

# Preface

In an increasingly complex business operating environment, organizations around the world face the twin challenge of creating and deploying information technology application infrastructure for information capture and sharing, and for making effective use of the information in decision making. Two categories of IT applications, enterprise resource planning (ERP) and data warehousing (DW), encapsulate the attempts by organizations to make more effective and proactive uses of organizational information to support strategic and tactical decision making.

## ENTERPRISE RESOURCE PLANNING

Since the mid-1990s, companies worldwide have invested heavily in a variety of ERP systems from companies such as SAP\_AG, Oracle, and Peoplesoft. Partly in a bid to renew IT infrastructure, and spurred to a large extent by the Y2K crisis, companies, using these commercial off-the-shelf software (COTS) packages, are attempting to create “seamless” integrated information environments that provide the agility and flexibility needed to pursue and support current and future growth. The deployment of these systems promises to end the information anarchy typically found in both private and public sector organizations. ERPs, like other enterprise systems, are designed to streamline data flows within and between organizations, providing management and other organizational members with direct access to real-time operating information (Davenport, 1998). When implemented effectively, these systems can provide a variety of strategic, organizational, operational, and technological opportunities (Ali, 2000; Markus & Tanis, 2000).

The ERP implementation experience has been and continues to be mixed. While there have been many notable successes (Kalakota & Robinson, 1999; Davenport, 2000; Brown & Vessey, 2001), there have been a significant number of failures (Stedman, 1999; Schneider, 2000; Stedman, 2000a; Scott & Vessey, 2002). According to Markus et al. (2000), many of these failures seem to occur during the “shakedown” phase of the ERP implementation. Many organizations adopting ERP systems seem to be somewhat naïve about the

risks faced in deploying such systems and are prone to panic when they run into trouble. Implementing an ERP system can be a tremendous business risk, and, as such, executives need to be cognizant of the risks faced and address them appropriately (Scott & Vessey, 2002).

Early generation ERP systems almost entirely focused on infrastructure renewal and creating efficiencies in back office operations around key functional areas such as finance and production management. These systems, while useful, did not address the mission critical issues such as supply chain management (SCM), customer relationship management (CRM), and knowledge management (KM). New generation systems have sought to address these shortcomings in a variety of ways. Also, while early generation ERP systems were found mainly in large organizations, newer systems are now being targeted at small and medium enterprises as means of expanding the ERP market.

The purported benefits of deploying ERP systems have been widely discussed. However, it is not entirely clear how these benefits can be realized in practice. To what extent does ERP implementation contribute to overall organizational effectiveness? What has been the impact of deploying ERP systems on organizations, their structures, their jobs, and their employees? How can they be used to facilitate collaborative work and information sharing? These and other issues will be addressed in the first seven chapters of the book.

## **DATA WAREHOUSING**

Even when data is efficiently captured and stored, it may remain relatively useless for reporting and decision making purposes. Transaction and other data often need to be combined in order to provide useful information for those requiring it, be it senior decision makers or individual employees doing their assigned jobs. Data warehouses provide a mechanism for storing and combining data from a large number of sources for the purpose of querying, reporting and decision-making. Data warehouses are different from online transaction processing databases. They are “subject-oriented, integrated, time-variant, non-volatile collection of data” used to support decision making (Gray & Watson, 1998, p. 89).

Data warehousing was initially viewed as a way to solve the problems associated with independently maintained legacy data. Legacy data systems were originally developed to support functional activities such as accounting, sales and human resources. They often contained duplicate, dissimilar, or inaccurate information about the same entity. For example, three databases may have different renderings of the address of the same company. However, creating a single data warehouse to address the problems associated with non-integrated legacy data has itself proved to be difficult and problematic. Some of the difficulties relate to the nature of the data in a data warehouse, the cost

and complexity of building and maintaining it, and the challenges associated with using the data contained in the warehouse.

Since single, large-scale data warehouses are proving to be too difficult to build and maintain, there is a move to develop distributed data warehouses. Distributed data warehouses, especially those built around Internet technology, hold the promise for increased functionality and usability, as well as reduced deployment costs (Hsieh & Lin, 2003).

Once a data warehouse is built, a number of issues related to obtaining useful information out of the warehouse arise. These include data quality, techniques for mining the data, and the correctness and relevance of the data. Chapters 8-14 of this book address these issues.

## ORGANIZATION OF THE BOOK

This book is divided into two parts. The first seven chapters of the book focus on issues related to ERP systems and enterprise integration. The second part contains seven chapters addressing issues related to data warehousing and data utilization.

### Part 1: ERP Systems and Enterprise Integration

In Chapter 1, Hedman and Borell use an artifact evaluation approach to address the issue of ERP implementation and its impact on organizational effectiveness. Adopting the Competing Values Model (Quinn & Rohrbaugh, 1981; Rohrbaugh, 1981), they conducted an organizational level analysis of the impact of SAP R/3 enterprise system on the effectiveness of adopting organizations. Their evaluation suggests that there are both strengths and weaknesses associated with the ERP system as it relates to four organizational models. ERP systems are strong as they relate to internal process (IP) and their rational goal (RG) models of organization. ERPs have significant shortcomings in relation to human relations (HR) and open systems (OS) models.

Berlak and Deifel, in Chapter 2, propose a cybernetic model of order management to address the challenge of flexibility and responsiveness of order management systems (OMS) to variations in the business operating environment.

The decision process surrounding the selection of an ERP package is critical to the eventual success of the system deployment and use. Deciding on which ERP package to acquire is not a single decision but involves multiple iterative activities geared towards evaluating factors such as functionality, price, training requirements, and post-implementation maintenance of the acquired system. In Chapter 3, Bernroider and Koch propose a rational process model for ERP software acquisition. He uses empirical data obtained from a survey of Austrian organizations to investigate five hypotheses and every stage of the

process acquisition model proposed. The findings suggest that smaller organizations adopt less complex approaches to ERP software acquisition and tend to expend less effort during all stages of the decision making process.

The first wave of ERP implementations focused primarily on IT infrastructure renewal in large organizations. With the market for large-scale ERP implementations slowing, software vendors such as SAP have begun to target small and medium enterprises with scaled-down versions of their products. The vendors have also turned their attention to developing software that provides extended functionality for interacting with customers, suppliers, and partners. Stein and Hawking provide insight into the penetration of SAP into the Australasian market. Using data supplied by SAP Asia-Pacific as well as three mini case studies, they trace the development and growth of the Australasian market for ERP software. They highlight the fact that as mature users of ERP seek to benefit from their previous investments they are more open to adopting software with additional functionality.

In Chapter 5, Schelp and Rowohl address the issue of enterprise application integration. They highlight the fact that because organizations operate in dynamic and heterogeneous environments; there is a growing and pervasive need for integrating applications across functions and processes. These needs cannot possibly be met by any single application such as an ERP system. However, solutions provided by either software vendors or scientists address only some portions of the complex problems associated with enterprise application integration. They call for an integrated approach and suggest some topics that an approach should address.

As organizations undertake the deployment of integrated ERP systems, concerns are growing about its impact on people occupying jobs and roles in those organizations. Grant and Uruthirapathy set out to assess the impact of ERP implementation on job characteristics. Using the Hackman and Oldham job characteristics model as a basis, the study assesses how ERP affected work redesign and job satisfaction of people working in several Canadian federal government organizations.

ERPs provide a collaborative environment where people perform a variety of tasks in their assigned roles. The effectiveness with which those tasks are performed is dependent on the level of awareness each actor has of the role as it exists in an ERP process map. In Chapter 7, Daneshgar introduces a conceptual object-oriented framework based on the notion of process awareness to assist in the analysis and design of ERP systems for virtual communities (VC).

## **Part II: Data Warehousing and Data Utilization**

In the second part of the book, chapters addressing issues around data warehousing and data utilization are presented.

In the chapter, *Distributed Data Warehouse for Geo-spatial Services*, Sikder and Gangopadhyay address the issues and challenges involved with decision making using spatially distributed data and data models. Focusing on the specific area of geo-spatial data, they advance ideas for addressing the lack of standardization for re-use specification of existing spatial models, emphasizing the need to take a user or decision maker view. They present a prototype system, GEO-ELCA, to illustrate collaborative access to data and model for supporting spatial decision-making.

In Chapter 9, Lee, Otondo, Kim, Prasarnphanich and Nichols examine the use of data mining tools to address data mining for business process reengineering. While most data mining problems are solved using set-theoretic approaches, business process reengineering problems require graph-theoretic approaches to find a solution. Using the case of Poplar County Criminal Justice System (PCCJS), the researchers applied two different data mining technologies in an attempt to generate meaningful hypotheses for business process reengineering. They were successful in this effort even though they had to switch data mining technologies during the research.

In Chapter 10, Borchers discusses intrinsic and contextual data quality and the effects of media and personal involvement on these. Using a controlled experiment, the author tests four hypotheses about perceptions of data quality in information about cancer. The results of the experiment suggest that media is not a significant factor in perceptions of data quality. Limited support was found for the notion that people become more discriminating of data quality for topics they are personally involved with.

The next three chapters address issues concerning the effective use of healthcare information. In Chapter 11, Kraft, Desouza and Androwich provide a detailed discussion of the concept of healthcare information, particularly from a nursing perspective. They define core constructs such as healthcare informatics as well as address key issues related to healthcare records and databases. Through a data mining exploration of the Veteran's Health Administration (VHA) Spinal Cord Injury (SCI) clinical database, the researchers sought to discover if there were patterns of patient needs, nursing diagnoses, nursing interventions, and patient outcomes.

Gorla and Bennon demonstrate the use of data mining techniques, particularly clustering algorithms, to address the problem of duplicate patient information in healthcare information repositories. Duplicate data, arising from a number of sources, is a significant issue faced by health service providers because of the potential for misleading healthcare workers in making diagnoses or other interventions. The researchers used hierarchical, partitioned, and hybrid clustering algorithms to determine which approach produced the best results. Hybrid clustering methods appeared to be best.

In Chapter 13, Schuring and Spil introduce the notion of relevance and micro-relevance as precursors to actual information technology use in organi-

zations. Based on their case studies of general practitioners' use of an electronic prescription system in the Netherlands, they assert that the sub-optimal use of IT systems will persist if there continues to be a mismatch between what is relevant to the user as opposed to the creators and owners of the system.

In the last chapter, Baim presents a proposal to create interactive websites in support of community policing programs. Data collected from residents in three communities highlighted varying degrees of readiness for use of interactive websites.

## CONCLUSION

Addressing two very substantial subjects in one book is not only challenging but is destined to be inadequate. This book is not intended to provide definitive coverage of all the issues concerning either ERP or data warehousing. What it attempts to do is to provide insight into current thinking and research about two very important information management topics.

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