

# Chapter 1.15

## Challenges for Deploying Web Services–Based E–Business Systems in SMEs

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### **ABSTRACT**

E-business initiative in many companies had started in the 1990s. These companies have recently begun to explore the use of Web Services (WS) technologies within their e-business context, since they provide an attractive, language-neutral, environment-neutral programming model that accelerates application development and integration inside and outside the enterprise. Despite these advantages, companies are slow to deploy WS because it requires a considerable shift in their application development process. While a few studies have reported on some of the reasons for this wait-and-see approach, a thorough and systematic investigation of the challenges from the stakeholders' — providers, consumers, and standards organizations — perspective is needed. This study addresses that and provides a framework for

studying the factors that impact the deployment and use of WS. The framework is used to analyze small and medium-sized enterprises (SMEs), as they play a vital role in generating employment opportunity and turnover within many major economies globally.

### **INTRODUCTION**

The e-business initiative in many companies had started in the 1990s. The first generation e-business application, with a business-to-consumer (B2C) focus, had simple Web sites with databases and forms for buying and selling online products. Subsequently, the second generation e-business application, with a business-to-business (B2B) focus, had Web sites that were fully integrated with backend systems — consisting of the major

legacy applications — internally, as well as with business partners' information systems externally to provide a wide range of online services (Gonsalves, 2002).

The emerging field of Web Services (WS) enables different software components to be integrated without having to develop these components from scratch and without the hassle of custom coding (Stal, 2002). It is resulting in significant changes in the way applications and supporting infrastructures are integrated (Schmidt, 2003). These changes have led to the design and development of service-oriented architecture (SOA) of application systems (Fowler, 2003). WS are becoming the basic building blocks out of which new applications are being created, and service composition is becoming the main focus of the application development process (Peltz, 2003). Service composition combines two or more WS following a certain composition pattern to achieve a business process goal. Thus, service composition provides a mechanism for seamless integration of cross-enterprise and intra-enterprise applications (Chung, Lin, & Mathieu, 2003).

The SOA is built on a foundation of standards, which define the roles and activities of the architectural elements, and thus support the interoperability of incompatible systems across the Web. The SOA is distributed, permitting elements of an application to be deployed on multiple systems and executed across connected networks (Geng, Gopal, Ramesh, & Whinston, 2003; Kleijen & Raju, 2003). Because the transport mechanism is built on HTTP (Hyper Text Transfer Protocol), it is possible for application elements to interact within and across enterprises. The elements of an application are designed to support specific tasks within a broader workflow or business process. Each of these service elements of an application is responsible for defining its inputs and outputs using the standards for WS, so that other elements are able to determine how this element operates, how to make use of its functionality, and what

result to expect from its execution (Papazoglou, 2003).

A Web service is thus a self-contained and self-described modular element of an application that can be published, located, and invoked across the Web. Based on existing and emerging standards such as HTTP, XML (Extensible Markup Language), SOAP (Simple Object Access Protocol), WSDL (Web Services Description Language), and UDDI (Universal Description, Discovery and Integration Service), WS provide significant opportunities for technical and business innovation (Arsanjani, Hailpern, Martin, & Tarr, 2003; Maruyama, 2002). Since the WS technologies provide a language-neutral, environment-neutral programming model that accelerates application development and integration inside and outside the enterprise, they encourage an approach to application development that is evolutionary, building on investments previously made within an IT organization, and developing new capabilities incrementally (Khalaf, 2002; Rust & Kannan, 2003).

Because of this potential to enable a new paradigm for enterprise application development and deployment, companies have recently begun to explore the use of WS technologies within their e-business context (Hagel, 2002). The integration of WS into e-business provides several business benefits that include lowering costs, improving application sharing, increasing flexibility, streamlining business processes, and opportunity to create innovative business models among others. However, there are a few obstacles that need to be overcome before widespread adoption of WS into e-business is realized (Tilley, Gerdes, Hamilton, Huang, Miller, Smith, & Wong, 2004). They include security, availability, reliability, and performance of WS-based e-business systems.

WS-based e-business systems are currently in the early phase of adoption, primarily within large organizations that have well-established IT infrastructures and technically savvy staff

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