



# A systematic literature review on Enterprise Architecture Implementation Methodologies



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## ABSTRACT

**Context:** Enterprise Architecture (EA) is a strategy to align business and Information Technology (IT) within an enterprise. EA is managed, developed, and maintained throughout the EA Implementation Methodology (EAIM).

**Objective:** The aims of this study are to identify the existing effective practices that are used by existing EAIMs, identify the factors that affect the effectiveness of EAIM, identify the current tools that are used by existing EAIMs, and identify the open problems and areas related to EAIM for improvement.

**Method:** A Systematic Literature Review (SLR) was carried out. 669 papers were retrieved by a manual search in 6 databases and 46 primary studies were finally included.

**Result:** From these studies 33% were journal articles, 41% were conference papers while 26% were contributions from the studies consisted of book chapters. Consequently, 28 practices, 19 factors, and 15 tools were identified and analysed.

**Conclusion:** Several rigorous researches have been done in order to provide effective EAIM, however there are still problems in components of EAIM, including: there is lack of tool support for whole part of EA implementation, there are deficiency in addressing the EAIM's practices especially in modeling, management, and maintenance, there is lack of consideration on non-functional requirement in existing EAIM, there is no appropriate consideration on requirement analysis in most existing EAIM. This review provides researchers with some guidelines for future research on this topic. It also provides broad information on EAIM, which could be useful for practitioners.

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## 1. Introduction

Enterprise Architecture (EA) is employed by enterprises for providing an integrated environment in order to support the alignment of the enterprise's business and Information Technology (IT) [1,8]. EA project consists of two main approaches including: Enterprise Architecture Framework (EAF), and Enterprise Architecture Implementation Methodology (EAIM). These approaches are intended to support EA implementation by providing planning for EA project, modeling the EA artefacts, developing well-structured artefacts, managing the EA implementation, supporting the EA governance, and maintaining the EA implementation. While EA framework tries to capture information from enterprise's business and IT and model them, EAIM tries to utilize models for developing appropriate ISs and IT Infrastructure for enterprise [40].

EAF represents the structure to model enterprise's business and IT entities. There are various models for different perspectives in EAF, each with different scopes and activities. The outputs of EAF are EA's artefacts that consist of models, diagrams, documents and reports [11,41]. Since EA artefacts are not sufficient for make alignment between business and IT within enterprises, enterprises are looking to find a method to address their challenges on competitiveness by implementing EA artefacts [5,6].

EAIM describes the structured approach in order to answer the EA implementation needs and provide a specific plan for enabling the EA artefacts [7,25]. EAIM should covers all aspects of the EA lifecycle, including: the planning for enterprise understanding projects, the analysis of business requirements, the design of systems, the evolution of systems, and the ongoing enhancements of all of the above [5].

There are several EAIMs, each with different approach, practice, and perspective, however, they are common on definition of EAIM, which is the generic reference procedure that represents the (1) structure and condition of existing systems, (2) the practices and descriptions that lead to managing the step-by-step guidelines from current architecture to desired one, (3) the practices and description that lead to maintain and keep the enterprise updated in order to cope with upcoming changes, and (4) the practices and description that lead to supervise and govern the systems and artefacts [22,30,33]. The methodology is both complete and concise, serving as a coherent guide for practitioner professionals [3].

In EA, the effectiveness is determined by the degree in which the outputs of EA implementation can help the enterprise attain

its intended goals [39]. Besides, EA function effectiveness is: "The degree in which organizational objectives are attained through the outputs of the EA function". Effectiveness may be objectively measured using organizational performance data related to the implementation of EA decision-making [26].

There is ineffectiveness of EA implementation methodology that is used to support Enterprise Architecture Implementation due to the complexities; these complexities come from EAIM's processes, models, methods, and strategy [5,34]. Consequently, EA projects may be faced with lack of support in the following part of EA: requirement analysis, governance and evaluation, a guideline for implementation, and continuous improvement of EA implementation [10].

### 1.1. Paper goals and contributions

This study is partial of the research of developing an effective EAIM. A first step towards developing an effective EAIM is to identify effective practices and the factors that affect the effectiveness of EAIM. Therefore, this paper aims to represent the practices and factors, which make EAIM effective. This information could extend the Enterprise Architecture Body of Knowledge (EABOD) by providing broad information on EA implementation practices. Moreover, it provides an indication of the measurement implementation approaches being used by the enterprise architects.

We are particularly interested in:

- a. Assessing the current problems in existing EAIM.
- b. Identifying the tools that are used by exiting EAIM.
- c. Identifying open problems and areas for improvement.

The target audience for this review is twofold: First, we aim at researchers who would like to get a systematic overview of the area of EAIM in practices and factors of effective EAIM. Second, we aim at practitioners who would like to find out effective EAIM to apply in EA project.

### 1.2. Paper structure

The remainders of this paper are divided into the following parts: related work is described in Section 2, the research methodology is represented in Section 3, and, results of this review along with discussion on the finding of this study are described in

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