation. The nature of this dialectic is described as an openness, similar to the model of Platonic dialogue (Butler 1998), where the exchange takes on the mechanism of question and answer. The interpreter, in other words, poses questions to the text in order to come to an interpretation of the meaning of the text.

The interpretation in turn, after reflection can either confirm or deny an examining position held by the interpreter. The examining position itself is informed and based on the existing knowledge and education of the interpreter. The examining position serves the purpose of making the interpreter's pre-understanding about the meaning of the text explicit. The steps of the method are summarized as follows:

1. The examining position is informed by tradition.
2. The questions put to the text by the interpreter are framed by the examining position.
3. The dialectic process leads to an interpretation of the text.
4. The interpretation will confirm or deny the examining position.

A conceptual grouping of the method in Fig. 1 embodies the hermeneutic and interpretive aspects of dialectic, interpretation, reflection, prejudice and positioning (see Fig. 2).

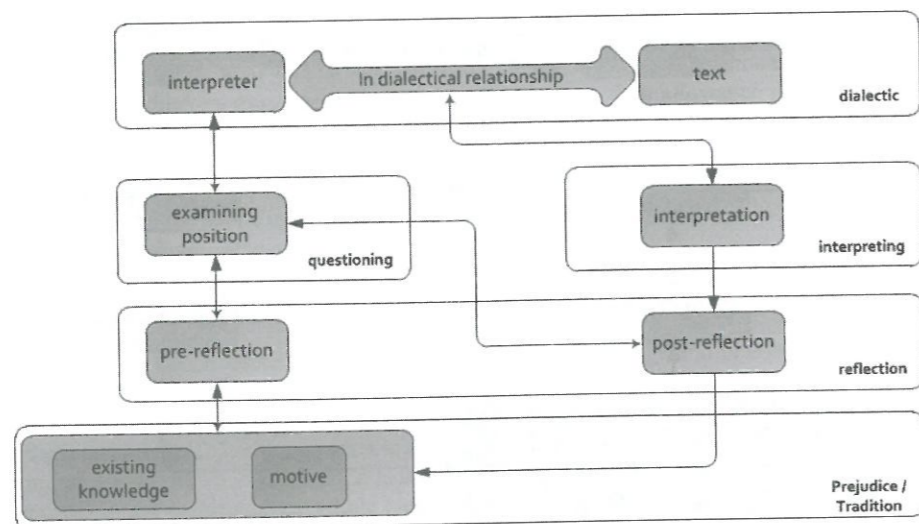


Figure 2. Conceptual view of the interpretation method.

#### 4 INTERPRETATION METHOD APPLICATION

In order to make the interpretation method practically implementable it was operationalized as a 3-phase process adapted from Cole and Avison's 6 stage hermeneutic research approach (Cole and Avison 2007).

During Phase 1 (Setup and Preparation), the interpretation method is prepared for application. The steps in this phase include:

- Identifying the field of inquiry.
- Identifying and collecting the text that will be interpreted.
- Preparing the examining position and questions.

Phase 1 is discussed in section 4.1. In Phase 2 (Understanding and Contextualization), the interpretation method is applied to the definitions of enterprise architecture. This interpretation is not final since the knowledge of a phenomenon changes as more is known about the subject matter, the execution of the method is therefore potentially a never-ending loop. The control of the number of times the method is executed is exerted by the researcher prior to the start of the method's execution. Phase 2 is discussed in section 4.2. Finally in Phase 3 (Reflection and Communication), the result of the interpretation method's execution is documented and made available for study to the larger research community. During this phase the implications of the findings from the method as well as its impact on the research field of enterprise architecture is explored. Phase 3 is discussed in section 4.3.

##### 4.1 Phase 1: Setup and preparation

###### Step 1: Describing the field of inquiry

During the setup and preparation phase the foundation for the interpretive undertaking towards understanding enterprise architecture is laid out and made clear. This phase includes two important steps:

- First the context is set in terms of the research topic's tradition and prejudice
- Second, the examining position is clarified by way of reflection

Our timeline of interest in enterprise architecture spans a period of at least twenty years. John Zachman (1987) is regarded as one of the founding fathers of enterprise architecture (Abdallah and

Galal-Edeen 2006) with his contribution of the Zachman Framework whilst legislation in the United States of America (Schekkerman 2006; Hagan 2004) led to the implementation of enterprise architecture frameworks in large enterprises. Examples of these frameworks include the Open Group Architecture Framework (TOGAF) (The Open Group 2009), the Extended Enterprise Architecture Framework (E2AF) (Schekkerman 2006) and the Federal Enterprise Architecture Framework (FEAF) (Federal Architecture Working Group 2001). Due to the proliferation of the usage of information technologies and systems in businesses across the globe, enterprise architecture is rooted in information technology as supporting business information systems. Taking the above facts into account enterprise architecture's history represents a tradition that informs an examining position according to the first step of the interpretation method (see section 3.4). The sections that follow discuss the development of this examining position by giving an overview of the tradition of enterprise architecture.

##### Broad overview of the tradition of enterprise architecture

The historical roots of enterprise architecture are well recorded (Hagan 2004; Schekkerman 2006; Chen, Doumeings, and Vernadat 2008; Sessions 2007) and span a period that starts with the Zachman framework (Zachman 1987) and continues to the present day. During these twenty years of productive activity many well-known frameworks and government level initiatives have seen the light. The aim of this section is to examine the history of enterprise architecture in an attempt to discover the tradition within which it stands. This tradition is explored in terms of its *diversity of definitions, the components of enterprise architecture, and enterprise architecture frameworks and methods*:

- A diversity of definitions: Various definitions of enterprise architecture have been proposed by researchers and practitioners. Although a precise and concise definition that is universally accepted is hard to attain (Lillehagen and Karlsen 2005) some effort has been made towards the classification of enterprise architecture definitions. Dankova (2009) proposes a scheme consisting of differing emphasis organized into 4 groupings, see Table 1 for a summary.
- A number of authors address the aspect of scope of enterprise architecture in their definitions. Zachman (Zachman 1997) sets the scope of enterprise architecture as the entire organization that is described and not just a part. For Schekkerman (2004) an enterprise architecture is a "complete expression of the enterprise" and Sessions (2007) in turn reflects that the "system in question is the whole enterprise, especially the business processes, technologies, and information systems of the enterprise." Given the occurrence of multiple and varied definitions from authors who are inclined to emphasize 'their' own aspects of enterprise architecture, it would be an inaccurate reflection on their work to claim that practitioners and researchers do not know what enterprise architecture is. What can be claimed though is that a universally accepted definition is not in evidence.
- The components of enterprise architecture: The components of enterprise architecture describe the parts that make the whole in an architecture work. A varied list of parts is proposed by the different enterprise architecture frameworks that range from sub architectures to artefacts. The creators of TOGAF (The Open Group 2009), for example, declares that enterprise architecture consist of various sub-architectures such as business architecture, data architecture, applications architecture and technology architecture. Lankhorst (2004), in turn, list the key components of enterprise architecture as application layer, business layer and technical layer. Winter and Fischer (2006) propose a list of core artefacts of enterprise architecture that includes specifications such as strategy, organization and process, application, software, technical infrastructure and interlayer dependencies.
- Enterprise architecture frameworks: For an architecture to be of any use to the enterprise it needs to be documented (Greefhorst, Koning, and Vliet 2006) as functional pieces of information. Such a description forms a record of the underlying infrastructure of a system (Urbaczewski and Mrdalj 2006). Ohren (2005) identifies this collection of documents as a "set of rules, guidelines and patterns for describing the architecture of systems" and name it an architecture framework

Table 1. Dankova's categories.

Group Emphasis	Description	References
Planning and design	EA represents a summarized conceptual plan, describing the structure of an organization with its separate components and interrelations between them. The main goal of EA is considered finding the most efficient way, in which the enterprise can reach its goals.	(Lillehagen and Karlsen 2005)
Regulative	EA is treated as a set of principles, rules, and models, upon which the development and implementation of organization structure, business processes, information systems, applications, and technical structure in an organization, are based.	(Lankhorst 2005; Wagter et al. 2005)
ICT's	An emphasis on system approach to organization, according to which EA deals with understanding and explanation of the different components of the enterprise, the interrelation between them, and the principles of their design and development.	(IEEE Architecture Working Group 2000; Bredemeyer and Malan 2004)
Business	EA as an approach to the achievement of business goals through the best possible application of IT. They use the expression "synchronizing business goals and processes with IT" and consider EA as a sort of framework, which is used to document existing information systems, their interrelations, and the way in which they interact to fulfil the enterprise mission.	(Sousa, Pereira, and Marques 2004; Daniel 2007; Ross, Weill, and Robertson 2006; West, Bittner, and Glenn 2002)

or, as it deals with the enterprise, it is also known as an enterprise architecture framework. Zachman (1996) describes this kind of framework as "simply a logical structure for classifying and organizing the descriptive representations of an enterprise". McCarthy (2006) declares that the enterprise architecture framework is used to implement an enterprise architecture. Hagan (2004) stresses that the framework is not the architecture itself but rather an organized description of the enterprise architecture. For example, it contains a list of recommended standards and compliant products for implementing an information system (Shah and Kourdi 2007). Schekkerman (2006) expands this list to include models, principles, services, approaches, standards, components and visualizations to guide the development of specific architectures. According to Sessions (2007) an architectural framework defines architectural artefacts, their relation to each other and what those artefacts might look like. Hagan (2004) identifies architectural artefacts as at least business processes, data, IT mission systems, and IT infrastructure and adds that a framework should also address standards, security and relate the enterprise architecture to the corporate strategy and objectives.

- The methods to achieve the enterprise architecture are for the most part contained in the enterprise architecture framework. For example, TOGAF's (The Open Group 2009) Architecture Development Method (ADM) consists of 9 discrete phases that is executed iteratively. The Zachman Framework is populated by a 6 step method developed by Pereira and Sousa (2004) in the absence of a formal Zachman method. Other examples of frameworks that contain their own methods include DoDAF (DoD Deputy Chief Information Officer 2009), FEAF (Federal Architecture Working Group 2001) and E2AF (Schekkerman 2006). The key target for an enterprise architecture method is the creation of a model (Franke et al. 2009) and specific modelling languages have been created for that purpose such as Archimate (Lankhorst 2005)

Enterprise architecture research output has shown an increase over the twenty years of its existence (Schönherr 2008). Research efforts such as the Finnish Enterprise Architecture Research (FEAR) project (Liimatainen, Hofmann, and Heikkilä 2007) shows an active international interest in the usage of enterprise architecture for governmental purposes (confirmed by (Paszkowski and Mortensen 2008) survey results). The number of research publications have also grown over

the last number of years (Langenberg and Wegmann 2004; Schönherr 2008). The proliferation of enterprise architecture frameworks over the same period in turn indicates an active practitioner interest in enterprise architecture.

A predominant aspect in Schekkerman's research (Schekkerman 2006) is the high level of inter-relatedness amongst the different enterprise architecture frameworks. This suggests a tradition in the sense of a collection of understanding, knowledge and assumption (Davey 2006) that is part of every research field. In straightforward terms this means that much is known already of the research domain of enterprise architecture. Another feature of Schekkerman's work is that the origins of enterprise architecture lay at least in two places: the Zachman Framework and United State of American legislative activities (see EABOK (Hagan 2004) for an overview). The tradition therefore, as it stands, is rich with meaning, however as Schönherr (Schönherr 2008) warns, this could simply be a "horrible mess" in the use of the term enterprise architecture, and advises the cultivation of a common structure and the development of a core theory.

### Step 2: Selecting the text to be interpreted

Given that a multitude of frameworks exist and that the literature (Liimatainen, Hofmann, and Heikkilä 2007) indicates the development of localized (to their own enterprise context) enterprise architecture frameworks, it is possible that the number of enterprise architecture frameworks may increase over time. This is a testimony to the flexibility in applying enterprise architecture in different contexts. A complete and comprehensive analysis of every possible framework is untenable in the face of limited research time and resources and leads to the necessity of a selection of frameworks. This selection, in order to satisfy the demands for scientific rigour and to ensure the quality of conclusions based on the research, cannot be of an arbitrary nature. What follows is a discussion of the motivation and reasoning for the selection of the two frameworks analysed in this paper.

#### Selection criteria

The framework reference map devised by Ernst and Matthes (2009) shows enterprise architecture framework activity between 2009 and 1984. This time span essentially represents the historical timeline of the field of enterprise architecture and allows hermeneutical analysis on the grounds of a known and visible tradition as well as a well-documented progression of the thought in this tradition. This leads to the formulation of the first selection criteria as "*a selected framework must have a clearly distinguishable and traceable history.*"

To enable research to impact the field of study in order to develop it and solve its problems, openness and the availability of results are key. This accessibility plays out in many different ways, on the one hand it does not serve the research community if an obscure framework is selected for analysis, and on the other hand the selected framework must be open for examination by the academic community. Finally the framework must in a way already be under examination so that any given researcher can build upon what is already known. These factors are captured in a set of criteria such as "*a selected framework must be widely referenced in the research literature*" and "*a selected framework must be open for evaluation by the academic community*".

Finally to provide validity in the results of academic research and promote the possibility of making generalized conclusions it is important that the framework under study be active in terms of its own development and in its implementation by practitioners. This makes applied research possible by the provision of appropriate research results for the practitioners in the field. To capture this aspect the final set of criteria reads as follows: "*a selected framework must be actively under development*" and "*a selected framework must be used for actual enterprise architecture work.*"

These selection criteria are summarized in Table 2.

#### Applying the selection criteria

These criteria served as the selection guide for frameworks and their representative text that is analysed in this paper. In keeping with the criteria of openness and accessibility two types of sources were consulted in determining a short list of enterprise architecture frameworks. These

Table 2. Enterprise architecture framework selection criteria.

A selected enterprise architecture framework must be referenced in literature and highlighted in survey results (a citation count)
A selected enterprise architecture framework must have traceable history
A selected enterprise architecture framework must be up to date and actively under development
A selected enterprise architecture framework must have accessible descriptions, i.e. is not commercially closed to academic examination
A selected enterprise architecture framework must be in use for actual architecture work in industry and not only for academic research

are academic research reports based on surveys and comparison articles published in journals and academic conference proceedings.

Three enterprise architecture surveys measured the use of frameworks by practitioners in enterprise architecture initiatives. These are projects managed by the Institute for Enterprise Architecture Developments (IFEAD) (Institute For Enterprise Architecture Developments 2011), the Finnish Ministry of Finance (FEAR Project) (Information Technology Research Institute 2011) and an Enterprise Architecture survey from students (Paszkowski and Mortensen 2008) of the Copenhagen Business School.

The purpose of the Trends in Enterprise Architecture 2005 survey (Schekkerman 2005) was to measure the progress of the usage of enterprise architecture and its implementations in several organizations across the world. The survey was executed as an online web-based mechanism with the participants taking part on a voluntary basis. In a total of 25 questions covered, amongst others, aspects such as geography, enterprise architecture implementations and methodologies. The survey results are of interest due the direct questioning relating to the usage of enterprise architecture frameworks worded as "What kind of Enterprise Architecture Framework does your organization use?", the answer of which has direct bearing on setting a shortlist of frameworks. Out of 79 respondents the Zachman Framework scored 25% and TOGAF scored 11%.

The FEAR project, sponsored by the Finnish Ministry of Finance has as its goal the support of the development of the Finnish state IT function, particularly in terms of the enterprise architecture work of public administration (Liimatainen, Hofmann, and Heikkilä 2007). The project made use of a 5 viewpoint evaluation framework to compare enterprise work in 15 different countries. The third viewpoint of architecture frameworks and methodologies are of interest to this paper. The results suggested that the Zachman Framework was used by the Danish government and in simplified form by the Netherlands, whilst Switzerland and the United States of America used TOGAF.

The survey at the Copenhagen Business School managed by postgraduate students (Paszkowski and Mortensen 2008) aimed at gathering information from government participants in order to establish a maturity rating for enterprise architecture work in government. The results from the 13 participating governments the Zachman Framework where used as formal basis for localized framework formulations.

These efforts indicate the prominence of the Zachman Framework and the Open Group's TOGAF in enterprise architecture work around the world. This prominence is supported by the 92% citation rate in comparisons articles published during the period 2004 to 2010 (Tang, Han, and Chen 2004; Ohren 2005; Goethals 2005; Abdallah and Galal-Edeen 2006; Greefhorst, Koning, and Vliet 2006; Leist and Zellner 2006; McCarthy 2006; Urbaczewski and Mrdalj 2006; Zarvic and Wieringa 2006; Sessions 2007; Franke et al. 2009; Alghamdi 2010). Table 3 shows the results of the selection criteria when applied to the Zachman and TOGAF frameworks.

As illustrated in Table 3, the Zachman Framework and TOGAF fulfil all of the requirements as set out in Step 2 of the process. As such they are taken as representative examples suitable for interpretation by the method described in section 3. The definition of enterprise architecture that are most representative of the Zachman framework is taken from (Zachman 1997) and reads as "that set of descriptive representations (i.e. 'models') that are relevant for describing an enterprise

Table 3. Selection criteria applied to frameworks.

Framework	Criteria				
	Citation count	History (y/n)	Updated or active (y/n)	Descriptions accessible (y/n)	Currently in use (y/n)
Zachman	11	Y	Y	Y, i.t.o framework	Y
TOGAF	11	Y	Y, ver 9 released 2009	Y, on web and print	Y

such that it can be produced to management's requirements (quality) and maintained over the period of its useful life (change)". The definition put forth by TOGAF is taken from (The Open Group 2009) and describes the enterprise as "any collection of organizations that has a common set of goals", architecture is described as "a formal description of a system, or a detailed plan of the system at component level to guide its implementation, and the structure of components, their inter-relationships, and the principles and guidelines governing their design and evolution over time".

### Step 3: Developing the examining position

The final step of the Phase 1 is the formulation of the examining position as a question or a set of questions. The two definitions that are taken to represent the practitioner (LinkedIn definition) and academic (Dankova definition) view are restated as questions that will be put to the Zachman and TOGAF definitions. The list of questions that represents the practitioner view (taken from the LinkedIn definition) is as follows:

Does the definition make any mention of:

1. Vision and or mission?
2. Responsiveness to change?
3. Increase in aspects such as effectiveness, profitability etc.?
4. Reducing cost and risk?
5. Strategic planning and or governance?
6. Decision support framework?
7. Models, guidance, processes, etc.?

Accordingly the researcher view is expressed as the following list of questions. Does the definition make any mention of:

1. General conceptual plans?
2. Structure of enterprise?
3. Principles and rules for design and operation of organization structure?
4. Information technologies?
5. Business goals and processes?

These questions are put to the representative definitions (Zachman Framework and TOGAF) and results in a secondary text (see Table 4) that will serve as the interpretation that either confirms or denies the examining position.

### 4.2 Phase 2: Understanding and contextualization

The results of the hermeneutic process are contained in a secondary text that represents the answers to the questions posed to the text. This process due to its dialectical nature is never-ending with each secondary text creating a new set of questions. For the purpose of this paper only the first set of results are listed in table format, see Table 4 and 5.

Table 4 lists the answers to the set of questions that resulted from the LinkedIn definition. At the same time the table also shows how each of the frameworks responded to the evaluation. There is an



Table 4. Answers to LinkedIn questions.

Questions	Zachman	TOGAF
Vision and or mission?	Implied by management's requirements	Implied by common set of goals
Responsiveness to change?	Yes	Yes
Increase in aspects such as effectiveness, profitability etc.?	No	No
Reducing cost and risk?	No	No
Strategic planning and or governance?	No	No
Decision support framework?	Implied by phrase "descriptive representations"	Implied by phrase "governing of design etc."
Models, guidance, processes, etc.?	Yes	Yes

Table 5. Answers to Dankova questions.

Questions	Zachman	TOGAF
General conceptual plans?	Yes	Yes
Structure of enterprise?	Yes	Yes
Principles and rules for design and operation of organization structure?	Yes	Yes
Information technologies?	No	Implied by component level and structure
Business goals and processes?	Implied by phrase "management's requirements"	Implied by phrase "common set of goals"

alignment of the answers given which suggest that the Zachman Framework and TOGAF definitions, when interpreted in the light of the LinkedIn position, shows that they are in agreement. The negative answers in the table indicate areas of the LinkedIn definition where the Zachman Framework and TOGAF definitions are either not in agreement or are silent on the aspects examined. From the perspective of the method, the claim can be made that the Zachman Framework and TOGAF definitions are in partial support of the examining position.

The situation in Table 5 indicates the same alignment between Zachman Framework and TOGAF as in Table 4 with the resulting interpretation that the Zachman Framework definition is interpreted as mostly supportive and the TOGAF definition as fully supportive of the Dankova examining position.

#### 4.3 Phase 3: Reflection and communication

Both the Zachman Framework and TOGAF confirm the examining position as presented by the Dankova definition. This result can be explained by the inclusion these two frameworks in Dankova's dataset.

The results as interpreted in the light of the LinkedIn definition show a partial confirmation with the examining position. There are no clearly evident reason for this situation and need to be carefully examined in further research. A possible interpretation of the reason for such a disagreement might be that the aspects of the LinkedIn definition do not properly belong to a definition. These aspects deal with the advantages of enterprise architecture and belong more properly in a discussion of the value of enterprise architecture.

Finally, the alignment between the way that practitioners and researchers view and describe reality lies in the utility of the thing described. For the researcher the idea and its scientific meaning is important whilst for the practitioner the practical application of the thing is important. The results do indicate in an indirect way that the practitioner and researcher position is both catered for when examined in the light of real life enterprise architecture frameworks.

## 5 CONCLUSION

The important role of definitions in the identity of the thing defined cannot be underestimated. Whenever a researcher or a practitioner engages for the first time with something, the question is invariably "what is this thing I am examining?" The situation is made more difficult when a plethora of options, all claiming to be of the same kind, compete for the attention of researcher and practitioner. A simple side by side comparison of definitions do not completely solve the problem either since the underlying assumption of such an exercise is that all definitions compared are of things that are similar in kind. The method described in this paper addressed this issue by focusing on the meaning of things as interpreted by a researcher. The understanding of the interpreter is included in the process by making visible what the existing understanding is of the thing being studied. When a new framework or theory present itself as of the kind of thing that enterprise architecture is, it can simply and efficiently interpreted in the light of what is already known. This process does not only provide greater potential understanding for the researcher but it also presents an opportunity of the body of understanding to grow.

## REFERENCES

- Abdallah, S., and G. H. Galal-Edeen. 2006. Towards a framework for enterprise architecture frameworks comparison and selection. In *The Fourth International Conference on Informatics and Systems (INFOS2006)*.
- Alghamdi, Abdullah S. 2010. A Review of Commercial Related Architecture Frameworks and their Feasibility to C4I System. *European Journal of Scientific Research* 40 (1):43-49.
- Allega, Philip. *EA Dying? No! Let's Get Ready to Rumble!* Gartner Blog Forum 2010 [cited 7 December 2010]. Available from <http://blogs.gartner.com/philip-allega/2010/08/17/ea-dying-no-lets-get-ready-to-rumble/>.
- Anells, M. 1996. Hermeneutic phenomenology: philosophical perspectives and current use in nursing research. *Journal of Advanced Nursing* 23 (4):705-713.
- Banerjee, Udayan. *Why is Enterprise Architecture Dying?* 2010]. Available from <http://enterprisearchitecture.ulitzer.com/node/1385669>.
- Berrios, G. E. 1989. What is phenomenology? A review. *Journal of the Royal Society of Medicine* 82.
- Boh, Wai Fong, and Daniel Yellin. 2007. Using Enterprise Architecture Standards in Managing Information Technology. *Journal of Management Information Systems* 23 (3):163-207.
- Bredemeyer, Dana., and Ruth. Malan. 2004. What it Takes to be Great Enterprise Architect. In *Enterprise Architecture Executive Report: Cutter Consortium*.
- Burton, Betsy, and Philip Allega. 2010. Hype Cycle for Enterprise Architecture, 2010. *GARTNER*.
- Butler, T. 1998. Towards a hermeneutic method for interpretive research in information systems. *Journal of Information Technology* 13:285-300.
- Cerbone, David R. 2008. *Heidegger: a guide for the perplexed*: Continuum International Publishing Group.
- Chen, David, Guy Doumeings, and Francois Vernadat. 2008. Architecture for enterprise integration and interoperability: past, present and future. *Computers in Industry* 59:647-659.
- Cole, M., and D. Avison. 2007. The potential of hermeneutics in information systems research. *European Journal of Information Systems* 16 (6):820.
- Crotty, Michael. 1998. *The foundations of social research: meaning and perspective in the research process*: SAGE.
- Crowell, Steven. 2006. Husserlian Phenomenology. In *A Companion to Phenomenology and Existentialism*, edited by M. A. W. Hubert L. Dreyfus: Blackwell Publishing Ltd.
- Daniel, D. 2007. The rising importance of the Enterprise Architect. *CIO*.
- Dankova, Capp. 2009. Main Aspects of Enterprise Architecture Concept. *Economic Alternatives* (1):102-114.
- Davey, N. 2006. *Unquiet understanding: Gadamer's philosophical hermeneutics*: State University of New York Press.
- Demeterio, F. P. A. 2001. Introduction to hermeneutics. *Diwatao* 1 (1):1-9.
- DoD Deputy Chief Information Officer. 2010. *Department of Defense Architecture Framework Version 2.0* 2009 [cited 8 March 2010 2010]. Available from <http://cio-nii.defense.gov/sites/dodaf20/index.html>.
- Ernst, Alexander M, and Florian Matthes. 2009. A Pattern-based Approach to Enterprise Architecture Management. In *4th Meeting of the Working Group Enterprise Architecture Management (AkEAM)*. Munchen.

- Federal Architecture Working Group. 2001. A Practical Guide to Federal Enterprise Architecture.
- Franke, U., D. Höök, J. König, et al. 2009. EAF2-A Framework for Categorizing Enterprise Architecture Frameworks. Paper read at 10th ACIS International Conference on Software Engineering, Artificial Intelligences, Networking and Parallel/Distributed Computing.
- Gadamer, H-G. 2004. *Truth and Method*: Continuum.
- Gadamer, H-G. 2006. Classical and Philosophical Hermeneutics. *Theory Culture & Society* 23 (29).
- Gelven, Michael. 1989. *A commentary on Heidegger's Being and Time: revised edition*: Harper & Row.
- Goethals, F. 2005. An overview of enterprise architecture framework deliverables. In *Working Paper Series*. Leuven, Belgium: Catholic University of Leuven (KUL).
- Greefhorst, D., H. Koning, and H. V. Vliet. 2006. The many faces of architectural descriptions. *Information Systems Frontiers* 8 (2):103–113.
- Hagan, Paula J. 2004. Guide to the (Evolving) Enterprise Architecture Body of Knowledge. In *EABOK*. McLean, Virginia: MITRE corporation.
- Hammersley, Martyn. 2003. Phenomenology. In *Encyclopedia of Social Science Research Methods*. 2003: SAGE Publications.
- Harman, Graham. 2007. *Heidegger explained: from phenomenon to thing*. Vol. 4, *Ideas explained*: Carus Publishing Company.
- Heidegger, M., J. Macquarrie, and E. Robinson. 2000. *Being and time*: Blackwell Pub.
- IEEE Architecture Working Group, ed. 2000. *IEEE Recommended Practice for Architectural Description of Software-Intensive Systems, IEEE Std 1471-2000*: IEEE
- Information Technology Research Institute. *FEAR Research Project*. University of Jyväskylä 2011 [cited 15 December 2011]. Available from [https://www.jyu.fi/it/itokset/titu/projektit/kaynnissa/fear/in\\_english](https://www.jyu.fi/it/itokset/titu/projektit/kaynnissa/fear/in_english).
- Institute For Enterprise Architecture Developments. *IFEAD About*. IFEAD 2011 [cited 15 december 2011]. Available from <http://www.enterprise-architecture.info/ifead%20about.htm>.
- Inwood, Michael. 1999. *A Heidegger Dictionary, The Blackwell Philosopher Dictionaries*: Blackwell Publishers.
- Jasper, D. 2004. *A short introduction to hermeneutics*: Westminster John Knox Press.
- Jeanrond, Werner G. 1994. *Theological Hermeneutics: Development and Significance*: SCM.
- Jonkers, Henk, Marc M Lankhorst, Hugo W. L. ter Doest, Farhad Arbab, Hans Bosma, and Roel J. Wieringa. 2006. Enterprise architecture: management tool and blueprint for the organization. *Information Systems Frontiers* 8:63–66.
- Klein, H. K., and M. D. Myers. 1999. A set of principles for conducting and evaluating interpretive field studies in information systems. *MIS quarterly*:67–93.
- Langenberg, K., and A. Wegmann. 2004. Enterprise Architecture: What Aspects is Current Research Targeting. Technical report, EPFL.
- Lankhorst, M. M. 2004. Enterprise architecture modelling—the issue of integration. *Advanced Engineering Informatics* 18 (4):205–216.
- Lankhorst, Marc. 2005. *Enterprise Architecture at Work: Modelling, Communication, and Analysis*: Springer.
- Lee, A. 1994. The hermeneutic circle as a source of emergent richness in the managerial use of electronic mail. In *International Conference on Information Systems (ICIS)*.
- Leist, Susanne, and Gregor Zellner. 2006. Evaluation of current architecture frameworks. In *SAC'06*. Dijon, France: ACM.
- Liimatainen, Katja, Martin Hofmann, and Jukka Heikkilä. 2007. Overview of Enterprise Architecture work in 15 countries: Finnish Enterprise Architecture Research Project. Finnish Ministry of Finance.
- Lillehagen, F., and D. Karlsen. 2005. Enterprise Architectures—Survey of Practices and Initiatives. Paper read at Interoperability of Enterprise Software and Applications (INTEROP-ESA '05), at Geneva, Switzerland. LinkedIn Corporation. *LikedIn* 2011 [cited 15 December 2011]. Available from [www.linkedin.com](http://www.linkedin.com).
- McCarthy, R. V. 2006. Toward a unified enterprise architecture framework: an analytical evaluation. *Issues in Information Systems* 7(2).
- Moran, D. 2002. *Introduction to Phenomenology*: Routledge.
- Myers, Michael D. 2008. *Qualitative Research in Business & Management*: SAGE Publications Ltd.
- Ohren, O. P. 2005. An Ontological Approach to Characterising Enterprise Architecture Frameworks. In *Knowledge sharing in the integrated enterprise: interoperability strategies for the enterprise architect*, edited by P. Bernus, and M. Fox: Springer Boston.
- Outhwaite, William. 1990. Hans-Georg Gadamer. In *The Return of grand theory in the human sciences*, edited by Q. Skinner: Cambridge University Press.
- Paszkowski, Slawomir, and Rasmus Kirkegaard Mortensen. 2008. Enterprise Architecture Survey Results. Copenhagen Business School.
- Pereira, Carla Marques, and Pedro Sousa. 2004. A Method to Define an Enterprise Architecture using the Zachman Framework. In *ACM Symposium on Applied Computing*. Nicosia, Cyprus: ACM.
- Pragmatic EA. 2010. The 160 Character Challenge.
- Ranganathan, Parthasarathy, and Norman Jouppi. 2005. Enterprise IT trends and implications for architecture research. In *11th International Symposium on High-Performance Computer Architecture HPCA-11 2005*.
- Ross, J. W., P. Weill, and D. Robertson. 2006. *Enterprise architecture as strategy: Creating a foundation for business execution*: Harvard Business School Pr.
- Sandage, Steven J., Kaye V. Cook, Peter C. Hill, Brad D. Strawn, and Kevin S. Reimer. 2008. Hermeneutics and Psychology: A Review and Dialectical Model *Review of General Psychology* 12 (4):344–364.
- Schekkerman, J. 2004. How are organizations progressing? In *Trends in Enterprise Architecture*, edited by J. Schekkerman: IFEAD.
- Schekkerman, J. 2005. How are organizations progressing? In *Trends in Enterprise Architecture*, edited by J. Schekkerman: IFEAD.
- Schekkerman, J. 2006. *Extended Enterprise Architecture Framework Essentials Guide*: Institute for Enterprise Architecture Development.
- Schekkerman, J. 2006. *How to Survive in the Jungle of Enterprise Architecture Frameworks: Creating Or Choosing an Enterprise Architecture Framework*. 3 ed: Trafford Publishing.
- Schönherr, M. 2008. Towards a common terminology in the discipline of enterprise architecture. Paper read at Service-Oriented Computing – ICSOC 2008 Workshops, at Sydney, Australia.
- Sessions, Roger. 2007. A Comparison of the Top Four Enterprise-Architecture Methodologies. MSDN Architecture Center. Microsoft Corporation.
- Shah, H., and M. E. Kourdi. 2007. Frameworks for enterprise architecture. *IT Professional* 9 (5):36–41.
- Smith, Kevin. 2010. 160 Character Challenge: What is the Purpose of EA? – Analysis. Pragmatic EA ltd.
- Smith, Kevin. 2010. 160 Character Challenge: What is the Purpose of EA? – Source. Pragmatic EA ltd.
- Sousa, P., C. Pereira, and J. Marques. 2004. Enterprise architecture alignment heuristics. *Microsoft Architects Journal* 4:34–39.
- Tang, Antony, Jun Han, and Ping Chen. 2004. A comparative analysis of architecture frameworks. In *11th Asia-Pacific Software Engineering Conference (APSEC'04)*: IEEE
- The Open Group. 2009. *TOGAF Version 9, TOGAF Series*: Van Haren Publishing.
- Urbaczewski, Lise, and Stevan Mrdalj. 2006. A comparison of enterprise architecture frameworks. *Issues in Information Systems* 7 (2):18–23.
- Van Buren, John, ed. 2005. *The Earliest Heidegger: A New Field of Research*. Edited by H. L. Dreyfus, and M. A. Wrathall, *A Companion to Heidegger*: Blackwell Publishing Ltd.
- Wagter, R., M. van den Berg, J. Luijpers, and M. Van Steenbergen. 2005. *Dynamic enterprise architecture: how to make it work*: Wiley.
- Wang, S. F., C. M. Lin, and J. K. Feng. 2008. A Hermeneutic Approach to the Notion of Information in IS. *Lecture Notes in Computer Science* 5178:340–345.
- Webb, P., and C. Pollard. 2006. Demystifying a Hermeneutic Approach to IS Research. *Australasian Journal of Information Systems* 13 (2):31.
- West, D., K. Bittner, and E. Glenn. 2002. Ingredients for Building Effective Enterprise Architectures. *The Rational Edge*.
- Winter, Robert, and Ronny Fischer. 2006. Essential layers, artifacts and dependencies of enterprise architecture. In *10th IEEE International Enterprise Distributed Object Computing Conference Workshops EDOCW'06*: IEEE.
- Wrathall, Mark A., and Hubert L. Dreyfus. 2006. A Brief Introduction to Phenomenology and Existentialism. In *A Companion to Phenomenology and Existentialism*, edited by H. L. Dreyfus, and M. A. Wrathall: Blackwell Publishing Ltd.
- Zachman, J. A. 1996. The framework for enterprise architecture: background, description and utility. *Zachman International*.
- Zachman, J. A. 1997. Enterprise architecture: The issue of the century. *Database Programming and Design* 10(3):44–53.
- Zachman, John. 1987. A framework for information systems architecture. *IBM Systems Journal*.
- Zachman, John P. 2009. Yes, "Enterprise Architecture Is Relative" BUT It Is Not Arbitrary. <http://www.scc.cc/voice/ArtArchitecture%20Is%20Architecture.pdf> (7 December 2010).
- Zarvic, N., and R. Wieringa. 2006. An integrated enterprise architecture framework for business-IT alignment. *The Impact of Enterprise Architecture on Business Processes in Different Countries*.

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