AN OVERVIEW OF THE OSTRA FRAMEWORK FOR THE TRANSITION TO SOA

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Abstract: Service-Oriented Architecture is an emerging paradigm to build applications as a collection of services that can be coordinated to provide flexible applications. At its full potential, the development of services is considered from the perspective of the enterprise to deliver services that can be reused across applications and provide flexible solutions. However, the achievement of an enterprise-wide SOA is challenging, as it remains unclear how organizations should evolve towards the SOA paradigm. This paper discusses issues related to transition to SOA and provides an overview of OSTRA - a framework which provides a realistic approach for the transition to SOA, by considering short-term and long-term goals and balancing planning and management with practical experimentation.

1 INTRODUCTION

Organizations have always been under constant pressure to adjust quickly to the changing demands of their businesses. Service-Oriented Architecture (SOA) technology promises unmatched flexibility and seamless integration at relatively low costs. SOA is comprised of a set of design principles that promotes the development of applications as a composition of loosely coupled Web services (Erl, 2005). The emphasis of web services on industry-wide standards has enabled the vision of the agile enterprise that flexibly adapts its technology to its business needs.

In general, the transition to an SOA requires changes to company's existing applications, and there is a lot of uncertainty surrounding the challenges involved in the implementation of an SOA. Although many researchers have worked on the individual difficulties of the transition, there is still a lack of frameworks to guide the entire transition to SOA. Academic literature is focused on providing solutions for technical challenges rather than in the overall transition itself, and while the industry has provided a fair amount of research on management issues, a complete solution for the transition to SOA has not been yet published as it probably composes their portfolio of consulting services. The main reason for the shortage of frameworks though, is that the concepts and technology that have enabled the SOA vision are recent and still evolving, and therefore, the need for a framework describing the transition to SOA has only recently become a priority issue.

In this paper, we discuss the transition approaches to SOA and their adoption challenges. Moreover, it presents an overview of the OSTRA (Opportunity-driven Service-oriented TRAnsition) framework to guide enterprises in the evolution to SOA, followed by a discussion of the initial implementation of OSTRA in a real organization. The paper is organized as follows: Section 2 presents the OSTRA framework. Section 3 overviews the implementation of OSTRA in a real company while Section 4 discusses the lessons learned from the real case and presents its conclusions.

2 OSTRA: AN SOA TRANSITION FRAMEWORK

In contrast to other transition approaches (Bieberstein, 2005) (Sprott, 2003), which recommends the development of a precise long-term plan, OSTRA aims to provide a more adaptive approach to managing the iterative and incremental

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transition to SOA. OSTRA achieves this by balancing a continuous analysis of the transition process with the development of opportunities into projects, which enable organizations to obtain and evaluate short-term goals while still laying the foundation for the achievement of its long-term vision.

2.1 OSTRA Streams

OSTRA defines three streams as its key foundations for the successful transition to the enterprise SOA: SOA Roadmap, SOA Development and SOA Governance, which are represented in Figure 1.

Figure 1: OSTRA streams.

- *SOA Roadmap* defines topic areas focused on the planning of the transition. It organizes the planning in four topic areas: the identification of goals (Actional, 2005); the assessment of the current state of the organization; the identification of opportunities; and the subsequent elaboration of a plan to achieve that vision.
- *SOA Development* contains topics for effectively constructing the conceptual SOA (Krafzig, 2004). These topics are categorized as service development, service composition, service management and infrastructure development.
- *SOA Governance* is composed of four topic areas that are concerned with controlling the transition and enforcing consistence of the resultant SOA: communication and education; policies and procedures; governance model; and SOA group and concepts. (Windley, 2006)

2.2 OSTRA Phases

These three streams of OSTRA are gradually investigated in the course of three phases, and can be executed simultaneously: Inception, Elaboration and Implementation as depicted in Figure 2.

Inception is the initial phase, where the enterprise establishes the foundations for the transition, defining goals and identifying the group that will be responsible for the transition process. Elaboration is an ongoing phase where the transition is planned by continually identifying opportunities, managing the transition, and governing the SOA. The identification of opportunities triggers the onset of the Implementation phase, where identified opportunities are developed as projects, with the evaluation of the benefits and practical challenges. The results are consolidated into processes, services and infrastructure, which are continuously improved until the goals are achieved. These results also provide feedback for the Elaboration phase to adjust and investigate other issues regarding the governance of the SOA and the transition.

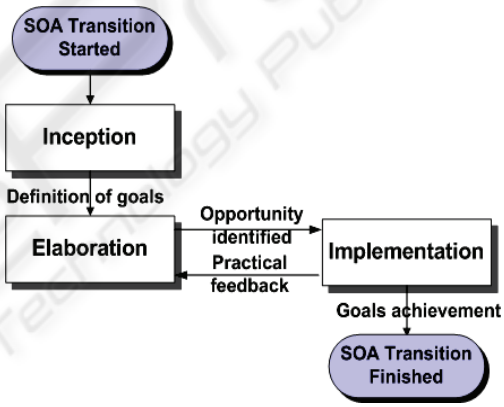

Figure 2: Overview of OSTRA phases.

OSTRA enables a dual positioning strategy with respect to goals, focusing not only on short-term results in the Implementation phase, but also ensuring that they are part of longer-term goals, which are continuously evaluated during the Elaboration phase. By utilizing a dual positioning strategy focused on opportunities, OSTRA aims to continuously align the business goals of the organization with its underlying technology while still supporting its immediate needs through the investigation of opportunities. This approach is evolutionary as it aims to gradually incorporate SOA values into the existing assets of the enterprise through the successive exploration of opportunities while minimizing risks and disruption.

3 CASE STUDY

We have been working with a large corporation to employ OSTRA to develop their SOA initiative. This industrial partner is interested in using SOA technology to improve their business flexibility and to enable better integration between its divisions and products (Bloomberg, 2003). However, the company size is a challenge for the implementation of enterprise-wide initiatives, as there are many conflicting interests and a myriad of existing applications and competing technologies. Therefore we have started the work in one of their division Plant-Wide Systems (PWS) and have been preparing to deliver it at other divisions.

3.1 Inception

The first step in the application of the OSTRA framework involves the definition of the SOA group and SOA concepts. The SOA Group contains a business leader, the manager, to provide a view of the customer needs and enterprise directions; a technical leader, the systems architect, to provide an overall perspective of the applications; product architects, to contribute with their detailed knowledge on each application; and external consultants, to provide an understanding of SOA technology. Moreover, in order to discuss information pertaining to SOA concepts, regular meetings were organized with core members of the SOA group. The results of these discussions were consolidated into a presentation to the entire SOA group and were compiled in a document that served as the basis for a conceptual whitepaper.

3.2 Elaboration

Although several opportunities were identified, it was decided that the initial focus would be on improving application integration, since this can produce more visible and immediate results than decomposing existing applications into services. A new application named InfoLite has been selected as the pilot project to illustrate the benefits of an SOA-approach in practice and to establish initial standards for SOA development. Furthermore, an overall plan for the transition has been established, which is depicted in Figure 3. The plan involved using the results of the development of the opportunities to demonstrate the value of an SOA to their applications and to obtain approval at the current business division, securing a budget and eventually triggering the SOA adoption for the entire system.

In the current organization of the enterprise, each division has a certain degree of autonomy to take their own decisions, and therefore it provides a natural structure for the Governance Model. Furthermore, initial investigation has started on policies and procedures, especially in terms of naming conventions and optimal services granularity; this investigation is being assisted through collaboration with the other information team. In order to facilitate reuse by different teams, specific industry standards have been adapted to build a vocabulary of valid verbs to use as service operation names, and to provide recommendations on the names and scope of the services.

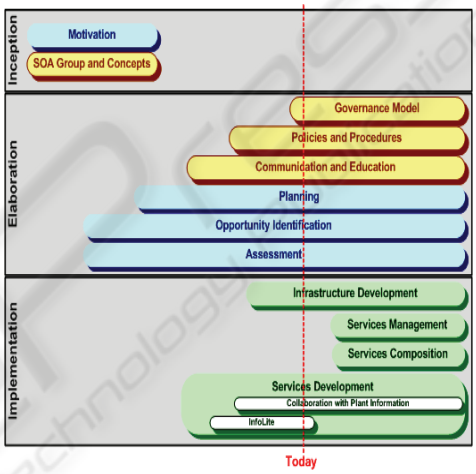

Figure 3: High-level plan for the transition.

3.3 Implementation

In the implementation phase, the pilot project InfoLite was developed. Figure 4 displays an overall view of the initial situation. Three applications from a plant control division are represented: Limit Control, Incident Intelligence, and Operator Assistance. Also depicted is the Plant Information application, which is used by managers to control the production of the plant at the next higher level. PWS platform and PWS database provide information models such as equipment structures for the Limit Control and Plant Information applications at enterprise level. The Limit Control (LC) database is depicted separately to assist in conceptualizing the models at domain level. Incident Intelligence retrieves their equipment structure, as well as other data, from the Limit Control database. However, these applications retrieve data directly from the Limit Control database and need to deal with problems such as synchronization and dependency on the Limit Control data structure. If designed

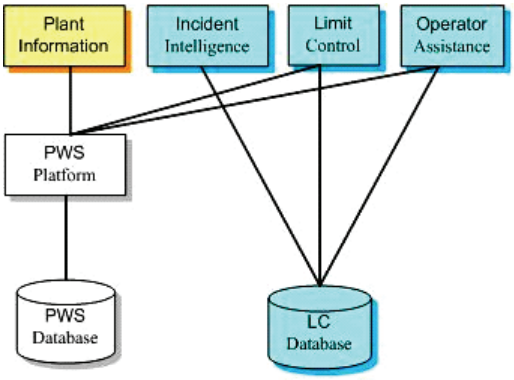

Figure 4: Initial situation.

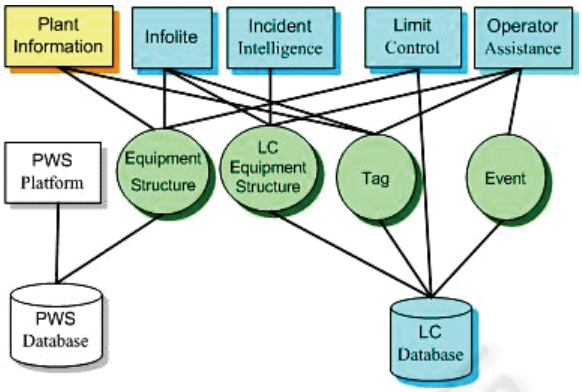

Figure 5: Improving integration between applications.

properly, the services developed for InfoLite could provide a more loosely-coupled solution for integrating applications that depend on Limit Control data. In fact, this potential solution was the main motivation for InfoLite's SOA, since retrieving data from Limit Control has been a recurring problem. After analysing the requirements of InfoLite and other PWS business units needs, the Infolite service was divided into four granular services. As depicted in Figure 5, instead of providing a specific service, this architecture provides four generic services that are useful for other applications. The Tag service will provide tag data to other applications, such as Plant Information Application and Incident Intelligence, making them independent of Limit Control data structure. The Equipment Structure services will provide the Equipment Structure that is required by other applications. Two versions of the Equipment Structure service are planned, one for Limit Control data and one for PWS Platform. Moreover, by defining the standard Equipment Structure service, it will be possible to switch from one version to another seamlessly.

4 CONCLUSIONS

The implementation of the SOA initiative in an actual company has provided invaluable feedback for certain areas in the transition process. These lessons have influenced the refinement of OSTRA and have provided insights on future improvements.

The pragmatic approach of OSTRA has been considered successful since the development of the identified opportunity has indeed provided the basis for the achievement of the vision and has clarified the challenges and issues of an SOA. Additionally, the development of the pilot project has provided valuable feedback from industry, as the practical results further illustrated the challenges, the importance of the SOA governance and the investigation of standards and recommendations.

During the implementation we have observed that technology vendors have a major influence on the practical implementation of the SOA, as the existence of tools and platforms to support the solution, as well as the alignment with industry trends, is crucial issue for enterprises. In the case of our industrial partner, the existence of supporting and reliable tools, as well as being aligned with their emerging industry SOA standards were important arguments for supporting the transition to SOA. Finally, OSTRA is an open-ended framework that enables the transition to SOA become harmonized with other initiatives like CMM or 6-Sigma.

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