Chapter 15
Web Services and E-Business Technologies: Security Issues

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ABSTRACT
The large scale deployment of Web services and e-business technologies in general – is affected by numerous implementation (for example, interoperability and integration) and security issues. The focus of this chapter is mainly on exploring the latter from the perspective of initiatives for mitigating security risks in Web services (for example, WS-S specifications) and e-business technologies (for example, security standards, business continuity planning, and cyber legislation). Best practices and recommendations for addressing security risks in the rapidly evolving Web environment are presented. Future research trends associated with the topic of security in Web services and e-business technology applications are also discussed.

INTRODUCTION
We are witnessing the evolution of Web 2.0! This marks the birth of a new Web, drastically different from the traditional Web, which is characterized by static screens and passive browsing. The hallmark of Web 2.0 (O’Reilly, 2007) is ‘true’ user interaction with Web sites (giving users the ability to modify content) and the use of the Web as a computing platform (that allows users to run software applications through their browser). The latter set of applications is commonly referred to as Web services. Enterprises are increasingly deploying Web services and other e-business technologies in their quest to adapt quickly to the rapidly chang-
ing business context owing to the ushering in of this new era. While Web services have delivered enormous benefits to the enterprises that employ them, and have indeed revolutionized e-business and other Internet-enabled services, they have also introduced greater complexity in the service environment. They are highly vulnerable to attack, and are still plagued by inadequate levels of enterprise system integration and interoperability (Anyiwo, 2006). Securing disparate systems and applications in a very complex service environment continues to pose significant challenges.

In spite of the recent advances in agent-based Web technologies, Web services are still hindered by security and interoperability (especially, semantic interoperability) problems. Although the Xtensible Markup Language (XML) has enabled some levels of structural and syntactic integration and interoperability in Web services, achieving semantic interoperability in a services-oriented architecture (SOA) is still very difficult.

This chapter provides an overview of the underlying opportunities as well as the security problems and other related challenges facing Web services, and other e-business technologies. In the second section of the chapter, the security risks affecting Web services and e-business technologies are presented. The current approaches in the mitigation of the security and other risks associated with each of these technologies are considered in the next section. The chapter also provides a list of recommendations for managing security risks in the Web 2.0 era as evidenced by the academic and practitioner literature, and explores emerging issues in semantic Web service security as well as the direction for future research.

WEB SERVICES SECURITY ISSUES

As the leading US analyst firm, Gartner, predicted a skyrocketing increase in Web services applications in 2003, it simultaneously identified Web services security as one among the top 11 security issues facing companies in that same year (Parry, 2003). Seven years later in 2010, the concern has only increased, mainly due to the fact that we have continued to see Web services applications being developed and deployed even though we have not exactly been able to address all the security challenges that confront these services. More recent reports also indicate that attackers are focusing their attention on interactive Web 2.0 elements with some 95 percent of user-generated comments on blogs, message boards, and chat rooms being either spam or containing malicious links (Websense, 2009). However, as O’Neill et al. (2003) point out, Web services needs to be secure in order to enjoy widespread deployment.

So what are some of the main issues associated with securing Web services? A survey of the literature reveals that many of the issues identified are in fact common to all distributed computing technologies and includes factors such as authentication, authorization, confidentiality, integrity, non-repudiation, availability and end to end security. These are in fact some of the main security issues facing Web service deployments. In addition, there could also be issues which arise from the nature of Web services themselves, such as diversity of standards specifications, need for new XML formats to structure security data, interoperability of requirements and online security elements, to name a few (Gutiérrez et al. 2004).

In their latest industry report, the Secure Enterprise 2.0 Forum (a group of organizations and individuals composed of executives at Fortune 500 companies who have embraced the trend of Web 2.0 tools and services in enterprise) has identified the top eight Web 2.0 vulnerabilities (Perez 2009). These are described in Table 1.

Hasan and Duran (2005) have grouped security challenges facing Web services deployment into three main categories: (1) interoperability and policies (since a plethora of encryption mechanisms and variety of platforms are involved); (2) message security (since a Simple Object Access Protocol (SOAP) message has to
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