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管理科学与工程经典教材  
MANAGEMENT SCIENCE AND ENGINEERING CLASSICS

# 管理信息系统

英文版 · 第15版

詹姆斯·A·奥布赖恩 (James A. O'Brien) 著  
乔治·M·马拉卡斯 (George M. Marakas)  
叶强 改编

INTRODUCTION TO INFORMATION SYSTEMS

..... Fifteenth Edition .....



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# 总 序

随着我国加入 WTO,越来越多的国内企业参与到国际竞争中来,用国际上通用的语言思考、工作、交流的能力也越来越受到重视。这样一种能力也成为我国各类人才参与竞争的一种有效工具。国家教育机构、各类院校以及一些主要的教材出版单位一直在思考,如何顺应这一发展潮流,推动各层次人员通过学习来获取这种能力。双语教学就是这种背景下的一种尝试。

双语教学在我国主要指汉语和国际通用的英语教学。事实上,双语教学在我国教育界已经不是一个陌生的词汇了,以双语教学为主的科研课题也已列入国家“十五”规划的重点课题。但从另一方面来看,双语教学从其诞生的那天起就被包围在人们的赞成与反对声中。如今,依然是有人赞成有人反对,但不论是赞成居多还是反对占上,双语教学的规模 and 影响都在原有的基础上不断扩大,且呈大发展之势。一些率先进行双语教学的院校在实践中积累了经验,不断加以改进;一些待进入者也在模仿中学习,并静待时机成熟时加入这一行列。由于我国长期缺乏讲第二语言(包括英语)的环境,开展双语教学面临特殊的困难,因此,选用合适的教材就成为双语教学成功与否的一个重要问题。我们认为,双语教学从一开始就应该使用原版的各类学科的教材,而不是由本土教师自编的教材,从而可以避免中国式英语问题,保证语言的原汁原味。各院校除应执行国家颁布的教学大纲和课程标准外,还应根据双语教学的特点和需要,适当调整教学课时的设置,合理选择优秀的、合适的双语教材。

顺应这样一种大的教育发展趋势,中国人民大学出版社同众多国际知名的大出版公司,如麦格劳-希尔出版公司、培生教育出版公司等合作,面向大学本科层次,遴选了一批国外最优秀的管理类原版教材,涉及专业基础课,人力资源管理、市场营销及国际化管理等专业方向课,并广泛听取有着丰富的双语一线教学经验的教师的建议和意见,对原版教材进行了适当的改编,删减了一些不适合我国国情和不适合教学的内容;另一方面,根据教育部对双语教学教材篇幅合理、定价低的要求,我们更是努力区别于目前市场上形形色色的各类英文版、英文影印版的大部头,将目标受众锁定在大学生本科层次。本套教材尤其突出了以下一些特点:

- 保持英文原版教材的特色。本套双语教材根据国内教学实际需要,对原书进行了一定的改编,主要是删减了一些不适合教学以及不符合我国国情的内容,但在体系结构和内容特色方面都保持了原版教材的风貌。专家们的认真改编和审定,使本套教材既保持了学术上的完整性,又贴近中国实际;既方便教师教学,又方便学生理解和掌握。

● 突出管理类专业教材的实用性。本套教材既强调学术的基础性，又兼顾应用的广泛性；既侧重让学生掌握基本的理论知识、专业术语和专业表达方式，又考虑到教材和管理实践的紧密结合，有助于学生形成专业的思维能力，培养实际的管理技能。

● 体系经过精心组织。本套教材在体系架构上充分考虑到当前我国在本科教育阶段推广双语教学的进度安排，首先针对那些课程内容国际化程度较高的学科进行双语教材开发，在其专业模块内精心选择各专业教材。这种安排既有利于我国教师摸索双语教学的经验，使得双语教学贴近现实教学的需要；也有利于我们收集关于双语教学教材的建议，更好地推出后续的双语教材及教辅材料。

● 篇幅合理，价格相对较低。为适应国内双语教学内容和课时上的实际需要，本套教材进行了一定的删减和改编，使总体篇幅更为合理；而采取低定价，则充分考虑到了学生实际的购买能力，从而使本套教材得以真正走近广大读者。

● 提供强大的教学支持。依托国际大出版公司的力量，本套教材为教师提供了配套的教辅材料，如教师手册、PowerPoint 讲义、试题库等，并配有内容极为丰富的网络资源，从而使教学更为便利。

本套教材是在双语教学教材出版方面的一种尝试。我们在选书、改编及出版的过程中得到了国内许多高校的专家、教师的支持和指导，在此深表谢意。同时，为使我们的教材更适于教学，我们也真诚地期待广大读者提出宝贵的意见和建议。需要说明的是，尽管我们在改编的过程中已加以注意，但由于各教材的作者所处的政治、经济和文化背景不同，书中内容仍可能有不妥之处，望读者在阅读时注意比较和甄别。

徐二明

中国人民大学商学院

# The O'Brien and Marakas Approach \*

The first thing you probably noticed about this new edition is the new, loose-leaf format. The 15th edition was produced this way in order to deliver a couple of important benefits for instructors and students.

- Lower cost to students—the loose-leaf format allows us to substantially lower the price that your campus bookstore pays for each copy, which should translate to a substantially lower price for each student.
- Less frequent course prep for faculty—We expect that, by providing students with this cost-competitive alternative to a used book, we won't need to revise the book as frequently. So instructors will get additional semesters out of their prep with this edition.
- Improved portability—Students and instructors need only carry the chapter required for today's lecture, leaving the rest in a three ring binder.

If for any reason you need a bound book for your class, simply contact your McGraw-Hill representative. They will arrange to have bound copies of *Introduction to Information Systems*, 15th edition produced for your adoption.

## A Business and Managerial Perspective

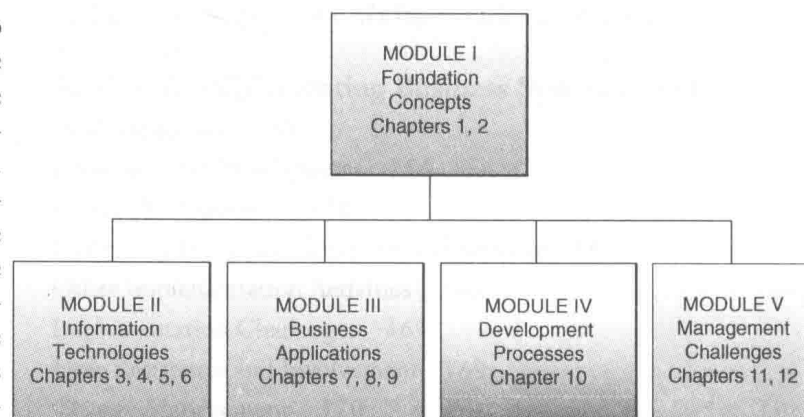
The Fifteenth Edition is designed for business students who are or who will soon become business professionals in the fast-changing business world of today. The goal of this text is to help business students learn how to use and manage information technologies to revitalize business processes, improve business decision making, and gain competitive advantage. Thus, it places a major emphasis on up-to-date coverage of the essential role of Internet technologies in providing a platform for business, commerce, and collaboration processes among all business stakeholders in today's networked enterprises and global markets. This is the business and managerial perspective that this text brings to the study of information systems. Of course, as in all O'Brien texts, this edition:

- Loads the text with **Real World Cases**, in-depth examples (**Blue Boxes**), and opportunities to learn about real people and companies in the business world (**Real World Activities**, **Case Study Questions**, **Discussion Questions**, and **Analysis Exercises**).
- Organizes the text around a simple **Five-Area Information Systems Framework** that emphasizes the IS knowledge a business professional needs to know.
- Places a **major emphasis on the strategic role of information technology** in providing business professionals with tools and resources for managing business operations, supporting decision making, enabling enterprise collaboration, and gaining competitive advantage.

## Modular Structure of the Text

The text is organized into modules that reflect the five major areas of the framework for information systems knowledge. Each chapter is then organized into two or more distinct sections to provide the best possible conceptual organization of the text and each chapter. This organization increases instructor flexibility in as-

signing course material because it structures the text into modular levels (i.e., modules, chapters, and sections) while reducing the number of chapters that need to be covered.



\* 为使读者了解原书概貌,前言未做删改。——改编者注

# An Information Systems Framework

## Business Applications

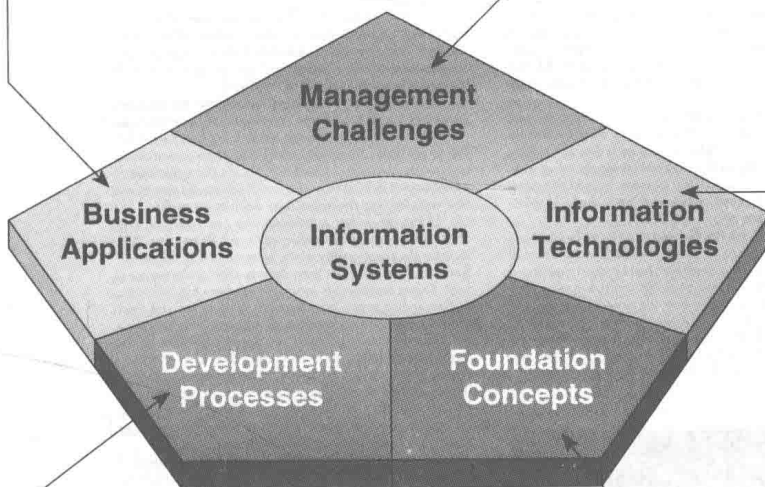
How businesses use the Internet and other information technologies to support their business processes, e-business and e-commerce initiatives, and business decision making (Chapters 7, 8, and 9).

## Management Challenges

The challenges of business/IT technologies and strategies, including security and ethical challenges and global IT management (Chapters 11 and 12).

## Information Technologies

Includes major concepts, developments, and managerial issues involved in computer hardware, software, telecommunications networks, data resource management technologies, and other technologies (Chapters 3, 4, 5, and 6).



## Development Processes

Developing and implementing business/IT strategies and systems using several strategic planning and application development approaches (Chapter 10).

## Foundation Concepts

Fundamental business information systems concepts, including trends, components, and roles of information systems (Chapter 1) and competitive advantage concepts and applications (Chapter 2). Selective coverage of relevant behavioral, managerial, and technical concepts.



# Real World Examples

## Real World Cases

Each chapter provides three Real World Cases—in-depth examples that illustrate how prominent businesses and organizations have attempted to implement the theoretical concepts students have just learned.

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### REAL WORLD

### CASE

## 1

### GE, H.B. Fuller Co., and Others: Successful Implementations of Software-as-a-Service

General Electric's supply chain is not simply enormous. It's a Byzantine web of sourcing partners, touching all corners of the globe: 500,000 suppliers in more than 100 countries that cut across 14 different languages. Each year, GE spends some \$55 billion among its vast supplier base.

Long-time GE CIO Gary Reiner knows this problem all too well, since, among his other duties, he is responsible for how the \$173 billion conglomerate spends that \$55 billion, utilizing GE's Six Sigma practices and taking advantage of its hefty purchasing power. GE, for instance, buys \$150 million in desktops and laptops each year from a single supplier, Dell—"at a very low price," says Reiner.

For years, GE's Global Procurement Group faced a challenging reality: trying to accurately track and make sense of all of the supply chain interactions with half a million suppliers—contracts, compliance initiatives, certifications, and other critical data, which needed to be centrally stored, managed, and made accessible to thousands across the globe. GE was using what it called a Global Supplier Library, a homegrown system that, Reiner says, had a "rudimentary capability." Reiner and his staff knew that GE needed something better, but they

didn't want to build it. They wanted a supplier information system that was easy to use and install, could unite GE's sourcing empire into one central repository, had multilanguage capabilities, and also offered "self-service" functionality so that each of its suppliers could manage its own data.

The destination was obvious: To achieve one common view of its supplier base, and one version of the truth in all that data, a goal which torments nearly every company today. But to get there, Reiner and his IT and procurement teams took a different route. In 2008, GE bought the application of a little-known Software-as-a-Service (SaaS) vendor that would ultimately become the largest SaaS deployment to date.

"When we judge a solution, we are indifferent to whether it's hosted by a supplier or by us," Reiner says. "We look for the functionality of the solution and at the price." And that, he claims, has been the way they've always operated. Reiner says that his group doesn't see a big difference in cost and in capabilities between on-premise and SaaS products. "And let me emphasize," he adds, "we don't see a big difference in cost either from the point of view of the ongoing operating costs, or the transition costs." Furthermore, when looking at implementation costs, "they're largely around interfacing with existing systems, process changes and data cleansing," he says. "Those three costs exist regardless of whether GE hosts that application or whether the supplier hosts that application."

The Aravo technology platform, which was untested at GE's level of requirements, and with just 20 or so customers, coupled with the sheer scale of GE's needs did not really concern Reiner. "We could have been concerned about that," he concedes. "But that would have also been a concern if we had hosted the software on our own servers. We knew Aravo could handle it." Plus, Reiner says that no other supply chain vendor offered the type of functionality that Aravo's SIM product offered, and Reiner and his team reasoned that it was much cheaper to buy than build. "We'd much rather work with them," he says, "than build it on our own." One GE sourcing manager told Aravo that GE's ROI on the project is not just positive, "it's massively positive."

"They're using SaaS for 100,000 users and 500,000 suppliers in six languages: that's a major technology deployment shift," says Mickey North Rizza, research director at AMR Research. She says that the sheer volume of transactions, combined with the fact that GE supply chain and procurement employees around the world can now access the same sourcing partner information, all from the same central spot, is significant not only for the supply chain management space but also for the SaaS and cloud computing world. "Finally we have a very large company tackling the data transparency issue by using a SaaS product," North Rizza says. "It's a huge deal."

So far, the thorny issue of data quality in GE's supplier data has been improved, because suppliers now use the self-service capabilities in the SaaS system to manage their own data.

FIGURE 4.1



Software-as-a-Service enables one of the largest and most impressive supply chains in the world.

Source: ©Chuck Savage/Corbis.



# Real Life Lessons

## Use Your Brain

Traditional case study questions promote and provide opportunity for critical thinking and classroom discussion.

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GE has 327,000 employees worldwide, and its sourcing systems have more than 100,000 users. There is still more work to do to the SIM platform—for example, GE sourcing employees will add more workflows and new queries to the system; more languages might be added as well (six are operational now).

Reiner says that GE is committed to working with Aravo for the long term and that the system has performed well so far. And SaaS, as an application delivery mechanism, appears to have a bright future at GE.

When Steven John took over as CIO at specialty chemical manufacturer H.B. Fuller Co., he inherited a North American payroll system implementation that was expensive and going nowhere. The business units hadn't participated in the technology decision, and the project was bogged down with customization issues and other concerns. John chose to relinquish control of payroll software and switched to SaaS.

"I wanted to do an implementation that was simple and straightforward—to configure but not customize—and see the benefits of a standard, global platform," John says. "This was a way to teach, save money and outsource a noncore system." Giving up control was an easy trade-off compared with the headaches he would face trying to fix the existing software.

"You're getting a lot more innovation," says Ray Wang, an analyst at Forrester Research Inc. "The products are a lot more configurable than what most people have in their own applications. You can change fields, rename things, and move attributes and workflows. So there's a good level of control there."

What's more, the configuration choices are more refined and well thoughtout, giving users a few good choices instead of myriad options. John found that configuration rather than customization allows H.B. Fuller to maintain its "lean core." "I believe that more standardization leads to more agility," John says. "SaaS allows us to say, 'This is good enough . . . for what we need.' So you don't end up with these horrible situations where you have these highly customized systems. We go with configuration option A, B or C. If one of those three doesn't meet our need, we can try to influence the next release. But in most cases, A, B or C is going to meet the need."

At H.B. Fuller, the move to SaaS for human resources tools allowed the company to empower its people. "I can do

a reorganization and have it reflected within minutes, and I don't have to call someone in HR to update everything," John says. "I can also pull up other people's organization charts and see where they are and what they're doing and better understand the organization."

When it comes to managing SaaS, neither the IT department nor the business unit using the software should be eager to relinquish control. "The buying decisions are shifting from IT to the business leaders," who often opt to charge the software as an expense rather than wait for approval through the capital budget committee, Wang says. Still, he adds, "it's very important to engage IT in these SaaS decisions because there are overall IT architectures and blueprints to consider." It becomes very costly when applications don't integrate or interoperate well with one another.

"It's good to at least have some parameters and policies in place so that people understand what type of apps will work better within the environment, what will be cheaper to share information and data with," says Wang.

One of the problems with SaaS is that if your vendor were to go bankrupt, everything would shut down. You don't own the software. It's on lease. The question is, what do you own? If the vendor doesn't have a separate on-premises deployment option, "you need the ability to take out transactional data, master file information, any kind of migration programs, just in case, so you can convert it to an on-premises alternative if they were to go down," Wang says.

In the long term, Wang envisions an IT culture where software as a service is commonplace. "We may live in a world where everything is provisioned. All our applications don't stay on premises, and business leaders are out procuring applications," he says. "IT teams are testing them to make sure they work well in the environment and there are no bugs or viruses and things integrate well, and basically the IT staff will spend a lot of time provisioning services and implementing, integrating, doing installs. That's where we envision the market in 2020."

Source: Adapted from Thomas Waiguna, "GE CIO Gets His Head in the Cloud for New SaaS Supply Chain Apps," *CIO Magazine*, January 22, 2009; and Stacy Collett, "SaaS Puts Focus on Functionality," *Computerworld*, March 23, 2009.

### CASE STUDY QUESTIONS

1. What factors should companies take into consideration when making the decision between developing their own applications, purchasing them from a vendor, or taking the SaaS route, as discussed here? Make a list of factors and discuss their importance to this decision.
2. What risks did GE take on when they contracted with a small and less experienced vendor? What contingencies could have been put in place to prevent any problems from arising? Provide several examples.
3. What should companies do if none of the "configuration options" perfectly fits with their needs? Should they attempt to customize, or select the least-worst alternative? When would they do each?

### REAL WORLD ACTIVITIES

1. The case mentions that GE's implementation of SaaS was, at the time, the largest rollout of the technology in the world. What other companies have started using SaaS extensively since? Go online and research recent implementations. How are those different from GE's experience? Prepare a report to share your findings.
2. By implementing systems based on SaaS, companies are relinquishing control over ownership of the technology and are putting access to valuable data on the hands of a third party. What are the perils of taking this approach? How could companies guard against them? Break into small groups to discuss these issues and provide some suggestions and recommendations.

## Use Your Hands

The Real World Activities section offers possibilities for hands-on exploration and learning.

# Strategy, Ethics . . .

## Competitive Advantage

Chapter 2 focuses on the use of IT as a way to surpass your competitor's performance.

### CHAPTER 2



#### COMPETING WITH INFORMATION TECHNOLOGY

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#### SECTION I Fundamentals of Strategic Advantage

##### Strategic IT

*Technology is no longer an afterthought in forming business strategy, but the actual cause and driver.*

This chapter will show you that it is important to view information systems as more than a set of technologies that support efficient business operations, workgroup and enterprise collaboration, or effective business decision making. Information technology can change the way businesses compete. You should also view information systems strategically, that is, as vital competitive networks, as a means of organizational renewal, and as a necessary investment in technologies, such technologies help a company adopt strategies and business processes that enable it to reengineer or reinvent itself to survive and succeed in today's dynamic business environment.

Section I of this chapter introduces fundamental competitive strategy concepts that underlie the strategic use of information systems. Section II then discusses several major strategic applications of information technology used by many companies today. Read the Real World Case regarding the competitive advantages of IT. We can learn a lot about the strategic business uses of information technologies from this case. See Figure 2.1.

##### Competitive Strategy Concepts

In Chapter 1, we emphasized that a major role of information systems applications in business is to provide effective support of a company's strategies for gaining competitive advantage. This strategic role of information systems involves using information technology to develop products, services, and capabilities that give a company major advantages over the competitive forces it faces in the global marketplace.

#### Learning Objectives

1. Identify several basic competitive strategies and explain how they use information technologies to confront the competitive forces faced by a business.
2. Identify several strategic uses of Internet technologies and give examples of how they can help a business gain competitive advantages.
3. Give examples of how business process reengineering frequently involves the strategic use of Internet technologies.
4. Identify the business value of using Internet technologies to become an agile competitor or form a virtual company.
5. Explain how knowledge management systems can help a business gain strategic advantages.

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## Ethics & Security

Chapter 11 discusses the issues surrounding these topics and the challenges IT faces.

### REAL WORLD CASE 1

#### Ethics, Moral Dilemmas, and Tough Decisions: The Many Challenges of Working in IT

Chapter 11 / Security and Ethical Challenges • 455

**W**hat Ryan found on an executive's computer six years ago still weighs heavily on his mind. He's particularly troubled that the man he discovered using a company PC to view pornography of Asian women and of children was subsequently promoted and moved to China to run a manufacturing plant. "To this day, I regret not taking that stuff to the FBI." It happened when Ryan, who asked that his last name not be published, was IT director at a national company.

and professional, throughout the company and they have the technical prowess to manipulate that information. That gives them both the power and responsibility to monitor and report employees who break company rules. IT professionals may also uncover evidence that a co-worker is, say, embezzling funds, or they could be tempted to peek at private salary information or personal e-mails. There's little guidance, however, on what to do in these circumstances.

FIGURE 11.1



The pervasive use of information technology in organizations and society presents individuals with new ethical challenges and dilemmas.

Source: ©Courtesy of Puschelock.

you don't make sure that you understand them, you're in trouble," says John Reece, Revenue Service and Time V guidelines also lets employ the person they discover b someone who reports to the Reece, who is now head of c Associates LLC. Organizati often focus on areas where emphasize whatever they a Reece was at the IRS, for exa on protecting the confiden

At the U.S. Department phasize procurement rules, i dent of the SANS Technol Ethics Handbook: Right and W to the complexity, an organ skilled workers might be n worked in IT security at the in Virginia, it was a rarefied after PhDs. "I was told prett lot of PhDs very unhappy so wouldn't need me anymore,"

Of course, that wasn't w Northcutt had to read betw prented it was: Child pornogr if the leading mathematical rules of naked girls, they did Northcutt says that he did and that both events led to p

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#### SECTION I Security, Ethical, and Societal Challenges of IT

##### Introduction

There is no question that the use of information technology in business presents major security challenges, poses serious ethical questions, and affects society in significant ways. Therefore, in this section, we explore the threats to businesses and individuals as a result of many types of computer crime and unethical behavior. In Section II, we will examine a variety of methods that companies use to manage the security and integrity of their business systems. Now let's look at a real-world example.

Read the Real World Case on the next page. We can learn a lot from this case about the security and ethical issues that result from the pervasive use of IT in organizations and society today. See Figure 11.1.

##### Business/IT Security, Ethics, and Society

The use of information technologies in business has had a major impact on society and thus raises ethical issues in the areas of crime, privacy, individuality, employment, health, and working conditions. See Figure 11.2.

It is important to understand that information technology has had beneficial results, as well as detrimental effects, on society and people in each of these areas. For example, computerizing a manufacturing process may have the beneficial result of improving working conditions and producing products of higher quality at lower cost, but it also has the adverse effect of eliminating people's jobs. So your job as a manager or business professional should involve managing your work activities and those of others to minimize the detrimental effects of business applications of information technology and optimize their beneficial effects. That would represent an ethically responsible use of information technology.

## SECTION II Managing Global IT

### The International Dimension

Whether they are in Berlin or Bombay, Kuala Lumpur or Kansas, San Francisco or Seoul, companies around the globe are developing new models to operate competitively in a digital economy. These models are structured, yet agile; global, yet local; and they concentrate on maximizing the risk-adjusted return from both knowledge and technology assets.

International dimensions have become a vital part of managing a business enterprise in the interconnected global economies and markets of today. Whether you become a manager in a large corporation or the owner of a small business, you will be affected by international business developments and deal in some way with people, products, or services whose origin is not your home country.

Read the Real World Case on the next page. We can learn a lot about approaches to successfully develop and roll out worldwide system implementations from this case. See Figure 12.11.

### Global IT Management

Figure 12.12 illustrates the major dimensions of the job of managing global information technology that we cover in this section. Notice that all global IT activities must be adjusted to take into account the cultural, political, and socioeconomic challenges that exist in the international business community. Developing appropriate business and IT strategies for the global marketplace should be the first step in global information technology management. Once that is done, end users and IS managers can move on to developing the portfolio of business applications needed to support business/IT strategies, the hardware, software, and Internet-based technology platforms to support those applications, the data resource management methods to provide necessary databases, and finally the systems development projects that will produce the global information system required.

### Global Teams: It's Still a Small World

We seem to have reached a point where virtually every CIO is a global CIO—a leader whose sphere of influence (and headaches) spans continents. The global CIO's most common challenge, according to CIO Executive Council members, is managing global virtual teams. In an ideal world, HR policies across the global IT team should be consistent, fair, and responsive. Titles and reporting structures (if not compensation) should be equalized.

The council's European members, representing Royal Dutch Shell, Galileima, Olympus, and others, commissioned a globalization playbook that collects and codifies best practices in this and other globalization challenges.

**Obtain local HR expertise.** Companies must have a local HR person in each country to deal with local laws. "Hiring, firing, and training obligations must be managed very differently in each location, and you need someone with local expertise on the laws and processes," says Michael Pilkington, former CIO of Euroclear, the Brussels-based provider of domestic and cross-border settlement for bond, equity, and fund transactions.

**Create job grade consistency across regions.** Euroclear is moving toward a job evaluation methodology that organizes job types into vertical categories, such as managing people/process, product development, business support, and project management. This provides a basis for comparing and translating roles and people across locations. Grade level is not the same thing as a title; people's titles are much more subject to local conventions.

(text continues on page 525)

## Go Global with IT

This text closes with Chapter 12, an in-depth look at IT across borders.

FIGURE 12.11



Consistency across the different business functions, countries, languages, and processes involved in worldwide implementations is one of the most important challenges faced by global organizations today.

Source: Getty Images.

## Expand Your Knowledge

Blue boxes in each chapter provide brief, in-depth examples of how corporations apply IS concepts and theories.

### Colorcon Inc.: Benefits and Challenges of Global ERPs

Since Colorcon Inc. consolidated all of its global offices and seven manufacturing sites onto one ERP system in 2001, the benefits have been indisputable. The specialty chemicals manufacturer has increased its annual inventory turns by 40 percent, closes its books each quarter more than 50 percent faster than it once did, and has improved its production lead times. "It was a significant improvement," says CIO Perry Cozzzone.

Yet getting to a single, global instance has also been fraught with challenges for the West Point, Pennsylvania-based company. Those included cleansing and verifying data from legacy systems, standardizing business processes globally, and getting buy-in from business leaders in locales as disparate as Brazil, Singapore, and the United Kingdom.

"It was hard work," says Cozzzone, who oversaw the final stages of the system implementation. Transitioning to a single, global instance of an ERP system is a heady challenge for large and midsize multinationals alike. For many organizations the toughest challenge in moving to one ERP system is change management. "It's a real struggle for many companies to have consistency around their business processes" because of differences in regional business requirements, says Rob Karel, an analyst at Forrester Research Inc.

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### Database Pioneer Rethinks the Best Way to Organize Data

Is there a better way to build a data warehouse? For years, relational databases, which organize data in tables composed of vertical columns and horizontal rows, have served as the foundation of data warehouses. Now database pioneer Michael Stonebraker is promoting a different way of organizing them, promising much faster response times. As a scientist at the University of California at Berkeley in the 1970s, Stonebraker was one of the original architects of the Ingres relational database, which spawned several commercial variants. A row-based system like Ingres is great for executing transactions, but a column-oriented system is a more natural fit for data warehouses, Stonebraker now says.

SQL Server, Sybase, and Teradata all have rows as their central design point. Yet in data warehousing, faster performance may be gained through a column layout. Stonebraker says all types of queries on "narrow data warehouses" will run up to 50 times faster in a column database. The bigger the data warehouse, the greater the performance gain.

Why? Data warehouses frequently store transactional data, and each transaction has many parts. Columns cut across transactions and store an element of information that is standard to each transaction, such as customer name, address, or purchase amount. A row, by comparison, may hold 20–200 different elements of a transaction.

### Fidelity and Unisys: Working in a Worldwide Campus

Once upon a time, companies boasted of having offices in Manhattan, Munich, Madrid, Mumbai, and Manila. Each office managed its set of customers and suppliers, with a lot of "good advice" coming in from the head office. There was precious little governance or standardization. Paradoxically, the use of third-party service providers has catalyzed better governance and standards in captive or shared-services centers scattered in distant parts of the world.

Boston-based Fidelity, the world's largest mutual fund company, for example, has subsidiary offices in most countries, which service local markets; has captive centers in India to service its global operations; has outsourced to almost half a dozen third-party IT service providers; and itself functions as a human resource and benefits administration provider to companies such as General Motors and Novartis.

There are multiple ways to implement the concept of a worldwide campus. Regardless of the company having globally dispersed teams working on disparate pieces of work, what binds these offices together is a defined, common architecture and a shared-enterprise objective.

Such complexity in operations is nothing new; it has been happening in other industries for decades. In manufacturing, for instance, components may be produced in China, assembled in Malaysia, and packaged in and shipped from China. All of these activities may be coordinated from the United States. "The services industry, and business process outsourcing (BPO) in general, is just starting to catch up with its manufacturing brethren," says Brian Maloney, recently appointed as president of the newly formed Unisys Global Industries. Maloney has been CEO of AT&T Solutions and CIO of B-Systems.

## Expand Your Horizons

Globe icons indicate examples with an international focus so that your knowledge makes you truly worldly.



# What's New?

The Fifteenth Edition includes significant changes to the Fourteenth Edition's content that update and improve its coverage, many of them suggested by an extensive faculty review process. Highlights of key changes for this edition include the following:

- Real World Cases provide current, relevant, and in-depth examples of IS theory applications. A combination of *Case Study Questions* and *Real World Activities* allows you to engage students on a variety of levels.
- More new Real World Cases: More than two-thirds of the cases are new to the Fifteenth Edition. These up-to-date cases provide students with in-depth business examples of the successes and challenges companies are experiencing in implementing the information technology concepts covered in each chapter.
- *Chapter 3: Computer Hardware* includes updated coverage of Moore's law, in addition to increased and updated coverage of information appliances, Grid computing, and voice recognition, as well as RFID technology and privacy challenges.
- *Chapter 4: Computer Software* provides additional information about OpenOffice Suite and XML.
- *Chapter 5: Data Resource Management* expands the discussion on records and primary keys.
- *Chapter 7: Electronic Business Systems* includes a new discussion on the relationship between SCM, CRM, and ERP with regard to supporting corporate strategy. It also provides an expanded discussion of SCM as a top strategic objective of modern enterprises and a new discussion on the use of digital billboards in targeted marketing.
- *Chapter 8: Electronic Commerce Systems* provides increased coverage and discussion of e-commerce success factors, a new section and discussion of search engine optimization, and new data relating to top retail web sites and online sales volume.
- *Chapter 9: Decision Support Systems* includes an additional discussion with regard to the strategic value of business intelligence activities in the modern organization, added coverage of CAPTCHA tests to prevent machine intervention in online environments, and expanded coverage of both OLAP and the modern use of expert system engines.
- *Chapter 10: Developing Business/IT Solutions* has added coverage of system implementation challenges, user resistance, and end-user development, and logical versus physical models.
- *Chapter 11: Security and Ethical Challenges* includes a new section on cyberterrorism. Additionally, it provides updated coverage of software piracy economic impacts, increased coverage of HIPAA, and a significant increase in discussion of current state of cyber law.
- *Chapter 12: Enterprise and Global Management of Information Technology* provides expanded in-depth coverage of COBIT and IT governance structures in organizations as well as an added section on trends in outsourcing and offshoring.

# Student Support

## Summary

- **Data Resource Management.** Data resource management is a managerial activity that applies information technology and software tools to the task of managing an organization's data resources. Early attempts to manage data resources used a file processing approach in which data were organized and accessible only in specialized files of data records that were designed for processing by specific business application programs. This approach proved too cumbersome, costly, and inflexible to supply the information needed to manage modern business processes and organizations. Thus, the database management approach was developed to solve the problems of file processing systems.
- **Database Management.** The database management approach affects the storage and processing of data. The data needed by different applications are consolidated and integrated into several common databases in-

distributed, and external databases. Data warehouses are a central source of data from other databases that have been cleaned, transformed, and cataloged for business analysis and decision support applications. That includes data mining, which attempts to find hidden patterns and trends in the warehouse data. Hypermedia databases on the World Wide Web and on corporate intranets and extranets store hyperlinked multimedia pages on a Web site. Web server software can manage such databases for quick access and maintenance of the Web database.

- **Data Access.** Data must be organized in some logical manner on physical storage devices so that they can be efficiently processed. For this reason, data are commonly organized into logical data elements such as characters, fields, records, files, and databases. Database structures, such as the hierarchical, network, relational,

are used to organize the records stored in data. Data can be organized in either a hierarchical or a relational access and can be accessed and retrieved by either a direct access

the development of database management systems using microcomputers for small end-user development of large data planning and entry area databases, and data elements and relationships for the operation and management of databases.

## Review Quiz

Match one of the key terms and concepts listed previously with one of the brief examples or definitions that follow. Try to find the best fit for answers that seem to fit more than one term or concept. Defend your choices.

- |   |   |
|---|---|
| 1. The use of integrated collections of data records and files for data storage and processing.   | 21. Records organized as cubes within cubes in a database.  |
| 2. Data in independent files made it difficult to provide answers to ad hoc requests and required special computer programs to be written to perform this task. | 22. Databases that support the major business processes of an organization.   |
| 3. A specialist in charge of the databases of an organization.  | 23. A centralized and integrated database of current and historical data about an organization.                                 |
| 4. A nonprocedural computer language used to interrogate a database.  | 24. Databases available on the Internet or provided by commercial information services.   |
| 5. Defines and catalogs the data elements and data relationships in an organization's database.   | 25. A problem in the file processing approach where major components of a system are dependent on each other to a large degree. |
| 6. A feature of database systems that uses queries or report generators to extract information.   | 26. Different approaches to the logical organization of individual data elements stored in a database.                          |
| 7. The main software package that supports a database management approach.  | 27. The most basic logical data element corresponding to a single letter or number.   |
| 8. A database structure that organizes data into a hierarchical structure.  | 28. A feature of distributed databases that identifies data elements and then makes appropriate use of them.                    |

## Discussion Questions

1. How should a business store, access, and distribute data and information about its internal operations and external environment?
2. What role does database management play in managing data as a business resource?
3. What are the advantages of a database management approach to the file processing approach? Give examples to illustrate your answer.
4. Refer to the Real World Case on Cogent Communications, Intel, and Others about IT-related issues in M&A.

## Analysis Exercises

Complete the following exercises as individual or group projects that apply chapter concepts to real-world businesses.

### 1. Joining Tables

You have the responsibility for managing technical training classes within your organization. These classes fall into two general types: highly technical training and end-user training. Software engineers sign up for the former, and administrative staff sign up for the latter. Your supervisor measures your effectiveness in part according to the average cost per training hour and type of training. In short, your supervisor expects the best training for the least cost.

To meet this need, you have negotiated an exclusive on-site training contract with Hands-On Technology Transfer (HOTT) Inc. ([www.traininghott.com](http://www.traininghott.com)), a high-quality technical training provider. Your negotiated rates are reproduced below in the pricing table. A separate table contains a sample list of courses you routinely make available for your organization.

- a. Using these data, design and populate a table that includes basic training rate information. Designate the "Technical" field type as "Yes/No" (Boolean).

Course Table

| Course ID | Course Name              | Duration | Technical |
|-----------|--------------------------|----------|-----------|
| 1         | ASP Programming          | 5        | Yes       |
| 2         | XML Programming          | 5        | Yes       |
| 3         | PHP Programming          | 4        | Yes       |
| 4         | Microsoft Word-Advanced  | 5        | No        |
| 5         | Microsoft Excel-Advanced | 5        | No        |

### 2. Training Cost Management

Having determined the cost per student for each of the classes in the previous problem, you now must carefully manage class registration. Because you pay the same flat rates no matter how many students attend (up to capacity), you want to do all you can to ensure maximum attendance. Your training provider, Hands-On Technology Transfer Inc., requires two weeks' notice in the event that you need to reschedule a class. You should make sure your classes are at least two-thirds

Each chapter contains *complete pedagogical support* in the form of:

- **Summary.** Revisiting key chapter concepts in a bullet-point summary.
- **Key Terms and Concepts.** Using page numbers to reference where terms are discussed in the text.
- **Review Quiz.** Providing a self-assessment for your students. Great for review before an important exam.
- **Discussion Questions.** Whether assigned as homework or used for in-class discussion, these complex questions will help your students develop critical thinking skills.
- **Analysis Exercises.** Each innovative scenario presents a business problem and asks students to use and test their IS knowledge through analytical, Web-based, spreadsheet, and/or database skills.
- **Closing Case Studies.** Reinforcing important concepts with prominent examples from businesses and organizations. Discussion questions follow each case study.

# Instructor Support

## Online Learning Center

Available to adopting faculty, the Online Learning Center provides one convenient place to access the Instructor's Manual, PowerPoint slides, and videos.

### **Instructor's Manual (IM)**

To help ease your teaching burden, each chapter is supported by solutions to Real World Case questions, Discussion Questions, and Analysis Exercises.

### **Test Bank**

Choose from over 1,200 true/false, multiple-choice, and fill-in-the-blank questions of varying levels of difficulty. Complete answers are provided for all test questions. By using the **EZ Test Computerized Test Bank** instructors can design, save, and generate custom tests. EZ Test also enables instructors to edit, add, or delete questions from the test bank; analyze test results; and organize a database of tests and student results.

### **PowerPoint Slides**

A set of visually stimulating PowerPoint slides accompanies each chapter, providing a lecture outline and key figures and tables from the text. Slides can be edited to fit the needs of your course.

### **Videos**

Videos will be downloadable from the instructor side of the OLC.

## MBA MIS Cases

Developed by Richard Perle of Loyola Marymount University, these 14 cases allow you to add MBA-level analysis to your course. See your McGraw-Hill Irwin sales representative for more information.

## Online Course Formats

Content for the Fifteenth Edition is available in WebCT, Blackboard, and PageOut formats to accommodate virtually any online delivery platform.



## Online Learning Center

Visit [www.mhhe.com/obrien](http://www.mhhe.com/obrien) for additional instructor and student resources.

## Use our EZ Test Online to help your students prepare to succeed with Apple iPod® iQuiz.

Using our EZ Test Online you can make test and quiz content available for a student's Apple iPod®.

Students must purchase the iQuiz game application from Apple for 99¢ in order to use the iQuiz content. It works on fifth-generation iPods and better.

Instructors only need EZ Test Online to produce iQuiz ready content. Instructors take their existing tests and quizzes and export them to a file that can then be made available to the student to take as a self-quiz on their iPods. It's as simple as that.

# Empower Your Students

# MISOURCE

## Mastery of Skills and Concepts

This student supplement provides animated tutorials and simulated practice of the core skills in Microsoft Office 2007 Excel, Access, and PowerPoint, as well as animation of 47 important computer concepts.

With MISource's three-pronged **Teach Me-Show Me-Let Me Try** approach, students of all learning styles can quickly master core MS Office skills—leaving you more classroom time to cover more important and more complex topics.

For those students who need it, MISource for Office 2007 is delivered online at [www.mhhe.com/misource](http://www.mhhe.com/misource).

**Excel Lesson 2: Working with Cells and Cell Data**

**Entering Data in Cells**

1st Q Employee Sales.xlsx - Microsoft Excel

|                   | JAN         | FEB       | MAR         |  |
|-------------------|-------------|-----------|-------------|--|
| SALES STAFF       |             |           |             |  |
| Ken Drahner       | \$ 310.00   | \$ 280.00 | \$ 590.00   |  |
| Lou Paath         | \$ 750.00   | \$ 960.00 | \$ 1,610.00 |  |
| Shore Rivers      | \$ 480.00   | \$ 530.00 | \$ 1,010.00 |  |
| Faye Shell        | \$ 240.00   | \$ 190.00 | \$ 430.00   |  |
|                   | \$ 1,780.00 |           | \$ 3,640.00 |  |
| Most Sales in Jan | \$ 750.00   |           |             |  |
| Most Sales in Feb | \$ 960.00   |           |             |  |

The most basic task in Excel is entering data in your workbook. Entering numerical data is as easy as typing a number in a cell. Numbers can be displayed as dates, currency values, percentages, and other formats. (Later tasks discuss number formatting and using functions and formulas to automate numerical calculations.)

Excel is not just about numbers, though. Without text headers, descriptions, and instructions, your workbook would consist of numbers and formulas without any structure. Adding text headers to your rows and columns creates the structure for you to enter data into your workbook.

To enter data in a cell:

1. Click the cell where you want the data to appear.
2. Type the number or text.
3. Press the **ENTER** key or the **TAB** key on your keyboard.

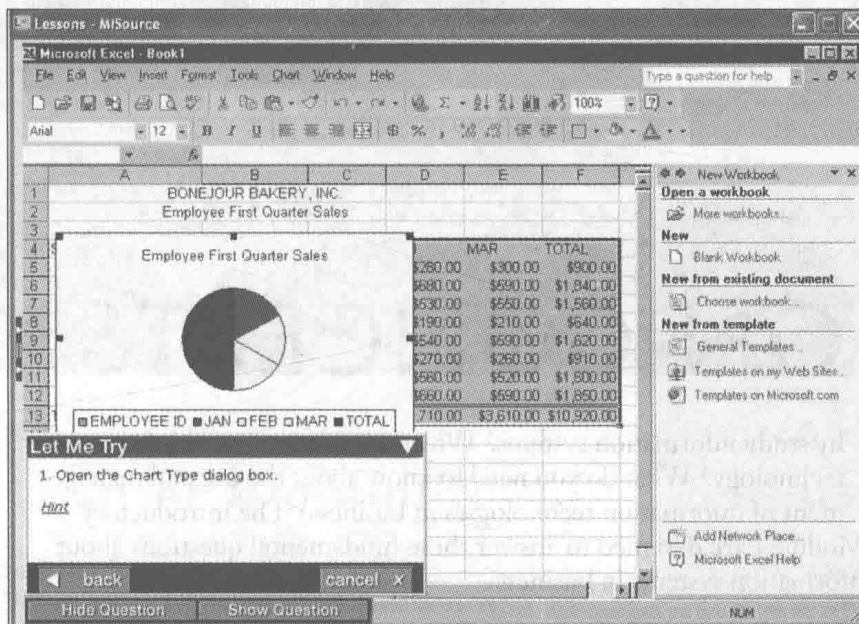
Pressing **Enter** on the keyboard after entering text will move the cursor down one cell. Pressing **Tab** will move the cursor to the right one cell.

Note: For this graphic, the Ribbon has been minimized.

# Empower Your Classroom

Watch.

**Show Me** illustrates the skill step by step, click by click, with accompanying narration to strengthen the learning process.



Do.

Students do the clicking with **Let Me Try**, as they complete the previously demonstrated task.

## Modifying the Chart Type

To change the chart type:

1. Select the chart you want to change.
2. Select **Chart Type...** from the **Chart** menu.
3. Click the different Chart types and click a **Chart sub-type** to select it.
4. Click the **Press and Hold to View Sample** button to see how your data will appear in the chart.
5. Click **OK**.

## Show Me

