

# Chapter 1.11

## Enterprise Information System Security: A Life–Cycle Approach

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### ABSTRACT

There has been an unprecedented thrust in employing Computers and Communication technologies in all walks of life. The systems enabled by Information Technology are becoming more and more complex resulting in various threats and vulnerabilities. The security properties, like confidentiality, integrity, and availability, are becoming more and more difficult to protect. In this chapter, a life-cycle approach to achieve and maintain security of enterprises has been proposed. First, enterprise information systems are looked at in detail. Then, the need for enterprise information system security and problems associated with security implementation are discussed. The authors

consider enterprise information system security as a management issue and detail the information security parameters. Finally, the proposed security engineering life-cycle is described in detail, which includes, Security Requirement Analysis, Security Policy Formulation, Security Infrastructure Advisory Generation, Security Testing and Validation, and Review and Monitoring phases.

### INTRODUCTION

There has been unprecedented thrust in employing Computers and Communication technologies in all walks of life including business, education and governance in almost all the countries. This is a one-way trend in the sense that there is no going back. While, this means lower cost, operational

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efficiency and client satisfaction, on the flip side, the systems enabled by Information Technology are becoming more and more complex resulting in various vulnerabilities. Also, there are innumerable threats which exploit those vulnerabilities. More importantly, due to global connectivity through the Internet, threats are not confined to a particular area or region; they are omnipresent. These threats pose problems to the economic and administrative independence.

In the context of Information Security, as our information infrastructures are becoming more and more complex, and connected, the properties like confidentiality, integrity and availability are becoming more and more difficult to protect/achieve. The adoption of Information Technology Act in different countries provides the legal framework for acceptance of electronic documents in business and governance, as well as to deter the wrong-doers. Also, the international community is adopting Standards such as ISO 27001 (Snare, 2005) and ISO 17799 (Plate, 2005) for best practices in security management. All these standards have evolved from the knowledge, experience and expertise of international experts. It has been recognized that the security of enterprises has to be tackled from the point of view of a management structure than from purely technological angle.

The rest of this chapter is organized as follows. Section 2 presents some background information and defines an enterprise and its functionality. It also details enterprise information systems and discusses the need for enterprise information system security. Section 3 lists the issues, controversies and problems associated with security implementation. It describes enterprise information system security as a management issue and details the information security parameters. Section 4 describes our proposed security engineering life-cycle. Section 5 lists few future research areas in enterprise information system security. Finally, our conclusions are in section 6.

## BACKGROUND

### Enterprise and its Functionality

The *Compact Oxford English Dictionary* (Weiner, 1991) defines an “enterprise” as “a project or undertaking, especially a bold one”; “bold resourcefulness”; or, “a business or company”. *Webopedia* states that an enterprise is “a business organization. In the computer industry, the term is often used to describe any large organization that utilizes computers”. Combining these, we define an enterprise as an organization (Industry/Govt./Academic) created for business or service ventures. From the Information Security point of view, an enterprise is characterized by its business goals, business activities, organizational structure, and assets and infrastructure.

The *Compact Oxford English Dictionary* (Weiner, 1991) defines “information” as “facts or knowledge provided or learned; what is conveyed or represented by a particular sequence of symbols, impulses, etc”. The Wikipedia entry for information is “the result of processing, manipulating and organizing data in a way that adds to the knowledge of the receiver”. Thus, information can be viewed as data that is organized and accessible in a coherent and meaningful manner. The generation and use of information has some commonalities in different types of enterprises. For example, all of them rely on user and operator interactions, reliable storage and retrieval, correct processing, as well as timely and good quality dissemination of information. More and more enterprises are becoming dependent on the efficiency and quality of generation and processing of information. Information has become the prime mover in the growth and sustenance of all kinds of enterprises. Information and the technology supporting the creation, and management of information act as important assets of any enterprise. Thus there is a specific need to protect these assets.

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