

Preface

Since the U.S. Department of Defense initiated the development of networked computers in 1969, Internet technologies have rapidly advanced and revolutionized the way we communicate and conduct business. The second wave of the technological revolution came with intranet technology in the mid-1990s. With the intranet, organizations have strengthened the powers and speed of data gathering and sharing, communication, collaboration, and decision making within a firewall-protected organizational boundary. The third wave of this technological evolution, extranets, began in the second half of the 1990s. Many believe that it is the key technology enabler that is triggering a revolution in the structure and operations of many organizations in the new Internet-driven global economy. In addition to maturing Internet technologies, several technology drivers, as well as business drivers, further pushed the emergence of new types of organizations—virtual corporations, virtual organizations, extended enterprises, and trans-enterprise systems.

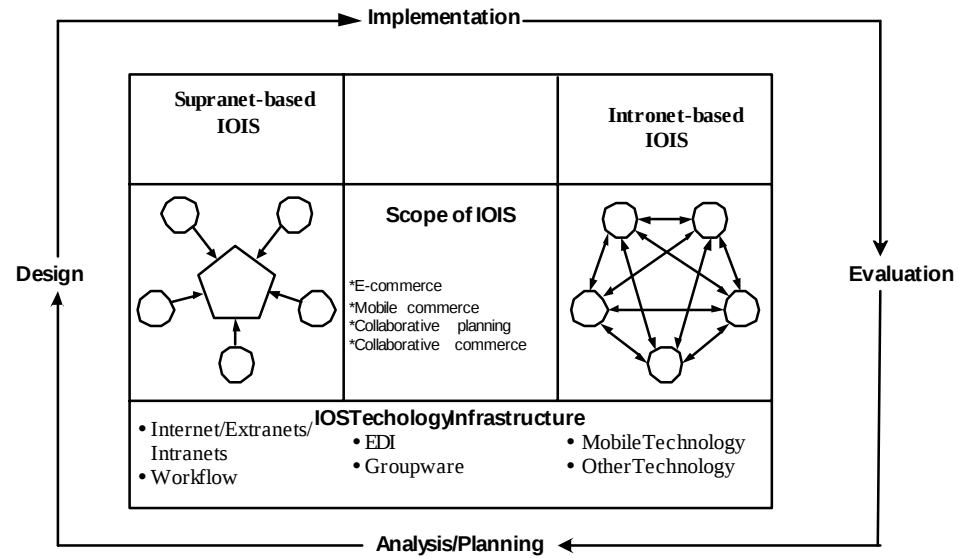
Since we began to study information systems, academics and practitioners have expanded the focus of information technology's role in managing organizations, from individuals to groups to functional departments to organizations to inter-organizations. In the 1980s, technology's impact on organizations has been an ongoing research theme. For example, Rockart and Short (1989, p. 7) argued that a firm's ability to continuously improve the effectiveness of managing interdependence is the critical element in responding to new and pressing competitive forces. The concept of inter-organizational systems (IOSs) emerged as a tool for achieving competitive advantages. Many well-known examples of information systems that provide competitive advantages that are discussed in the literature (Porter & Millar, 1985) are those of inter-organizational information systems (IOISs).

The Objective of this Book

The purpose of this book is to provide the readers with a guidepost that helps them understand the current state of IOS and the foundational concepts. This book aims to provide readers with a framework for IOS management, which is comprised of the management of IOS technology infrastructure and the ongoing process of IOS analysis and planning, design, implementation, and evaluation (see Figure 1). Discussed in this book are the foundational concepts of the IOIS, its typology, real-world IOS examples (supranet-based IOS and intranet-based IOS), configurations (horizontal or vertical electronic linkage) and categories, benefits, risks, corporate strategies, future trends, and a wide range of issues addressing all aspects of IOIS management, including technological and organizational issues, opportunities, and managerial issues in the processes of planning, designing, implementing, and evaluating IOISs.

In designing supranet-based IOSs, identifying the information requirements of a business or industrial association is an extremely important activity in the IOS development process. This book presents the virtual association platform model, a framework of the relationships, and the corresponding information flow. The framework provides the readers with indispensable tools with which to identify information requirements as well as the flow of information among the various entities, such as consortium members, association (consortium), government, financial institutions, customers, nonmember customers, and nonmember sup-

Figure 1: IOIS management framework



pliers. Other critically important contributions of this book are in the IOS network information management and IOS evaluations. Network information management refers to the management of IOS information resources, infrastructures, and systems to improve the management of information flows in the most efficient and effective way. Further, the book presents inter-organizational decision support systems, IOS research methods, and empirical study on how information technology encourages the creation of strategic networks.

The Structure of the Book

This book is divided into seven sections: *Foundations*, *Technology Infrastructure*, *Systems Analysis/Planning*, *Systems Management*, *Implementation and Applications*, *Evaluation*, and *Research Method and Empirical Study*.

The first section, *Foundations*, consists of three chapters. These three chapters offer a broad landscape for the rest of the book. In chapter 1, Eom provides the readers with a brief overview of foundational concepts, definitions, and information technology infrastructure. A definition of IOS is *an information and management system that transcends organizational boundaries via electronic linkages with its trading partners to share data, information, and business applications; provide the capabilities of electronic transactions, including buying and selling goods and services; and facilitate communications and decision making for the purposes of increasing efficiency, effectiveness, competitiveness, and profitability for participating organizations*. The electronic linkage is established by an information technology environment, including extranets, Internet, groupware, electronic data interchange (EDI), workflow, mobile communication technologies, and other information and communication technologies. Finally, the chapter systematically classifies the IOIS literature of 192 bibliographic items into 10 subspecialties. Therefore, along with a previous survey (Ngai & Wat, 2002) of 275 bibliographic items, readers are in a better position to comprehend the big picture of IOS.

In Chapter 2, O'Donnell and Glassberg provide a typology of IOIS to help readers understand the purpose of IOIS systems and how they are structured, in order to fill in the gaps not yet investigated by researchers. This typology not only highlights the differences and similarities among the many configurations of IOIS available today, but also contrasts this with internal Web sites (Intranets) and public (external) Internet Web sites. This approach offers new insights for both practitioners and researchers. O'Donnell and Glassberg present the background and the typology of IOIS. The two general areas in which these systems differ—the structures of the relationships and the types and formats of the

information exchanged-are identified and discussed in separate sections, respectively. Each system that has features that help distinguish between it and these differences will be highlighted. Next, the benefits and risks of IOIS are discussed. Later, previous research on EDI and systems is introduced to identify exciting new areas for investigation. Finally, O'Donnell and Glassberg identify future trends for IOIS, and the implications for both researchers and practitioners are discussed.

Chapter 3 aims to develop a framework for business-to-business inter-organizational systems based on real-world IOS examples. Based upon two dimensions-role linkage and system support level, Hong proposes a new framework that classifies IOS into four basic types: resource pooling, operational cooperation, operational coordination, and complementary cooperation. He reviews selected cases that fit into each category and considers the common characteristics of systems in each category. He then draws implications for IOS planning and suggests a four-step process for creating an IOS plan. It is argued that each category of IOS needs to be linked with a specific business strategy, although each employs a common technical infrastructure.

The second section of the book is titled *Technology Infrastructure*. The first chapter in this section, Chapter 4, discusses an extranet, which is one of the information systems infrastructures on which an IOS is built. An extranet is a Web-based private network that interconnects a company's network to the networks of business partners, suppliers, customers, and others in a secure, electronic, online environment for the purpose of conducting business. The extranet is an extended corporate intranet using Internet technology operating over the Internet for a wide range of applications in the areas of sales, marketing, manufacturing, online publishing, design and development of new product, communications via videoconferencing and real-time voice conversations, business transactions, decision making, etc. Extranets are the core technology for building IOSs. There are a host of other technologies that serve as infrastructures for managing IOS. They include coordination technologies for coordinating resources, facilities, and projects, monitoring technologies, filtering and negotiating technologies (intelligent agents), and decision-making and knowledge management technologies. In this chapter, the authors provide brief overviews of each of these technologies.

Chapter 5 presents the Application Service Provision/Provider (ASP) business model, which offers a pragmatic adoption path for inter-organizations in the Internet Age. The official body of authority, ASP Industry Consortium, defines ASP as "a third party service firm which deploys, manages and remotely hosts software applications through centrally-located services in a rental or lease agreement" (ASP Consortium, 2001). Such application deliveries are done to multiple entities from data centers across a wide area network as a service, rather than as a product, priced according to a license fee and maintenance contract set by the vendor. This model enables ASPs to serve their customers

regardless of geographical, cultural, organizational, and technical constraints, thereby adding value of location. Given this pragmatic adoption path, academics are beginning to question: Where are enterprises adopting ASP technology first? Why are they choosing these areas? Where will they apply the evolving Web services technology next?

This chapter's primary purpose is to point out a number of issues that concern management of inter-organizations of the Internet Age and to explore the impact of ASP on such organizations. It will examine the strategies that will enable inter-organizations to better manage ASP resources for competitive advantage. While the phenomenon of ASP is still in an embryonic stage, we draw from seminal works of IS pioneers like Markus, Porter, Checkland, Maslow, and others. Their intellectual contributions, plus findings from research work at Brunel University, provide a framework for discussion. By shedding light on patterns of ASP's trajectory, drivers, benefits, and risks, the chapter will help managers and academics reflect on determining where ASP-and associated technologies-might be deployed and define a broad implementation program to exploit the potential of an ASP business model. The chapter seeks to find if Web services architectures are distinctively able to enhance the flexible coordination of business processes, which span various enterprises and rely on inter-organizational information systems in the Internet Age.

The third section of the book is titled *Systems Analysis/Planning*. In Chapter 6, the subject matter concerns the study of information and communication technology application to improve business/industrial association environment. This chapter provides the readers with an important example of supranet-based IOS (introduced in Chapter 1). Business/industrial associations are a form of industrial aggregation that has the purpose of providing all association members with social activities and collective business services. Business associations represent the interest of their members. In pursuing consortium competitiveness and efficiency, the development of successful information and communication technology solutions is a must to create and extend value chains by improving collaboration, information sharing, and joint decision making among association members.

Pigni and others present the virtual association platform model, which is a comprehensive framework for analysis of the information requirements for the activities of business/industrial associations. They provide an assessment of the main activities of a business association and describe the relevance of relationships management within a business association. They then propose a framework for use in identifying the information requirements of a business/industrial association BA. Finally, such a framework is applied to the case of the 2Cities portal, a platform designed to deliver services to business/industrial associations in Western Australia. This global model is used for defining the information requirements for the design of a technological platform supporting its activities.

The fourth section of the book is called *Systems Management*. The IOS is created by a long-term IT-related business arrangement regulated by contract, including EDI, EFT, and Internet services. A plethora of various issues has been discussed in the literature. These issues include organizational, collaboration, technological, and other miscellaneous issues, as reviewed in Chapter 1. In Chapter 7, Klein and his colleagues discussed the specific challenges of designing and running IS in an inter-organizational setting and presented an IOIS management framework as a basis for explaining the different outcomes of IOISs. Their framework proposes that the IOS outcomes are the results of the dynamic process among several elements. The IOISs need to be strategically aligned with the purpose of the network and the strategic goals of its members. Furthermore, they need to be organizationally embedded so that they can support network relations and processes. The cases have highlighted the need to develop shared visions and incentives for the IOIS—successfully in the ONIA NET case, unsuccessfully in the DIMER example—and to build relationships and inter-organizational practices that provide initial support for the IOIS. Once in place, we observe a reciprocal relationship between the technically mediated and the social relationships: initial trust is essential for the setup of the IOIS, which then has to confirm and reinforce trust, e.g., through extended transparency among the network members.

The fifth section of the book, *Implementation and Applications*, deals with the implementation of the IOS and specific applications. The IOS can be applied in the form of transaction processing systems, management information systems, decision support systems (DSSs), etc. In this section, we include two chapters on DSS applications. Chapter 8, presented by Hope Koch, contains information about the adoption and diffusion of IOISs. Realizing the full potential of emerging inter-organizational connectivity requires understanding what facilitates its adoption and diffusion. A history of IOIS adoption research exists in electronic data interchange (EDI). Based on this work, Chwelos, Benbasat, and Dexter (2001) hypothesized that constructs at three levels (organizational, inter-organizational, and technological) influence IOIS adoption. This chapter expands Chwelos et al.'s hypothesis by looking at variables found to significantly influence adoption and diffusion of an array of IOISs. In this process, Koch reviews 25 empirical IOIS studies and lists and categorizes variables significantly influencing IOIS adoption and diffusion by IOIS type. Bringing IOIS adoption and diffusion literature together, this chapter can be a starting point for research on emerging IOISs. Koch's research supports and extends Chwelos et al.'s hypothesis. While Chwelos et al.'s hypothesis focuses on EDI adoption, her research found that variables at the adoption and diffusion stages for an array of IOISs fall into Chwelos et al.'s construct categories. However, some variables fall into multiple categories. Koch further proposes that variables found to significantly influence IOIS adoption and diffusion also facilitate adoption and diffusion of emerging IOIS forms.

In Chapter 9, Eom discusses inter-organizational DSSs (IODSSs) as a new frontier in DSSs. The focus of DSSs has been shifting from teams, work groups, and intranet-based organizational DSSs to extranet-based IODSSs. The extranets' built-in technologies are sufficient to make the extranets as rudimentary IODSS. This chapter discusses the evolution of DSSs from single-user DSSs to IODSSs. To better understand the IODSS, Eom briefly discusses two predecessors, the organizational DSS and the global DSS, followed by the IODSS definition, architecture, and its applications. With the addition of many readily available Web groupware to extranets, the IODSS is an indispensable communication/decision support tool for enhancing inter-organizational competitiveness to achieve system-wide global objectives. In doing so, costs must be minimized, and products must be differentiated. The cost minimization can be achieved by making a series of decisions in the value chains, such as inbound logistics, operations, outbound logistics, marketing, service, etc. Over the past three decades, numerous DSSs have been developed to manage each stage of the value chain. Future research is designed to develop integrated models to optimize the extended enterprise as a whole. To do so, changes in management process thinking from a discrete firm-based view to an industry-based perspective of cooperation is necessary. Furthermore, several ongoing technological developments in the DSS area can make the IODSS an effective management support tool.

Chapter 10 examines recent developments associated with building and deploying IODSSs to support external stakeholders of an organization. The IODSS concept is defined, and an information-technology architecture for such a system is explored. Examples of current implementations are categorized as communication, data, document, knowledge, and model-driven IODSSs. Further, implementations of IODSSs are categorized as customer- and supplier-focused. Advantages, disadvantages, and current issues associated with the IODSS conclude the discussion.

The sixth section of the book, *Evaluation*, has one chapter titled "Evaluating Inter-Organizational Information Systems." In Chapter 11, Drury and Scholtz describe different means of evaluating the usability and suitability of computer-based IOISs. They begin by describing why doing so is important yet difficult, and they provide an assessment of the advantages and disadvantages of the major types of evaluation. The chapter continues with a case study focusing on determining whether an application provides the necessary insight into other collaborators' identities, presence, and activities, while keeping sensitive information private from a subset of the collaborators. The goal of this chapter is to provide practical guidance to organizations seeking IOISs to help them choose (or develop) an IOIS that best meets their needs. The authors describe evaluation methods for multiuser applications, in general. One evaluation method, in particular, Synchronous Collaborative Awareness and Privacy Evaluation (SCAPE), is singled out for description. The chapter also presents a case study

using SCAPE to evaluate Groove™, a popular tool that aids inter-organizational information sharing.

The seventh section of the book is titled *Research Method and Empirical Study*. The section consists of Chapters 12 and 13. Chapter 12 suggests the use of comparative pairs analysis as a method of collecting data for inter-organizational information system and chain research. It is argued that chains of organizations can be analyzed by collecting data from a focal firm about upstream suppliers and downstream customers. By comparing pairs of respondents within the focal firm, the differences between customers and suppliers can be analyzed. In addition, it is suggested that by asking each respondent to discuss two third-party organizations, differences in responses can be highlighted and explained during the data collection process. This can provide a rich source of data to explain the results obtained.

Chapter 13 analyzes how information technology fosters and supports the creation of strategic networks. The creation of strategic networks of firms has been widely studied, and there has been some work on the importance of information technology (IT) in these networks. But, there is little in the literature that explains in detail the role of IT in the formation of inter-organizational networks. There are gaps with respect to what IT actually does, and how it makes possible, or at least facilitates, the operation of the network. This chapter attempts to fill this important gap, in a literature where IT appears to be very important for inter-organizational relations, but the reason why is anecdotal. This chapter looks in detail at the reasons why strategic networks are formed, developing a theoretical framework that can explain these reasons adequately, and allows us to analyze the role of IT in the formation and maintenance of these networks. The conclusions we come to will be tested against a case study, which, as well as being illustrative, will allow us to make a theoretical generalization.