Enterprise Information Systems and Implementing IT Infrastructures: Challenges and Issues

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BUSINESS SCIENCE REFERENCE

Hershey • New York

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Section 1 Challenges and Issues in Enterprise Information Systems

Chapter 1

Engineering the Coordination Requirements in Cross-Organizational ERP Projects:	
A Package of Good Practices1	
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There is yet little knowledge about cross-organizational Enterprise Resource Planning (ERP) implementation projects when it comes to determining requirements and achieving alignment between IT and businesses. Consequently, the requirements engineering (RE) processes are often more expensive and less effective as they could be. In this chapter, we view a cross-organization ERP implementation as a coordination problem, and introduce a coordination complexity model based on an organization's level of participation in a business network. We show how the external coordination characteristics of an organization can be mapped to ERP-supported mechanisms for cross-organizational coordination. To incorporate this activity in the state-of-the-art ERP RE processes, we propose a set of good practices that counterpart certain coordination issues at different complexity levels. Our paper is based on empirical data gathered from secondary sources. We also carried out an early validation assessment based on an online focus group composed of ERP solution architects.

Chapter 2

Agile Software Development for Customizing ERPs20)
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Björn Johansson, Copenhagen Business School, Denmark	
Rodrigo Soares Manhães, State University of North Fluminense, Brazil	

Customization of ERP systems is a complex task, and great part of this complexity is directly related to requirements management. In this context, a well-known problem is the misfit between the ERP functionalities and the business requirements. This problem comprises communication bottlenecks and difficulties on responding to changes. The proposals for minimizing these misfits are mostly focused on traditional, heavyweight waterfall-like approaches for software development. On the other side, the last decade has witnessed the rise and growth of agile methods, which have both close communication and fast response to changes among their main values. This chapter maps some of the main agile practices to ERP customization processes, using, where applicable, practices from a real-world ERP project. Moreover, some limitations on the agile approach to ERP customization are presented and discussed.

Chapter 3

The demand for ERP systems grows rapidly along with complexity and integration of enterprise systems. ERP is an enterprise oriented information system for resource planning which integrates various departments and systems. This chapter identifies a set of key characteristics of ERP system and then map onto a software component model which has been customised for ERP characteristics. A component based software process model for ERP projects is proposed and its significance during the ERP implementation is indicated.

Chapter 4

Business information system is an area of the greatest significance in any business enterprise today. Enterprise Resource Planning (ERP) projects are a growing segment of this vital area. Software engineering metrics are units of measurement used to characterize the software engineering products and processes. The research about the software process has acquired great importance in the last few years due to the growing interest of software companies in the improvement of their quality. Enterprise Resource Planning (ERP) projects are very complex products, and this fact is directly linked to their development and maintenance. One of the major reasons found in the literature for the failure of ERP projects is the poor management of software processes. In this chapter, we propose a Software Metrics Plan (SMP) containing different software metrics to manage software processes during ERP implementation. Two hypotheses have been formulated and tested using statistical techniques to validate the SMP. The statistical analysis of the collected data from an ERP project supports the two hypotheses, leading to the conclusion that the software metrics are momentous in ERP projects.

Chapter 5

ERP Implementation in a Steel Major in India61
Sanjay Kumar, MDI Gurgaon, India
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The case describes an ERP implementation in a steel major in India. The various factors which impact ERP implementation as identified in literature are discussed. The implementation of ERP systems in the organization has been described at each stage of the implementation. The activities at each stage and also the issues arising at each stage of the implementation have been discussed. The benefits identified by the managers have also been included.

Chapter 6

The model discusses the implementation of ERP systems. The article discusses the process based implementation approach and also the critical success factors approach for the implementation. A gap identified in literature is that critical success factors and ERP implementation has not been studied from the viewpoint of other stakeholders. This chapter tries to address this gap by proposing a seven stage model of ERP implementation and adoption from the viewpoint of the ERP implementation consultant. The model also addresses subsequent stages such a data exploitation stage where organizations learn to use data for decision making and process management. The model also addresses the subsequent stages of extension of ERP to partners like suppliers and dealers, and the innovation stage when the organizations starts to experiment with newer solutions based on ERP systems.

Chapter 7

This publication presents cognitive systems designed for analyzing economic data. Such systems have been created as the next step in the development of classical DSS systems (Decision Support Systems), which are currently the most widespread tools providing computer support for economic decision-making. The increasing complexity of decision-making processes in business combined with increasing demands that managers put on IT tools supporting management cause DSS systems to evolve into intelligent information systems. This publication defines a new category of systems - UBMSS (Understanding Based Management Support Systems) which conduct in-depth analyses of data using on an apparatus for linguistic and meaning-based interpretation and reasoning. This type of interpretation and reasoning is inherent in the human way of perceiving the world. This is why the authors of this publication have striven to perfect the scope and depth of computer interpretation of economic information based on human processes of cognitive data analysis. As a result, they have created UBMSS systems for the automatic analysis and interpretation of economic data. The essence of the proposed approach to the cognitive analysis of economic data is the use of the apparatus for the linguistic description of data and for semantic analysis. This type of analysis is based on expectations generated automatically by a system which collects resources of expert knowledge, taking into account the information which can significantly characterize the analyzed data. In this publication, the processes of classical data description and analysis are extended to include cognitive processes as well as reasoning and forecasting mechanisms.

As a result of the analyses shown, we will present a new class of UBMSS cognitive economic information systems which automatically perform a semantic analysis of business data.

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EIS for Consumers Classification and Support Decision Making in a Power Utility Database....... 103 Juan Ignacio Guerrero Alonso, University of Seville, Spain Carlos León de Mora, University of Seville, Spain Félix Biscarri Triviño, University of Seville, Spain Iñigo Monedero Goicoechea, University of Seville, Spain Jesús Biscarri Triviño, University of Seville, Spain Rocío Millán, University of Seville, Spain

The increasing of the storage system capacity and the reduction of the access time has allowed the development of new technologies which have afforded solutions for the automatic treatment of great databases. In this paper a methodology to create Enterprise Information Systems which are capable of using all information available about customers is proposed. As example of utilization of this methodology, an Enterprise Information System for classification of customer problems is proposed. This EIS implements several technologies. Data Warehousing and Data Mining are two technologies which can analyze automatically corporative databases. Integration of these two technologies is proposed by the present work together with a rule based expert system to classify the utility consumption through the information stored in corporative databases.

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Enhancing the Electronic Customer Relationship Management through Data Mining:	
A Business Intelligence Approach	119
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According to the Moore's law, the number of transistors per microprocessor will double in every two years. In no doubt, this exponential increase in the processing speeds would be flanked by the increasing amount of data that corporates contend on a daily basis. Hence all corporates are literally drowning in data. But definitely there exists a hiatus between the data storage and the information retrieval. One can ask an enigmatic question, how effectively a stored data can be utilised for the decision making in the long-term perspective. The answer is not yet arrived out. Hence the "Organizations are data rich, but information poor!". If capturing and storing the relevant data is a hectic task, then analyzing and translating this data into the actionable information is the other corner stone in any information systems of a concern. This gap can be bridged or overruled by the concept of business intelligence. Business Intelligence (BI) can be simply defined in terms of data -driven approach rather than information driven which includes methods as decision support systems, online analytical processing (OLAP), statistical analysis, query and reporting, forecasting which can be primarily done by data mining. BI along with customer relationship management (CRM) software forms the second tier of a firm's IT infrastructure. This chapter holds a bird's eye view of the usage of datawarehousing approaches for a systematic business intelligence approach and its varied applications in view of electronic customer relationship management.

Chapter 10

This chapter aims to present a new modeling paradigm that promises to significantly increase the efficiency of developing enterprise information systems. Currently, the software industry faces considerable challenges as it tries to build larger, more complex, software systems with fewer resources. Although modern programming languages such as C++ and Java have in general improved the software development process, they have failed to significantly increase developer's productivity. Thus, developers are considering other paths to address this issue. One of the potential paths is designing, developing and deploying enterprise information systems using the Model Driven Architecture (MDA).MDA is a model-centric approach that allows for modeling the overall business of an enterprise and capturing requirements to developing, deploying, integrating, and managing different kinds of software components without considering any particular implementation technology. At the center of this approach are models; the software development process is driven by constructing models representing the software under development. Code that expresses the implementation of the model in a certain underlying technology is obtained as a result of model transformation. Thus, the intellectual investment spent in developing the business model of an enterprise is not jeopardized by the continuous changes of the implementation technologies. Currently there are two main approaches trying to implement MDA-based tools. One of the approaches is based on the Object Constraint Language and the other on Action Language. An example of designing, developing and deploying an application using this new modeling paradigm is presented. The MDA approach to software development is considered as the biggest shift since the move from Assembler to the first high level languages.

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Global Emergency-Response System Using GIS	159
Salem Al-Marri, Leeds Metropolitan University, UK	
Muthu Ramachandran, Leeds Metropolitan University, UK	

Emergency needs occur naturally, manually (error and terror) and accidentally in addition to worldwide death by hunger and poverty. These situations can arise anytime, anyplace and thus globally, people are in need of any emergency help by every second. This paper proposes a model for Disaster Classification system of Natural Disasters and Catastrophic Failures activity. This model also proposes the use of emerging technologies such as ubiquitous computing and wireless communications systems that are used by people in recent years to communicate in event of any disaster. The use of emerging technologies also depends on the role of the people and their culture and global support. Furthermore, the paper will propose the deployment of Global Information Systems (GIS) as an aid to emergency management by identifying the related areas pertaining to disaster and thus to help the personnel involved to analyze disaster areas using the GIS technology and to provide support for decision makers during emergencies. Due to the significant development of computerization, networking and mobile systems, reporting a disaster, nowadays, is only a matter of seconds whereas, in the past it would take days or even weeks for the news to reach the people.

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S.R.Balasundaram, National Institute of Technology, Tiruchirappalli, India	
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The rapidly changing nature of business environments requires organizations to be more flexible to gain competitive advantages. Organizations are turning into a new generation of software called Enterprise Application Integration (EAI) to fully integrate business processes. It is an activity that integrates and harmonizes an enterprise's isolated business applications, processes and functions. EAI is a complex task involving both technological and business challenges. Developing quality EAI projects is quite a big challenge. Even though success of EAI projects depends on so many parameters, 'testing' is the most significant phase that can ensure the quality as well as the success of EAI projects. Modern enterprises heavily rely on integrations linking systems and business processes using real time data. Components integrated without testing in EAI systems may affect the enterprise system as a whole. This in turn may result in revenue loss and status degradation in the competitive edge. This chapter focuses on the testing aspects related to EAI applications. Especially the significance of testing for various types of "Integrations" is discussed in detail.

Chapter 13

In this chapter we focus on the iterative process that occurs within the implementation phase of an ERP which we depict as a series of learning cycles: managers make decisions, identify mistakes, and accumulate experience (lessons learned). We examine these "learning cycles" through the lens of absorptive capacity and we use a case study and a qualitative perspective. We identify a number of tradeoffs that represent the learning paths of Alpha Co. and we find that such learning process is path dependent, or-ganizational memory plays a fundamental role, and double loop cycles contribute in the development of absorptive capacity seen as a dynamic capability.

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Challenges in Enterprise Information Systems Implementation: An Empirical Study...... 195 Ashim Raj Singla, Indian Institute of Foreign Trade, New Delhi, India

Enterprise Information Systems are the most integrated information systems that cut across various organizations as well as various functional areas. Small and medium enterprises, competitor's behavior, business partner requirement are the identified and established dimensions that affect these systems. Further it has been observed that such enterprise wide software systems prove to be a failure either in the design or its implementation. A number of reasons contribute in the success or failure of such systems. Enterprise information systems inherently present unique risks due to tightly linked interdependencies of business processes, relational databases, and process reengineering, etc. Knowledge of such risks is

important in design of system and program management as they contribute to success of overall system. In this chapter an attempt has been made to study the design and implementation risks factors for ERP systems in large scale manufacturing organizations. Based on the model used to study ERP risks and thus the findings, various recommendations have been put forward to suggest a strategy so as to mitigate and manage such risks.

Section 2 Supply Chain Management (SCM) System using Information Technology (IT) and Mathematical Modeling

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K. Ganesh, Global Business Services – Global Delivery, IBM India Private Limited, India	
K.Mohandas, Amrita School of Engineering, India	
Tzong-Ru Lee, National Chung Hsing University Taiwan, ROC	

This chapter presents the development of simulated annealing (SA) for a health care application which is modeled as Single Depot Vehicle routing problem called Mixed Vehicle Routing Problem with Backhauls (MVRPB), an extension of Vehicle Routing Problem with Backhauls (VRPB). This variant involves both delivery and pick-up customers and sequence of visiting the customers is mixed. The entire pick-up load should take back to depot. The latest rapid advancement of meta-heuristics has shown that it can be applied in practice if they are personified in packaged information technology (IT) solutions along with the combination of a supply chain management (SCM) application integrated with an enterprise resource planning (ERP) resulted to this decision support tool. This chapter provides empirical proof in sustain of the hypothesis, that a population extension of SA with supportive transitions leads to a major increase of efficiency and solution quality for MVRPB if and only if the globally optimal solution is located close to the center of all locally optimal solution.

Chapter 16

Supply chain is a network of firms interacting in a linear fashion to produce, sell and deliver a product or service to a predetermined market segment. The soft issues of supply chain models can be dealt through proper information sharing, communication and coordination between the stages of supply chain. Vendor managed inventory is a proven concept for successful collaborative and cooperative agreements in supply chain. This chapter reviews some of the soft issues in two-echelon supply chain models and proposes a

classification schema. This chapter surveys the theoretical background and application of vendor managed inventory systems based on environment, operational issues and solution approaches. Hence it is concluded that the framework presented in this chapter would aid supply chain managers and researchers to further look into the soft issues while modelling supply chain with information technology enabled vendor managed inventory systems.

Chapter 17

Two-Way Substitutable Inventory System with N-Policy	
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This article presents a two commodity stochastic inventory system under continuous review. The maximum storage capacity for the -th item is fixed as It is assumed that demand for the -th commodity is of unit size and demand time points form Poisson distribution with parameter The reorder level is fixed as for the -th commodity and the ordering policy is to place order for items for the -th commodity (i = 1, 2) when both the inventory levels are less than or equal to their respective reorder levels. The lead time is assumed to be exponential. The two commodities are assumed to be substitutable. That is, if the inventory level of one commodity reaches zero, then any demand for this commodity will be satisfied by the item of the other commodity. If no substitute is available, then this demand is backlogged up to a certain level , for the -th commodity. Whenever the inventory level reaches , , an order for items is replenished instantaneously. For this model, the limiting probability distribution for the joint inventory levels is computed. Various operational characteristics and expression for long run total expected cost rate are derived.

Chapter 18

Selection of service providers in the global supply chains of today has been recognized as having a very important effect on the competitiveness of the entire supply chain. It results in achieving high quality end results (products and/or services), at reasonable cost coupled with high customer satisfaction. This article discusses the use of Fuzzy Analytic Hierarchy Process (FAHP) to effectively manage the qualitative and quantitative decision factors which are involved in the selection of providers of 3PL services under Lead Logistics Provider (LLP) environments of today. Lead logistics providers (LLP) are increasingly being banked upon to integrate the best of 3PL service providers and allow for synchronized and optimized operations. In the asset free environments of today, many a times, the LLP uses the services of the 3PL and hence the issue of reliably choosing them assumes increasingly greater significance. The fuzzy-AHP has been adequately demonstrated in literature to be an effective tool which can be used to factor-in the fuzziness of data. Triangular Fuzzy Numbers (TFN) has been deployed to make over the linguistic comparisons of criteria, sub-criteria and the alternatives. The FAHP based model formulated in this paper is applied to a case study in the Indian context using data from three leading LSPs with significant operating leverages in the province of Uttrakhand (India). The proposed model can provide

the guidelines and directions for the decision makers to effectively select their global service providers in the present day competitive logistics markets.

Chapter 19

Achieving Alignment in Production and Logistics Operations in Three Echelon	
Supply Chain Network Through New Heuristic Optimizer	
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Mohanasundaram K.M. Karpagam College of Engineering. India	

During the past decade, great studies have been made in the development of standardized tools for supply chain modeling and network optimization Network optimization is the most basic type of modeling that can be performed with tools which helps to identity optimum paths or flow of goods in supply chain network. In this case, the network is defined by the flow of finished goods from origin to destination. Network modeling becomes more complex as the dimensions and scope of the supply chain expand Uncertainties in the supply chain usually increase the variance of profit or cost to the company, increasing the likely hood of decreased profit i.e. increase in total supply chain cost. Demand uncertainty and constraints posed by the every echelon are important factors to be considered in the supply chain design operations. This paper specifically deals with the modeling and optimization of a three echelon supply chain network architecture using new Particle Swarm Optimization algorithm.

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Ashutosh Mohan, Banaras Hindu University (BHU), India	
Shikha Lal, Banaras Hindu University (BHU), India	

Information and communication technology infrastructure has changed modern business practice. The ever-changing information and communication technology infrastructure of organizations' is opening new vista, which has not only bundles of opportunities to encash but also tremendous obstacles as survival threats. The concern about organizational competitiveness and development is closely linked to notions of the information sensitive society and global knowledge based economies. The business organizations under global knowledge economy can emerge and grow rapidly by formulating and adopting the innovative business practices. Information's impact is easily seen—it substitutes for inventory, speeds product design and delivery, drives process reengineering, and acts as a coordinating mechanism, helping different members of the supply chain work together effectively. While the potential of information sharing is widely promoted, relatively few companies have fully harnessed its capability to enhance competitive performance. The chapter tries to provide insight into how information and communication technology can be leveraged for supply chain value creation and make it possible to achieve synergy with customer relationship management.

Chapter 21

Benefits of Information Technology Implementations for Supply Chain Management:	
An Explorative Study of Progressive Indian Companies	323
Prashant R. Nair. Amrita University. Coimbatore. India	

The usage of Information Technology (IT) in organizations across the supply chain has become a determinant of competitive advantage for many corporations. This chapter focuses on the usage of IT tools for Supply Chain Management (SCM). It also highlights the contribution of IT in helping restructure the entire distribution set-up to achieve higher service levels, lower inventory, and lower supply chain costs. An overview and tangible benefits of the existing IT tools, which are widely deployed, is provided with focus on existing configuration considerations, available applications, and deployments in India. The role of existing communication technologies in making IT an enabler of SCM, is highlighted by addressing a range of different point and enterprise solutions in a variety of supply chain settings. Critical IT demonstrations and implementations in SCM are discussed. Fundamental changes have occurred in today's global economy. These changes alter the relationship that we have with our customers, our suppliers, our business partners, and our colleagues. Reflection on the evolving and emerging IT trends like software agents, RFID, web services, virtual supply chains, electronic commerce, and decision support systems, further highlights the importance of IT in the context of increasingly global competition. The rapid adoption of the Internet for communication with all stakeholders seems to reflect the potential of the new-age communication media. It has also been observed that several progressive Indian companies are extensively using emerging tools like virtual supply chains, web services, RFID, and electronic commerce to shore up their supply chain operations. However, adoption of tools like software agents and decision support systems for supply chain integration by Indian companies is limited.

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C. Elango, Cardamom Planters' Association College, India	`
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Supply Chain Management (SCM) is the practice of coordinating the flow of goods, services, information and finances as they move from raw materials to parts supplier to manufacturer to wholesaler to retailer to consumer. Different supply chains have been designed for a variety of firms and this chapter discusses some issues in this regard. This chapter attempts to find why we require different supply chain for different companies. This chapter discusses the role of stochastic models in supply chain management system. This chapter also discusses other mathematical models for SCM.

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C. Elango, Cardomam Planters' Association College, India	

flow and storage of goods, services, and related information from the point-of-origin to the point-ofconsumption in order to meet customers' requirements. Supply Chain Management (SCM) is the practice of coordinating the flow of goods, services, information and finances as they move from raw materials to parts supplier to manufacturer to wholesaler to retailer to consumer. This chapter introduces the concept of Supply Chain Management System(SCMS). Two stochastic modelling problems are discussed in this chapter. Poisson demand process with (s,S) installation policy at retailer nodes are assumed to simplify the study. The system performance measures are computed with reference to specific cost structure. The total average annual variable cost is taken as optimization criterion. Numerical examples are provided to illustrate the problem.

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