A Business Model Approach for Service Engineering in the Internet of Services

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ABSTRACT

In all major industrialized countries, the service sector is the largest economic segment maintaining the highest growth rate. A current trend in the Internet of Services is to develop and offer software as a service (SaaS). Some research activities, such as Theseus/TEXO (http://theseus-programm.de/en/914.php), focus on the design and development of Web-based service ecosystems based on Web-platforms which allow offering, trading, and executing of services over the Internet. This paper is based on the Integrated Service Engineering (ISE) methodology, an interdisciplinary methodology for developing electronic services. The focus of this work is laid on the development of business models from a strategic-/market-oriented perspective, prior to consider the service business processes and the underlying IT-oriented service concept. The role of the business strategist and its objectives is introduced. The methodology has been developed in the Theseus/TEXO project which is funded by the German Federal Ministry of Economy and Technology.

Keywords: Business Models, Internet of Services, Service Description, Service Engineering, Software as a Service (SaaS)

INTRODUCTION

Software development as an engineering discipline relies on formal models and methodologies. On the one hand, models serve as development artefacts which can be explicitly measured, validated and adapted. Methodologies, on the other hand, control the software development process (Weisbecker, 2002). Since software is increasingly offered as a service (König, McNee, Guptill, & Cassell, 2006; Lorenz, Martzahn, Rüdiger, Renner, & Pols, 2007; Weiner, Renner, & Kett, 2010), the Theseus/TEXO project conducts research in the context of a Web-based platform which offers, trades, and executes software as a service (Barros & Dumas, 2006; Janiesch, Ruggaber, & Sure, 2008).

Prior to design the service processes and the service concept, a service provider or a consortium of service providers needs to agree on the services which are offered over the Internet. Those aspects are designed within a service concept (Bullinger, Fährnick, & Meiren, 2003) or a business model (Österwalder, 2004) and further refined by a business process model and an IT-oriented service concept. The Integrated Service Engineering ISE methodology has been...
developed to support the engineering process of services in the context of the Internet of Services (Kett, Scheithauer, Weiner, & Weisbecker, 2009; Kett, Voigt, Scheithauer, & Cardoso, 2008).

**METHODOLOGY**

The basis of this work is the ISE methodology and its strategic perspective on a developing electronic business service. Relevant approaches for designing business models have been examined in the state-of-the-art by comparing the requirements from the viewpoint of organisations which collaborate to offer a service over the Internet. The major targets of applying business models in this context is to identify the crucial elements, describe and discuss them, assess the business model’s feasibility, and finally, use and detail it in the further steps of ISE. None of the identified approaches sufficiently meet the targets. Therefore, a new approach for creating business models has been developed and integrated into the overall ISE methodology which is also shown in this contribution. Finally, the business model approach has been tested and evaluated.

**STATE-OF-THE-ART**

In this section, the following three approaches which focus on business models have been identified and examined. The terms service concept and business models are used as similar expressions within this work.

**Service Concept** *(Bullinger et al., 2003)*

The service concept is part of the service engineering process. Bullinger et al. (2003) introduce a structured approach for developing service similar to the technical discipline of product engineering. In this approach, three different models are subsumed in the service concept: Resource model, product model, and process model. Here, the participation of different partners in the service delivery process is not considered within the model as well as attributes which specify the model elements in more details. Also financial aspects are neglected.

**e³-Value Ontology** *(Gordijn & Akkermans, 2003)*

In comparison to the above-mentioned service concept, the e³-value ontology strongly considers partner networks who offer a service. Therefore, the ontology differentiates between a value web perspective and a trust perspective. The value web perspective models the creation, distribution, and consumption of goods or services of economic value in a network of multiple enterprises and end-consumers. The goal of the methodology is to create a shared understanding of a business model for all actors involved and to assess the potential profitability. However, the trust perspective describes how value webs can be expanded with trustworthy control procedures thus enhancing confidence of actors in each other to enable trading.

**Business Model Ontology** *(Osterwalder, 2004)*

Osterwalder suggests a generic meta-model for the business models development. He analyses 14 different business model approaches in-depth and derives a generic meta-model from the results.

For the generic meta-model, Osterwalder has chosen elements which are interior to the business model, service, customer interface, infrastructure management, and financial aspects and, thus, can be directly influenced by an organization.

The above-mentioned approaches have been examined towards the degree of meeting the above-mentioned major targets and compared on the following five aspects (Table 1). The only approach which addresses all five aspects is the one from Osterwalder. However, the business model approach of Osterwalder does not meet the major targets since it does not provide the appropriate structure of describing the business model elements (complex structure and less relevant elements/attributes for the
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