OSTRA: A Process Framework for the Transition to Service-Oriented Architecture

Fabiano Tiba, The University of Western Ontario, Canada
Shuying Wang, The University of Western Ontario, Canada
Sunitha Ramanujam, The University of Western Ontario, Canada
Miriam A. M. Capretz, The University of Western Ontario, Canada

ABSTRACT

Service-Oriented Architecture (SOA) is an emerging paradigm that entails building applications as a collection of flexible services. Although there is a considerable amount of research on the challenges involving the transition to SOA, it is still necessary to incorporate frameworks that provide guidance for companies adopting this architecture. Accordingly, this article presents a framework, which is entitled OSTRA (Opportunity-driven Service-oriented TRAnsition). OSTRA provides a realistic approach for the development of SOA by considering short-term and long-term term goals as well as by balancing planning and management. This work describes the three streams that OSTRA organizes throughout the SOA transition: SOA roadmap, SOA development and SOA governance. Moreover, it discusses the implementation of OSTRA in a real organization. [Article copies are available for purchase from InfoSci-on-Demand.com]

Keywords: Enterprise IS; IS Development Strategies; Software Architecture; Web Technologies

INTRODUCTION

Service-Oriented Architecture (SOA) technology promises unmatched flexibility that quickly adapts to changing business demands. However, the achievement of a high-quality SOA is a long term project that may last several years, since it requires an extensive analysis of the enterprise to understand current applications, envision the desired SOA, and ensure that business goals are aligned with the technology (Erl, 2005). Furthermore, the magnitude of these changes involves considerable risks, especially because of the novelty of this service
paradigm, the complexity of the applications involved and the constantly changing environment. Additionally, the cost of failure may be detrimental to companies, as it directly affects their strategic decisions. Therefore, in order to transfer their systems to SOA, enterprises need to have precise guidelines and methodologies to govern the transition process.

The transition to SOA usually needs to be delivered from an existing set of applications that were not built with the service-oriented paradigm in mind. An SOA conversion process can be largely defined in three steps: the first stage entails establishing a strategy or a plan for the transition in order to guide the enterprise. The second step involves recommending that the plan focuses on business values and on the incremental delivery of projects; finally, the last phase stresses the importance of SOA governance, which manages the definition of processes, rules and policies for the development of services. Thus, any approach for the transition to SOA should provide guidance on the entire conversion as well as on the individual steps.

This article aims to provide a framework named OSTRA (Opportunity-driven Service-oriented TRAnsition) that guides enterprises in the evolution of their current applications to an SOA. OSTRA is an iterative and incremental process that organizes the transition into three streams. First, the SOA Roadmap Stream identifies and plans the development of service-oriented systems. Next, SOA Development implements the transition, and lastly, SOA Governance maintains and monitors the results produced in the previous phases. The OSTRA framework also defines an overall structure for the transition to SOA, which includes the definition of several topic areas requiring investigation. Specifically, it focuses on identifying opportunities for using services to achieve short-term goals, with the intention of slowly evolving towards an SOA that incorporates the entire enterprise.

The remainder of this article is organized into a number of smaller parts. First, Section 2 presents the current research in the area of SOA. The salient features of the proposed OSTRA framework are described in detail throughout Section 3, and its implementation and evaluation in a real enterprise is delineated in Section 4. Finally, Section 5 concludes the article and presents future directions for this research.

THE SOA TRANSITION APPROACH AND RELATED RESEARCH

There are plenty of research and industry studies focused on the transition to SOA (Royce, 2005). All of these works can be classified into two approaches: the top-down or the bottom-up method (Nadhan, 2004; Perepletchikov, Ryan, & Tari, 2005). On one hand, the top-down approach, which adapts a generic systematic methodology (Boehm, & Jain, 2007; Osterweil, 2007; Petkov, Edgar-Nevill, Madachy, & O’Connor, 2008), aims to develop the SOA through a thorough overall analysis in the design of the architecture, the planning of a common infrastructure and the establishment of enterprise-wide standards. Conversely, the bottom-up methodology focuses on delivering each service solely to accommodate an application’s specific needs. However, while a more systematic top-down approach would result in a higher-quality SOA at the expense of increased cost, time and risk, a more organic bottom-up approach would amortize costs with a short term ROI (Return on Investment) and minimize risks. The strategy for a particular enterprise depends on factors such as the importance of service-orientation to the context of the enterprise, the acceptable level of risk, the amount of funds allocated for the transition to SOA, the acceptable degree of disruption to current applications, and the time and effort assigned to the initial analysis. Therefore, there is no single strategy that accommodates the needs of every enterprise. The challenge is to provide a flexible approach that gradually transforms existing applications to a service-oriented architecture. This approach should accommodate enterprise priorities and
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