Enterprise Transformation to a Service Oriented Architecture: Successful Patterns

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Abstract

This paper presents the initial findings from a series of case studies involving the enterprise transformation to Service Oriented Architecture. Ten large enterprises were studied to determine how they were able to convert their legacy IT architecture. Particular interest was paid to business models, governance, enterprise architecture, change management, risk management, and technology. These cases were used to form a predictive model of successfactors in transformation.

1 Introduction

The major problem facing enterprises today is constructing large scale multi-enterprise "systems of systems". These complex large-scale initiatives attempt to integrate dozens of legacy applications into a "system of pre-existing systems" in order to solve new and unexpected problems. The paradigm called the Service Oriented Architecture (SOA) has been gaining widespread attention lately in hopes of managing the complexity and adaptability needed to effectively create these "systems of systems".

2 Successful Patterns in the Transformation to SOA

Through empirical study of ten SOA initiatives undertaken by large enterprises, we have developed a framework as a guide based upon successful and unsuccessful transformations. Seven issues were found to be critical to successful transformation:

1) Cross Organizational Business Model
2) Federated Governance Model
3) Enterprise Service Architecture
4) Staged Portfolio of Investments
5) Program Office Risk Management
6) Simultaneous Tight and Loose Control
7) Managing the Fluid Stage of Technology

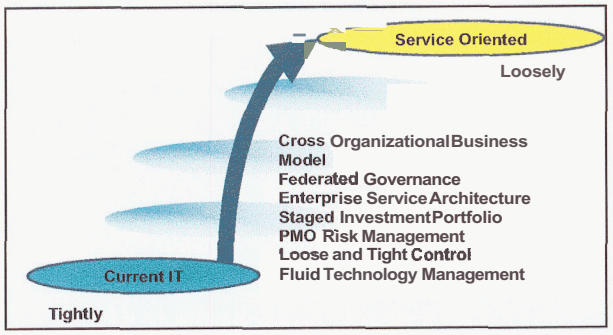

Figure 1. Seven patterns of successful transformation to Service Oriented Architecture.

2.1 Cross Organizational Business Model

SOAs are first being first used in cross-organizational information sharing and processing implementations. All cases involved multiple organizations interacting together in an ecosystem (Iansiti, 2004). The loose coupling of applications afforded by SOA was a way for multiple organizations to cooperate on a problem while still maintaining ownership of their own applications, and overcome the difficulties of traditional governance and funding mechanisms.

2.2 Federated Governance Model

Based upon the IT governance model introduced by Weill and Ross (2004), IT governance involves five decisions: IT principles, IT architecture, technology, applications, and investments.

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In organizations that succeeded with SOAs, decision making was split between two groups. IT department decided upon **SOA** policy, architecture, and technology while business units made the application priority and investment decisions. IT principles, architecture, and technology decisions were made by a central IT group composed of members of the interacting organizations in the ecosystem.

2.3 An Enterprise Service Architecture

The architecture evolved into a three layer structure (producers, distributors, and consumers) in 84% of the cases. The producer layer consisted of services designed specifically to either provide information upon request or provide information via publish-subscribe. The middle layer is the distributors, which were concerned with the physical transport, infrastructure management and security. The third layer is the consumers, which consume information sources through the middle layer.

2.4 A Staged Portfolio of Investments

Portfolio investments and application decisions were made by two different parties (both the business units and by the central IT department), and were staged in incremental improvements involving standards, SOA infrastructure, and legacy application interfaces. Incentives have ranged from the ability to be closer to the end user (war fighter), the ability to send data to different classification levels, the ability to obtain data from many sources, and the offer of receiving additional funding for future years.

2.5 Program Office Risk Management

In an SOA, multiple peer organizations demanded that there was no overall controlling agency. The central office controlled the infrastructure, and had to encourage, rather than dictate, that participants engage with the SOA. Program offices were forced to provide an ecosystem that encouraged services and consumers to join.

2.6 Simultaneous Tight and Loose Control

Historically, two different change management schemes have been used: "Designed Target" and "Spiral". In the "Designed Target" (Halley and Marsh, 2004), a final to-be state was defined and intermediate steps were conceptualized and executed. This technique *was* used primarily in COTS-based SOA architectures. "Spiral" (Boehm et. al. 2004) change consisted of a series of evolutionary steps based upon the results of the previous step, with only a very vague notion of the eventual goal. Service Oriented Architecture encouraged a new form of continuous change which was a combination of the previous approaches. The delivery and functionality of each individual service was tightly controlled and independent of every other service. However, as new services were deployed, older services would take advantage of the new services to provide additional capabilities. Therefore, the entire ecosystem was in "spiral" development, while the individual services were each in "designed target". This resulted in a changing ecosystem composed of tightly controlled services.

2.7 Managing the Fluid Stage of Technology

SOA is in the "Fluid Stage" of the technology lifecycle (Utterback, 1996). This stage is characterized by considerable uncertainty in technologies, standards, and implementation patterns. Organizations were able to overcome proprietary approaches by developing a three layer horizontal architecture model and making sure that interfaces were described in industry accepted standards.

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