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Customer oriented enterprise IT architecture framework

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ABSTRACT

Due to the rapid expansion and complexity of mechanisms, technologies, systems, processes and communications in organizations, governance and management has become something beyond the control of hardware and software systems and include integration and convergence of all components of an organization. Enterprise architecture (EA) by breaking down the organization's systems to its components and determining the relationship between them in different layers offers an appropriate solution for understanding and investigating relationships and processes of organizations which develop strategies and information technology plans. This paper proposes a conceptual model for enterprise IT architecture. For this purpose, conceptual and reference models of enterprise architecture are investigated and key concepts of them are described. By identifying dimensions of reviewed models, key dimensions of the proposed model are extracted and by using Shannon's entropy, weight and priority of each dimension is determined. In order to determine building blocks of each dimension, a mapping has been established between customer and functional requirements by using axiomatic method and relations between customer and functional requirements has been validated by experts' opinions using Quality Function Development (QFD) method. Proposed model has been described by determining goals, components and relations. Then the model is validated by surveying experts. Finally an Iranian telecommunication enterprise is selected for a case study and the model is tested there and promoting solutions are proposed to improve the status of the organization for implementing the model.

1. Introduction

Enterprise architecture shows how organizational components like business processes, organizational responsibilities, services and information technology platforms adapt to create powerful integrated mechanisms to suit the organization's drivers (Armour et al., 1999). Currently, there are different enterprise architecture reference models and frameworks for designing and developing information systems in organizations that each one introduces different structures and principles to design and implement enterprise architecture based on organizational needs. In this article a conceptual model of enterprise IT architecture is presented for Iranian customer-oriented organizations. Customer-oriented approach means thinking about products and services that are required for proliferating or recruitment of technology from the viewpoint of customer. Solutions of customer-oriented businesses combine rigid processes of industry standard frameworks with experiences, methodologies, engineering mechanisms, technology and industry tools and resources. These solutions help organizations continue business planning and receive maximum return on IT investments. This approach includes gathering information about the customers and its applications, such as personalization and integration of service delivery to customers as well as identifying opportunities for increasing customer value for organization (Rajal and Savolainen, 1996; Chalmeta, 2006). With

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regards to globalization, if an organization wishes to be successful and wants to have a large market share and obtain profitability, it must consider customers in all of its affairs. The aim of this paper is to answer to following question:

1. What are the key dimensions of customer oriented enterprise IT architecture and what are their relations?
2. What are building blocks of each dimension?
3. What are the priorities of building blocks (components) in each dimension?

Therefore, Section 2 investigates conceptual and reference models of enterprise architecture. After presenting the methodology in Section 3, in Section 4 principal dimensions of these models are extracted then weighted and prioritized by using Shannon's entropy. In Section 5 by using axiomatic method components of each dimension are extracted and in Section 6 the proposed model is described by determining goals, relations and components of each dimension. In Section 7, the proposed model is validated by Friedman test and components of each dimension are prioritized. Finally a telecommunication enterprise has been chosen as a case study and the model has been tested there.

2. Review of conceptual and reference models of enterprise architecture

FEAF[1] introduces five layers of architecture including performance, business, data, service, and technology (CIO council, 1999). Conceptual architecture of HUD defines security architecture beside the other architectures of FEAF and put performance and security layer crossing all other layers. So these two layers are vertical. Also data layer is in direct relation with service, business and technology layers (HUD EA team, 2005), While FEAF puts data layer horizontally and relates it just to technology layer. So HUD is a revised revision of FEAF that consider service oriented features in architecture model. Also HUD considers the existence of rules and procedures necessary. Conceptual architecture of ACCESS[2], include five building blocks of presentation, security, application, service and data (IBM, 2005). This model is compatible with DSS[3] standards and rules and shows all building blocks required for business requirements. Building blocks of this enterprise architecture are constant over time but as performance or technology will change, technology layer has spread in all layers. Conceptual architecture of Louisiana State is a fundamental framework of technical architecture in enterprise level. This architecture provides vision, rules and high level guidelines for alignment of business drivers with vision of enterprise architecture (CT Architecture Team, 2000). This includes security, network, facility, platform, data, application and management architectures. Besides, this architecture emphasizes rules and principles. NGOSS[4] is an integrated framework for developing business supporting systems. This framework includes business process model, SID model (common data and information), security model, policy model, business application, services, contracts and fundamental mechanisms (Strassner et al., 2004). NGOSS considers four main aspects including business, system, implementation and execution that are implemented by business process model of e-TOM (TM forum, 2002), data model (SID) and TNA[5]. In JTA architecture framework there are four views of business, data, application and technology (DoD, 2003). These views cover all aspects of RM-ODP international standard. EWTA[6] introduces seven interrelated architecture as constructive blocks of enterprise architecture including application, cooperation and workflow, data and information, e-commerce, platform, network, system management architecture (DOIT, 2009). TOGAF introduces a scientific standard method for designing enterprise architecture. This framework consists of four architecture or views of enterprises including business process, application, data and technical architecture (TOGAF, 2007). C4ISR that firs designed for military systems is a comprehensive framework for enterprise architecture description. This framework uses operational, systematic and technical views to describe different levels of a system (C4ISR, 1997). E2AF ensures that the organization has complete balance between business processes and IT processes and states enterprise architecture plan should establish relations between internal components and systems of organization including business, information, information systems, infrastructure and security (Schekkerman, 2006).

3. Methodology

To propose a conceptual model for customer oriented enterprises, conceptual models of EA are reviewed first and key concepts and dimensions of them are extracted. Regarding to frequency of dimensions in reviewed frameworks and by using Shannon's entropy (Shannon, 1948), priority and weight of each dimension are determined and therefore dimensions of proposed model are extracted. Then by using axiomatic method and following two steps of it, components of each dimension are identified and extracted. Axiomatic method is a framework to describe designing components that include all different designing types. This method is one of the logical methods for identifying step by step process of creating solution for a requirement that is stated by a customer or enterprise. In this method that has four main steps; first customer attributes (CA) are extracted. Then to resolve the extracted customer needs, functional requirements (FR) are extracted. Further according to achieved results in two previous steps, designing parameters (DP) are extracted and finally process variables (PV) are

[1] Federal Enterprise Architecture Framework
[2] A Comprehensive Enterprise Services System
[3] Decision Support system
[4] New Generation Operations Systems and Software
[5] Technology Neutral Architecture
[6] Enterprise Wide Technical Architecture