Chapter 7
Visual Semantic Analysis to Support Semi-Automatic Modeling of Semantic Service Descriptions

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ABSTRACT

The service-oriented architecture has become one of the most popular approaches for distributed business applications. A new trend service ecosystem is merging, where service providers can augment their core services by using business service delivery-related available functionalities like distribution and delivery. The semantic service description of services for the business service delivery will become a bottleneck in the service ecosystem. In this chapter, the Visual Semantic Analysis approach is presented to support semi-automatic modeling of semantic service description by combining machine learning and interactive visualization techniques. Furthermore, two application scenarios from the project THESEUS-TEXO (funded by German federal ministry of economics and technology) are presented as evaluation of the Visual Semantic Analysis approach.

INTRODUCTION

As the web service infrastructures matures and standards facilitating web service-enabled applications, the Service-oriented Architecture (SOA) is becoming one of the most popular approach for the design of IT landscape. A new trend in service-orientation is merging, which allow web service providers to interconnect their offerings in unforeseen ways (Barros, A. & Dumas, M (2006)). This phenomenon is captured as service ecosystem.

A Web Service Ecosystem is a logical collection of Web services whose exposure and access

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are subject to constraints characteristic of business service delivery (Barros, A. & Dumas, M ((2006)).

In the service ecosystem, service providers could augment their core services by using available service ecosystem functionalities like distribution and delivery. For example, the service provider can use payment facility provided by service ecosystem to extend the functionality of their core services. As service ecosystem grows, service provider can outsource the "front desk" role to service broker in order to increase service procurement through different markets. A service broker is responsible for delivering services according to provider's constraints, such as authentication, payment, timelines and enforcement of penalties. Service brokers bring service providers and service consumers closer. They can integrate a service with certain delivery functionality like authentication and payment or combine services offered by one or more service providers to create new value added services. They can provide these integrated services or value added service to service consumers to meet their demand (Barros, A. & Dumas, M (2006); Barros, A. & Dumas, M (2005)). Routing between service broker and single/multiple service providers is another issue. Service brokers should focus on their own competency and outsource routing to service mediator. Service mediators offer translation between different service formats and other routine functions.

Basole and Rouse introduce value networks, i.e., complex networks of social and technological resources that create economic value, also on the web (Basole, R.C. & Rouse, W.B. (2008); Speiser, S, Blau, B., Lamparter, S. & Tai, S. (2008); Vervest, P.H.M (2005)). Such occurrences of value networks are often called Future Business Value Networks or Business Webs (Kagermann, H. & Österle, H.(2006)). The platform for the realization of business webs is called Internet of Servics (IoS) (Heuser, L., Alsdorf, C. & Woods, D.(2008)). The IoS allows offering services and selling services. As a result services become tradable goods. The Internet of Services can be considered as infrastructure for Web service ecosystem, where services are deployed, published, discovered and delivered via different business channels (Cardoso, J., Winkler, M. & Voigt, K.(2009); Barros, A. & Dumas, M (2006); Rai, A, Sambamurthy, V. (2006); Oberle, D., Bhatti, N., Brockmans, S., Niemann, M. & Janiesch, C. (2009); Jensen, J. B., Kletzer, L. G.(2005); Papazoglou, M.P. (2003); Rust, R. T., Kannan, P. K. (2003)).

Barros and Dumas (Barros, A. & Dumas, M (2006)) identified three major challenges for service ecosystem flexible service discovery, conversational multiparty interactions and, service mediation and adaptation. To offer flexible service discovery, service providers must describe non functional service properties e.g. guarantees, pricing, payment, penalties and delivery modes. The service description with rich semantic will help service consumer to find services easily. Conversational multiparty interaction has to be supported in emerging service ecosystems. Single request-response transactions give way to multiparty, pull-oriented and stream based interaction e.g. auctions, voting and RSS feeds. For the Service mediation and adaption, the aspects not only from structural perspective like schema-mapping and transformation language, but also from behavioral and policy perspective have to be address. According to Barros and Dumas (Barros, A. & Dumas, M (2006)), the explicit and formalized Semantic Service Description, which includes of non-functional aspects of such as guarantees, pricing, payment, penalties, and delivery modes, will become a bottleneck for service ecosystems.

In this book chapter, the Visual Semantic Analysis (VSA) approach is introduced to support semi-automatic modeling of SSD. First, the fundamentals and related work related to services and semantic analysis are introduced. Afterwards, a generic process model and a conceptual framework for VSA are presented. Finally, two application scenarios from the project THESEUS-TEXO[1] (funded by German federal ministry of econom-