

IMAF: A Visual Innovation Methodology Based on ArchiMate Framework

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ABSTRACT

Information technology has been used as a solution for improving productivity and service quality by enterprises, and software systematization supported by information technology has increasingly become the foundation for enterprise service. Innovation towards enterprise architecture improvement is usually necessary to provide high-quality service and create new value. This paper proposes a methodology aiming at stimulating innovation by evaluating the value provided by software system while visualizing the enterprise architectures. In this paper, the constituents of traditional business modeling methods are analyzed and integrated. Next, an innovation methodology based on ArchiMate framework is described and the detailed steps are defined. To evaluate the effectiveness of this proposed method, a case study on a Japanese convenience store information system is conducted and a controlled experiment is carried out.

KEYWORDS

ArchiMate, Business Model Canvas, Business Modeling, Enterprise Architecture, Innovation Methodology, Job Theory, Software Engineering, System Visualization

INTRODUCTION

Models in software engineering are simplified representations that focus on certain properties of design objects. Modeling simplifies the description, visualization and documentation for information systems. Through modeling, abstraction degree of the system design will be increased, and verification at an early stage of system development becomes possible. In addition, system modeling at the early-stage of software development is meaningful to prevent redevelopment caused by design mistakes.

Enterprise modeling enables information system designers to get a bird's-eye view for business and organization. When developing large-scale projects for large enterprises, EA (Enterprise Architecture) visualization makes it easier to manage the resources, strategies, risks and business processes. Enterprise architecture modeling is, after all, a static behavior based on fixed enterprise architectures. Nevertheless, it is dangerous for companies to stand in the same spot, because competitors may develop

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better or cheaper products or services. Therefore, it is necessary to introduce innovation methods into enterprise management. However, the existing innovation methods are not visualized, so they cannot be applied to enterprise architecture modeling. For the purpose of developing a system modeling method to analyze the mechanism of consumption that makes information technology innovation and business strategy innovation predictable, in this paper, EA modeling methods and innovation theory are compared and integrated to visualize the entire organization, including stakeholders, business actors, business processes, resources, software systems, business situations, evaluation indexes, etc. A method for developing EA models is proposed, and the detailed steps of this method are defined.

This paper is structured as follows. In this section, the research background, the purpose of this research and the result are described as an introduction. Next, in section 2, related researches and motivations of this paper are introduced. In section 3, composition items of each business modeling method are compared, and integration of common elements is performed. After that, the integrated elements are converted into ArchiMate expression. In section 4, a model-based method using ArchiMate elements is proposed and the detailed steps of the proposed method are defined. In section 5, a case study is conducted to confirm the effectiveness of the proposed method. After that, in section 6, an experiment is carried out to compare the proposed method with the traditional approaches. Finally, a summary of this research is made and the further work is clarified in section 7.

RELATED WORK

EA modeling methods, innovation theories and modeling language are briefly introduced in this section.

Enterprise Architecture Modeling Approaches

EA (enterprise architecture) is a special research field based on the practice of information system architecture design and implementation. Since Zachman carried out the groundbreaking research in (Zachman, 1987), many approaches for EA design have been put forward. The Business Model Canvas (BMC) (Osterwalder & Pigneur, 2010), a strategic management and lean startup template for developing new or documenting existing business models, was initially presented by Alexander Osterwalder. The BMC divides existing business models into nine factors: key partners, key activities, key resources, value propositions, customer relationship, channels, customer segment, cost structure and revenue streams, and clarifies how they are related to each other. Stephan Aier et al. proposed an engineering approach to enterprise architecture design and confirmed the effectiveness of this approach by reporting its application at a financial service provider (Aier & Kurpjuweit, 2008). Darius Silingas and Rimantas Butleris presented a novel domain-specific modeling approach by customizing UML (Silingas & Butleris, 2009). This approach was implemented in MagicDraw UML and has already started to gain adoption in industry. EA modeling can not only clarify the relationship between enterprise and market, but also support the communication within the organization. Kurt Van der Veken presented an EA modeling method to support collaboration between different departments and business units (Veken, 2013). Due to constant changes in business as well as in technology, enterprise architecture management is a long-term process rather than a one-time effort. Ronny Fischer et al. therefore proposed a federated approach for EA model maintenance (Fischer et al., 2007). Enterprise architecture modeling has different perspectives and starting points. Sabine Buckl et al. described an approach to make use of the wisdom of the crowds to develop EA models (Buckl et al., 2010). In their approach, EA relevant information is tied together and becomes accessible to both humans and applications, and employees are empowered to contribute their expert knowledge to EA modeling and documentation. In addition to these specific methodologies, there are also mature EA frameworks to provide the fundament for EA modeling. So far, the most cited and widely used EA frameworks are the TOGAF framework (The Open Group, 2005), the ARIS framework (Scheer, 1998) and the DoDAF framework (DOD Group, 2004). Robert S. Kaplan proposed a business performance evaluation

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