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An Adaptive Enterprise Architecture Framework and Implementation:

Towards Global Enterprises in the era of Cloud/Mobile IT/Digital IT

Yoshimasa Masuda, Keio Graduate School of System Design and Management, Yokohama, Japan

Seiko Shirasaka, Keio Graduate School of System Design and Management, Yokohama, Japan

Shuichiro Yamamoto, Graduate School of Information Science, Nagoya University, Nagoya, Japan

Thomas Hardjono, Media Lab, Connection Science and Engineering, Massachusetts Institute of Technology, Boston, MA, USA

ABSTRACT

Considering the relation between Enterprise Architecture (EA) and IT is a prerequisite when promoting the uptake of IT by societies. In this paper, the authors propose an "Adaptive Integrated EA framework," based on the results of a survey, to support the strategy of promoting cloud/mobile IT. They considered a unique advanced case and provide details and the structure/mechanism of building this EA framework in a global pharmaceutical company. Moreover, the authors revealed the effectiveness of the proposed EA framework by evaluating/analyzing the problems caused by the rapid shift to cloud/mobile IT in divisions in the US and Europe. Furthermore, they compared the characteristics of The Open Group Architecture Framework (TOGAF) and the "Adaptive Integrated EA framework" (global deployment) in building EA frameworks while evaluating the effectiveness of this framework to achieve digital transformation. Finally, the authors clarify the challenges, benefits, and critical success factors of the framework to assist EA practitioners with its implementation.

KEYWORDS

Case Study, Cloud Computing, Digital Transformation, EA, Enterprise Architecture, Enterprise Mobile IT, Global Corporation, Integration

1. INTRODUCTION

Many global corporations have experienced a variety of changes resulting from the emergence of new technologies, globalization, shifts in customer needs, and the implementation of new business models. Significant changes in cutting-edge IT technology due to recent developments in cloud computing and mobile IT (such as progress in big data technology), in particular, have arisen as new trends in IT. Furthermore, major advances in the abovementioned technologies and processes have created a "digital IT economy," introducing both business opportunities and business risks, forcing enterprises to innovate or face the consequences (Boardman & KPN 2015). Enterprise systems (ES) are complex application software packages that contain mechanisms capable of supporting the management of the entire enterprise and of integrating all areas of its functioning (Davenport 1998, p.121). This requires Enterprise Architecture (EA) to be effective because contributing to the design of such large

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integrated systems would in future represent a major technical challenge toward the era of cloud/mobile IT/digital IT. From a comprehensive perspective, EA encompasses all enterprise artifacts, such as business, the organization, applications, data, and infrastructure, which are necessary to establish current architecture visibility and future architecture to produce a roadmap. EA frameworks need to embrace change in ways that adequately consider new emerging paradigms and requirements that affect EA, such as enterprise mobile IT/cloud computing (Buckl et al., 2010/ Alwadain et al., 2014). However, specific EA frameworks, e.g., The Open Group Architecture Framework (TOGAF), are criticized for their size, lack of agility, and complexity (Gill et al., 2014). Masuda et al. (2016) found existing EA frameworks to be inappropriate to achieve digital transformation. On the other hand, the necessity of implementing EA in parallel in the mid-/long term (roadmaps and target architectures, etc.) in the era of cloud/mobile IT/digital IT should be emphasized in terms of promoting the alignment of IS/IT projects with management strategy/IT strategy.

In consideration of the above background information, the purpose of this paper is to propose an "Adaptive Integrated EA framework" to meet the requirements of the digital transformation in relation to the above agility-related aspects. The proposed EA framework should support an IT strategy promoting cloud/mobile IT/Digital IT on the basis of what our prior research suggested. The paper also presents the results of our investigation of an example case in a global healthcare enterprise (GHE), where the abovementioned EA framework is built and practically implemented. This is the only case study of related up-to-date EA toward the era of digital IT and enables us to clarify the effectiveness, adaptability, benefits, and critical success factors of this EA Framework in the era of cloud/mobile IT/digital IT.

2. DIRECTION OF ENTERPRISE ARCHITECTURE

2.1. Related Work

In the past ten years, EA has become an important method for modeling the relationship between the overall image of corporate and individual systems. In ISO/IEC/IEEE42010:2011, an architecture framework is defined as "conventions, principles, and practices for the description of architecture established within a specific domain of application and/or community of stakeholders." Furthermore, in the TOGAF (2011) technical literature, it is defined as "a conceptual structure used to develop, implement, and sustain an architecture." In addition, EA visualizes the current corporate IT environment and business landscape to promote a desirable future IT model (Buckl et al., 2010). EA is required as an essential element of corporate IT planning; it is not a simple support activity (Alwadain, 2013), and it offers many benefits to companies, such as coordination between business and IT, improvement in organizational communication, information provision, and reduction in the complexity of IT (Tamm et al., 2011). In order to continue to deliver these benefits, EA frameworks need to embrace change in ways that adequately consider the new emerging paradigms and requirements that affect EA, such as the paradigm of cloud computing or enterprise mobility (Alwadain et al., 2014).

Mobile IT computing is an emerging concept that uses cloud services provided over mobile devices (Muhammad & Khan, 2015). In addition, Mobile IT applications are based on web services. The literature does not contain many reports that discuss EA integration with Mobile IT and the relationship between the two; however, integration with SOA has been discussed greatly. Many organizations have invested in SOA as a crucial approach to achieve agility to ensure the organization can manage rapid change (Chen et al., 2010). In the meantime, there has been a recent focus on microservices architecture, which allows rapid adoption of new technologies such as Mobile IT applications and cloud computing (Newman, 2015). This paper considers both perspectives.

In terms of cloud computing, mobile devices also have cloud-computing capabilities, and many Mobile IT applications also operate with SaaS cloud-based software (Muhammad & Khan, 2015). A few studies concerning the integration and relationship between EA and cloud computing have also been reported. Although there are three general cloud-computing formats—SaaS, PaaS, and IaaS—the current EA framework merely models this computing format and the business components

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