




Arab World
Edition



Management Information Systems

Managing the Digital Firm

Kenneth C. Laudon
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Management Information Systems

MANAGING THE DIGITAL FIRM

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Production Controller: Christopher Crow
Cover Designer: Sarah Fach
Typesetter: Integra Software Services Pvt. Ltd.
Typeface: ITC Veljovic Std, 10.5/13
Printed in China

Pearson Education Limited

Edinburgh Gate
Harlow
Essex CM20 2JE
England

and Associated Companies throughout the world

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Authorized adaptation from the United States edition, entitled MANAGEMEN INFORMATION SYSTEMS, MANAGING THE DIGITAL FIRM, 12th Edition, ISBN: 9780136078463 by Kenneth C. Laudon and Jane P. Laudon, published by Pearson Education, Inc, publishing as Prentice Hall, Copyright © 2012.

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Arab World adaptation edition published by PEARSON EDUCATION LTD, Copyright © 2013

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First published 2013

21 20 19 18 17 16 15 14 13
IMP 10 9 8 7 6 5 4 3 2 1

ISBN: 978-1-4082-7160-5

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- The Egyptian Tax Authority: Transforming the Relationship with Taxpayers through Electronic Government
 - KAUST Mega Project: Shaheen the Supercomputer
 - DST Systems Scores with Scrum and Application Life Cycle Management
 - Structured Project Implementation Methodology at Focus
-

Chapter 13: Managing Global Systems

- 3M: Sticky Film and Scratchy Things that Sell Around the World
- Fonterra: Managing the World's Milk Trade
- Can Cell Phones Close the Global Digital Divide?
- WR Grace Consolidates its General Ledger System



Preface

This book has been carefully designed for business school students who want an in-depth look at how today's business firms use information technologies and systems to achieve corporate objectives. The Arab World Edition builds on the strengths of Laudon and Laudon's excellent textbook, incorporating new material of particular relevance to students in the Arab world. This edition includes new case studies, examples, and topics from across the Arab region, including a wide range of Arab businesses and industry sectors. It also continues to draw on global examples, offering students a balanced view of both the regional and global developments in management information systems.

Information systems are one of the major tools available to business managers for achieving operational excellence, developing new products and services, improving decision making, and achieving competitive advantage. Students will find here the most up-to-date and comprehensive overview of information systems used by business firms today.

When interviewing potential employees, business firms often look for new hires who know how to use information systems and technologies for achieving bottom-line business results. Regardless of whether a student is an accounting, finance, management, operations management, marketing, or information systems major, the knowledge and information found in this book will be valuable throughout a business career.

WHAT'S NEW IN MIS?

Plenty. A continuing stream of information technology innovations is transforming the traditional business world. What makes the MIS field the most dynamic area of study in schools of business is this continuous change in technology, management, and business processes. (Chapter 1 describes these changes in more detail.)

Examples of transforming technologies include the emergence of cloud computing, the growth of mobile digital business platforms based on smartphones, netbook computers, and, not least, the use of social networks by managers to achieve business objectives. These innovations enable entrepreneurs and innovative traditional firms to create new products and services, develop new business models, and transform the day-to-day conduct of business. E-commerce is generating global revenues which are growing at an exponential rate, and is changing how firms design, produce, and deliver their products and services. When we think of e-commerce, we tend to think of selling physical products. While this iconic vision of e-commerce is still very powerful, appearing alongside is a whole new value stream based on selling services, not goods. Information systems and technologies are the foundation of this new services-based e-commerce.

Likewise, the management of business firms has changed: With new mobile smartphones, high-speed Wi-Fi networks, and wireless laptop computers, salespeople on the road are only seconds away from their managers' questions and oversight. Managers on the move are in direct, continuous contact with their employees. The growth of enterprise-wide information systems

with extraordinarily rich data means that managers no longer operate in a fog of confusion, but instead have online, nearly instant access to the important information they need for accurate and timely decisions.

WHAT'S SPECIAL ABOUT THE ARAB WORLD EDITION?

Since it was first written, this text has helped to define the MIS course around the globe. It is now part of a complete learning package that includes the core text and an extensive offering of supplemental materials on the web.

This textbook is focused on student learning. Student learning objectives are organized around a set of study questions to focus student attention, and these are set out at the beginning of each chapter, and followed through the chapter structure. Each chapter concludes with a review summary and review questions organized around these study questions.

The Arab World Edition provides some exciting new and adapted features and content. In particular, we would like to draw your attention to the following:

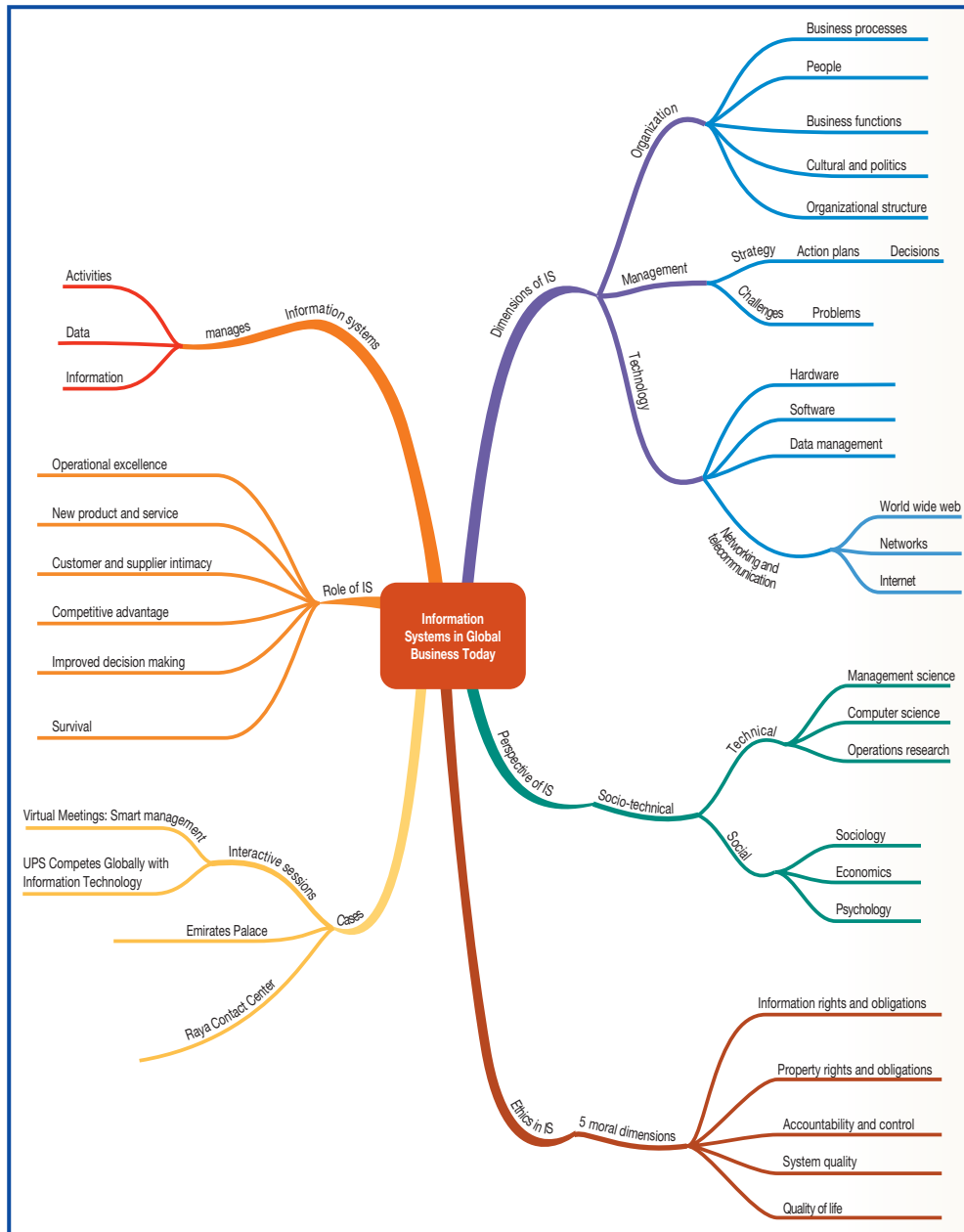
- **Book structure.** The selection of chapters included in the book has been based on careful research into the MIS courses taught across the Arab region, and closely reflects the structure and coverage of the majority of courses.
- **Case studies.** The adaptation includes a wide range of case studies (four per chapter), from the Arab region as well as global. Featured regional organizations include Raya, Aramco, Saudi Arabian Airlines, Aramex, Qatar Foundation, Jumeirah Group, Etisalat, Zain, Cyberoam, Dubai Islamic Bank, Lebanon's Bank Audi, KFUPM, Q8Oils, National Bank of Kuwait, and the Egyptian Tax Authority.
- **Range of industries and business types.** A wide range of business sectors is covered, including telecommunications, banking, retail, education, charity, leisure, airlines, ICT, and government.
- **Regional statistics and data.** These are integrated through the book, reflecting Arab situations and trends.
- **Global view.** The adaptation also provides balance, providing a link between regional and global developments. Global companies and leading multinationals are presented, including cases studies featuring BlackBerry, Apple, Microsoft, Google, UPS, eBay, Salesforce.com, SAP, Symantec, Facebook, Amazon, Walmart, and Chrysler.
- **Currency.** The text, figures, tables, and cases have been updated with the latest sources from industry and MIS research. Hot topics in MIS have been incorporated, including Enterprise 2.0, big data, cloud computing, agile software development, 4G networks, and social networks.
- **Mindmaps.** This new feature, which appears at the start of every chapter, is unique to the Arab World Edition and has been developed based on market feedback. The mindmaps provide students with a single view of all the ideas contained within the chapter. They are excellent for drawing ideas together and are useful for a refresher or revision.
- **English–Arabic Glossary.** Found in the back of the book, this provides a standard English glossary, along with an Arabic translation of all the terms.
- **MyMISLab.** A highly user-friendly web-based assessment and tutorial tool, this resource is described in more detail below. It has been completely adapted to fit the Arab World Edition.
- **Supplements.** Accompanying the Arab World Edition of MIS are PowerPoint presentations, Test Bank, an Instructor's Manual, and a wealth of student resources on MyMISLab.

CHAPTER FEATURES

Each chapter contains the following elements:

Chapter opening features

- The chapter introductory paragraph sets the scene and lists chapter highlights and case studies.
- The mindmap provides an instant and memorable overview of the chapter coverage.

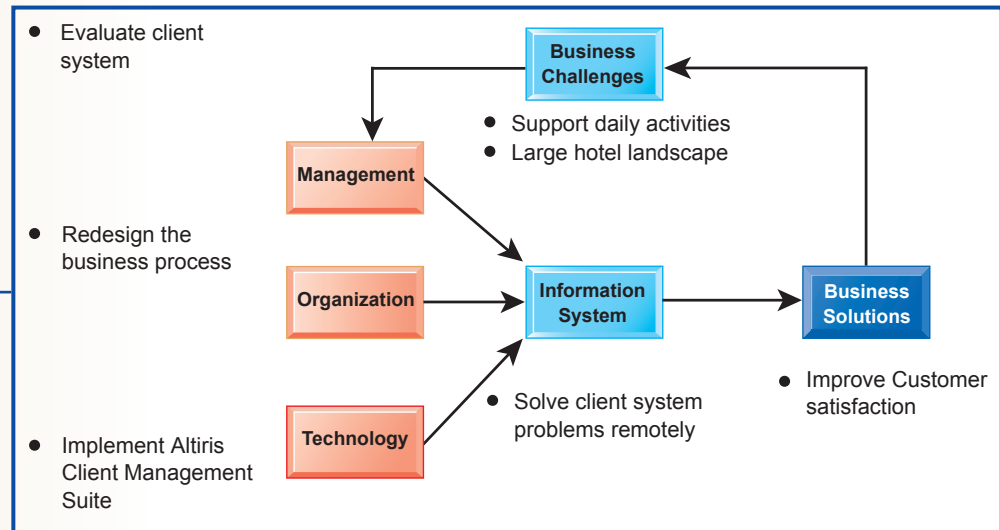


Mindmaps provide an instant and memorable overview of the chapter coverage.

- Learning objectives help students to focus on central ideas through focused questions.
- The chapter outline summarizes the key topics covered.
- A chapter-opening case describes a real-world organization to establish the theme and importance of the chapter.

- A diagram analyzes the opening case in terms of the management, organization, and technology model used throughout the text.

A diagram accompanying each chapter-opening case graphically illustrates how management, organization, and technology elements work together to create an information system solution to the business challenges discussed in the case.



In-chapter features

- Two Interactive Sessions with case study questions and MIS in Action projects.

Each chapter contains two Interactive Sessions focused on management, organizations, or technology using real-world companies to illustrate chapter concepts and issues.

INTERACTIVE SESSION: ORGANIZATIONS

SAUDI ARAMCO: THE WORLD'S MOST VALUABLE COMPANY UPGRADES ITS SAP R/3 SYSTEM



Saudi Aramco is a name recognized around the world as one of the leading and largest oil companies on the planet. Owned by the Saudi Arabian government, it was established in 1933 as the Kingdom of Saudi Arabia's national oil company, and has its headquarters in Dhahran. A global leader in oil exploration, production, refinement, distribution, shipping, and marketing, Aramco also has the largest oil production and reserves, managing over 112 oil and gas fields. In addition, it manages the biggest reserve of crude oil in the world, an astonishing 260 billion barrels, as well as massive gas reserves of 279 trillion cubic feet. It also exports more natural gas liquids (NGL) than any other company, over 316 million barrels in 2010. Little surprise then that Saudi Aramco is among the most valuable companies in the world.

Aramco's multiple business operations and processes require an integrated IT system that is able to cope with a great deal of complexity. The IT infrastructure must be able to cater for the specific

enhancements. In SAP terms, R refers to real time, in other words, all transactions stored on the system are spontaneously reflected in reporting, in contrast to offline systems. Keeping up to date with the latest releases is important to ensure Aramco is operating as efficiently as possible, helping it to gain competitive advantage. Due to the scale of the project, a decision was made to start to upgrade the R/3 system just within the hydrocarbon business initially, before later rolling it out to other units and departments.

Upgrading to SAP presented the IT department at Aramco with many challenges. One of the most difficult was the need to identify and specify the requirements of a global business of so many different operational areas, ensuring the investment improved operational efficiency. The value of the upgrade also had to be demonstrated to other divisions.

During the upgrade itself, it was crucial that day-to-day business needs were catered for without disruption. The need to avoid disruption and to minimize downtime to comply with strict business requirements led the company to work with the SAP Active Global Support organization to make use of a portfolio of services provided by a system called SAP Safeguarding for Upgrade. The outcome was that SAP finished the implementation phase a month ahead of schedule. "SAP Active Global Support worked closely with us throughout the project, helping us define requirements, draw up plans, and optimize the environment to ensure rapid implementation," said Adel Aldoulab, SAP Hydrocarbons Management Division Head at Aramco.

CASE STUDY QUESTIONS

MIS IN ACTION

1. Discuss how SAP ERP could help Aramco gain a competitive edge?
2. With reference to the case, explain the importance of information and application integration.
3. What lessons can be learnt in systems upgrade according to this case study?

Explore SAP website www.sap.com and answer these questions:

1. What other SAP products are used in the oil and gas industry?
2. Discuss what SAP products use data mining techniques? How could those techniques/products help Aramco in support of future prediction of oil wells?
3. Explain how SAP enables and supports integration with GIS products/information?

Case study questions and MIS in Action projects encourage students to learn more about the companies and issues discussed in the case studies.

- Margin definitions of key terms.
- Figures, tables and photos are used to bring the text to life and aid student understanding.

End-of-chapter features

- A Hands-on MIS Projects section featuring two management decision problems, a hands-on application software project, and a project to develop internet skills.

Management Decision Problems

1. Applebee's is the largest casual dining chain in the world, with 1970 locations throughout the United States and nearly 20 other countries worldwide. The menu features beef and chicken items, as well as burgers, pasta, and seafood. The Applebee's CEO wants to make the restaurant more profitable by developing menus that are tastier and contain more items that customers want and are willing to pay for despite rising costs for gasoline and agricultural products. How might information systems help management implement this strategy? What pieces of data would Applebee's need to collect? What kinds of reports would be useful to help management make decisions on how to improve menus and profitability?

Two real-world business scenarios per chapter provide opportunities for students to apply chapter concepts and practise management decision making.

- A Learning Tracks section identifying supplementary material on MyMISLab.
- A Review Summary section keyed to the learning objectives.
- A list of key terms that students can use to review concepts.
- Review questions for students to test their comprehension of chapter material.
- Discussion questions raised by the broader themes of the chapter.
- A Collaboration and Teamwork project to develop teamwork and presentation skills, with options for using open source collaboration tools.
- A chapter-ending case study for students to apply chapter concepts.

SUPPLEMENTS

This textbook is accompanied by the supplementary resources described below. **All supplements have been adapted to match the text of the Arab World Edition.**

- **Test Bank.** The authors have worked closely with skilled test item writers to ensure that higher-level cognitive skills are tested. The test bank includes multiple-choice questions on content, but also includes many questions that require analysis, synthesis, and evaluation skills. (www.pearsonmiddleeastawe.com/laudon)
- **Interactive PowerPoint Lecture Slides.** The authors have prepared a comprehensive collection of PowerPoint slides to be used in lectures, mapping to the textbook. Ken Laudon uses many of these slides in his MIS

classes and executive education presentations. Each of the slides is annotated with teaching suggestions for asking students questions, developing in-class lists that illustrate key concepts, and recommending other firms as examples in addition to those provided in the text. The annotations are like an instructor's manual built into the slides and make it easier to teach the course effectively. (www.pearsonmiddleeastawe.com/laudon)

- **Image Library.** This is an impressive resource to help instructors create vibrant lecture presentations. Almost every figure and photo in the text is provided and organized by chapter for convenience. These images and lecture notes can be imported easily into PowerPoint to create new presentations or to add to existing ones. (www.pearsonmiddleeastawe.com/laudon)
- **Instructor's Manual.** The Instructor's Manual features not only answers to review, discussion, case study, and group project questions, but also in-depth lecture outlines, teaching objectives, key terms, teaching suggestions, and internet resources. (www.pearsonmiddleeastawe.com/laudon)
- **Online English-Arabic Glossary.** This includes all the key terms in English and Arabic with definitions also translated into Arabic. (www.pearsonmiddleeastawe.com/laudon)
- **MyMISLab.** This web-based assessment and tutorial tool provides practice and testing while personalizing course content and providing student and class assessment and reporting. Now all the resources that instructors and students need for course success are in one place—flexible and easily organized and adapted for an individual course experience. Visit www.pearsonmiddleeastawe.com/mymislab to see how you can teach, learn, and experience MIS.

MyMISLab®

ACKNOWLEDGMENTS

Preparing the Arab World Edition of *Management Information Systems: Managing the Digital Firm* has been a challenging task. It required, in addition to many months of work, a lot of communication with companies working in different Arab world countries to thoroughly understand their use of systems and technologies. This has enabled me to make clear what critical knowledge those companies use in information systems to solve business problems and support business objectives.

I would like to praise the efforts made by Kenneth C. Laudon and Jane P. Laudon in making this textbook an international success.

I also appreciate the feedback from the following reviewers for their comments which were vital in ensuring the Arab World Edition provides what students and instructors need:

Dr Raid Moh'd Al-adaileh, *Mu'tah University, Jordan*

Professor Cindy Baker, *American University of Sharjah, United Arab Emirates*

Dr Ahmed Elmorshidy, *Gulf University for Science & Technology, Kuwait*

Dr Othman Alsalloum, *King Saud University, Saudi Arabia*

Dr Alissar Nasser, *Middle East University, Lebanon*

Dr Marie Karim Abou-Jaoude, *Lebanese University, Lebanon*

Dr Sami Akabawi, *American University in Cairo, Egypt*

Dr Issam Moghrabi, *Gulf University for Science & Technology, Kuwait*

Dr Mohammed Yousif Sanad, *Ahlia University, Bahrain*

Several scholars have authored or co-authored cases adopted in this edition. We thank them for providing cases which showed how successfully companies in the Arab world are implementing information systems to achieve business objectives. These individuals are listed below:

Hany Ismail, *Germany University in Cairo (GUC)*
Daniel Ortiz Arroyo, *Aalborg University*
Heba Noureldin, Monika Fares, Nada Elgendy and Ola El-Telbany,
Germany University in Cairo
Faouzi Kamoun, *The University of Dubai*
Andy Jones, *Staffordshire University*
Neerja Sethi and Vijay Sethi, *Nanyang Technological University*
Hassan Abbas, *Kuwait University*
Nahed Azab, *American University in Cairo*

I would like to thank my assistants: Ghaidaa Hamdy Naguib and Shereen Magdi. They both have worked with me in early phases of the project. It was Ghaidaa who suggested the mindmap as the illustrative chapter introductory tool.

I would like to thank Sarah Wightman, the Development Editor, for her always useful edits, hints, and advice. I would also like to thank Rasheed Roussan, the former Acquisitions Editor, Arab World, at Pearson Education, who has worked with me from the early stages of preparation. In addition, I am thankful to Joyce Adjekum, Project Editor, Arab World Editions, and Fay Gibbons, Development Editor, also at Pearson Education, for their cooperation, hard work, and understanding.

Last but not least, this Arab World Edition of *Management Information Systems* comes in synchronization with the Arab Spring, so I hereby acknowledge the effort of the youth in the Arab region who have given their time, effort, and sometimes soul in support of freedom of speech and democracy in the region; to whom we in the Arab world are all indebted.

Ahmed Elragal

FOREWORD

We are delighted to see the Arab World Edition of *Management Information Systems: Managing the Digital Firm*. This edition demonstrates that the *Management Information Systems* textbook, in its scope and depth, effectively meets the demands of educators for a book that offers a sociotechnical approach to MIS. The outline of the Arab World Edition is based on market research in the Arab region, including analysis of MIS course outlines taught in Arab world universities. The resulting adaptation is a close fit with what students and instructors across the Arab world have been asking for from a textbook.

The Arab World Edition comes at a time when the region is witnessing the Arab Spring. The Arab Spring was facilitated by ICT, particularly social networking, and led by youth in the region moving aggressively toward modern democracies.

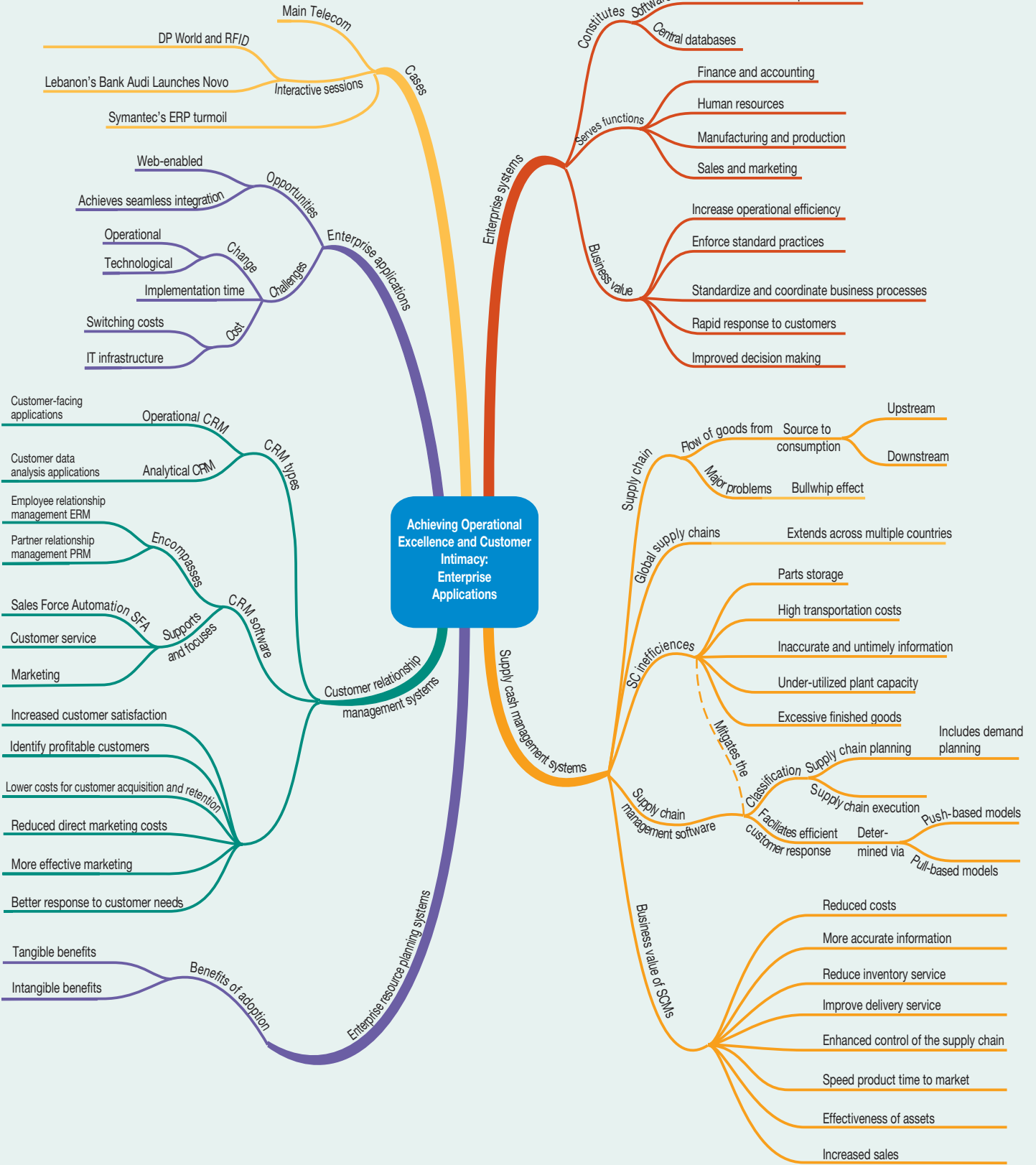
The Arab world region has become home for many leading multinational companies, either providing or consuming the technologies and systems. These multinational companies aim to gain a competitive footprint in this growing market. This requires recruitment of talented people who have an awareness of the region. For this reason among many others, the Arab World Edition is more necessary than ever.

The Arab World Edition focuses on studying the implementations of various information systems in the region, either in local or international companies. At the same time, leading examples from outside the Arab region are still kept to provide lessons learned from the international stage.

Professor Ahmed Elragal has established an excellent learning platform in which the region is addressed in depth and breadth. The edition is full of fresh thoughts and ideas such as chapter mindmaps, discussions of region-specific cultural issues, analysis of various industries and sectors, and the addition of many hot new topics including trajectory data mining, big data, crowd sourcing, and cost estimation. We hope Arab educators, students, and IS professionals alike find this edition useful to help them understand and utilize technology and systems to achieve business goals.

Kenneth C. Laudon
Jane P. Laudon

Achieving Operational Excellence and Customer Intimacy: Enterprise Applications



Chapter 8

Achieving Operational Excellence and Customer Intimacy: Enterprise Applications

INTRODUCTION TO CHAPTER 8

This chapter discusses enterprise applications; originally presented as an overview in Chapter 2, we now go into more detail. The chapter begins by defining enterprise systems and stating their value. Two case studies are presented, pinpointing the significance of enterprise applications: Main Telecom, and Lebanon's Bank Audi. The first illustrates how information systems can be developed within a company to meet specific employee requirements, improve

customer service, and address a social issue. The second explains the use of innovative tools and techniques for customer retention. The chapter provides details about supply chain management systems, customer relationship management systems, and enterprise resource planning systems. The chapter ends with a discussion of the opportunities and challenges most likely to face enterprise applications and their implementation.

LEARNING OBJECTIVES

After reading this chapter, you will be able to answer the following questions:

1. How do enterprise systems help businesses achieve operational excellence?
2. How do supply chain management systems coordinate planning, production, and logistics with suppliers?
3. How do customer relationship management systems help firms achieve customer intimacy?
4. What are the challenges posed by enterprise applications?
5. How are enterprise applications used in platforms for new cross-functional services?

CHAPTER OUTLINE

- 8.1 Enterprise Systems
- 8.2 Supply Chain Management Systems
- 8.3 Customer Relationship Management Systems
- 8.4 Enterprise Applications: New Opportunities and Challenges
- 8.5 Hands-on MIS Projects
Learning Track Modules

CHAPTER HIGHLIGHTS

Cases

- Main Telecom: Technology Serving Humanity
- Dubai Ports World Takes Port Management to the Next Level with RFID
- Lebanon's Bank Audi launches *Novo*: a Novel Customer Experience
- Symantec's ERP Turmoil

Industries

- Telecommunications
- Logistics
- Banking
- ICT—Enterprise Systems

MAIN TELECOM: TECHNOLOGY SERVING HUMANITY

Main Telecom (**M**isr **A**dvanced **T**elecommunication & **I**nformation **N**etworks) is an Egyptian company based in Giza. It provides telecommunications and IT services to clients across a range of business sectors, including government, manufacturing, financial, healthcare, communications, and services. It also manages the service of emergency 122 calls for all of Egypt, handling over 16 million incoming emergency calls every year.

Main Telecom has built up a successful business base in IT consultancy and telecom services. It has also expanded to offer a variety of services ranging from customized application development to e-commerce. Main Telecom's call center manages customer relationship management (CRM) services for business clients, staffed by over 1,500 call center agents who handle more than 30 million calls each year. Main Telecom has undertaken a number of ambitious projects for high-profile clients, including multinational companies such as Canon and Nissan. Projects have included development of telecom applications and reporting tools, and large-scale networking infrastructure development. Both in its own in-house service provision and in its system development projects for clients, Main Telecom works with the latest technologies in telecommunications. It has integrated CRM applications and multimedia applications using technologies such as SMS, e-mail, video, and VoIP, unifying these to find an ideal solution to meet each client's business needs.

Main Telecom also uses cutting-edge technologies including e-commerce solutions and CRM, call centers and enterprise resource planning (ERP). It employs computer telephony applications, telecommunication signaling (SS 7 - R 2 - ISDN), database analysis (SQL, Oracle), and SMS applications.

Main Telecom decided to provide employment opportunities for the blind, particularly aimed at women (who, with impaired sight, face difficulty in finding employers willing to take them on in Egypt), supporting and emphasizing their ability as fully participative members of the community. Call center-related work was a particularly suitable employment opportunity for those with impaired sight. To do the work effectively, the women employed needed specific systems and support to help them fulfill their job requirements. Main Telecom decided to develop sophisticated tools that could reply initially to incoming calls, perform database searches, and provide the blind employee with the data they needed at their fingertips. There were several issues which presented challenges in the involvement of blind employees. To start with, the cost of assistance programs is high. Additionally, training and qualifying centers for people with disabilities in the Arab region are rare. This makes real work opportunities for people with any type of disability hard to come by: the type of equal opportunity legislation and awareness found in the West is rarely apparent in the Arab region. Furthermore, there is a lack of suitably equipped office and work areas for disabled staff.

To fulfill this project, a consortium was established. Members of the consortium are: Main Telecom as technology provider; Xceed as mentor, training, and operation consultant; and a funding organization which remained anonymous.

In 2009, Main Telecom collaborated with Alnoor Blind Institute to design and implement a system specifically tailored to support the needs of blind employees. The system was intended to add to the capabilities of the original call center: in addition to receiving the calls, retrieving the caller's



information from the database, and displaying the information, it would also read the information as speech back to the blind employee. The outcome was a new Misr Advanced eXchange Call Center Solution (MAX CCS) with the proposed added functions to enable blind employees to fulfill their roles effectively.

The system included the Ibsar Reading Machine which converts computer screen text into human speech. Ibsar is the first integrated bilingual solution for the blind or visually impaired in the Arabic-speaking countries. Using Ibsar software in conjunction with MAX CCS, information displayed on the screen can be read aloud to the user. Ibsar provides the user with several important features, including reading the output of the computer and the keystrokes of the user. It also assists in the writing, reading, and sending of e-mail messages. It has functionality to maintain the user's privacy and independence. Also it has the capability to print using normal and Braille printers.

Ibsar uses Sakhr Software's text-to-speech (TTS) engine and optical character recognition (OCR). The OCR enables employees to scan a document as an image, and can then convert the image into a text document which can be read aloud. Sakhr's TTS engine is able to convert computer-readable text into human voice output. The TTS engine is built on three central applications which enable Arabic to be translated into speech. First, the Linguistic Module converts input text into a phonetic transcription. Next, the Phonetic Module calculates speech parameters. Finally, the Acoustic Module interprets those parameters to generate synthetic speech signals.

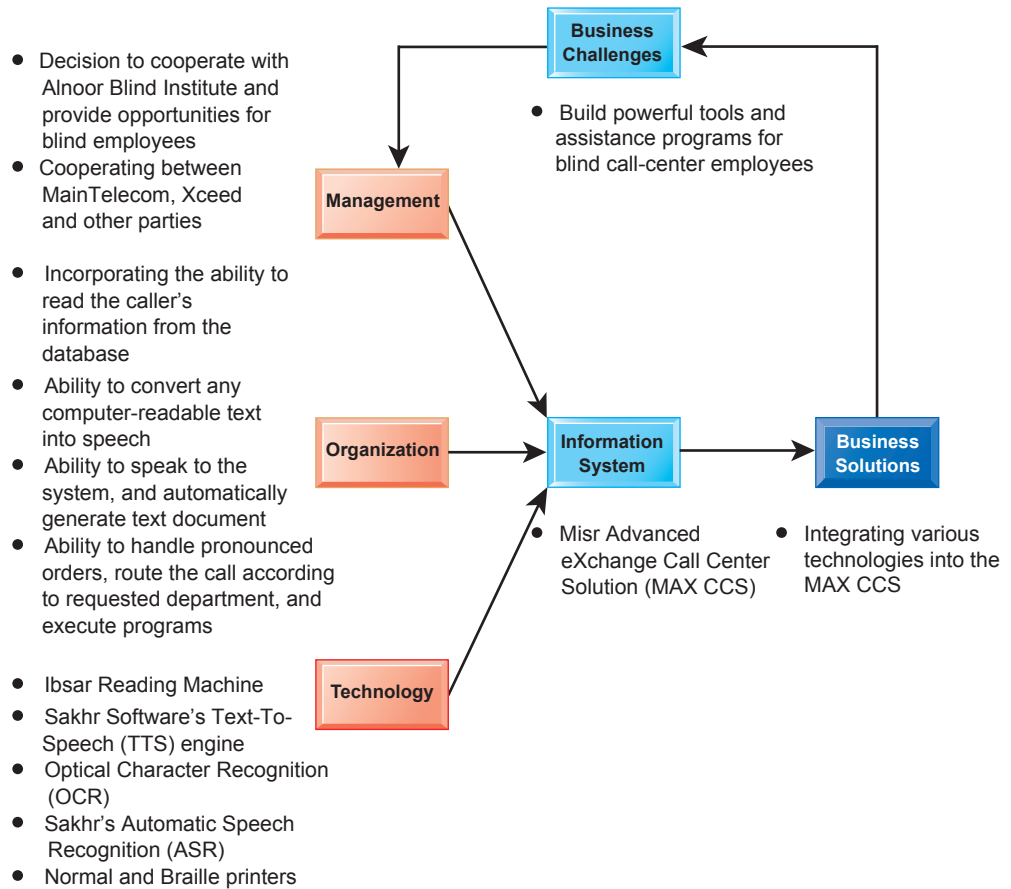
With Sakhr's Automatic Speech Recognition (ASR) integrated into Main Telecom's new system, it was able to provide enhanced support for call-center employees. ASR is capable of handling instructions voiced by the employee to route calls to particular departments, and to run programs such as sending the user back to their bank account balance. At the heart of the ASR engine, a voice recognition system identifies speech, even in noisy environments, and is able to interpret voice instructions, even anticipating different accents or pronunciations. This means that the system is able automatically to generate a text document based on voice instructions from the employee.

Main Telecom's new system has not only opened the doors to a new source of labor, but it has also addressed a social cause and provided opportunities for the blind which weren't previously available in Egypt. Main Telecom is an example of a company that has provided benefit to society at the same time as increasing its business success.

Case written by: Heba Noureldin, Monika Fares, Nada Elgendy, and Ola El-Telbany, German University in Cairo, Egypt

Sources: Aramedia. Ibsar. Retrieved August 29, 2010 from <http://aramedia.com/ibsar.htm>; Main Telecom Editorial Team. (2004). Retrieved August 29, 2010 from: <http://maintelecom.com/>; Sakhr Software. Sakhr text-to-speech (TTS). Retrieved August 29, 2010 from http://www.sakhr.com/L_Item/whitepaper/TTS.htm; Sakhr Software. Sakhr Automatic Speech Recognition Engine. Retrieved August 29, 2010 from http://www.sakhr.com/L_Item/datasheets/ASR.pdf.

The major challenge Main Telecom faced was providing blind call-center employees with tools and programs to help them perform their job duties. They provided the Ibsar Reading Machine, the Sakhr software text-to-speech (TTS) engine, and optical character recognition (OCR) technology to support their blind employees. The main decision taken by the management of Main Telecom was to cooperate with Alnoor Blind Institute and Xceed in supporting the employees in performing their job duties. The organization's goal was to provide its employees with the means of converting readable text into speech, and enable employees to input information in the form of voice, that would be then be transferred automatically into text. Main Telecom was able to solve and overcome the challenge by utilizing Misr Advanced eXchange Call Center Solution (MAX CCS) and integrating with various other technology trends.



8.1 ENTERPRISE SYSTEMS

Around the globe, companies are increasingly becoming more connected, both internally and with other companies. If you run a business, you'll want to be able to react instantaneously when a customer places a large order or when a shipment from a supplier is delayed. You may also want to know the impact of these events on every part of the business and how the business is performing at any point in time, especially if you're running a large company. Enterprise systems provide the integration between different functionalities and units in the organization to make this possible. Let's look at how they work and what enterprise systems can do for the firm.

WHAT ARE ENTERPRISE SYSTEMS?

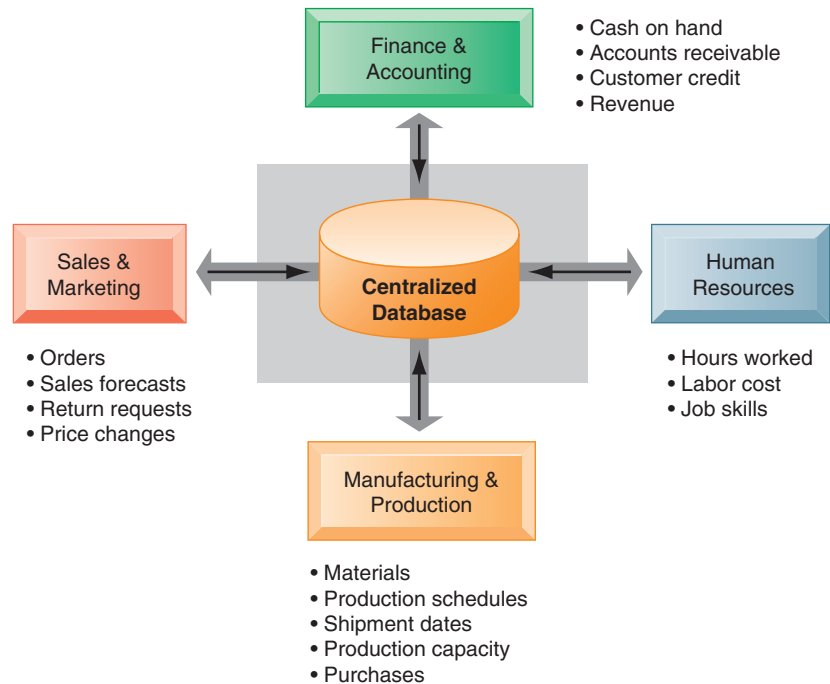
Imagine that you had to run a business based on information from tens or even hundreds of different databases and systems, none of which could speak to one another. Imagine your company had 10 different major product lines, each produced in separate factories, and each with separate and incompatible sets of systems controlling production, warehousing, and distribution.

For example, Alcoa, the world's leading producer of aluminum and aluminum products with operations spanning 41 countries and 500 locations, had initially been organized around lines of business, each of which had its own set of information systems. Many of these systems were redundant and inefficient. Alcoa's costs for executing requisition-to-pay and financial processes were much higher and its cycle times were longer than those of other companies in its industry (cycle time refers to the total elapsed time from the beginning to the end of a process). The company could not operate as a single worldwide entity.

At the very least, your decision making would often be based on manual hard-copy reports, often out of date, and it would be difficult to really understand what is happening in the business as whole. You now have a good idea of why firms need a special enterprise system to integrate information.

Chapter 2 introduced enterprise systems, also known as enterprise resource planning (ERP) systems, which are based on a suite of integrated software modules and a common central database. The database collects data from many different divisions and departments in a firm, and from a large number of key business processes in manufacturing and production, finance and accounting, sales and marketing, and human resources, making the data available for applications that support nearly all of an organization's internal business activities. When new information is entered by one process, the information is made immediately available to other business processes (see **Figure 8-1**).

If a sales representative places an order for tire rims, for example, the system verifies the customer's credit limit, schedules the shipment, identifies the best shipping route, and reserves the necessary items from inventory. If inventory stock were insufficient to fill the order, the system schedules the manufacture of more rims, ordering the needed materials and components from suppliers. Sales and production forecasts are immediately updated. General ledger and corporate cash levels are automatically updated with the revenue and cost information from the order. Users could tap into the system and find out where that particular order was at any minute. Management could obtain information at any point in time about how the business was operating. The system could also

FIGURE 8-1 HOW ENTERPRISE SYSTEMS WORK

Enterprise systems feature a set of integrated software modules and a central database that enables data to be shared by many different business processes and functional areas throughout the enterprise.

Enterprise software

Set of integrated modules for applications such as sales and distribution, financial accounting, investment management, materials management, production planning, plant maintenance, and human resources that allow data to be used by multiple functions and business processes.

generate enterprise-wide data for management analyses of product cost and profitability. This supports the middle-level managers to make semistructured decisions and senior managers are able to create unstructured decisions.

ENTERPRISE SOFTWARE

Enterprise software is built around thousands of predefined business processes that reflect best practices. Software modules allow the integration of the processes. **Table 8-1** describes some of the major business processes supported by enterprise software.

TABLE 8-1 BUSINESS PROCESSES SUPPORTED BY ENTERPRISE SYSTEMS

Financial and accounting processes, including general ledger, accounts payable, accounts receivable, fixed assets, cash management and forecasting, product-cost accounting, cost-center accounting, asset accounting, tax accounting, credit management, and financial reporting. Financial and accounting business processes support the organization in handling financial and managerial accounting transactions. Updated information related to the vendors, customers, and other sources will be presented in the central database, thus accurate accounting and financial transactions will be implemented.

Human resources processes, including personnel administration, time accounting, payroll, personnel planning and development, benefits accounting, applicant tracking, time management, compensation, workforce planning, performance management, and travel expense reporting. Human resource processes allow the organization to track the performance of its employees, working hours, vacations, salaries, bonuses, etc. As a result, HR specialists are able to evaluate staff members and handle decisions such as job promotions.

Manufacturing and production processes, including procurement, inventory management, purchasing, shipping, production planning, production scheduling, material requirements planning, quality control, distribution, transportation execution, and plant and equipment maintenance. Manufacturing and production processes allow the organization to perform accurate demand forecasting, thus avoiding high variations and fluctuations in the production of goods. Additionally, inventory stock level will be managed efficiently, which will result in a decrease in stockouts.

Sales and marketing processes, including order processing, quotations, contracts, product configuration, pricing, billing, credit checking, incentive and commission management, and sales planning. As a result, sales and marketing can promptly provide customers with accurate information concerning the status of products.

Companies implementing this software must first select the functions of the system they wish to use and then map their business processes to the pre-defined business processes in the software. (One of our Learning Tracks shows how SAP enterprise software handles the procurement process for a new piece of equipment.) A firm would use configuration tables provided by the software to tailor a particular aspect of the system to the way it does business. For example, the firm could use these tables to select whether it wants to track revenue by product line, geographical unit, or distribution channel.

If the enterprise software does not support the way the organization does business, companies can rewrite some of the software to support the way their business processes work. However, enterprise software is unusually complex, and extensive customization may degrade system performance, compromising the information and process integration that are the main benefits of the system. If companies want to reap the maximum benefits from enterprise software, they must change the way they work to conform to the business processes in the software.

Major enterprise software vendors include SAP, Oracle (with its acquisition of PeopleSoft), and SSA Global. There are versions of enterprise software packages designed for small businesses and versions obtained through software service providers over the web. Although initially designed to automate the firm's internal back-office business processes, enterprise systems have become more externally oriented and capable of communicating with customers, suppliers, and other organizations.

BUSINESS VALUE OF ENTERPRISE SYSTEMS

Enterprise systems provide value both by increasing operational efficiency and by providing firmwide information to help managers make better decisions. Large companies with many operating units in different locations have used enterprise systems to enforce standard practices and data so that everyone does business the same way worldwide.

Coca Cola, for instance, implemented a SAP enterprise system to standardize and coordinate important business processes in 200 countries. Lack of standard, company-wide business processes prevented the company from leveraging its worldwide buying power to obtain lower prices for raw materials and from reacting rapidly to market changes. Nestlé SA installed a SAP enterprise system to standardize business processes in 500 facilities in 80 countries for the same reason.

Enterprise systems help firms respond rapidly to customer requests for information or products. Because the system integrates order, manufacturing, and delivery data, manufacturing is better informed about producing only what customers have ordered, procuring exactly the right amount of components or raw materials to fill actual orders, staging production, and minimizing the time that components or finished products are in inventory.

After implementing enterprise software from Oracle, Alcoa eliminated many redundant processes and systems. The enterprise system helped Alcoa reduce requisition-to-pay cycle time (the total elapsed time from the time a purchase requisition is generated to the time the payment for the purchase is made) by verifying receipt of goods and automatically generating receipts for payment. Alcoa's accounts payable transaction processing dropped 89 percent. Alcoa was able to centralize financial and procurement activities, which helped the company reduce nearly 20 percent of its worldwide costs.

Enterprise systems provide much valuable information for improving management decision making. Corporate headquarters has access to up-to-the-minute data on sales, inventory, and production and uses this information to create more accurate sales and production forecasts. Enterprise software includes analytical tools for using data captured by the system to evaluate overall organizational performance, for use by top-level managers. Enterprise system data have common standardized definitions and formats that are accepted by the entire organization. Performance figures mean the same thing across the company. Enterprise systems allow senior management to easily find out at any moment how a particular organizational unit is performing, determine which products are most or least profitable, or calculate costs for the company as a whole.

For example, Alcoa's enterprise system includes functionality for global human resources management that shows correlations between investment in employee training and quality; measures the company-wide costs of delivering services to employees; and measures the effectiveness of employee recruitment, compensation, and training.

LIFECYCLE

In their research paper, Haddara and Elragal (2011) explained that ERP systems pass through a lifecycle as follows:

1. *Adoption decision phase.* In this phase, in order to satisfy their business and technical needs, companies start to question the need for an ERP system.
2. *Acquisition phase.* This phase refers to the buying of the ERP system and vendor selection. This happens after evaluating the organization's business needs, ERP packages, and vendors.
3. *Implementation phase.* This phase deals with the ERP system installation. This phase includes many activities, like customizing the system to comply with the business needs, business process reengineering, data migration, end-user training, etc. As the implementation phase is the most critical, costly, and time-consuming phase, it is not surprising that it has the highest attention from ERP researchers.
4. *Use and maintenance phase.* After the ERP system implementation and the go-live take place, users start using the system on a daily basis. Many topics have been the subject of research in this phase, including system use and user acceptance, benefits management and realization, ERP impact on organization, and maintenance processes.
5. *Evolution phase.* This phase involves the extension and integration of the ERP system with other systems such as customer relationship management, supply chain management, or advanced planning and scheduling systems. The ERP system evolution is a non-trivial process, and requires a stable and mature ERP system.
6. *Retirement phase.* This is where the ERP system is abandoned and substituted by another information system or ERP system.

The research work of Haddara and Elragal (2011) stressed that the choice of the ERP system should be taken by both business and IT staff. It also emphasized that the criteria of choice should include current as well as future demands; for example, web interface, business intelligence, HR, user-friendly interface. It is very important to have key users and function owners supporting the system and acting as a bridge between implementation consultants and functional users.

COST ESTIMATION

Generally speaking, cost estimation is an important topic of interest for both vendors and customers. Vendors need to estimate the budgets needed for their software development, as well as pricing their final product or implementations. For organizations, they need to know how much money they will pay in order to buy and implement a system such as SAP ERP. The problem with cost estimation is that organizations usually have no prior experience or enough knowledge to predict all the hidden costs associated with the implementation. In addition, even large and competent organizations suffer from faulty budget estimations when it comes to IT or IS projects. That is because cost factors are hard to identify and predict, especially the additional costs that may arise during the implementation. Research into the factors contributing to the total cost of ERP implementation has produced a list of cost drivers which influence the ERP project total implementation budget to a great extent. These cost drivers are:

1. *Hardware.* This includes the cost of buying or upgrading servers and clients to comply with the ERP hardware requirements.
2. *Software.* This is the licenses paid mainly to the ERP vendor and any other licenses needed for the ERP—for example, licenses for the RDBMS, OS, backup solution.
3. *Human resources.* These are the costs for hiring new resources needed for the ERP project and costs for retention and training;
4. *Change management.* This is the cost of change which ERP systems usually bring in to organizations. The changes could include buying new machinery, upgrading existing ones, business process reengineering, and so on.
5. *Vendor services.* This refers to costs which are mainly abstracted in the form of man/days or consulting fees.

It is very important here to indicate that defining the ERP implementation budget needs clear understanding of cost drivers. When a company decides to go ahead with an implementation with a lack of clear cost driver understanding, this might result in a budget shortfall during the implementation and hence put the whole project at risk of cancellation. Companies implementing an ERP should develop their own cost drivers in isolation of the vendor, as the vendor will always try to enforce its model, which could lead to the budget being over-inflated.

BENEFITS REALIZATION

The use of ERP systems has become increasingly common in today's businesses. They are adopted in many firms for the purpose of enhancing business performance, which is usually interpreted as either financial gains, operational improvements, or intangible gains. Financial benefits can be analyzed in depth but do not always give a clear or specific measure of the effectiveness of the ERP. The reason for the insufficiency of financial indicators on their own as a measure of ERP systems is that more than just quantitative measures are needed. Qualitative measures combined with quantitative measures give a fuller picture of overall benefits to the organization. Qualitative information focusing on operational and intangible benefits can better outline the direct relationship between the ERP system and business performance.

The benefits of ERP systems are usually overestimated by ERP vendors. Promises are made about performance such as rapid return on investment (ROI) and fast decision making, but such claims need to be researched and

tested in order to verify them. Research results indicate that many benefits have been achieved after ERP adoption including operational efficiency, communication efficiency, and information efficiency (Elragal and Al-Serafi, 2011).

Meanwhile, other research claims that benefits of ERP implementations are hard to define, since most of them are not measurable. In addition, some of the companies implementing an ERP system rarely conduct post-implementation analyses to measure the benefits. Although benefits realization proponents suggest that organizations need to apply benefits realization practices to realize potential benefits, others argue that the contemporary formal IT investment evaluation and benefits realization practices are inadequate and better methods are needed. Furthermore, they argue that in some cases benefits realization practices are not needed, as benefits could be self-evident or too costly to measure (Haddara and Päiväranta, 2011).

Benefits realization advocates suggest that an extra effort on benefits realization and IT investment evaluation will eventually pay off and cover its costs, although some organizations may not see that. However, the literature argues that the failure behind adopting benefits realization and investment evaluation practices is mainly due to issues of organizational culture, structure, and low maturity, which explains why such organizations would not identify the basic motives and drivers to implement those practices (Haddara and Päiväranta, 2011).

8.2 SUPPLY CHAIN MANAGEMENT SYSTEMS

If you manage a small firm that makes a few products or sells a few services, chances are you will have a small number of suppliers. You could coordinate your supplier orders and deliveries using a telephone and e-mail or fax machine. But if you manage a firm that produces more complex products and services, then you will have hundreds of suppliers, and your suppliers will each have their own set of suppliers. Suddenly, you are in a situation where you will need to coordinate the activities of hundreds or even thousands of other firms in order to produce your products and services. Supply chain management systems, which we introduced in Chapter 2, are an answer to these problems of supply chain complexity and scale.

THE SUPPLY CHAIN

Supply chain

Network of organizations and business processes for procuring materials, transforming raw materials into intermediate and finished products, and distributing the finished products to customers.

A firm's **supply chain** is a network of organizations and business processes for procuring raw materials, transforming these materials into intermediate and finished products, and distributing the finished products to customers. It links suppliers, manufacturing plants, distribution centers, retail outlets, and customers to supply goods and services from source through consumption. Materials, information, and payments flow through the supply chain in both directions.

Goods start out as raw materials and, as they move through the supply chain, are transformed into intermediate products (also referred to as components or parts or semi-finished goods), and finally, into finished products. The finished products are shipped to distribution centers and from there to retailers and customers. Returned items—such as products with defects—flow in the reverse direction from the buyer back to the seller.

Let's look at the supply chain for Nike running shoes as an example. Nike designs, markets, and sells running shoes, socks, athletic clothing, and

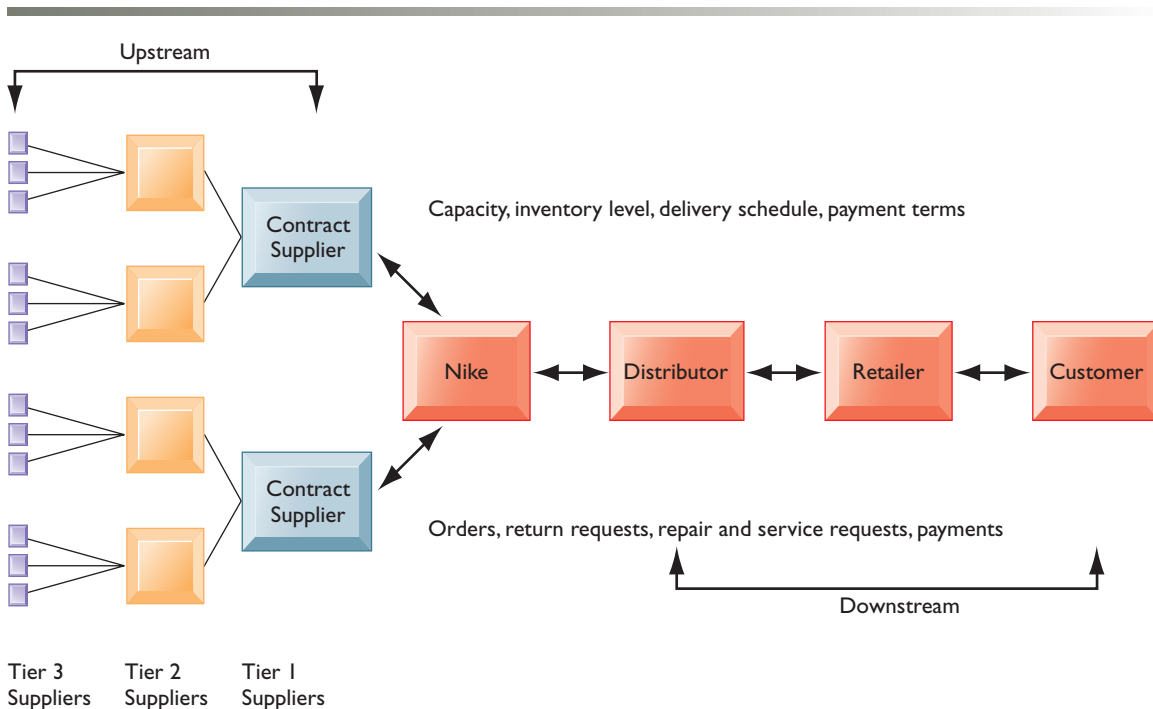
accessories throughout the world. Its primary suppliers are contract manufacturers with factories in China, Thailand, Indonesia, Brazil, and other countries. These companies fashion Nike’s finished products.

Nike’s contract suppliers do not manufacture running shoes from scratch. They obtain components for the running shoes—the laces, eyelets, uppers, and soles—from other suppliers and then assemble them into finished shoes. These suppliers in turn have their own suppliers. For example, the suppliers of soles have suppliers for synthetic rubber, suppliers for chemicals used to melt the rubber for molding, and suppliers for the molds into which to pour the rubber. Suppliers of laces would have suppliers for their thread, for dyes, and for the plastic lace tips.

Figure 8-2 provides a simplified illustration of Nike’s supply chain for running shoes; it shows the flow of information and materials among suppliers, Nike, Nike’s distributors, retailers, and customers. Nike’s contract manufacturers are its primary suppliers. The suppliers of soles, eyelets, uppers, and laces are the secondary (Tier 2) suppliers. Suppliers to these suppliers are the tertiary (Tier 3) suppliers.

The *upstream* portion of the supply chain includes the company’s suppliers, the suppliers’ suppliers, and the processes for managing relationships with them. The *downstream* portion consists of the organizations and processes for distributing and delivering products to the final customers. Companies doing manufacturing, such as Nike’s contract suppliers of running shoes, also manage their own *internal supply chain* processes for transforming materials, components, and services furnished by their suppliers into finished products or intermediate products (components or parts) for their customers and for managing materials and inventory.

FIGURE 8-2 NIKE’S SUPPLY CHAIN



This figure illustrates the major entities in Nike’s supply chain and the flow of information upstream and downstream to coordinate the activities involved in buying, making, and moving a product. Shown here is a simplified supply chain, with the upstream portion focusing only on the suppliers for running shoes and running shoe soles.

The supply chain illustrated in **Figure 8-2** been simplified. It only shows two contract manufacturers for running shoes and only the upstream supply chain for running shoe soles. Nike has hundreds of contract manufacturers turning out finished running shoes, socks, and athletic clothing, each with its own set of suppliers. The upstream portion of Nike's supply chain would actually comprise thousands of entities. Nike also has numerous distributors and many thousands of retail stores where its shoes are sold, so the downstream portion of its supply chain is also large and complex.

INFORMATION SYSTEMS AND SCM

Inefficiencies in the supply chain, such as parts shortages, underutilized plant capacity, excessive finished goods inventory, or high transportation costs, are caused by inaccurate or untimely information. For example, manufacturers may keep too many parts in inventory because they do not know exactly when they will receive their next shipments from their suppliers, thus increasing the inventory stock level and cost. Suppliers may order too few raw materials because they do not have precise information on demand, which can result in stockout if there is high demand. These supply chain inefficiencies waste as much as 25 percent of a company's operating costs.

If a manufacturer had perfect information about exactly how many units of product customers wanted, when they wanted them, and when they could be produced, it would be possible to implement a highly efficient **just-in-time strategy**. Components would arrive exactly at the moment they were needed and finished goods would be shipped as they left the assembly line.

In a supply chain, however, uncertainties arise because many events cannot be foreseen—uncertain product demand, late shipments from suppliers, defective parts or raw materials, or production process breakdowns. To satisfy customers, manufacturers often deal with such uncertainties and unforeseen events by keeping more material or products in inventory than what they think they may actually need. The *safety stock* acts as a buffer for the lack of flexibility in the supply chain. Although excess inventory is expensive, low fill rates are also costly because business may be lost from canceled orders.

One recurring problem in supply chain management is the **bullwhip effect**, in which information about the demand for a product gets distorted as it passes from one entity to the next across the supply chain. A slight rise in demand for an item might cause different members in the supply chain—distributors, manufacturers, suppliers, secondary suppliers (suppliers' suppliers), and tertiary suppliers (suppliers' suppliers' suppliers)—to stockpile inventory so each has enough 'just in case.' These changes ripple throughout the supply chain, magnifying what started out as a small change from planned orders, creating excess inventory, production, warehousing, and shipping costs (see **Figure 8-3**).

For example, Procter & Gamble (P&G) found it had excessively high inventories of its Pampers disposable diapers at various points along its supply chain because of such distorted information. Although customer purchases in stores were fairly stable, orders from distributors would spike when P&G offered aggressive price promotions. Pampers and Pampers' components accumulated in warehouses along the supply chain to meet demand that did not actually exist. To eliminate this problem, P&G revised its marketing, sales, and supply chain processes and used more accurate demand forecasting (Lee, Padmanabhan, and Wang, 1997).

The bullwhip is tamed by reducing uncertainties about demand and supply when all members of the supply chain have accurate and

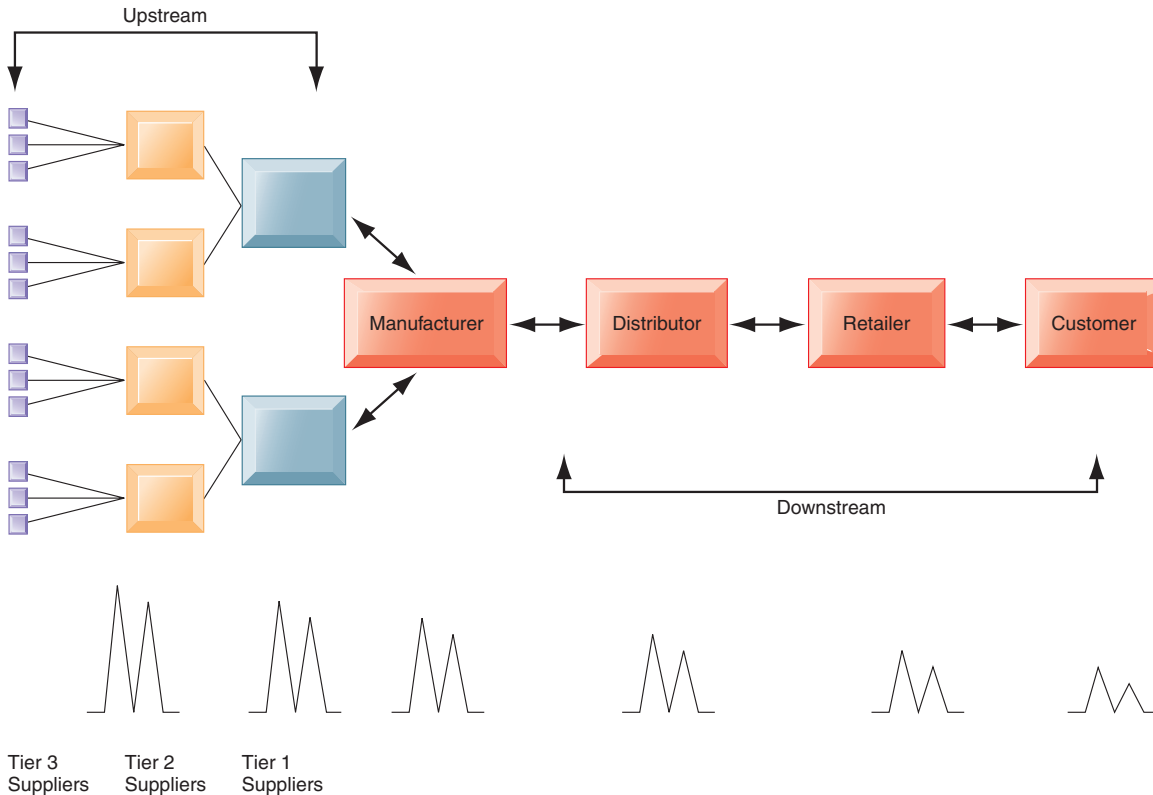
Just-in-time strategy

Scheduling system for minimizing inventory by having components arrive exactly at the moment they are needed and finished goods shipped as soon as they leave the assembly line.

Bullwhip effect

Distortion of information about the demand for a product as it passes from one entity to the next across the supply chain.

FIGURE 8-3 THE BULLWHIP EFFECT



Inaccurate information can cause minor fluctuations in demand for a product to be amplified as one moves further back in the supply chain. Minor fluctuations in retail sales for a product can create excess inventory for distributors, manufacturers, and suppliers.

up-to-date information. If all supply chain members share dynamic information about inventory levels, schedules, forecasts, and shipments, they have more precise knowledge about how to adjust their sourcing, manufacturing, and distribution plans. Supply chain management systems provide the kind of information that helps members of the supply chain make better purchasing and scheduling decisions. This will have a positive effect on the profitability level of the entire supply chain network.

Table 8-2 describes how firms benefit from these systems.

TABLE 8-2 HOW INFORMATION SYSTEMS FACILITATE SUPPLY CHAIN MANAGEMENT

| INFORMATION FROM SUPPLY CHAIN MANAGEMENT SYSTEMS HELPS FIRMS |
|--|
| Decide when and what to produce, store, and move |
| Rapidly communicate orders |
| Track the status of orders |
| Check inventory availability and monitor inventory levels |
| Reduce inventory, transportation, and warehousing costs |
| Track shipments |
| Plan production based on actual customer demand |
| Rapidly communicate changes in product design |

SCM SOFTWARE

Supply chain planning systems

Systems that enable a firm to generate demand forecasts for a product and to develop sourcing and manufacturing plans for that product.

Supply chain software is classified as either software to help businesses plan their supply chains (supply chain planning) or software to help them execute the supply chain steps (supply chain execution). **Supply chain planning systems** enable the firm to model its existing supply chain, generate demand forecasts for products, and develop optimal sourcing and manufacturing plans. Such systems help companies make better decisions such as determining how much of a specific product to manufacture in a given time period; establishing inventory levels for raw materials, intermediate products, and finished goods; determining where to store finished goods; and identifying the transportation mode to use for product delivery.

For example, if a large customer places a larger order than usual or changes the order on short notice, it can have a widespread impact throughout the supply chain. Additional raw materials or a different mix of raw materials may need to be ordered from suppliers. Manufacturing may have to change job scheduling. A transportation carrier may have to reschedule deliveries. Supply chain planning software makes the necessary adjustments to production and distribution plans. Information about changes is shared among the relevant supply chain members so that their work can be coordinated. One of the most important—and complex—supply chain planning functions is **demand planning**, which determines how much product a business needs to make to satisfy all of its customers' demands.

Demand planning

Determining how much product a business needs to make to satisfy all its customers' demands.

Whirlpool Corporation, which produces washing machines, dryers, refrigerators, ovens, and other home appliances, uses supply chain planning systems to make sure that what it produces matches customer demand. The company uses supply chain planning software from i2 Technologies that includes modules for master scheduling, deployment planning, and inventory planning. Whirlpool also installed i2's web-based tool for collaborative planning, forecasting, and replenishment (CPFR) for sharing and combining its sales forecasts with those of its major sales partners. Improvements in supply chain planning helped Whirlpool increase availability of products in stock when customers needed them to 97 percent, while reducing the number of excess finished goods in inventory by 20 percent and forecasting errors by 50 percent (Barrett, 2009).

Supply chain execution systems

Systems to manage the flow of products through distribution centers and warehouses to ensure that products are delivered to the right locations in the most efficient manner.

Supply chain execution systems manage the flow of products through distribution centers and warehouses to ensure that products are delivered to the right locations in the most efficient manner. They track the physical status of goods, the management of materials, warehouse and transportation operations, and financial information involving all parties. Manugistics and i2 Technologies (both acquired by JDA Software) are major supply chain management software vendors, and enterprise software vendors SAP and Oracle-PeopleSoft offer supply chain management modules.

The Interactive Session on Organizations describes how Dubai Ports World has implemented RFID to improve its management of customer supply chains. The firm invests heavily in terminal infrastructures, technologies, and people to best serve its customers.

GLOBAL SUPPLY CHAINS AND THE INTERNET

Before the internet, supply chain coordination was hampered by the difficulties of making information flow smoothly among disparate internal supply chain systems for purchasing, materials management, manufacturing, and distribution. It was also difficult to share information with external supply chain

INTERACTIVE SESSION: ORGANIZATIONS

DUBAI PORTS WORLD TAKES PORT MANAGEMENT TO THE NEXT LEVEL WITH RFID

Dubai Ports (DP) World has reason to be proud of its accomplishment of becoming one of the leading terminal operators in the world. Today, DP World has 50 terminals in 31 countries, and 11 new terminals are under development. The firm employs an international professional team of more than 30,000 people to serve customers in some of the most dynamic economies in the world.

DP World has adopted a customer-centric approach to enhancing its customers' supply chains by providing quality, innovative services to effectively manage container, bulk, and other terminal cargo. The firm invests heavily in terminal infrastructures, technologies, and people to best serve its customers.

Like other global port and terminal operators, DP World helps shippers around the world address the often complex and costly challenges of managing the supply chain. One of the typical problems encountered in container terminal operations is traffic congestion at port entry points. This congestion is often due to delays introduced by lengthy procedures and paper-based logistics. In response, DP World has introduced many IT-based solutions to enhance terminal capacity utilization. These solutions include the electronic customs release of cargo, electronic data interchange (EDI) reporting, two-way digital radio communications, and the 'e-token' advance booking system.

DP World management wanted to take things a step further and decided to make the loading and unloading of containers operate on just-in-time principles to improve container turnaround. It found that radio frequency identification (RFID) technology was an effective way of increasing the efficiency of truck movements through port access gates. Today, DP World uses RFID-enabled automatic gate systems at the port terminals it operates in Dubai and Australia. According to Mohammed Al Muallem, managing director of DP World U.A.E., "By introducing the automated gate system, we are not only eliminating traffic congestion but also eradicating a number of lengthy procedures, increasing productivity at our ports, and improving customer satisfaction. Our customers will now be able to have their goods cleared and shipped at much faster speed."

Prior to the RFID deployment, DP World spent several months performing proof-of-concept trials involving several competing RFID suppliers. Because of the rugged environmental conditions at the ports, DP World required that 99.5 percent of all tags be read successfully, which was a key challenge for many vendors. After extensive testing and evaluation, DP World selected Identec Solutions, a global leader in active wireless tracking solutions, as its RFID supplier.

How does the RFID tracking system work? Trucks that visit a port terminal are equipped with active RFID tags supplied by Identec Solutions that are fixed on the rear chassis. As a truck moves towards the gate, its unique tag ID number is read by an RFID reader, which is integrated with an automated gate system. At the gate, an optical character recognition (OCR) system determines if the truck is loaded with a container, identifies the ID number of the truck's container, and reads the truck license plate number as a backup identification. The system uses the supplied information to automatically issue a ticket to the driver that specifies the lane the truck should proceed to in order to load or unload the container. The system can also automatically determine if the truck is on time, which is essential information for the efficient pick-up and drop-off of containers. As the truck leaves the gate, the RFID tag is read once again, and the driver receives a receipt for the completed transaction.

RFID has enabled DP World to increase the productivity of container handoffs, speed the entry and exit of trucks through terminal gates, and increase fuel efficiency. Victoria Rose, regional office project coordinator at DP World Sydney stated, "We saw that RFID could improve gate efficiency through improved truck management, reduce queues and congestion around gates, and remove the number of trucks from public roads by streamlining truck-processing procedures."

Identec's RFID-based solution has also enabled DP World to improve customer satisfaction by enhancing the efficiency of customers' supply chains through smoother, faster, and more effective delivery of their containers at terminal gates. The elimination of lengthy paper transactions and manual inspections at gates and the reduction in

manual data input errors demonstrate DP World's customer-centric approach to delivering a superior level of service. The technology also allows transport companies to save time, increase revenues, and reduce costs.

DP World's use of RFID has also helped it to tighten security by providing better accuracy on inbound and outbound truck movements through the terminals. For instance, the system can automatically check whether a truck has a booking and whether it is authorized to enter the port.

As a next step, DP World will consider expanding its use of RFID-enabled scanning and tracking

technology to further optimize supply chain flow. "Investigation around its use within the yard, and how the data captured can be used, will be the focus of the coming months," Rose added.

Sources: Dave Friedlos, "RFID Boosts DP World's Productivity in Australia," *RFID Journal*, July 27, 2009 (www.rfidjournal.com/article/view/5086, accessed October 20, 2010); Rhea Wessel, "DP World Ramps Up Its Dubai Deployment," *RFID Journal*, August 13, 2009 (www.rfidjournal.com/article/view/5130, accessed October 20, 2010); "DP World UAE Implements Automated Gate System at Jebel Ali Port," *The Zone*, May-June 2008 (www.jafza.ae/media-files/2008/10/23/20081023_Issue-11.pdf, accessed October 20, 2010), p. 11; DP World (www.dpworld.com, accessed October 20, 2010); Identec Solutions (www.identecsolutions.com, accessed October 20, 2010).

CASE STUDY QUESTIONS

1. How did the Identec Solutions RFID-based technology help DP World increase the efficiency and effectiveness of its customers' supply chains?
2. Describe two improvements that resulted from implementing the Identec RFID-based solution.
3. How does the concept of supply chain execution relate to this interactive session?
4. What managerial, organizational, and technological challenges might DP World have faced in the early stages of the RFID project's deployment?

MIS IN ACTION

Visit the Identec Solutions website (www.identecsolutions.com) and learn about some of the other companies that have used its tracking services to increase supply chain efficiency. Pick one of these companies and then answer the following questions:

1. What problems did the company solve through the use of Identec Solutions' tracking technology?
2. Why did the company select Identec Solutions to be its tracking-solution vendor?
3. What benefits did the company realize as a result of implementing the tracking solution?

Case contributed by Faouzi Kamoun, The University of Dubai

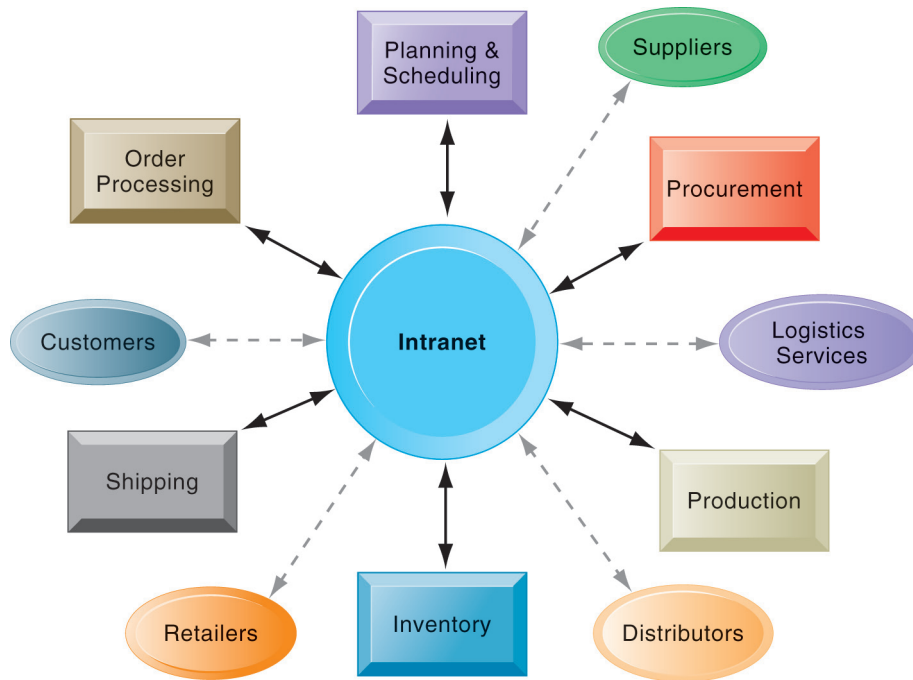
partners because the systems of suppliers, distributors, or logistics providers were based on incompatible technology platforms and standards. Enterprise systems supply some integration of internal supply chain processes but they are not designed to deal with external supply chain processes.

Some supply chain integration is supplied inexpensively using internet technology. Firms use intranets to improve coordination among their internal supply chain processes, and they use extranets to coordinate supply chain processes shared with their business partners (see **Figure 8-4**).

Using intranets and extranets, all members of the supply chain are instantly able to communicate with each other, using up-to-date information to adjust purchasing, logistics, manufacturing, packaging, and schedules. A manager will use a web interface to tap into suppliers' systems to determine whether inventory and production capabilities match demand for the firm's products and to keep up-to-date information posted to the suppliers for managing demand levels. Business partners will use web-based supply chain management tools to collaborate online on forecasts. Sales representatives will access suppliers' production schedules and logistics information to monitor customers' order status.

Global Supply Chain Issues

More and more companies are entering international markets, outsourcing manufacturing operations and obtaining supplies from other countries as well as selling

FIGURE 8-4 INTRANETS AND EXTRANETS FOR SUPPLY CHAIN MANAGEMENT

Intranets integrate information from isolated business processes within the firm to help manage its internal supply chain. Access to these private intranets can also be extended to authorized suppliers, distributors, logistics services, and, sometimes, to retail customers to improve coordination of external supply chain processes.

abroad. Their supply chains extend across multiple countries and regions. There are additional complexities and challenges to managing a global supply chain.

Global supply chains typically span greater geographic distances and time differences than domestic supply chains and have participants from a number of different countries. Although the purchase price of many goods might be lower abroad, there are often additional costs for transportation, inventory (the need for a larger buffer of safety stock), and local taxes or fees. Performance standards may vary from region to region or from nation to nation. Supply chain management may need to reflect foreign government regulations and cultural differences. All of these factors impact how a company takes orders, plans distribution, sizes warehousing, and manages inbound and outbound logistics throughout the global markets it services.

The internet helps companies manage many aspects of their global supply chains, including sourcing, transportation, communications, and international finance. Today's apparel industry, for example, relies heavily on outsourcing to contract manufacturers in China and other low-wage countries. Apparel companies are starting to use the web to manage their global supply chain and production issues.

As an example, Mercedes-Benz, located in Cairo, Egypt, contacts the parent company Daimler in Germany in order to send and receive information on the passenger cars required and their latest updates.

As goods are being sourced, produced, and shipped, communication is required among retailers, manufacturers, contractors, agents, and logistics providers. Many, especially smaller companies, still share product information over the phone, via e-mail, or through faxes. These methods slow down the supply chain and also increase errors, costs, and uncertainty.

In addition to contract manufacturing, globalization has encouraged outsourcing warehouse management, transportation management, and related operations to third-party logistics providers, such as UPS Supply Chain Services. Such logistics services offer web-based software to give their customers a better view of their global supply chains. Customers are able to check a secure web-site to monitor inventory and shipments, helping them run their global supply chains more efficiently.

Demand-Driven Supply Chains: From Push to Pull Manufacturing and Efficient Customer Response

In addition to reducing costs, supply chain management systems facilitate efficient customer response, enabling the workings of the business to be driven more by customer demand. (We introduced efficient customer response systems in Chapter 3.)

Earlier supply chain management systems were driven by a push-based model (also known as build-to-stock). In a **push-based model**, production master schedules are based on forecasts or best guesses of demand for products, and products are 'pushed' to customers. With new flows of information made possible by web-based tools, supply chain management more easily follows a **pull-based model**. In a pull-based model, also known as a demand-driven model or build-to-order, actual customer orders or purchases trigger events in the supply chain. Transactions to produce and deliver only what customers have ordered move up the supply chain from retailers to distributors to manufacturers and eventually to suppliers. Only products to fulfill these orders move back down the supply chain to the retailer. Manufacturers use only actual order demand information to drive their production schedules and the procurement of components or raw materials, as illustrated in **Figure 8-5**. Dell Computer's build-to-order system, described in Chapter 3, is an example of the pull-based model.

The internet and internet technology make it possible to move from sequential supply chains, where information and materials flow sequentially from company to company, to concurrent supply chains, where information flows in many directions simultaneously among members of a supply chain network.

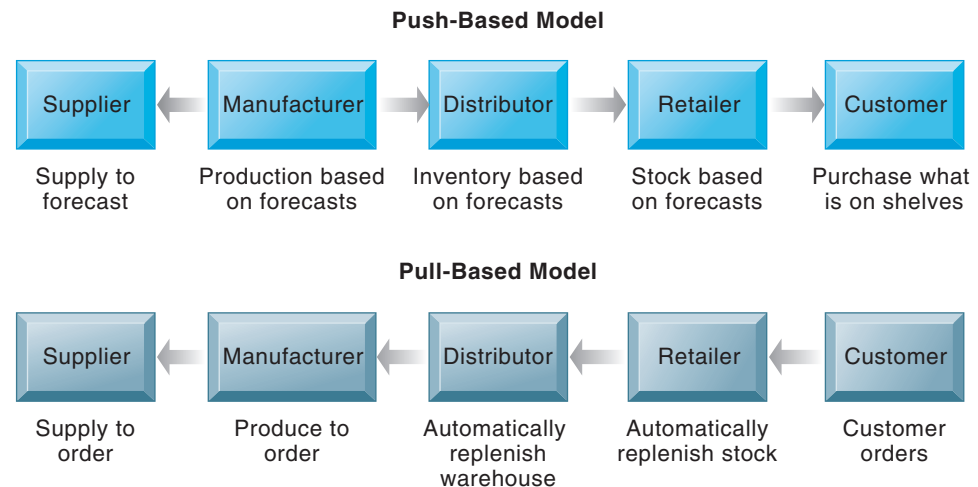
Push-based model

Supply chain driven by production master schedules based on forecasts or best guesses of demand for products, and products are 'pushed' to customers.

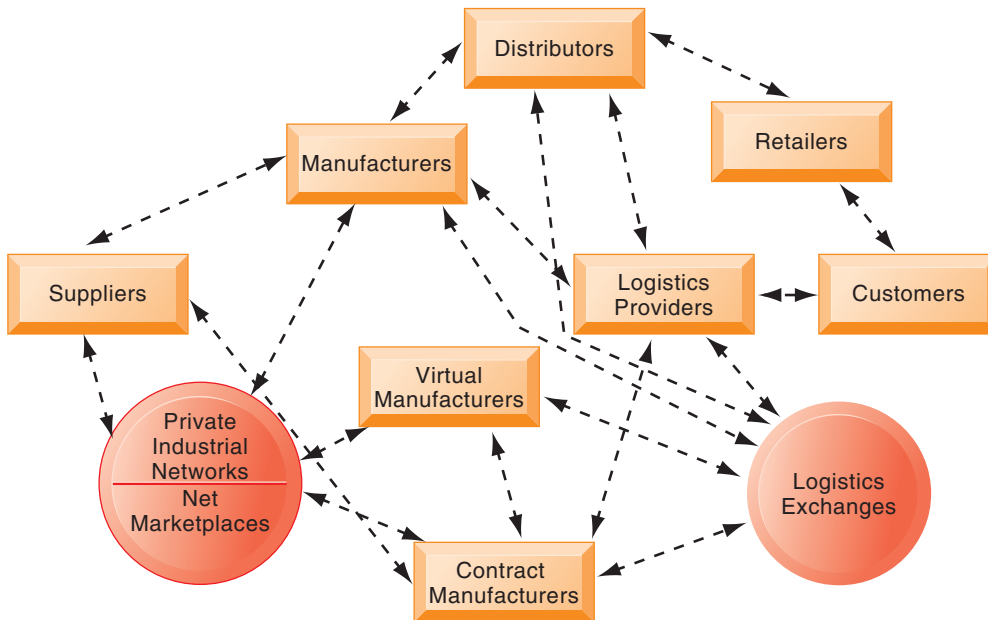
Pull-based model

Supply chain driven by actual customer orders or purchases so that members of the supply chain produce and deliver only what customers have ordered.

FIGURE 8-5 PUSH- VERSUS PULL-BASED SUPPLY CHAIN MODELS



The difference between push- and pull-based models is summarized by the slogan 'Make what we sell, not sell what we make.'

FIGURE 8-6 THE FUTURE INTERNET-DRIVEN SUPPLY CHAIN

The future internet-driven supply chain operates like a digital logistics nervous system. It provides multidirectional communication among firms, networks of firms, and e-marketplaces so that entire networks of supply chain partners can immediately adjust inventories, orders, and capacities.

Members of the network immediately adjust to changes in schedules or orders. Ultimately, the internet could create a 'digital logistics nervous system' throughout the supply chain (see **Figure 8-6**).

BUSINESS VALUE OF SCM SYSTEMS

You have just seen how supply chain management systems enable firms to streamline both their internal and external supply chain processes and provide management with more accurate information about what to produce, store, and move. By implementing a networked and integrated supply chain management system, companies match supply to demand, reduce inventory levels, improve delivery service, speed product time to market, and use assets more effectively.

Total supply chain costs represent the majority of operating expenses for many businesses and in some industries approach 75 percent of the total operating budget. Reducing supply chain costs may have a major impact on firm profitability.

In addition to reducing costs, supply chain management systems help increase sales. If a product is not available when a customer wants it, customers often try to purchase it from another manufacturer. More precise control of the supply chain enhances the firm's ability to have the right product available for customer purchases at the right time.

8.3 CUSTOMER RELATIONSHIP MANAGEMENT SYSTEMS

You've probably heard phrases such as 'the customer is always right' or 'the customer comes first.' Today these words ring more true than ever. Because competitive advantage based on an innovative new product or service is often very short lived, companies are realizing that their only enduring competitive

strength may be their relationships with their customers. Some say that the basis of competition has switched from who sells the most products and services to who ‘owns’ the customer, and that customer relationships represent a firm’s most valuable asset.

WHAT IS CUSTOMER RELATIONSHIP MANAGEMENT?

What kinds of information would you need to build and nurture strong, long-lasting relationships with customers? You’d want to know exactly who your customers are, how to contact them, whether they are costly to service and sell to, what kinds of products and services they are interested in, and how much money they spend on your company. If you could, you’d want to make sure you knew each of your customers well, as if you were running a small-town store. And you’d want to make your good customers feel special.

In a small business operating in a neighborhood, it is possible for business owners and managers to really know their customers on a personal, face-to-face basis. But in a large business operating on a metropolitan, regional, national, or even global basis, it is impossible to ‘know your customer’ in this intimate way. In these kinds of businesses there are too many customers and too many different ways that customers interact with the firm (over the web, the phone, fax, and face to face). It becomes especially difficult to integrate information from all these sources and to deal with the large numbers of customers.

A large business’s processes for sales, service, and marketing tend to be highly compartmentalized, and these departments do not share much essential customer information. Some information on a specific customer might be stored and organized in terms of that person’s account with the company. Other pieces of information about the same customer might be organized by products that were purchased. There is no way to consolidate all of this information to provide a unified view of a customer across the company.

This is where customer relationship management (CRM) systems help. CRM systems, which we introduced in Chapter 2, capture and integrate customer data from all over the organization, consolidate the data, analyze the data, and then distribute the results to various systems and customer touch points across the enterprise. A **touch point** (also known as a contact point) is a method of interaction with the customer, such as telephone, e-mail, customer service desk, conventional mail, website, wireless device, or retail store.

Well-designed CRM systems provide a single enterprise view of customers that is useful for improving both sales and customer service. Such systems likewise provide customers with a single view of the company, regardless of what touch point the customer uses (see **Figure 8-7**).

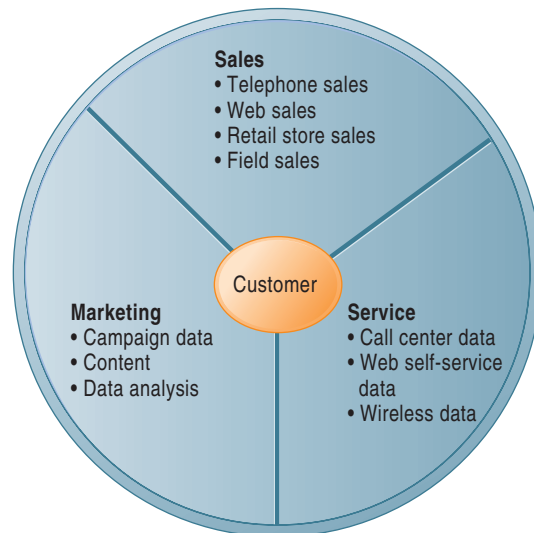
Good CRM systems provide data and analytical tools for answering questions such as these: ‘What is the value of a particular customer to the firm over their lifetime?’ ‘Who are our most loyal customers?’ (It can cost six times more to sell to a new customer than to an existing customer.) ‘Who are our most profitable customers?’ and ‘What do these profitable customers want to buy?’ Firms use the answers to these questions to acquire new customers, provide better service and support to existing customers, customize their offerings more precisely to customer preferences, and provide ongoing value to retain profitable customers.

CRM SOFTWARE

Commercial CRM software packages range from niche tools that perform limited functions, such as personalizing websites for specific customers, to

Touch point

Method of firm interaction with a customer, such as telephone, e-mail, customer service desk, conventional mail, or point-of-purchase.

FIGURE 8-7 CUSTOMER RELATIONSHIP MANAGEMENT (CRM)

CRM systems examine customers from a multifaceted perspective. These systems use a set of integrated applications to address all aspects of the customer relationship, including customer service, sales, and marketing.

large-scale enterprise applications that capture myriad interactions with customers, analyze them with sophisticated reporting tools, and link to other major enterprise applications, such as supply chain management and enterprise systems. The more comprehensive CRM packages contain modules for **partner relationship management (PRM)** and **employee relationship management (ERM)**.

PRM uses many of the same data, tools, and systems as customer relationship management to enhance collaboration between a company and its selling partners. If a company does not sell directly to customers but rather works through distributors or retailers, PRM helps these channels sell to customers directly. It provides a company and its selling partners with the ability to trade information and distribute leads and data about customers, integrating lead generation, pricing, promotions, order configurations, and availability. It also provides a firm with tools to assess its partners' performances so it can make sure its best partners receive the support they need to close more business.

ERM software deals with employee issues that are closely related to CRM, such as setting objectives, employee performance management, performance-based compensation, and employee training. Major CRM application software vendors include Oracle-owned Siebel Systems and PeopleSoft, SAP, Salesforce.com, and Microsoft Dynamics CRM.

Customer relationship management systems typically provide software and online tools for sales, customer service, and marketing. We briefly describe some of these capabilities.

Sales Force Automation (SFA)

Sales force automation modules in CRM systems help sales staff increase their productivity by focusing sales efforts on the most profitable customers, those who are good candidates for sales and services. CRM systems provide sales prospect and contact information, product information, product configuration capabilities, and sales quote generation capabilities. Such software can

Partner relationship management (PRM)

Automation of the firm's relationships with its selling partners using customer data and analytical tools to improve coordination and customer sales.

Employee relationship management (ERM)

Software dealing with employee issues that are closely related to CRM, such as setting objectives, employee performance management, performance-based compensation, and employee training.

assemble information about a particular customer's past purchases to help the salesperson make personalized recommendations. CRM software enables sales, marketing, and delivery departments to easily share customer and prospect information. It increases each salesperson's efficiency in reducing the cost per sale as well as the cost of acquiring new customers and retaining old ones. CRM software also has capabilities for sales forecasting, territory management, and team selling.

Customer Service

Customer service modules in CRM systems provide information and tools to increase the efficiency of call centers, help desks, and customer support staff. They have capabilities for assigning and managing customer service requests.

One such capability is an appointment or advice telephone line: when a customer calls a standard phone number, the system routes the call to the correct service person, which inputs information about that customer into the system only once. Once the customer's data are in the system, any service representative can handle the customer relationship. Improved access to consistent and accurate customer information helps call centers handle more calls per day and decrease the duration of each call. Thus, call centers and customer service groups achieve greater productivity, reduced transaction time, and higher quality of service at lower cost. The customer is happier because they spend less time on the phone restating their problem to customer service representatives and obtain prompt information.

CRM systems may also include web-based self-service capabilities: the company's website can be set up to provide inquiring customers personalized support information as well as the option to contact customer service staff by phone for additional assistance.

Marketing

CRM systems support direct-marketing campaigns by providing capabilities for capturing prospect and customer data, for providing product and service information, for qualifying leads for targeted marketing, and for scheduling and tracking direct-marketing mailings or e-mail (see **Figure 8-8**). Marketing modules also include tools for analyzing marketing and customer data, identifying profitable and unprofitable customers, designing products and services to satisfy specific customer needs and interests, and identifying opportunities for cross-selling.

Cross-selling is the marketing of complementary products to customers. (For example, in financial services, a customer with a checking account might be sold a money market account or a home improvement loan.) CRM tools also help firms manage and execute marketing campaigns at all stages, from planning to determining the rate of success for each campaign.

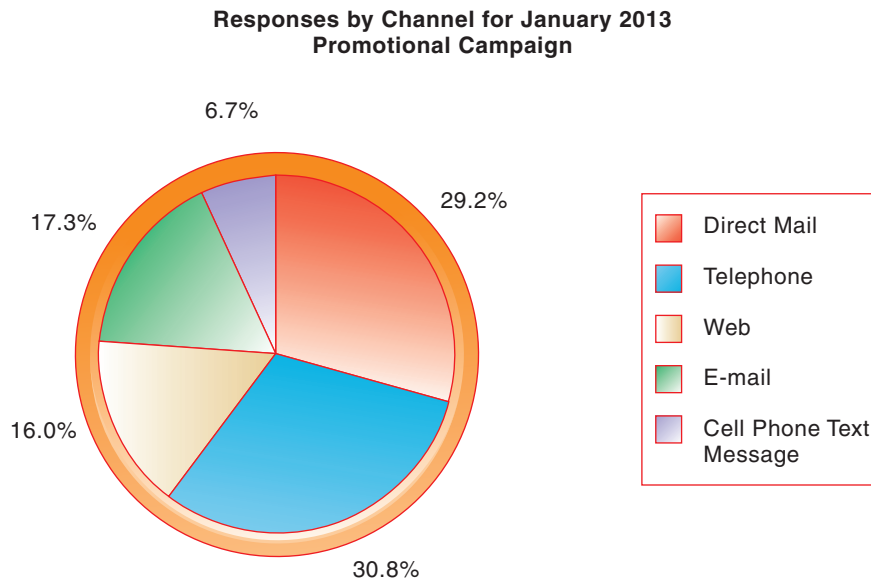
Figure 8-9 illustrates the most important capabilities for sales, service, and marketing processes that would be found in major CRM software products. Like enterprise software, this software is business-process driven, incorporating hundreds of business processes thought to represent best practices in each of these areas. To achieve maximum benefit, companies need to revise and model their business processes to conform to the best-practice business processes in the CRM software.

Figure 8-10 illustrates how best practice for increasing customer loyalty through customer service might be modeled by CRM software. Directly servicing customers provides firms with opportunities to increase customer retention

Cross-selling

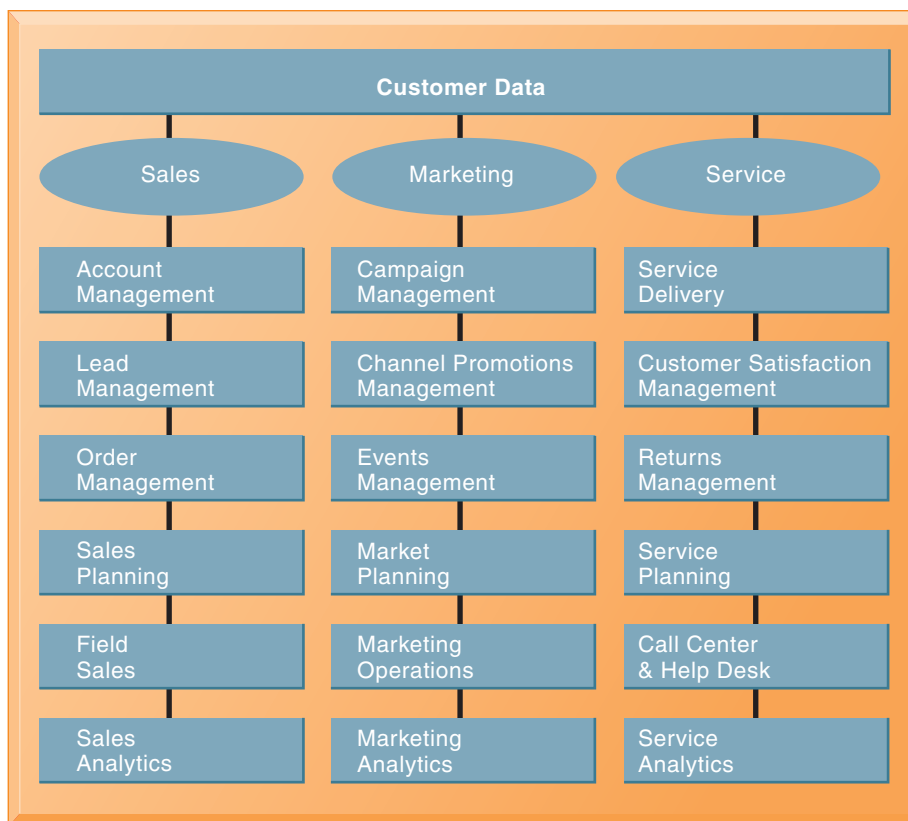
The marketing of complementary products to customers.

FIGURE 8-8 HOW CRM SYSTEMS SUPPORT MARKETING

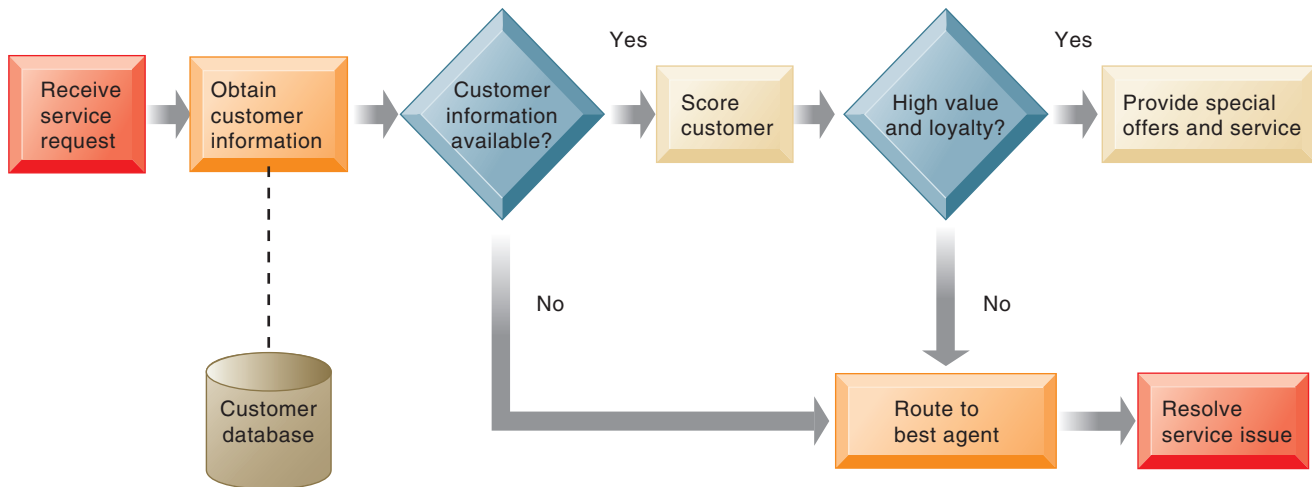


Customer relationship management software provides a single point for users to manage and evaluate marketing campaigns across multiple channels, including e-mail, direct mail, telephone, the web, and wireless messages.

FIGURE 8-9 CRM SOFTWARE CAPABILITIES



The major CRM software products support business processes in sales, service, and marketing, integrating customer information from many different sources. Included are support for both the operational and analytical aspects of CRM.

FIGURE 8-10 CUSTOMER LOYALTY MANAGEMENT PROCESS MAP

This process map shows how a best practice for promoting customer loyalty through customer service would be modeled by customer relationship management software. The CRM software helps firms identify high-value customers for preferential treatment.

by singling out profitable long-term customers for preferential treatment. CRM software can assign each customer a score based on that person's value and loyalty to the company and provide that information to help call centers route each customer's service request to agents who can best handle that customer's needs. The system would automatically provide the service agent with a detailed profile of that customer that included their score for value and loyalty. The service agent would use this information to present special offers or additional service to the customer with the aim of encouraging the customer to keep transacting business with the company.

OPERATIONAL AND ANALYTICAL CRM

Operational CRM

Customer-facing applications, such as sales force automation, call center and customer service support, and marketing automation.

Analytical CRM

Customer relationship management applications dealing with the analysis of customer data to provide information for improving business performance.

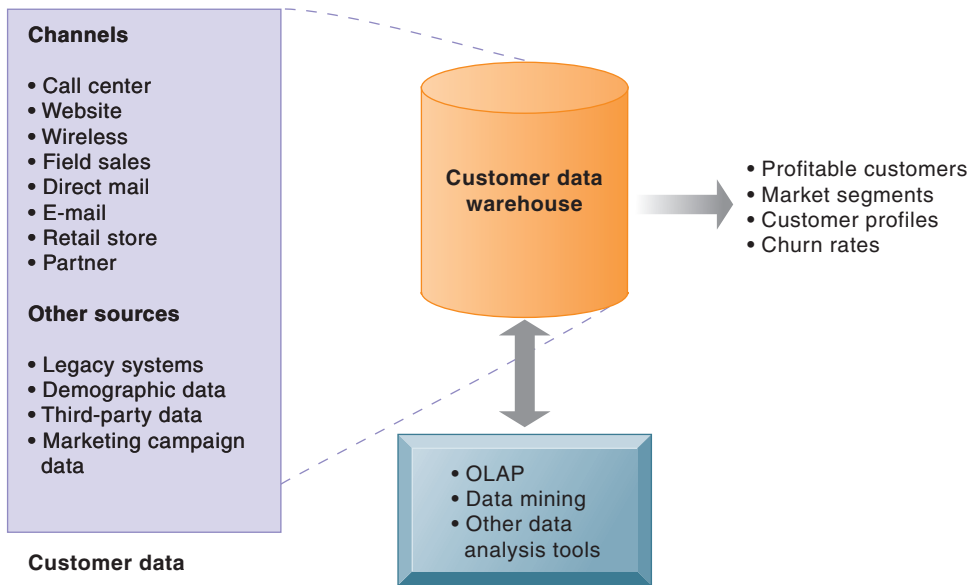
Customer lifetime value (CLTV)

Difference between revenues produced by a specific customer and the expenses for acquiring and servicing that customer minus the cost of promotional marketing over the lifetime of the customer relationship, expressed in monetary terms.

All of the applications we have just described support either the operational or analytical aspects of customer relationship management. **Operational CRM** includes customer-facing applications, such as tools for sales force automation, call center and customer service support, and marketing automation. **Analytical CRM** includes applications that analyze customer data generated by operational CRM applications to provide information for improving business performance.

Analytical CRM applications are based on data warehouses that consolidate the data from operational CRM systems and customer touch points for use with online analytical processing (OLAP), data mining, and other data analysis techniques (see Chapter 5). Customer data collected by the organization might be combined with data from other sources, such as customer lists for direct-marketing campaigns purchased from other companies or demographic data. Such data are analyzed to identify buying patterns, to create segments for targeted marketing, and to pinpoint profitable and unprofitable customers (see **Figure 8-11**).

Another important output of analytical CRM is the customer's lifetime value to the firm. **Customer lifetime value (CLTV)** is based on the relationship between the revenue produced by a specific customer, the expenses incurred in acquiring and servicing that customer, and the expected life of the relationship between the customer and the company.

FIGURE 8-11 ANALYTICAL CRM DATA WAREHOUSE

Analytical CRM uses a customer data warehouse and tools to analyze customer data collected from the firm's customer touch points and from other sources.

BUSINESS VALUE OF CRM SYSTEMS

Companies with effective customer relationship management systems realize many benefits, including increased customer satisfaction, reduced direct-marketing costs, more effective marketing, and lower costs for customer acquisition and retention. Information from CRM systems increases sales revenue by identifying the most profitable customers and segments for focused marketing and cross-selling.

Customer churn is reduced as sales, service, and marketing better respond to customer needs. The **churn rate** measures the number of customers who stop using or purchasing products or services from a company. It is an important indicator of the growth or decline of a firm's customer base.

Churn rate

Measurement of the number of customers who stop using or purchasing products or services from a company. Used as an indicator of the growth or decline of a firm's customer base.

8.4 ENTERPRISE APPLICATIONS: NEW OPPORTUNITIES AND CHALLENGES

Many firms have implemented enterprise systems and systems for supply chain management and customer relationship because they are such powerful instruments for achieving operational excellence and enhancing decision making. But precisely because they are so powerful in changing the way the organization works, they are challenging to implement. Let's briefly examine some of these challenges, as well as new ways of obtaining value from these systems.

ENTERPRISE APPLICATION CHALLENGES

Promises of dramatic reductions in inventory costs, order-to-delivery time, as well as more efficient customer response and higher product and customer profitability make enterprise systems and systems for supply chain management

and customer relationship management very alluring. But to obtain this value, you must clearly understand how your business has to change to use these systems effectively.

Enterprise applications are usually complex pieces of software that are very expensive to purchase and implement. It might take a large company several years to complete a large-scale implementation of an enterprise system or an SCM or CRM system, all of which require expertise and consultants to manage and plan for its implementation. The total implementation cost of a large system, including software, database tools, consulting fees, personnel costs, training, and perhaps hardware costs, might amount to four to five times the initial purchase price for the software.

Enterprise applications require not only deep-seated technological changes but also fundamental changes in the way the business operates. Companies must make sweeping changes to their business processes to work with the software. Employees must accept new job functions and responsibilities. They must learn how to perform a new set of work activities and understand how the information they enter into the system can affect other parts of the company. This requires new organizational learning.

SCM systems require multiple organizations involved in the supply chain network to share information and business processes. Each participant in the system may have to change some of its processes and the way it uses information to create a system that best serves the supply chain as a whole.

Some firms experienced enormous operating problems and losses when they first implemented enterprise applications because they did not understand how much organizational change was required.

In the United States, Hershey Foods' profitability dropped when it tried to implement SAP enterprise software, Manugistics SCM software, and Siebel Systems CRM software on a crash schedule in 1999 without thorough testing and employee training. Shipments ran two weeks late and many customers did not receive enough candy to stock shelves during the busy Halloween selling period. Hershey lost sales and customers during that period, although the new systems eventually improved operational efficiency.

Enterprise applications also introduce *switching costs*. Once you adopt an enterprise application from a single vendor, such as SAP or Oracle, it is very costly to switch vendors, and your firm becomes dependent on the vendor to upgrade its product and maintain your installation.

Enterprise applications are based on organization-wide definitions of data. You'll need to understand exactly how your business uses its data and how the data would be organized in a CRM, SCM, or enterprise system. CRM systems typically require some data cleansing work.

Enterprise software vendors are addressing these problems by offering pared-down versions of their software and 'fast-start' programs for small and medium-sized businesses and best-practice guidelines for larger companies. Our Interactive Session on Technology describes how banks use technology in order to achieve customer satisfaction.

Companies adopting enterprise applications can also save time and money by keeping customizations to the minimum. For example, Kennametal, a US\$2 billion metal-cutting tools company in Pennsylvania, U.S.A, had spent US\$10 million over 13 years maintaining an ERP system with over 6,400 customizations. The company is now replacing it with a 'plain vanilla,' non-customized version of SAP enterprise software and changing its business processes to conform to the software (Johnson, 2010).

INTERACTIVE SESSION: TECHNOLOGY

LEBANON'S BANK AUDI LAUNCHES *NOVO*: A NOVEL CUSTOMER EXPERIENCE

Ranked best bank in Lebanon by Euromoney in 2011, Bank Audi continues to strive to maintain competitive leadership in the banking sector. As of the end of 2011, the bank had US\$28.7 billion in total assets, US\$24.8 billion in customer deposits, US\$2.4 billion of shareholder equity, and US\$365.2 million of consolidated net profits.

The bank has a long tradition of IT investments and has the largest bank network in Lebanon. Back in 2001, the bank implemented an IP telephony technology solution from Cisco, the giant IT vendor. This merged Bank Audi's internal communications infrastructure and later enabled the implementation of intelligent applications in its systems.

In January 2012, the bank announced the launching of *Novo*. This is a banking kiosk, providing a pioneering service which gives customers interactive banking. The introduction of this service is considered an important milestone in the financial sector, enabling customers to interact more easily with the banking services they need. *Novo* is designed to give the customer full control over interactive banking solutions: user-friendly multitouch interactive screens will give customers access to banking services.

Novo takes the customer into a futuristic-style booth which includes two information stations equipped with screens, two ATM machines which allow customers to deposit money and checks, and a private, virtual area to make transactions. The first *Novo* kiosk was installed at City Mall, Dora, Lebanon.

Through *Novo*, customers are able to gain access to all of the bank's products and services. Customer support is provided through video-conference technology, either in the two information stations, or in the private interactive room.

In order for *Novo* to provide customers with seamless interactions, including video-conferencing, the external architecture of *Novo* booths has been carefully designed and developed. The application employs smart tools including advanced design patterns, which allow customers to navigate in multitouch interactive screens, as well as hardware and software tools. These



combine to give the customer a straightforward and more satisfying banking experience.

Novo is based on a database, which interacts with the user's visual dynamic control. Data is synchronized between *Novo* and the bank's back-office systems securely using advanced computer algorithms. Bank Audi plans to implement *Novo* across all branches in Lebanon and abroad in the near future. It anticipates that this will help it to gain a competitive advantage in its markets.

Novo has helped Bank Audi to extend support to its customers 365 days a year. *Novo* will also help Bank Audi to achieve better customer relationships, and to raise its profile through the highly visible kiosks.

At the same time, the bank is implementing aggressive expansion plans. With branches in ten countries as of 2012, Bank Audi announced that it plans to open around 50 branches in Turkey within a few years, including 15 in Istanbul, where it will focus on corporate and commercial banking.

Sources:

<http://www.banqueaudi.com/Pages/Default.aspx>, accessed March 2012;

Bank Audi launches 'Novo' the ultimate new banking experience, <http://www.ameinfo.com/288192.html>, accessed March 2012;

Lebanese bank to open 50-60 branches in Turkey, <http://www.ameinfo.com/292083.html>, accessed March 2012;

Bank Audi teams up with Cisco, <http://www.arabianbusiness.com/banque-audi-teams-up-with-cisco-141876.html>, accessed March 2012.

CASE STUDY QUESTIONS

MIS IN ACTION

1. What is the reason for implementing Novo?
2. What benefits does Novo bring to Bank Audi's customers?
3. Investment in IT has the potential to give companies a competitive edge. Discuss this statement in the light of the case.

Explore the Bank's website www.bankaudi.com and answer the following questions:

1. Given that Bank Audi has a presence in ten countries, what technology do you think could help the bank managers to consolidate financial statements and provide them with KPIs and dashboards?
2. What do you think the bank could do in order to maintain its competitive edge, with regard to technology adoption?
3. Visit www.ibm.com and explain what banking technologies from IBM could be used at Bank Audi.

NEXT-GENERATION ENTERPRISE APPLICATIONS

Today, enterprise application vendors are delivering more value by becoming more flexible, web-enabled, and capable of integration with other systems. Standalone enterprise systems, CRM, and SCM systems are becoming a thing of the past.

The major enterprise software vendors have created what they call *enterprise solutions*, *enterprise suites*, or *e-business suites* to make their CRM, SCM, and enterprise systems work closely with each other, and link to systems of customers and suppliers. SAP Business Suite, Oracle's e-Business Suite, and Microsoft's Dynamics suite (aimed at mid-sized companies) are examples, and they now utilize web services and service-oriented architecture (SOA, see Chapter 4).

SAP's next-generation enterprise applications are based on its enterprise service-oriented architecture. It incorporates SOA standards and uses its NetWeaver tool as an integration platform linking SAP's own applications and also web services developed by independent software vendors. The goal is to make enterprise applications easier to implement and manage.

For example, the current version of SAP enterprise software combines key applications in finance, logistics and procurement, and human resources administration into a core ERP component. Businesses then extend these applications by linking to function-specific web services such as employee recruiting or collections management provided by SAP and other vendors. SAP provides over 500 web services through its website.

Oracle also has included SOA and business process management capabilities into its Fusion middleware products. Businesses can use Oracle tools to customize Oracle's applications without negatively affecting the entire application.

Next-generation enterprise applications also include *open-source* and *on-demand solutions*. Compared to commercial enterprise application software, open-source products such as Compiere, Open for Business, and Openbravo are not as mature, nor do they include as much support. However, companies such as small manufacturers are choosing this option because they cannot afford to pay the software licensing fees of the leading vendors.

The most explosive growth in software as a service (SaaS) offerings has been for CRM systems. Salesforce.com has been the leader in hosted CRM

solutions, but Oracle and SAP have also developed SaaS capabilities. SaaS and cloud-based versions of enterprise systems are starting to be offered by vendors such as NetSuite and Plex Online. Compiere sells both cloud and on-premises versions of its ERP systems. Use of cloud-based enterprise applications is becoming increasingly popular.

The major enterprise application vendors also offer portions of their products that work on mobile handhelds. You can find out more about this topic in our Learning Track on Wireless Applications for Customer Relationship Management, Supply Chain Management, and Healthcare.

Salesforce.com and Oracle have added Web 2.0 capabilities that enable organizations to identify new ideas more rapidly, improve team productivity, and deepen interactions with customers. For example, Salesforce Ideas enables subscribers to harness the ‘wisdom of crowds’ by allowing their customers to submit and discuss new ideas. Dell Computer deployed this technology as Dell IdeaStorm (dellideastorm.com) to encourage its customers to suggest and vote on new concepts and feature changes in Dell products.

Enterprise application vendors have also beefed up their business intelligence features to help managers obtain more meaningful information from the massive amounts of data generated by these systems. Rather than requiring users to leave an application and launch separate reporting and analytics tools, the vendors are starting to embed analytics within the context of the application itself. They are also offering complementary analytics products, such as SAP Business Objects and Oracle Business Intelligence Enterprise Edition. We discuss business intelligence analytics in greater detail in Chapter 10.

Service Platforms

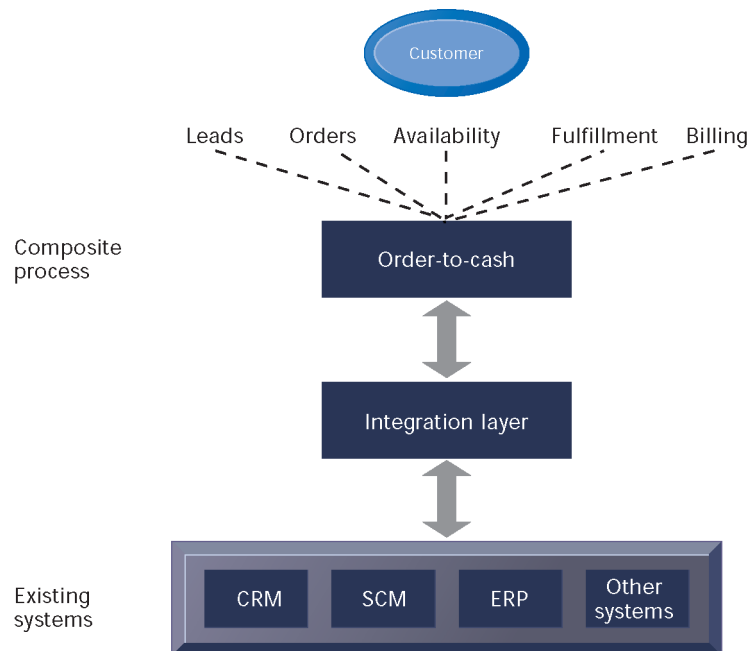
Another way of extending enterprise applications is to use them for creating service platforms for new or improved business processes, which integrate information from multiple functional areas. These enterprise-wide service platforms provide a greater degree of cross-functional integration than the traditional enterprise applications. A **service platform** integrates multiple applications from multiple business functions, business units, or business partners to deliver a seamless experience for the customer, employee, manager, or business partner.

For instance, the order-to-cash process involves receiving an order and seeing it all the way through obtaining payment for the order. This process begins with lead generation, marketing campaigns, and order entry, which are typically supported by CRM systems. Once the order is received, manufacturing is scheduled and parts availability is verified. The order then is handled by processes for distribution planning, warehousing, order fulfillment, and shipping, which are usually supported by SCM systems. Finally, the order is billed to the customer, which is handled by the enterprise financial accounting process. If the purchase at some point required customer service, CRM systems would again be invoked.

A service such as order-to-cash requires data from enterprise applications and financial systems to be further integrated into an enterprise-wide composite process. To accomplish this, firms need software tools that use existing applications as building blocks for new cross-enterprise processes (see **Figure 8-12**). Enterprise application vendors provide middleware and tools that use XML and

Service platform

Integration of multiple applications from multiple business functions, business units, or business partners to deliver a seamless experience for the customer, employee, manager, or business partner.

FIGURE 8-12 ORDER-TO-CASH SERVICE

Order-to-cash is a composite process that integrates data from individual enterprise systems and legacy financial applications. The process must be modeled and translated into a software system using application integration tools.

web services for integrating enterprise applications with older legacy applications and systems from other vendors.

Increasingly, these new services will be delivered through portals. Portal software can integrate information from enterprise applications and disparate in-house legacy systems, presenting it to users through a web interface so that the information appears to be coming from a single source. For example, SAP NetWeaver Portal provides an interface to clients' invoice, price, electronic funds, and credit card transaction data stored in SAP's customer relationship management system data warehouse as well as in non-SAP systems (Zaino, 2007).

8.5 HANDS-ON MIS PROJECTS

The projects in this section give you hands-on experience analyzing business process integration, suggesting supply chain management and customer relationship management applications, using database software to manage customer service requests, and evaluating supply chain management business services.

Management Decision Problems

1. Toronto-based Mercedes-Benz Canada, with a network of 55 dealers, did not know enough about its customers. Dealers provided customer data to the company on an ad hoc basis. Mercedes did not force dealers to report this information, and its process for tracking dealers that failed to report was cumbersome. There was no real incentive for dealers to share information with the company.

How could customer relationship management (CRM) and partner relationship management (PRM) systems help solve this problem?

- Office Depot sells a wide range of office products and services in the United States and internationally, including general office supplies, computer supplies, business machines (and related supplies), and office furniture. The company tries to offer a wider range of office supplies at lower cost than other retailers by using just-in-time replenishment and tight inventory control systems. It uses information from a demand forecasting system and point-of-sale data to replenish its inventory in its 1,600 retail stores. Explain how these systems help Office Depot minimize costs and any other benefits they provide. Identify and describe other supply chain management applications that would be especially helpful to Office Depot.

Improving Decision Making: Using Database Software to Manage Partner Service Requests

Software skills: Database design; querying and reporting

Business skills: Partner service analysis

In this exercise, you'll use database software to develop an application that tracks partner service requests and analyzes partners' data to identify partners meriting priority treatment.

Gateworx (www.gateworx.net) is an Egyptian SME with its main business in ICT. Gateworx has branches in Cairo, Alexandria, and Riyadh. The company has two main business units: information security and business solutions. Gateworx's information security business unit is the exclusive distributor of a unified threat management (UTM) device called Cyberoam from Elitecore, an Indian vendor. In order to maintain its presence as the exclusive distributor of the UTM, Gateworx has to manage a network of partner resellers. Their network in Egypt has nearly 50 partners which sell to various market segments and business sizes. In order to meet the needs of its partners, Gateworx decided to implement a partner service solution whereby partners are assigned a ticket number, priority, and assigned person. One of the objectives of the partner service solution is to better serve the partners. A second objective is to provide outstanding service to class-A partners. According to Gateworx, a class-A partner is one that places orders worth of EGP250,000 each quarter (EGP1 million annually).

Gateworx has a small database with partner account information, which can be found in MyMISLab. The database table includes fields for the account ID, company (account) name, street address, city, state, code, account size (in EGP), contact last name, contact first name, and contact telephone number. The contact is the name of the person in each company who is responsible for contacting Gateworx about demo, installation, and troubleshooting work. Use your database software to design a solution that would enable Gateworx's technical support team members to identify the most important partners so that they could receive priority service. Your solution will require more than one table. Populate your database with at least 15 partner service requests. Create several reports that would be of interest to management, such as a list of the highest- and lowest-priority accounts or a report showing the most frequently occurring service problems. Create a report showing partner service representatives which service calls they should respond to first on a specific date.

Achieving Operational Excellence: Evaluating Supply Chain Management Services

Software skills: Web browser and presentation software

Business skills: Evaluating SCM services

Trucking companies no longer merely carry goods from one place to another. Some also provide SCM services to their customers and help them manage their information. In this project, you'll use the web to research and evaluate two of these business services.

Investigate the websites of two companies, J.B. Hunt and Schneider Logistics, to see how these companies' services can be used for SCM. Then respond to the following questions:

- What supply chain processes can each of these companies support for their clients?
- How can customers use the websites of each company to help them with SCM?
- Compare the SCM services provided by these companies. Which company would you select to help your firm manage its supply chain? Why?

LEARNING TRACK MODULES

The following Learning Tracks provide content relevant to topics covered in this chapter:

1. SAP Business Process Map
2. Business Processes in Supply Chain Management and Supply Chain Metrics
3. Best-Practice Business Processes in CRM Software

Review Summary

1. *How do enterprise systems help businesses achieve operational excellence?*

Enterprise software is based on a suite of integrated software modules and a common central database. The database collects data from and feeds the data into numerous applications that can support nearly all of an organization's internal business activities. When new information is entered by one process, the information is made available immediately to other business processes.

Enterprise systems support organizational centralization by enforcing uniform data standards and business processes throughout the company and a single unified technology platform. The firmwide data generated by enterprise systems helps managers evaluate organizational performance.

2. *How do supply chain management systems coordinate planning, production, and logistics with suppliers?*

SCM systems automate the flow of information among members of the supply chain so they can use it to make better decisions about when and how much to purchase, produce, or ship. More accurate information from SCM systems reduces uncertainty and the impact of the bullwhip effect.

SCM software includes software for supply chain planning and for supply chain execution. Internet technology facilitates the management of global supply chains by providing the connectivity for organizations in different countries to share supply chain information. Improved communication among supply chain members also facilitates efficient customer response and movement toward a demand-driven model.

3. *How do customer relationship management systems help firms achieve customer intimacy?*

CRM systems integrate and automate customer-facing processes in sales, marketing, and customer service, providing an enterprise-wide view of customers. Companies can use this customer knowledge when they interact with customers to provide them with better service or to sell new products and services. These systems also identify profitable or non-profitable customers or opportunities to reduce the churn rate.

The major CRM software packages provide capabilities for both operational CRM and analytical CRM. They often include modules for managing relationships with selling partners (partner relationship management) and for employee relationship management.

4. *What are the challenges posed by enterprise applications?*

Enterprise applications are difficult to implement. They require extensive organizational change, large new software investments, and careful assessment of how these systems will enhance organizational performance. Enterprise applications cannot provide value if they are implemented atop flawed processes or if firms do not know how to use these systems to measure performance improvements. Employees require training to prepare for new procedures and roles. Attention to data management is essential.

5. *How are enterprise applications used in platforms for new cross-functional services?*

Service platforms integrate data and processes from the various enterprise applications (CRM, SCM, and enterprise systems), as well as from disparate legacy applications to create new composite business processes. Web services tie various systems together. The new services are delivered through enterprise portals, which can integrate disparate applications so that information appears to be coming from a single source. Open-source, mobile, and cloud computing versions of some of these products are becoming available.

Key Terms

Analytical CRM, p. 324

Bullwhip effect, p. 312

Churn rate, p. 325

Cross-selling, p. 322

Customer lifetime value (CLTV), p. 324

Demand planning, p. 314

Employee relationship management (ERM), p. 321

Enterprise software, p. 306

Just-in-time strategy, p. 312

Operational CRM, p. 324

Partner relationship management (PRM), p. 321

Pull-based model, p. 318

Push-based model, p. 318

Service platform, p. 329

Supply chain, p. 310

Supply chain execution systems, p. 314

Supply chain planning systems, p. 314

Touch point, p. 320

Review Questions

1. What is an enterprise system?
2. Would enterprise systems give organizations competitive advantage by simply implementing them?
3. What are the components of the supply chain?
4. What is a supply chain management system?
5. How does a supply chain management system affect the relationship between suppliers?
6. Explain the difference between supply chain planning and supply chain execution systems.
7. Explain the difference between the pull-based and push-based model of the supply chain.
8. What is a customer relationship management system?
9. How do organizations benefit from the implementation of a customer relationship management system?
10. What are the components of CRM systems?
11. Explain the functionalities of CRM systems.
12. If you were the CIO of an SME, what are the different enterprise applications that you would recommend for implementation?
13. Explain the challenges that you might face during or after the implementation of enterprise applications.

Discussion Questions

1. Supply chain management is less about managing the physical movement of goods and more about managing information. Discuss the implications of this statement.
2. If a company wants to implement an enterprise application, it had better do its homework. Discuss the implications of this statement.

Collaboration and Teamwork: Analyzing Enterprise Application Vendors

With a group of three or four students, use the web to research and evaluate the products of two vendors of enterprise application software. You could compare, for example, the SAP and Oracle enterprise systems, the supply chain management systems from i2 and SAP, or the customer relationship management systems of Oracle's Siebel Systems and Salesforce.com. Use what you have learned from these companies' websites to compare the software packages you have selected

in terms of business functions supported, technology platforms, cost, and ease of use. Which vendor would you select? Why? Would you select the same vendor for a small business as well as a large one? If possible, use Google Sites to post links to web pages, team communication announcements, and work assignments; to brainstorm; and to work collaboratively on project documents. Try to use Google Docs to develop a presentation of your findings for the class.

Symantec's ERP Turmoil

CASE STUDY

Symantec Corporation is a leading software vendor specializing in security and information management. The company is well known for its Norton brand of security products in addition to a variety of other security and storage software. Symantec has operations in more than 40 countries and over 17,500 employees. A major source of Symantec's growth since the company's creation in the 1980s has been the acquisition of other companies, including Norton, Brightmail, Altiris, and many smaller software developers. In 2005, the company made its largest acquisition to date, acquiring Veritas Software for approximately US\$13.5 billion in what was the largest software industry merger ever at that time.

While Symantec's focus was security and information management for consumers, Veritas specialized in storage management software geared toward large-scale licensing. Because the two companies were of similar size and specialized in different types of software, many industry pundits questioned whether or not they were ideal candidates for a merger. Today, those questions appear to have been well-founded, in large part because of the difficulties incurred by Symantec's attempts to complete an overhaul of their enterprise resource planning systems.

Shortly after acquiring Veritas in late 2005, Symantec began an ERP rollout, referred to internally as *Project Oasis*, intended to standardize and unify the Symantec and Veritas information systems. The goal of the rollout was to create a single ERP system, within which all of the company's extensive network of resellers, integrators, distributors, and customers could place orders in the same way for over 250,000 different products Symantec offered. The two companies had each used Oracle E-Business Suite 11d prior to the merger, but both used highly customized versions of the systems that made integration a daunting task.

An overhaul of the combined company's enterprise systems was needed to combine Symantec and Veritas's data from key business processes. A common enterprise system would also reduce the cost of maintaining Symantec's IT infrastructure and licensing fees for the enterprise software.

For their new system, Symantec opted to upgrade to Oracle's E-Business Suite 11i, running it on Sun Solaris servers. The system used an Oracle Fusion middleware portal on the front end, providing a single contact point for all of Symantec's partners and customers. Both Symantec's security applications and Veritas's backup and storage applications are available via the same portal. On the front end, the new Oracle system was linked to Salesforce.com's on-demand CRM system and on the back end, the system linked to Symantec's Oracle PeopleSoft Enterprise human resources applications.

The initial reaction to the launch of the new system was decidedly negative. While the system itself was technically sound and working exactly as intended, users struggled to process the large amount of information provided to them and were overwhelmed by the increased number of steps, all of them new, required to place orders. Unhappy with the new system, customers began calling Symantec's support team in record numbers, but the company was unprepared to meet the increased demand for customer support. Wait times ballooned from an average of 2 minutes to an average of 25 minutes for a typical customer support call. Once customers reached a Symantec employee, they could spend up to 20 more minutes troubleshooting the problems, and were often told that there was nothing that could be done.

Symantec also neglected to coordinate the development of its new ERP system with the launch of other products from different divisions within the company, compounding the issues with customer support and response times. For example, the new system's launch coincided with the launch of the newest version of Symantec Backup Exec 10d, one of the company's flagship products. There was simply too much change occurring all at once for typical customers to handle. Even long-time partners expressed displeasure at the steep drop in the quality of Symantec's customer service.

Customers were also unhappy with Symantec's changes to its stock-keeping unit product system, or SKU system. Symantec improved the system by creating a single set of codes for all of its applications. Although reducing the number of codes made

ordering products simpler and easier, it also caught many smaller partners of Symantec off guard. Some smaller distributors and partners didn't update their systems to handle the new SKUs and were unable to submit purchase orders electronically, forcing Symantec to process orders manually. Although Symantec extended the deadline for its partners to switch to the new purchasing system to accommodate these customers, the overhaul still represented an annoyance for many who had been satisfied with the previous system.

Symantec's changes to the software licensing process were another irritant to customers. Prior to the ERP rollout, the software licensing program worked well. Customers could put in an order and receive a license certificate promptly, usually within a couple of days. After the rollout, licensing became much more difficult for Symantec's customers and partners, forcing them to wait many weeks before receiving their licenses. When licenses didn't show up, unhappy customers called Symantec for support, further burdening their already overworked customer service department. The changes to the licensing system were also not coordinated with the rest of Project Oasis, creating unnecessary confusion.

Symantec had designed the new enterprise system to show customers their existing licenses. However, one company could have multiple accounts with variations in corporate names when divisions and branch offices purchased their own licenses separately from the central office.

Channel partners reported that buying Symantec products through distribution via companies like Ingram Micro became unusually difficult. One Symantec channel partner commented that "the multiplication of cryptically described part numbers has rendered it impossible to purchase Symantec licenses from Ingram Micro without assistance from the licensing help desk. This makes the process much more time-consuming." For its part, Ingram Micro said they were working with Symantec to fix these issues, but many partners were unhappy with Symantec's slow response.

As a result of these many mis-steps, Symantec was in danger of losing many loyal customers. Most of the issues were due to the company's shortsightedness in implementing Project Oasis. Although the ERP rollout cost 7.75 percent less than budgeted, Symantec reported lower-than-expected earnings in the third quarter of 2007 and blamed these results on their ERP woes. Management said the company would need to cut US\$200 million in annual costs through layoffs or restructuring activities. Symantec

CEO John Thompson said of the botched upgrade, "Systems changes such as these certainly don't come without issues. And we may have had more than our fair share of them with this set of changes, where we incurred higher expenses than planned and lost some revenue opportunities during the quarter."

Almost immediately, the company set about undoing mistakes with a follow-up project, named Project Nero. The goal of Project Nero was to recapture the loyalty of customers who were disenchanted by the changes brought about by Oasis, both by reaching out to those customers and by fixing the problems with their information systems to improve response times and streamline operations. Symantec had overlooked the needs of many customers while designing a technically sound but user-unfriendly ERP system. Project Nero's purpose was to assure those customers that Symantec still had their best interests in mind.

The company began by adding over 150 new customer representatives to handle the increased volume of calls, reducing wait times and increasing customer satisfaction. Symantec's executives traveled the country in order to improve relations with angered customers and partners. To correct the issue of product updates being released at the same time as the ERP overhaul, the company introduced a master list of product releases readily available and standardized its communication methods between departments regarding new projects and change management.

Symantec also used Net Promoter methodology to measure and increase customer loyalty. Developed shortly before the acquisition of Veritas, Net Promoter was an initiative in which the company periodically surveyed customers to gauge their satisfaction with Symantec. The results from Net Promoter identified specific criticisms and problems of customers and dramatically aided Symantec in correcting those problems. One such example is the master list of product releases, which was a direct result of customer suggestions received via Net Promoter.

Symantec's customer satisfaction levels were at all-time lows after the launch of Project Oasis, but Project Nero has helped the company to weather the worst of the crisis. Symantec reports that it now enjoys satisfaction levels on a par with the rest of its industry and averted a potential disaster. However, the company does not release the results of its Net Promoter surveys to the public, so the extent to which it has repaired its reputation is unclear. Smaller value-added resellers and distributors report that they are receiving more attention from their regional representatives at Symantec than ever before, with some reporting that CEO Thompson routinely calls to

check up on the quality of customer service. Although Symantec has done well to recover from the fallout after its initial ERP implementation, Project Oasis serves as a cautionary tale for businesses undertaking ERP overhauls. Even the most careful planning and well-designed systems can quickly go awry if customers are unable to make use of the new system.

Sources: Lawrence Walsh, "Symantec's Midnight at the Oasis," *Baseline Magazine*, March 31, 2008; Kevin McLaughlin, "Partners Still Hung Over from Symantec ERP Upgrade," *ChannelWeb*, March 2, 2007; Marc L. Songini, "ERP Rollout Whacks Symantec's Bottom Line," *Computerworld*, January 31, 2007, "ERP Rollout Continues to Weigh Down Symantec," *Computerworld*, February 5, 2007, and "ERP Rollout Weighs Symantec Down," *Computerworld*, February 12, 2007.

CASE STUDY QUESTIONS

1. What concepts in this chapter are illustrated in this case?
2. What management, organization, and technology factors were responsible for Symantec's difficulties in overhauling its ERP systems?
3. Was Symantec's response to the problem adequate? Explain your reasoning.
4. What would you have done differently to prevent the implementation problems that arose at Symantec?
5. If you were a partner or customer of Symantec, would you have switched vendors in response to the ERP overhaul issues? Why or why not?

Glossary

3G network (third generation) | شبكة الجيل الثالث

Cellular network based on packet-switched technology with speeds ranging from 144 Kbps for mobile users to over 2 Mbps for stationary users, enabling users to transmit video, graphics, and other rich media, in addition to voice

4G network | شبكات الجيل الرابع

Wireless network entirely packet switched and capable of 100 Mbps transmission speed (which can reach 1 Gbps under optimal conditions), with premium quality and high security

Acceptable use policy (AUP) | سياسة الاستخدام المقبول

Defines acceptable uses of the firm's information resources and computing equipment, including desktop and laptop computers, wireless devices, telephones, and the internet, and specifies consequences for noncompliance

Acceptance testing | اختبار القبول

Provides the final certification that the system is ready to be used in a production setting

Accountability | المحاسبة

The mechanisms for assessing responsibility for decisions made and actions taken

Accumulated balance digital payment systems |

نظم الدفع الرقمية المخصصة للأرصدة المتراكمة

Systems enabling users to make micropayments and purchases on the web, accumulating a debit balance on their credit card or telephone bills

Advertising revenue model | نموذج عائدات الإعلان

A website generates revenue by attracting a large audience of visitors who can then be exposed to advertisements

Affiliate revenue model | عائدات مواقع الإحالة

Websites send visitors to other websites in return for a referral fee or percentage of the revenue from any resulting sales

Agency theory | نظرية الوكالة

Economic theory that views the firm as a nexus of contracts among self-interested individuals who must be supervised and managed

Agile development | التطوير السريع للبرامج والنظم

Rapid delivery of working software by breaking a large project into a series of small sub-projects that are completed in short periods of time using iteration and continuous feedback

Ajax | أچكس

Development technique for creating interactive web applications capable of updating the user interface without reloading the entire browser page

Analytical CRM | إدارة علاقات العملاء التحليلية

Customer relationship management applications dealing with the analysis of customer data to provide information for improving business performance

Android | تطويره

A mobile operating system developed by Google

Antivirus software | برامج مكافحة الفيروسات

Software designed to detect, and often eliminate, computer viruses from an information system

Application controls | ضوابط التطبيق

Specific controls unique to each computerized application that ensure that only authorized data are completely and accurately processed by that application

Application server | خادم التطبيقات

Software that handles all application operations between browser-based computers and a company's back-end business applications or databases

Apps | التطبيقات

Small pieces of software that run on the internet, on your computer, or on your cell phone and are generally delivered over the internet

Attribute | الخاصية

A piece of information describing a particular entity

Authentication | المصادقة

The ability of each party in a transaction to ascertain the identity of the other party

Authorization management systems | نظم إدارة التصاريح

Systems for allowing each user access only to those portions of a system or the web that person is permitted to enter, based on information established by a set of access rules

Authorization policies | سياسة التصريح

Determine differing levels of access to information assets for different levels of users in an organization

Automation | التشغيل الآلي

Using the computer to speed up the performance of existing tasks

Autonomic computing | الحوسبة التلقائية

Industry-wide effort to develop systems that can configure, optimize, and tune themselves, heal themselves when broken, and protect themselves from outside intruders and self-destruction without user intervention

Balanced scorecard | بطاقة الأداء المتوازن

Framework for operationalizing a firm's strategic plan by focusing on measurable financial, business process, customer, and learning and growth outcomes of firm performance

Bandwidth | حيز النطاق

The capacity of a communications channel as measured by the difference between the highest and lowest frequencies that can be transmitted by that channel

Behavioral models | النماذج السلوكية

Descriptions of management based on behavioral scientists' observations of what managers actually do in their jobs

Behavioural targeting | تتبع مسار العميل سلوكيا

Tracking the click streams of individuals to understand their intentions and interests

G-2 Glossary

Benchmarking | معايرة الأداء

Setting strict standards for products, services, or activities and measuring organizational performance against those standards

Best practices | أفضل الممارسات

The most successful solutions or problem-solving methods that have been developed by a specific organization or industry

Big data analytics | تحليل البيانات الكبيرة

The use of data mining techniques to find hidden patterns and knowledge in big data

Big data | البيانات الكبيرة

Data that are of high volume, of high variety, and high velocity, which make them very hard to be managed via normal DBMS

Biometric authentication | المصادقة الحيوية

Technology for authenticating system users that compares a person's unique characteristics such as fingerprints, face, or retinal image, against a stored set profile of these characteristics

Blade server | شفرة الخادم

Entire computer that fits on a single, thin card (or blade) and that is plugged into a single chassis to save space, power, and complexity

Blog | مدونة

Popular term for weblog, designating an informal yet structured website where individuals can publish stories, opinions, and links to other websites of interest

Bluetooth | بلوتوث

Standard for wireless personal area networks that can transmit up to 722 Kbps within a 10-meter area

Botnet | (بوتنت)

A group of computers that have been infected with bot malware without users' knowledge, enabling a hacker to use the amassed resources of the computers to launch distributed denial-of-service attacks, phishing campaigns, or spam

Broadband | تقنية الإتصال السريع

High-speed transmission technology. Also designates a single communications medium that can transmit multiple channels of data simultaneously

Bugs | الأخطاء البرمجية

Software program code defects

Bullwhip effect | التأثير المتنامي

Distortion of information about the demand for a product as it passes from one entity to the next across the supply chain

Bus topology | توبولوجيا الحافلة

Network topology linking a number of computers by a single circuit with all messages broadcast to the entire network

Business analytics (BA) | تحليل بيانات الأعمال المتعمق

Vendor-defined term that focuses tools and techniques for analyzing and understanding data

Business continuity planning | تخطيط استمرارية الأعمال

Planning that focuses on how the company can restore business operations after a disaster strikes

Business driver | محرك الأعمال

An environmental force, to which the business must respond, that influences the business directions

Business ecosystem | نظام الأعمال الإيكولوجي

Loosely coupled but interdependent networks of suppliers, distributors, outsourcing firms, transportation service firms, and technology manufacturers

Business functions | وظائف الأعمال

Specialized tasks performed in a business organization, including manufacturing and production, sales and marketing, finance and accounting, and human resources

Business intelligence (BI) | نكاه الأعمال

Applications and technologies to help users make better business decisions

Business model | نموذج العمل

An abstraction of what an enterprise is and how the enterprise delivers a product or service, showing how the enterprise creates wealth

Business performance management (BPM) | إدارة أداء الأعمال

A management methodology which attempts to systematically translate a firm's strategies into operational goals

Business processes | العمليات التجارية

The unique ways in which organizations coordinate and organize work activities, information, and knowledge to produce a product or service

Business process management (BPM) | إدارة العمليات التجارية

Methodology for revising the organization's business processes to use business processes as fundamental building blocks of corporate information systems

Business process redesign (BPR) | إعادة تصميم عملية الأعمال

The radical redesign of business processes, combining steps to cut waste and eliminating repetitive, paper-intensive tasks in order to improve cost, quality, and service, and to maximize the benefits of information technology

Business-to-business (B2B) | التجارة الإلكترونية بين مؤسسات الأعمال

Electronic sales of goods and services among businesses

Business-to-consumer (B2C) | التجارة الإلكترونية بين مؤسسات الأعمال والمستهلك

Electronic retailing of products and services directly to individual consumers

Cable internet connections | اتصالات الإنترنت عبر الكابلات

Internet connections that use digital cable lines to deliver high-speed internet access to homes and businesses

Capital budgeting | الموازنة الرأسمالية

The process of analyzing and selecting various proposals for capital expenditures

Cell phone | الهاتف النقال

A device that transmits voice or data, using radio waves to communicate with radio antennas placed within adjacent geographic areas called cells

Change agent | عامل التغيير

In the context of implementation, the individual acting as the catalyst during the change process to ensure successful organizational adaptation to a new system or innovation

Change management | إدارة التغيير

Managing the impact of organizational change associated with an innovation, such as a new information system

Chat | دردشة

Live, interactive conversations over a public network

Chief information officer (CIO) | الرئيس التنفيذي للمعلوماتية

Senior manager in charge of the information systems function in the firm

Chief knowledge officer (CKO) | مسئول المعرفة

Senior executive in charge of the organization's knowledge management program

Chief privacy officer (CPO) | مسئول خصوصية المعلومات

Responsible for ensuring the company complies with existing data privacy laws

Chief security officer (CSO) | مسئول أمن المعلومات

Heads a formal security function for the organization and is responsible for enforcing the firm's security policy

Choice | الاختيار

Simon's third stage of decision making, when the individual selects among the various solution alternatives

Chrome OS | نظام تشغيل كروم

A lightweight operating system for cloud computing using netbooks

Churn rate | معدل تغير قاعدة العملاء

Measurement of the number of customers who stop using or purchasing products or services from a company. Used as an indicator of the growth or decline of a firm's customer base

Classical model of management | النموذج الكلاسيكي للإدارة

Traditional description of management that focused on its formal functions of planning, organizing, coordinating, deciding, and controlling

Click fraud | الإعلانات الكاذبة

Fraudulently clicking on an online ad in pay-per-click advertising to generate an improper charge per click

Client/server computing | حوسبة العميل والخادم

A model for computing that splits processing between clients and servers on a network, assigning functions to the machine most able to perform the function

Clients | العميل

The user point-of-entry for the required function in client/server computing. Normally a desktop computer, workstation, or laptop computer

Cloud computing | الحوسبة السحابية

Web-based applications that are stored on remote servers and accessed via the "cloud" of the internet using a standard web browser

Co-location | تأجير المساحة من المورد

Your firm purchases or leases a webserver (and has total control over its operation) but locates the server in a vendor's physical facility

Coaxial cable | الكابل المحوري

A transmission medium consisting of thickly insulated copper wire; can transmit large volumes of data quickly

Communication satellites (COMSAT) | الأقمار الصناعية الإتصالات

Are used as a transmission media to link geographically dispersed organizations that find it difficult to use cabling media or terrestrial microwave

Communities of practice (COPs) | المجتمعات المهنية

Informal social networks of professionals and employees within and outside the firm who have similar work-related activities and interests

Community providers | مقدمي خدمة المجتمع

Sites that create a digital online environment where people with similar interests can transact; share interests, photos, videos; communicate with like-minded people; receive interest-related information

Competitive forces model | نموذج القوى التنافسية

Model used to describe the interaction of external influences, specifically threats and opportunities, that affect an organization's strategy and ability to compete

Complementary assets | الأصول التكميلية

Additional assets required to derive value from a primary investment

Component-based development | تطوير البرامج على أساس المكونات

Building large software systems by combining pre-existing software components

Computer crime | جرائم الحاسب

The commission of illegal acts through the use of a computer or against a computer system

Computer forensics | جمع الأدلة من الحاسب

The scientific collection, examination, authentication, preservation, and analysis of data held on or retrieved from computer storage media in such a way that the information can be used as evidence in a court of law

Computer hardware | أجهزة الحاسب

Physical equipment used for input, processing, and output activities in an information system

Computer literacy | المعرفة بالحاسب الآلي

Knowledge about information technology, focusing on understanding how computer-based technologies work

Computer software | البرامج

Detailed, preprogrammed instructions that control and coordinate the work of computer hardware components in an information system

Computer virus | فيروس الحاسب الآلي

Rogue software program that attaches itself to other software programs or data files in order to be executed, often causing hardware and software malfunctions

Computer-aided software engineering (CASE) |

هندسة البرمجيات بمساعدة الحاسوب الآلي

Automation of step-by-step methodologies for software and systems development to reduce the amounts of repetitive work the developer needs to do

Consumer-to-consumer (C2C) | التجارة الإلكترونية بين المستهلكين

Consumers selling goods and services electronically to other consumers

Controls | التحكم

All of the methods, policies, and procedures that ensure protection of the organization's assets, accuracy and reliability of its records, and operational adherence to management standards

Conversion | تحويل

The process of changing from the old system to the new system

Cooptation | الإستقطاب

It is bringing the opposition into the process of designing and implementing the solution without giving up control over the direction and nature of the change

Copyright | حقوق الطبع والنشر

A statutory grant that protects creators of intellectual property against copying by others for any purpose for a minimum of 70 years

Core competency | الكفاءة الجوهرية

Activity at which a firm excels as a world-class leader

Core system | نظام جوهري

A system that supports function that is absolutely critical to the organization

Cost transparency | شفافية التكلفة

The ability of consumers to discover the actual costs merchants pay for products

Counter-implementation | مكافحة التنفيذ

A deliberate strategy to thwart the implementation of an information system or an innovation in an organization

Critical success factors (CSFs) | عوامل النجاح الحرجة

A small number of easily identifiable operational goals shaped by the industry, the firm, the manager, and the broader environment that are believed to assure the success of an organization. Used to determine the information requirements of an organization

Cross-selling | المبيعات المختلطة

Marketing complementary products to customers

Crowdsourcing | استخدام الجماهير لحل المشاكل

Firms can be actively helped in solving some business problems using customers' choices

Culture | الثقافة

The set of fundamental assumptions about what products the organization should produce, how and where it should produce them, and for whom they should be produced

G-4 Glossary

Customer lifetime value (CLTV) | القيمة المتوقعة خلال مدى عمر العميل

Difference between revenues produced by a specific customer and the expenses for acquiring and servicing that customer minus the cost of promotional marketing over the lifetime of the customer relationship, expressed in monetary terms

Customer relationship management (CRM) systems |

نظم إدارة علاقات العملاء

Information systems that track all the ways in which a company interacts with its customers and analyze these interactions to optimize revenue, profitability, customer satisfaction, and customer retention

Customization (website) | التخصيص (الموقع الإلكتروني)

Changing the delivered product or service based on a user's preferences or prior behavior

Customization (systems) | التخصيص (نظم)

The modification of a software package to meet an organization's unique requirements without destroying the package software's integrity

Cyber vandalism | التخريب الإلكتروني

Intentional disruption, defacement, or destruction of a website or corporate information system

Data | البيانات

Streams of raw facts representing events occurring in organizations or the physical environment before they have been organized and arranged into a form that people can understand and use

Data administration | إدارة البيانات

A special organizational function for managing the organization's data resources, concerned with information policy, data planning, maintenance of data dictionaries, and data quality standards

Data cleansing | تنقية البيانات

Activities for detecting and correcting data in a database or file that are incorrect, incomplete, improperly formatted, or redundant. Also known as data scrubbing

Data definition | تعريف البيانات

DBMS capability that specifies the structure and content of the database

Data dictionary | قاموس البيانات

An automated or manual tool for storing and organizing information about the data maintained in a database

Data flow diagram (DFD) | خرائط تدفق البيانات (دي-أف-دي)

Primary tool for structured analysis that graphically illustrates a system's component processes and the flow of data between them

Data governance | حوكمة البيانات

Policies and processes for managing the availability, usability, integrity, and security of the firm's data

Data inconsistency | عدم تناسق البيانات

The presence of different values for the same attribute when the same data are stored in multiple locations

Data management technology | تكنولوجيا إدارة البيانات

Consists of the software governing the organization of data on physical storage media

Data manipulation language | لغة معالجة البيانات

A language associated with a database management system that end users and programmers use to manipulate data in the database

Data mart | أسواق البيانات

A small data warehouse containing only a portion of the organization's data for a specified function or population of users

Data mining | التنقيب في البيانات

Analysis of large pools of data to find patterns and rules that can be used to guide decision making and predict future behavior

Data quality audit | مراجعة جودة البيانات

A survey and/or sample of files to determine accuracy and completeness of data in an information system

Data redundancy | تكرار البيانات

The presence of duplicate data in multiple data files

Data science | علم البيانات

The integration of non-relational data, data mining, and analytical programming

Data visualization | البيانات التصويرية

Technology for helping users see patterns and relationships in large amounts of data by presenting the data in graphical form

Data warehouse | مستودعات البيانات

A database, with reporting and query tools, that stores current and historical data extracted from various operational systems and consolidated for management reporting and analysis

Data workers | عمال البيانات

People such as secretaries or bookkeepers who process the organization's paperwork

Database | قاعدة البيانات

A group of related files. A collection of data organized to service many applications at the same time by storing and managing data so that they appear to be in one location (rigorous definition)

Database management system (DBMS) | نظام إدارة قواعد البيانات

Special software to create and maintain a database, and enable individual business applications to extract the data they need without having to create separate files or data definitions in their computer programs

Database administration | إدارة قواعد البيانات

Refers to the more technical and operational aspects of managing data, including physical database design and maintenance

Database server | خادم قواعد البيانات

A computer in a client/server environment that is responsible for running a DBMS to process SQL statements and perform database management tasks

Decision-support systems (DSS) | نظم دعم القرارات

Information systems at the organization's strategic level that combine data and sophisticated analytical models or data analysis tools to support semistructured and unstructured decision making

Decisional role | دور إتخاذ القرار

Mintzberg's classification for managerial roles where managers initiate activities, handle disturbances, allocate resources, and negotiate conflicts

Deep packet inspection (DPI) | حزم التفتيش العميقة

Technology for managing network traffic by examining data packets, sorting out low-priority data from higher priority business-critical data, and sending packets in order of priority

Demand planning | التخطيط للطلبات

Determining how much product a business needs to make to satisfy all its customers' demands

Denial-of-service (DoS) attack | هجمة الحرمان من الخدمات

Flooding a network server or webserver with false communications or requests for services in order to crash the network

Descartes' rule of change | مبدأ التغيير لديكارت

A principle that states that if an action cannot be taken repeatedly, then it is not right to be taken at any time

Design | التصميم

Simon's second stage of decision making, when the individual conceives of possible alternative solutions to a problem

Digital asset management systems | نظم إدارة الأصول الرقمية

Classify, store, and distribute digital objects such as photographs, graphic images, video, and audio content

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ISBN 978-1-4082-7160-5



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