Enterprise Architecture Quality Attributes base Enterprise Architecture Frameworks Analysis

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Abstract: Many Enterprise Architecture Frameworks (EAFs) are in use and several researchers offer general comparative information about EAF. However, there has been little work based on the quality of Enterprise Architecture (EA). This study provides the characteristics of the five EAFs using comparative analysis based on Enterprise Architecture Quality Attributes (EAQAs). To compare EAFs, the attributes of EA qualities were extracted from the EAFs and the definition of EAQA was defined from EA user’s viewpoint. The criteria for each quality attribute were developed using four dimensional concepts. This paper provides guidance in the selection of the EAFs that supports the user’s quality requirement on the EA.

Keywords: Enterprise Architecture, Enterprise Architecture Framework, Quality Attributes

1. Introduction

EA ‘provides a knowledge base and supports for decision making within the enterprise and it serves as the blueprint of current situation and strategy for future directions of the enterprise’ [1].

EAF describes the fundamental elements of an EA and the relationship between them [2]. It provides guidance for developing architectures and a logical structure for classifying and organizing enterprise system [3,4]. It also provides definition of the EA artifacts. Since well-defined artifacts provide good enterprise operational information and system management, appropriate EAF selection determines the quality of the EA.

Researchers offer comparative information about EAF. Tang et al. provide a comparative analysis of architecture frameworks based on fundamental element of EAFs such as “goal, input, and outcomes” [5]. Goethals compares the EAF based on the artifacts [6]. Urbaczewski et al. distinguish the EAFs based on the “view, abstraction, and system development life cycle” [7]. J.W. Kim et al. compare the EAFs based on their feature [8].

The objective of this paper is to provide the comparative characteristics of EAFs using EAQAs. In order to establish a common ground for the comparison based on the EAQAs, Firstly, we studied well-known EAFs and extracted EAQAs from them. Secondly, we defined EAQAs and reified them using four dimensional concepts; ‘View’, ‘Perspective’, ‘Scope’, and ‘Time’. The comparison criteria for each EAQA were also made. Finally, we compared and analyzed EAFs. We discussed the characteristics of the EAFs and the way of selecting the most suitable one to satisfy user’s requirement.

2. Related Work

Enterprise is an organization (or cross organizational entity) supporting defined business scope and mission. It implicitly implies the scope concept and it means the widest area in general as in Figure 1. In this paper, we divide the scope as follows; Enterprise scope, Domain scope, Program scope, Project scope.
The most widely accepted definition of the EA is the one specified by the Federal Enterprise Architecture Framework (FEAF). It defines EA as “a strategic information asset base, which defines the agency’s mission and business activities supporting the mission, the information necessary for agency operations, the technologies necessary to support operations, and the transitional processes necessary for implementing new technologies in response to changing business needs”. EA is an integrated model or representation of the enterprise [3].

EAF is a tool that defines the suggested architecture artifacts and generic definition which can be used for developing a different IT architecture and a logical structure for classifying and organizing complex information [3, 4].

Many EAFs are in use today and they provide the guidance to produce EA artifacts. EAFs have been designed to address specific needs and concerns of an organization. Examples include: Zachman Framework (ZF) is the earliest framework which provides a generic definition of EA and use it as the enterprise entities description [9], the U.S. CIO council released the Federal Enterprise Architecture (FEA) to provide federal guidance for the EA activities [10], the Department of Defense established the Department of Defense Architectural Framework (DoDAF) to define common approach for architectures of DoD [11], the Department of the Treasury released the Enterprise Architecture Framework (TEAF) to guide in producing an EA and EA lifecycle activities of the department [12], and the TOGAF (The Open Architecture Group Framework) was established by the open group to provide tool for defining an IT architecture [13].

There is no standard classification for the EAF, yet. So we classified the frameworks according to their usage for the convenience of EAF categorization – ‘Descriptive’, ‘Prescriptive’ and ‘Combined’ framework.

The descriptive framework mainly specifies what are the enterprise entities and EA artifact. The most famous one of it is the ZF. It models an enterprise with 30 cells to describe enterprise entities and provided the description of each cell. DoDAF and TEAF also can be classified as the descriptive framework.

Some frameworks describe EA lifecycle activity consisting of plan, development, implementation, use and maintenance. We define this type of framework as prescriptive framework. FEA and TOGAF can be classified of it.

The combined framework has the characteristics of descriptive and prescriptive framework. It describes what the EA artifact is and how to manage EA lifecycle activity. The FEAF [3] and LTGAF [14] are combined framework.

According to the IEEE’s definition, Quality is “the totality of features and characteristics of a product or a service that bear on its ability to satisfy stated or implied user’s needs”. Quality attribute is the element which affects quality degree. We found that the process quality leads to the product quality [15-17]. Consequently, EAF induces EA quality because EAF provides guidance about EA artifact, plan, development, implementation, use, and maintenance activities. Quality can be defined differently by the user’s concern and viewpoint [18-20].

3. EA Quality Attributes

We defined EA quality as the degree of features and characteristics of a product or a service of EA that bears on its ability to satisfy EA user’s needs. Firstly, we had to define EA user’s needs to understand what EA quality is.

Based on the understanding of correlation between EA and EAF, we studied well known EAFs such as ZF, FEAF, FEA, TOGAF, TEAF, and DoDAF to collect user requirement on the EA. User requirements on the EA are well specified in terms of ‘objective’, ‘purpose’, ‘need’, ‘benefit’, ‘impact’ and ‘reason’ of the EA usage or development in each EAF doc-