A Comparative Analysis of the Integration of SOA Elements in Widely-Used Enterprise Architecture Frameworks

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ABSTRACT

In recent years, enterprise architecture (EA) has captured increasing interest as a means to systematically consolidate and manage various enterprise artefacts in order to provide holistic decision support for business/IT alignment and business/IT landscapes management. To provide a holistic perspective on the enterprise over time, EA frameworks need to co-evolve with the changes in the enterprise and its IT over time. In this paper the authors focus on the emergence of Service-Oriented Architecture (SOA). There is a need to integrate SOA with EA to keep EA relevant and to use EA products to help drive successful SOA. This paper investigates and compares the integration of SOA elements in five widely used EA frameworks: Archimate, The Open Group Architecture Framework (TOGAF), Federal Enterprise Architecture Framework (FEAF), Department of Defence Architecture Framework (DoDAF) and the Ministry of Defence Architecture Framework (MODAF). It identifies what SOA elements are considered and their relative position in the overall structure. The results show that services and related elements are far from being well-integrated constructs in current EA frameworks and that the different EA frameworks integrates SOA elements in substantially different ways. The results can support the academic EA and SOA communities with a closer and more consistent integration of EA and SOA and support practitioners in identifying an EA framework that provides the SOA support that matches their requirements.

Keywords: Enterprise Architecture (EA), Federal Enterprise Architecture Framework (FEAF), Information Technology, Service Orientation, Service-Oriented Architecture (SOA)

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1. INTRODUCTION AND RESEARCH QUESTION

Enterprises face many changes, such as shifting customer demands, new technologies, globalization, changing legal requirements, new business models etc. Moreover, enterprises have more and more options with respect to how they do business such as networked business, virtual enterprises, cloud computing etc. All these factors contribute to an increasingly dynamic environment in which enterprises desire to flourish. Consequently, enterprises need to be able to rapidly adapt themselves to changes in their environment to seize opportunities and improve competitiveness. Businesses rely on Information Technology (IT) to assist them to improve competitiveness and productivity in the marketplace. Building an IT enabled enterprise that supports the business value chains is no trivial task. The technological evolutions confront enterprises with tough questions in terms of the relevance of the new technologies, how they are going to change the enterprise, its structure and the way it delivers its products and services. Managers and IT professionals need to be perceptive about the features of new technology and the impact on, and possibilities for their enterprises (Land, Proper, Waage, Cloo & Steghuis, 2009).

Architecture models serve the purpose of making the complexities of the real world understandable and controllable (Land et al., 2009). Enterprises can be better understood when blueprints of the current elements that represent the enterprise and their relationships are present. Architecture models provide decision support for the stakeholders and are critical to the success of management tasks such as business-IT alignment, portfolio planning, and governance (Lagerstrom, 2010). Enterprise Architecture (EA) is a holistic perspective incorporating all artefacts of an enterprise such as business, organisational, application, information, data and infrastructure artefacts (Buckl, Matthes, Schulz & Schweda, 2010). It describes and models elements of organisations and shows how they are organised and connected, and how they function as a whole. Therefore, enterprises have invested in EA as a considerable approach to deal with the resulting complexity of technological and business evolution to reduce the increasing complexity and improve communication.

In order to develop architectures and models that reflect the systems nature of the enterprise, frameworks, methodologies and terminology used in the development of EA should consider that an enterprise is an adaptive system of systems (Sampaio, 2010; Sousa, Lima, Sampaio & Pereira, 2009). As the enterprises evolve, their ontology and modelling should evolve too in order to improve the value of EA (Harmon, 2005). Enterprises have made considerable efforts to produce and use architectural models to reduce the increasing complexity and improve communication. They have started modelling and producing high-level and detailed blueprints of their IT and business landscapes (Sampaio, 2010; Sousa et al., 2009). However, the dynamic nature of the architectural artefacts has been a difficult task not only in modelling but also in keeping the architectural blueprints updated and relevant. Enterprises have failed to keep these blueprints relevant, due to the high rate of changes of the architectural artefacts (Sousa et al., 2009). Thus, the value of these blueprints is significantly reduced as it is tied to their accuracy, adequacy and ability to convey the intended message to targeted stakeholders (Sampaio, 2010).

Architecture descriptions have to be accurately and traceably linked to its implementation in order to manage the complexity, development and maintenance of evolving systems. The ISO/IEC/IEEE 42010:2011 standard recommends providing architectural descriptions of systems to deal with their escalating complexity and to alleviate the risks incurred during the development and evolvement of these systems. Any changes to the implementation have to be reflected back in its architecture. Otherwise, the architecture description will become quickly out-dated as the system evolves to accommodate changes (Mens, Magee, & Rumpe, 2010). Misrepresentation and occasionally even failures result
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