



SEVENTH CANADIAN EDITION

MANAGEMENT INFORMATION SYSTEMS

MANAGING THE DIGITAL FIRM

Kenneth C. Laudon | Jane P. Laudon

Canadian Adaptation by Mary Elizabeth Brabston

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New York University

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Azimuth Information Systems

Canadian adaptation by

Mary Elizabeth Brabston

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PEARSON

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*For
Erica and Elisabeth*

—K.C.L. and J.P.L.

*For JTW and DAS,
and other friends and colleagues for
their support and love; for my parents, both now
deceased, who taught me to value teaching, writing,
and excellence; and finally, for God, for all his gifts*

—M.E.B.

About the Authors



Kenneth C. Laudon is a Professor of Information Systems at New York University's Stern School of Business. He holds a B.A. in Economics from Stanford and a Ph.D. from Columbia University. He has authored twelve books dealing with electronic commerce, information systems, organizations, and society. Professor Laudon has also written over forty articles concerned with the social, organizational, and management impacts of information systems, privacy, ethics, and multimedia technology.

Professor Laudon's current research is on the planning and management of largescale information systems and multimedia information technology. He has received grants from the National Science Foundation to study the evolution of national information systems at the Social Security Administration, the IRS, and the FBI. Ken's research focuses on enterprise system implementation, computer-related organizational and occupational changes in large organizations, changes in management ideology, changes in public policy, and understanding productivity change in the knowledge sector.

Ken Laudon has testified as an expert before the United States Congress. He has been a researcher and consultant to the Office of Technology Assessment (United States Congress), Department of Homeland Security, and to the Office of the President, several executive branch agencies, and Congressional Committees. Professor Laudon also acts as an in-house educator for several consulting firms and as a consultant on systems planning and strategy to several Fortune 500 firms.

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The Laudons have two daughters, Erica and Elisabeth, to whom this book is dedicated.

About the Canadian Adapter



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Preface

We wrote this book for business school students who need an in-depth look at how today's business firms use information technologies and systems to achieve corporate objectives. 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 you are an accounting, finance, management, operations management, marketing, or information systems major, the knowledge and information you find in this book will be valuable throughout your business career.

What's New in This Edition

Currency

The seventh Canadian edition features new and updated opening, closing, and “Window on” cases. The text, figures, tables, and cases have been updated through February 2013 with the latest sources from industry and MIS research.

New Features

- Chapter-opening cases have been expanded, and new questions have been added to case studies throughout.
- Videos and Video Cases covering key concepts and experiences in the MIS world are included on the Companion Website.
- Learning Track Modules that provide additional coverage of selected topics can be accessed on the Companion Website.

New Topics

- **Social Business:** Extensive coverage of social business, introduced in Chapter 2 and discussed throughout the text. Detailed discussions of enterprise (internal corporate) social networking as well as social networking in e-commerce.
- **Big Data:** Chapter 6 on Databases and Information Management has been rewritten to provide in-depth coverage of Big Data and new data management technologies, including Hadoop, in-memory computing, non-relational databases, and analytic platforms.
- **Cloud Computing:** Expanded and updated coverage of cloud computing in Chapter 5 (IT Infrastructure), with more detail on types of cloud services, private and public clouds, hybrid clouds, managing cloud services, and a new chapter-ending case on Amazon's cloud services. Cloud computing also covered in Chapter 6 (databases in the cloud); Chapter 8 (cloud security); Chapter 9 (cloud-based CRM); and Chapter 13 (cloud-based systems development and component-based development).
- **Social, legal, and ethical issues:** Expanded and updated coverage in Chapter 4 (Social, Ethical, and Legal Issues in the Digital Firm) of the social, legal, and ethical issues that surround the rapid expansion of the mobile platform, including privacy, patent and copyright, behavioural and smartphone tracking, data quality, due process, and quality of life.

- Social graph
- Social marketing
- Social search
- Social CRM
- Consumerization of IT and BYOD
- Mobile device management
- Mobile application development
- Responsive Web design
- Cyberlockers
- Expanded coverage of business analytics
- Machine learning
- Windows 8, Android, iOS, and Chrome operating systems
- Apps
- HTML5
- IPv6
- Microblogging
- Multitouch interface
- Siri
- Software-defined networking
- Tablet computers
- 3-D printing

What's New in MIS

Plenty. In fact, there is a whole new world of doing business using new technologies for managing and organizing. What makes the MIS field the most exciting area of study in schools of business is the continuous change in technology, management, and business processes. (Chapter 1 describes these changes in more detail.)

A continuing stream of information technology innovations is transforming the traditional business world. Examples include the emergence of cloud computing, the growth of a mobile digital business platform based on smartphones, tablets, and ultrabooks, and not least, the use of social networks by managers to achieve business objectives. Most of these changes have occurred in the last few years. These innovations are enabling entrepreneurs and innovative traditional firms to create new products and services, develop new business models, and transform the day-to-day conduct of business. In the process, some old businesses, even industries, are being destroyed, while new businesses are springing up.

For instance, the rapid growth of online content stores such as iTunes and Amazon, based on cloud storage services and driven by millions of consumers who prefer smartphones and tablet computers as the centre of their media world, has forever changed the older business models of distributing books, music, television, and movies on physical discs, such as CDs and DVDs. Cloud-based content delivered on the Internet is beginning to challenge the dominance of cable television networks for the delivery of television shows.

E-commerce is growing rapidly again following a deep recession, generating more than \$368 billion in revenues in 2012, and is estimated to grow to over \$552 billion in 2016. With approximately 28 million Canadians accessing the Internet with their smartphones, mobile commerce is growing by double digits each year. Amazon's revenues grew 41 percent in 2011, despite the recession, while offline retail grew by 5 percent. E-commerce is changing how firms design, produce, and deliver their products and services. E-commerce has reinvented itself again, disrupting the traditional marketing and advertising industry and putting major media and content firms in jeopardy. Facebook and other social networking sites such as

YouTube, Twitter, and Tumblr, and new graphical social sites such as Pinterest, exemplify the new face of e-commerce in the 21st century. They sell services. When we think of e-commerce, we tend to think of an online store selling physical products. While this iconic vision of e-commerce is still very powerful and the fastest growing form of retail sales, growing up alongside is a whole new value stream based on selling services, not goods. It is a services model of e-commerce. 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 smart-phones, high-speed Wi-Fi networks, and wireless laptop and tablet computers, remote sales-people 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 really important information they need for accurate and timely decisions. In addition to their public uses on the Web, private social networks, wikis, and blogs are becoming important corporate tools for communication, collaboration, and information sharing.

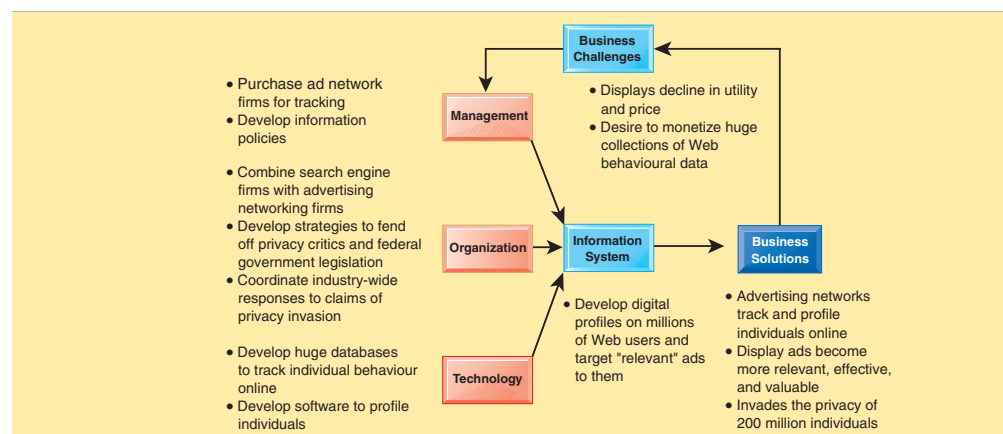
The Seventh Canadian Edition: The Comprehensive Solution for the MIS Curriculum

Since its inception, this text has helped to define the MIS course around the globe and, for the last 14 years, in Canada. This edition continues to be authoritative but is also more customizable, flexible, and geared to meeting the needs of different colleges, universities, and individual instructors. This book is now part of a complete learning package that includes the core text and an extensive offering of supplemental materials on the Web.

The core text consists of 15 chapters with Hands-On MIS Projects covering essential topics in MIS. The Companion Website provides more in-depth coverage of chapter topics, career resources, supplementary chapter material, as well the data files for the Hands-on Projects from the text. For students and instructors who want to go deeper into selected topics, there are more than 40 online Learning Tracks that cover a variety of MIS topics in greater depth.

The Core Text

The core text provides an overview of fundamental MIS concepts using an integrated framework for describing and analyzing information systems. This framework shows information systems composed of management, organization, and technology elements; this is reinforced in student projects and case studies.



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.

Chapter Organization

Each chapter contains the following elements:

- A chapter-opening case describing a real-world organization to establish the theme and importance of the chapter
- A diagram analyzing the opening case in terms of the management, organization, and technology model used throughout the text
- A series of learning objectives
- Two “Window on” features with case study questions
- A Learning Tracks Module with supplementary material on the Companion Website
- 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 series of Hands-On MIS Projects consisting of two Management Decision Problems, a hands-on application software project, and a project to develop Internet skills
- 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 learn about how real business firms use information systems and to apply chapter concepts

Key Features

We have enhanced the text to make it more interactive, cutting-edge, and appealing to both students and instructors. The features and learning tools are described in the following sections.

Business-Driven with Real-World Business Cases and Examples The text helps students see the direct connection between information systems and business performance. It describes the main business objectives driving the use of information systems and technologies in corporations all over the world: operational excellence; new products and services; customer and supplier intimacy; improved decision making; competitive advantage; and survival. In-text examples and case studies show students how specific companies use information systems to achieve these objectives.

We use current examples from business and public organizations throughout the text to illustrate the important concepts in each chapter. All the case studies describe companies or organizations that are familiar to students, such as Canadian Tire, Starbucks, Google, Groupon, Facebook, The Canadian Wheat Board, Amazon, Walmart, L’Oréal, and Procter & Gamble.

Interactivity There is no better way to learn about MIS than by doing MIS. We provide different kinds of hands-on projects where students can work with real-world business scenarios and data and learn first hand what MIS is all about. These projects heighten student involvement in this exciting subject.

- **Video Cases.** Students can watch short videos online, either in-class or on their own, and then apply the concepts of the book to the analysis of the video. The videos explain how business firms and managers are using information systems, describe new management practices, and explore concepts discussed in the chapter. Each video case consists of a video about a real-world company, a background text case, and case study questions. These video cases enhance students’ understanding of MIS topics and the relevance of MIS to the business world. In addition to the cases, a link to additional relevant videos is available on the Companion Website.

- **“Window On” features.** Two short cases in each chapter have been designed to be used in the classroom (or on Internet discussion boards) to stimulate student interest and active learning. Each Window on Management, Window on Technology, and Window on Organizations concludes with case study questions which provide topics for class discussion, Internet discussion, or written assignments.

WINDOW ON TECHNOLOGY	
<p>Green Data Centres: Good for Business?</p> <p>What is too hot to handle? It might very well be your company's data centre, which can easily consume more than 100 times more power than a standard office building. Data-hungry tasks such as video on demand, maintaining Web sites, or analyzing large pools of transactions or social media data require more and more power-hungry machines. Power and cooling costs for data centres have skyrocketed, with cooling a server requiring roughly the same number of kilowatts of energy as running one. All this additional power consumption has a negative impact on the environment and on corporate operating costs.</p> <p>Companies are now looking to green computing for solutions. The standard for measuring data centre energy efficiency is Power Usage Effectiveness (PUE). This metric is a ratio of the total annual power consumed by a data centre divided by how much is used annually by IT equipment. The lower the ratio, the better with a PUE of 1.0 representing a desirable</p> <p>electricity that is actually needed to do the computing. (The extra power is consumed by lighting, cooling, and other systems.) PUE is influenced by many factors, including hardware efficiency, data centre size, the types of servers and their uses, the proficiency of monitoring software, building architecture, and the climate outside the facility. New data centre designs with PUEs of 1.5 or better are emerging.</p> <p>Virtualization is a highly effective tool for cost-effective green computing because it reduces the number of servers and storage resources in a firm's IT infrastructure. Toronto's Data Centers Canada (DCC) uses 'free cooling' — a process in which cold air is inducted from outside during the winter months to cool server cabinets. With free cooling, DCC can turn off the air conditioning and chillers altogether, allowing the company to save between \$3000 and \$4000 each month on electricity costs. They also use 'cold air containment' so that cool air flowing into the cabinets stays contained and does</p>	

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

- **Hands-On MIS Projects.** Every chapter concludes with a Hands-On MIS Projects section containing three types of projects: two Management Decision Problems, a hands-on application software exercise using Microsoft Excel, Access, or Web page and blog creation tools, and a project that develops Internet business skills. The Dirt Bikes running case is included with the Instructor's Resource Manual and can be used for additional hands-on projects for each chapter.
- **Collaboration and Teamwork Projects.** Each chapter includes a collaborative project on the Companion Website that encourages students working in teams to use Google Sites, Google Docs, and other open-source collaboration tools. The first team project in Chapter 1 asks students to build a collaborative Google site.

Hands-On MIS Projects	
<p>The projects in this section give you hands-on experience in developing solutions for managing IT infrastructures and IT outsourcing, using spreadsheet software to evaluate alternative desktop systems, and using Web research to budget for a sales conference.</p> <p>Management Decision Problems</p> <ol style="list-style-type: none"> 1. The University of Guelph Medical Centre (UGMC), a fictitious organization, relies on information systems to operate 19 hospitals, a network of other care sites, and international and commercial ventures. Demand for additional servers and storage technology is growing by 20 percent each year. UGMC sets up a separate server for every application, and its servers and other computers are running a number of different operating systems, including several versions of Unix and Windows. UGMC is managing technologies from many different vendors, including Hewlett-Packard (HP), Sun Microsystems, Microsoft, and IBM. Assess the impact of this situation on business performance. What factors and management decisions must be considered when 	<p>of global airline traffic. To remain competitive, the airline must find ways to keep costs low while providing a high level of customer service. Qantas had a 30-year-old data centre, and management had to decide whether to replace its IT infrastructure with newer technology or outsource it. What factors should be considered by Qantas management when deciding whether to outsource? If Qantas decides to outsource, list and describe points that should be addressed in a service level agreement.</p> <p>Improving Decision Making: Using a Spreadsheet to Evaluate Hardware and Software Options</p> <p>Software skills: Spreadsheet formulas</p> <p>Business skills: Technology pricing</p> <p>In this exercise, you will use spreadsheet software to calculate the cost of desktop systems, printers, and software.</p>

Each chapter features a project to develop Internet skills for accessing information, conducting research, and performing online calculations and analysis.

Assessment and AACSB Assessment Guidelines The Association to Advance Collegiate Schools of Business (AACSB) is a not-for-profit corporation of educational institutions, corporations, and other organizations that seeks to improve business education primarily by accrediting university business programs. As a part of its accreditation activities, the AACSB has developed an Assurance of Learning Program designed to ensure that schools do in fact teach students what they promise. Schools are required to state a clear mission, develop a coherent business program, identify student learning objectives, and then prove that students do in fact achieve the objectives.

We have attempted in this book to support AACSB efforts to encourage assessment-based education. The front end papers of this edition identify student learning objectives and anticipated outcomes for our Hands-On MIS projects. Because each school is different and may have different missions and learning objectives, no single document can satisfy all situations. The authors will provide custom advice on how to use this text in their colleges with different missions and assessment needs. Please e-mail the authors, or contact your local Pearson Canada representative for contact information.

For more information on the AACSB Assurance of Learning Program and how this text supports assessment-based learning, please visit the Web site for this book.

Customization and Flexibility: New Learning Track Modules Our Learning Tracks feature gives instructors the flexibility to provide in-depth coverage of the topics they choose. There are more than 40 Learning Tracks available to instructors and students. A Learning Tracks section at the end of each chapter directs students to short essays or additional chapters on the Companion Website. This supplementary content takes students deeper into MIS topics, concepts, and debates; reviews basic technology concepts in hardware, software, database design, telecommunications, and other areas; and provide additional hands-on software instruction. The 7th Canadian Edition includes new Learning Tracks on E-Commerce Payment Systems, LAN Topologies, and the Occupational and Career Outlook for Information Systems Majors 2014–2018.

Student Learning-Focused

Student learning objectives are organized around a set of study questions to focus student attention. Each chapter concludes with a review summary and review questions organized around these study questions.

The Companion Website

The Companion Website contains study tools that will help students learn the key concepts of MIS. For each chapter, students will find a Self-Study Quiz, Glossary Flashcards to help them study key terms, a review summary, and a student version of the PowerPoint slides. The Hands-On MIS data files and the Learning Track Modules are also available, along with video links that will help bring MIS to life, and other valuable resources. Visit the Companion Website at www.pearsoncanada.ca/laudon.

Career Resources

Also available on the Companion Website, the Career Resources package includes a job-hunting guide, tips for writing resumés and cover letters, interview advice and instructions for building a Digital Portfolio to demonstrate the business knowledge, application software proficiency, and Internet skills you acquired from using this text. The portfolio can be included in a resume or job application or used as a learning assessment tool for instructors.

Instructional Supplements

Most of these instructor resources are available for download from a password-protected section of Pearson Canada's online catalogue (www.pearsoncanada.ca/highered). Navigate

to your book's catalogue page to view a list of those supplements that are available. See your local sales representative for details and access.

Instructor's Resource Manual The Instructor's Resource 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.

MyTest MyTest from Pearson Canada is a powerful assessment generation program that helps instructors easily create and print quizzes, tests, and exams, as well as homework or practice handouts. Questions and tests can all be authored online, allowing instructors ultimate flexibility and the ability to efficiently manage assessments at any time, from anywhere. MyTest for Management Information Systems is a comprehensive collection of true-false, multiple-choice, fill-in-the-blank, and essay questions. The questions are rated by difficulty level, and the answers are referenced by section. The test bank also contains questions tagged to the AACSB learning standards. 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. All the MyTest questions are also available in Microsoft Word format (see below).

Test Item File The Test Item File contains all of the questions from the MyTest (see above) in a convenient Word format.

PowerPoint Slides A comprehensive collection of more than five hundred PowerPoint slides is available for use in lectures. Each slide 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.

Image Library The Image Library can help instructors create vibrant lecture presentations. Almost every figure in the text is provided and organized by chapter for convenience. These files can be imported easily into PowerPoint to create new presentations or to add to existing ones.

Technology Specialists Pearson's Technology Specialists work with faculty and campus course designers to ensure that Pearson technology products, assessment tools, and online course materials are tailored to meet your specific needs. This highly qualified team is dedicated to helping schools take full advantage of a wide range of educational resources, by assisting in the integration of a variety of instructional materials and media formats. Your local Pearson Education sales representative can provide you with more details on this service program.

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Special thanks to Robert W. Zmud, my mentor and dear friend, who retired this past year. He helped to shape my thinking on advancing technology and the role of technology in our organizations and personal lives.

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Hossein Abolghasem	St. Francis Xavier University
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Roy Sinn	Langara College
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Brian Murray	University of Prince Edward Island

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Organizations, Management, and the Networked Enterprise

CHAPTER 1

Information Systems in Business Today

CHAPTER 2

How Businesses Use Information

CHAPTER 3

Information Systems, Organizations, and Strategy

CHAPTER 4

Social, Ethical, and Legal Issues in the Digital Firm

PART GOAL

Part One introduces the major themes of this book, raising a series of important questions: What is an information system, and what are its management, organization, and technology dimensions? Why are information systems so essential in businesses today? Why are systems for collaboration and social business so important? How can information systems help businesses become more competitive? What broader ethical and social issues are raised by widespread use of information systems?

Information Systems in Business Today

LEARNING OBJECTIVES

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

- 1 How are information systems transforming business, and what is their relationship to globalization?
- 2 Why are information systems so essential for running and managing a business today?
- 3 What exactly is an information system? How does it work? What are its management, organization, and technology components?
- 4 What are complementary assets? Why are complementary assets essential for ensuring that information systems provide genuine value for an organization?
- 5 What academic disciplines are used to study information systems? How does each contribute to an understanding of information systems? What is the sociotechnical systems perspective?

OPENING CASE

Pricing at the Canadian Wheat Board: A Little More than Numbers

The Canadian Wheat Board (CWB) is responsible for marketing all wheat and barley grown in Western Canada. As the marketing agency for more than 75 000 farmers, the CWB's role is to market grains for the best possible price both within Canada and throughout the world. There is strong competition in the global marketplace for these commodities. Farmers count on the CWB to properly price their products to maximize their revenues.

The CWB initially created an internal solution to ensure the accuracy of deal valuations and soon found out the system had limitations. It was not robust enough to adapt to the organization's growth, and it lacked flexibility for product creation and pricing, making it slow to respond to changing market regulation requirements.

The CWB's next step was to try outsourcing, wherein an outside party

is contracted to run the system. This was too expensive and limited. The CWB recognized that its finance group needed to find a more powerful solution that could provide pricing information to support the middle office during pre-post-trade deal evaluation. "Our goal was to price our derivatives in an accurate and timely fashion, as well as to give us the flexibility to break down results, test sensitivities and adapt to changes in future regulatory requirements," said Bill Sloan, Senior Risk Analyst at CWB.

After a review of proposal submissions and proofs of concept, the CWB chose Numerix for its high rating based on price, performance, and ability to adapt its product to the CWB's specific needs.

The installation time and costs of implementing Numerix analytics were minimal. Within one day, the Numerix Excel® add-in could already

be used to price structured products. The pre-rollout 30-day trial period and speedy implementation proved that Numerix analytics could be fully integrated with the CWB's network for market pricing analysis. In as short a time as six months, Numerix's analytics software was up and running at full capacity.

In addition to the quick implementation process, the application required little maintenance and few software updates. Numerix seamlessly integrated into the operations of the CWB and improved the speed with which deals were created and executed. Because of its efficient, flexible access to the analysis, the CWB was able to transform a complicated, labour-intensive process into a streamlined, nearly fully automated task. The CWB relies only on Numerix values for pricing structured products and sees this as a critical



step in meeting its financial-statement and risk-management requirements.

The CWB chose Numerix's analytics because the technology provided seamless integration with Excel and acted as a single source for valuing all the CWB's structured products. "We are now able to price our whole portfolio of structured products in less than half an hour at our own convenience without any loss of speed... We no longer have to coordinate with a third party to get the results we need in an accelerated global market," stated David Bailey, Technical Risk Analyst at the CWB.

The Canadian Wheat Board needed to produce accurate, timely results for all exotic derivative products. It also needed to be able to break out the option value and calculate estimated time to call of securities, and to adapt to future accounting, auditing, and regulatory requirements. Savings have not yet been quantified, but they are expected to be significant in both time savings and return on investment, as compared to other outsourced alternatives.

The above is only one part of a much larger story within CWB.

Over a 3-year period, CWB completely overhauled its supply chain management systems (see Chapter 9) and began implementing a variety of Web tools, including mobile tools, to help farmers analyze weather trends, pricing trends, and rail costs.

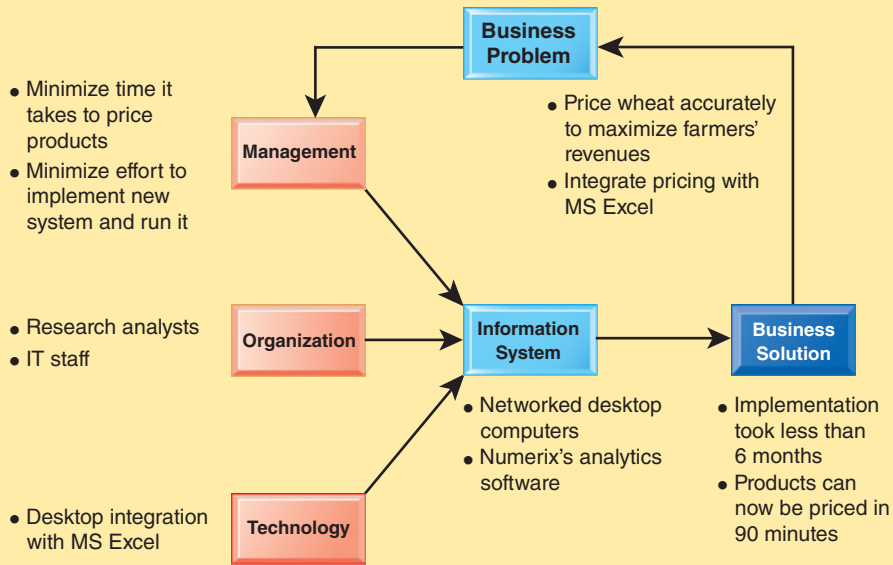
Sources: Numerix, "Case Study: The Canadian Wheat Board," www.numerix.com/resources/files/.../Wheatboard-casestudy-final72010.pdf, accessed July 27, 2011; Online Business Systems, "Case Study: The Canadian Wheat Board: Farmer Procurement and Payment Services," <http://www.obsglobal.com/SiteCollectionDocuments/FPPS - Mar 2009 - low res .pdf>, accessed July 27, 2011; Canadian Wheat Board Web site, <http://www.cwb.ca/public/en/>, accessed July 27, 2011.

The challenges facing the Canadian Wheat Board show why information systems are so essential today. The CWB is a business as well as a co-operative, and farmers need to have their products priced appropriately in order to stay in business. The chapter-opening diagram calls attention to important points raised by this case and this chapter. To price properly and quickly, the Canadian

Wheat Board chose to modernize its pricing software and rely on more advanced in-house information technology to provide its pricing models. The new system had to integrate with MS Excel and be available on desktop computers, and it had to be easy to learn. This was only one part of the advances in information technology and information systems that the CWB chose to make. They com-

pletely revised their supply chain management processes and made information available through the Web and on mobile devices for their farmer-members.

It is also important to note that these technologies changed the way the CWB runs its business. These changes had to be carefully planned to make sure they enhanced service, efficiency, and profitability.

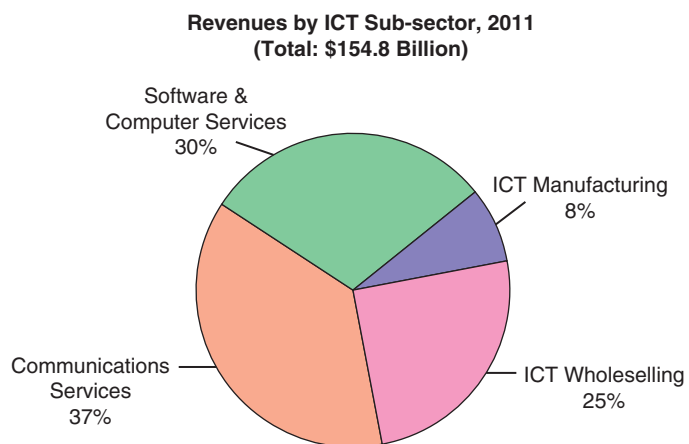


1.1 The Role of Information Systems in Business Today

It is not business as usual in Canada anymore, or the rest of the global economy. Industry Canada reported that spending on information communication and technology in 2011 was \$155 billion (Industry Canada, 2013). Figure 1-1 shows ICT sub-sector spending for 2011. In 2012, global spending on information systems hardware, software, and telecommunications equipment was more than \$3.6 trillion (Arellano, 2013).

As managers, most of you will work for firms that are intensively using information systems and making large investments in information technology. You will certainly

FIGURE 1-1 Industry Canada reveals the subsector spending in the overall area of information communication and technology (ICT) for 2011.



Source: Canadian ICT Sector Profile. Reproduced with the permission of the Minister of Public Works and Government Services Canada, 2013.

want to know how to invest this money wisely. If you make wise choices, your firm can outperform competitors. If you make poor choices, you will be wasting valuable capital. This book is dedicated to helping you make wise decisions about information technology and information systems.

How Information Systems are Transforming Business

You can see the results of this massive spending around you every day by observing how people conduct business. The percentage of Canadian homes without landlines, using only cell phones for household phone service, is expected to reach 26% by 2014 (McHugh, 2013). Smartphones, texting, e-mail, and online conferencing have all become essential tools of business. About fourteen million Canadians accessed the Internet using mobile devices in 2010, which is half of Canada's total Internet user population (iabCanada, 2012). There are almost thirty million cell phone subscribers in Canada (iabCanada, 2012) and nearly 5 billion worldwide (ITU, 2011).

By June 2012, more than 104 million businesses worldwide had dot-com Internet sites registered (Whois, 2012). In 2010, 114 million online shopping orders were placed by Canadians (Statistics Canada, 2012). On average, Canadians shopped online nearly 10 times during that year and spent an average of \$150 per purchase. Canadian merchants Aldo Shoes, Lululemon Athletica, Roots, and LaSenza are very successful selling their goods online.

In 2012, FedEx moved more 9 million packages daily worldwide, mostly overnight, and United Parcel Service (UPS) moved more than 15 million packages daily worldwide. Businesses sought to sense and respond to rapidly changing customer demand, reduce inventories to the lowest possible levels, and achieve higher levels of operational efficiency. Supply chains have become faster, with companies of all sizes depending on just-in-time inventory to reduce their overhead costs and get to market faster.

As newspaper readership continues to decline, 22 percent of Canadians read a newspaper online, and millions more read other news sites (Newspapers Canada, 2013). About 71 percent of Canadians watch a video online every month (Knowlton, 2012), 28 percent of Canadians read a blog on a monthly or more frequent basis, and 4 percent post to blogs, creating an explosion of new writers and new forms of customer feedback that did not exist five years ago (PMB Print Measurement Bureau, 2013). Social networking site Facebook has attracted more than a billion total users worldwide, and Google+ has 343 million active users (compared to Facebook's 693 million) (Smith, 2013). Businesses are starting to use social networking tools to connect their employees, customers, and managers around the world, and many Fortune 500 companies now have Facebook pages, Twitter accounts, Tumblr accounts, and even YouTube channels.

Despite the economic slowdown, e-commerce and Internet advertising continue to expand. Google's online ad revenues surpassed \$36 billion in 2011, and Internet advertising continues to grow at more than 10 percent a year, reaching more than \$40 billion in 2012 revenues.

New federal security and accounting laws requiring many businesses to keep e-mail messages for five years, coupled with existing occupational and health laws requiring firms to store employee chemical exposure data for up to 60 years, are spurring the annual growth of digital information at an estimated rate of 5 exabytes annually, or 5 billion billion bytes.

What Is New in Management Information Systems?

Lots! What makes management information systems the most exciting topic in business is the continual change in technology, management's use of the technology, and the resulting impact on business success. New businesses and industries appear, old ones decline, and the successful firms are those that learn how to use new technologies. Table 1-1 summarizes the major new themes in business uses of information systems. These themes will appear throughout the book in all the chapters, so it might be a good idea to take some time now and discuss these with your professor and other students.

TABLE 1-1 What is new in MIS.

Change	Business Impact
Technology	
Cloud computing platform emerges as a major business area of innovation	A flexible collection of computers on the Internet begins to perform tasks traditionally performed on corporate computers. Major business applications are delivered online as an Internet service (Software as a Service, or SaaS).
Big data	Businesses look for insights from huge volumes of data from Web traffic, e-mail messages, social media content, and machines (sensors) that require new data management tools to capture, store, and analyze.
A mobile digital platform emerges to compete with the PC as a business system	The Apple iPhone, Android, Blackberry, and other mobile devices are able to download hundreds of thousands of applications to support collaboration, location-based services, and communication with colleagues. Small tablet computers, including the iPad, Google Nexus, and Kindle Fire, challenge conventional laptops as platforms for consumer and corporate computing.
Management	
Managers adopt online collaboration and social networking software to improve coordination, collaboration, and knowledge sharing	Google Apps, Google Sites, Microsoft Windows SharePoint Services, and IBM Lotus Connections are used by more than 100 million business professionals worldwide to support blogs, project management, online meetings, personal profiles, social bookmarks, and online communities.
Business intelligence applications accelerate	More powerful data analytics and interactive dashboards provide real-time performance information to managers to enhance decision making.
Virtual meetings proliferate	Managers adopt telepresence videoconferencing and Web conferencing technologies to reduce travel time and cost while improving collaboration and decision making.
Organizations	
Social business	Businesses use social networking platforms, including Facebook, Twitter, and internal corporate social tools, to deepen interactions with employees, customers, and suppliers. Employees use blogs, wikis, e-mail texting, and messaging to interact in online communities.
Telework gains momentum in the workplace	The Internet, wireless laptops, smartphones, and tablet computers make it possible for a growing number of people to work away from the traditional office. Twenty-three percent of Canadian businesses have some form of remote work program (Marotte, 2013).
Co-creation of business value	Sources of business value shift from products to solutions and experiences, and from internal sources to networks of suppliers and collaboration with customers. Supply chains and product development become more global and collaborative; customer interactions help firms define new products and services.

There are three interrelated changes in the technology area: (1) the emerging mobile digital platform, (2) the growing business use of big data, and (3) the growth in cloud computing, where more and more business software runs over the Internet.

iPhones, iPads, BlackBerrys, Microsoft, and Android tablets and smartphones are not just gadgets or entertainment outlets. They represent new emerging computing platforms based on an array of new hardware and software technologies. More and more business computing is moving from PCs and desktop machines to these mobile devices. Managers are increasingly using these devices to coordinate work, communicate with employees, and provide information for decision making. We call these developments the “emerging mobile digital platform.”

Managers routinely use online collaboration and social technologies in order to make better, faster decisions. As management behaviour changes, how work is organized, coordinated, and measured also changes. By connecting employees working on teams and projects, the social network becomes where work gets done, where plans are executed, and where managers manage. Collaboration spaces are where employees meet one another—even when they are separated by continents and time zones.

The strength of cloud computing and the growth of the mobile digital platform allow organizations to rely more on telework, remote work, and distributed decision making. This same platform means firms can outsource more work, and rely on markets (rather

than employees) to build value. It also means that firms can collaborate with suppliers and customers to create new products, or make existing products more efficiently.

You can see some of these trends at work in the Window on Management box below. Millions of managers rely on the mobile digital platform to coordinate suppliers and shipments, satisfy customers, and manage their employees. A business day without these mobile devices or Internet access would be unthinkable. As you read this case, note how the emerging mobile platform greatly enhances the accuracy, speed, and richness of decision making.

Globalization Challenges and Opportunities: A Flattened World

In 1492, Columbus reaffirmed what astronomers had long said—the world was round and the seas could be safely sailed. As it turned out, the world was populated by peoples and languages living in isolation from one another, with great disparities in economic and scientific development. The world trade that ensued after Columbus's voyages has brought these peoples and cultures closer together. The Industrial Revolution was really a world-wide phenomenon energized by expansion of trade among nations.

In 2005, journalist Thomas Friedman wrote an influential book declaring that the world was now “flat;” he meant that the Internet and global communications had greatly reduced the economic and cultural advantages of developed countries. Friedman argued that the U.S. and European countries were in a fight for their economic lives, competing for jobs, markets, resources, and even ideas, with highly educated and motivated populations in low-wage areas in the less developed world (Friedman, 2007). This “globalization” presents both challenges and opportunities for business firms.

A growing percentage of the economy of North America and other advanced industrial countries in Europe and Asia depends on imports and exports. In 2012, more than 33 percent of the U.S. economy resulted from foreign trade, both imports and exports. In Europe and Asia, the number exceeded 50 percent. Many large firms derive half their revenues from foreign operations. For instance, 85 percent of Intel's revenues in 2011 came from overseas sales of its microprocessors. Eighty percent of the toys sold in North America are manufactured in China, while about 90 percent of the PCs manufactured in China use American-made Intel or AMD (Advanced Micro Design) chips.

Not just goods move across borders, so too do jobs, some of them high-level jobs that pay well and require a college degree. In the past decade, the U.S. lost several million manufacturing jobs to offshore, low-wage producers and manufacturing is now a very small part of U.S. employment (less than 12 percent and declining). There are no current statistics on Canadian businesses moving jobs offshore. In a normal year, about 300 000 service jobs move offshore from the U.S. to lower-wage countries. Many of the jobs are in less-skilled information system occupations, but some are “tradable service” jobs in architecture, financial services, customer call centres, consulting, engineering, and even radiology.

WINDOW ON MANAGEMENT

Running the Business from the Palm of Your Hand

Can you run your company from the palm of your hand? Perhaps not entirely, but today many business functions can be performed using an iPhone, iPad, BlackBerry, or other mobile handheld device.

The BlackBerry used to be the favourite mobile handheld for business because it was optimized for e-mail and messaging, with strong security and tools for accessing internal corporate systems; now that is changing. Companies, large and small, are deploying Apple's iPhone and iPad, as well as Android mobile

devices, to conduct more of their work and enhancing their security systems so that mobile users can remotely accessing proprietary corporate resources with confidence.

For some, these handhelds have become indispensable. Eric Jackson is a champion kayaker who spends half of each year following competitions and events throughout North America. He is also president of Jackson Kayak, the leading whitewater kayak manufacturer. It is essential that he participate in athletic events, monitor industry trends in the field, and meet directly

with dealers and customers. Jackson's strong customer focus has helped the company successfully expand worldwide, with distributors on six continents. With his iPhone and iPad, Jackson claims he can run the entire 120-person company from afar.

Jackson's Wi-Fi-equipped RV connects wirelessly to the company headquarters in Sparta, Tennessee. When Jackson's not on Wi-Fi, he uses his iPad 3G cellular connection. The iPad gives him instant access to his entire operation, so he can analyze customer data, refresh Web site content, or approve new designs. Jackson's iPad includes calendars, e-mail, contact management, and the ability to create and edit documents, spreadsheets, and presentations—all the tools he needs to communicate with the home office, dealers, and customers.

Back at the shop, Jackson Kayak's managers and employees find their iPads and iPhones equally invaluable. In the factory, Chief Operations Officer John Ratliff can compare Jackson Kayak's manufacturing equipment side-by-side with images of replacement parts on the iPad to make sure he's getting the correct pieces. The iPhone and iPad have become so indispensable that the company outfitted its entire workforce, from customer service, to design, to quality control, with iPhones. Many have iPads as well.

Using handhelds to run the business is not limited to small companies. General Electric (GE) is one of the world's largest companies, producing aircraft engines, locomotives and other transportation equipment, kitchen and laundry appliances, lighting, electric distribution and control equipment, generators and turbines, and medical imaging equipment. GE is also a leading provider of financial services, aviation, clean energy, media, and health care technology. This giant multinational was an early adopter of mobile technology; GE employees use their iPads to access e-mail, contacts, documents, and electronic presentations. GE's Mobile Center of Excellence has developed dozens of iPhone and iPad applications, including industry-specific diagnostic and monitoring tools and business intelligence tools that help decision makers find patterns and trends in large volumes of data. The company's Transformer Monitoring app helps manage gas turbine inventory and electronic transformers throughout the world with the ability to zoom in from a global map to a specific transformer and read all of the transformers' key performance indicators. A PDS Movement Planner lets service personnel monitor railway tracks and obtain diagnostic information on locomotives.

Canada's leading payroll outsourcing company, Ceridian, has launched a payroll app called Powerpay that lets its customers (firms for whom Ceridian handles payroll) review and approve payroll data using mobile phones or tablets. The app is available exclusively to existing Powerpay Web customers, more than 30 000 Canadian businesses, and works on BlackBerry, iPhone, and Android devices. The app provides a secure login process and includes the ability to preview and approve payroll as well as employee and corporate level data verification including hours and earnings, employee deductions and employer contributions, net pay, and company totals. In addition, the PowerPay app ensures data security as the data are not stored on the device itself. The app even uses the same familiar interface Ceridian's customers are used to on the Powerpay Web page, so there is no

steep learning curve. The app also includes on-demand support from the Ceridian small business services team.

With operations in 60 countries, Dow Corning offers more than 7000 products and services for consumer and industrial applications, from adhesives to lubricants, delivered as fluids, solids, gels, and powders. The Roambi Visualizer app lets Dow Corning executives use their iPhones to quickly view and analyze real-time data from their core corporate system, including sales figures, trends, and projections. It presents managers with simple, intuitive dashboards of complex data. According to Executive Vice President and Chief Financial Officer Don Sheets, in 15 seconds he can get a sense of whether there is a financial performance issue he needs to address.

Dow Corning's Analytics App for the iPhone monitors Web site traffic and online sales for the company's XIAMETER brand of standard silicone products. The Analytics App interfaces with Google Analytics. When Dow Corning rolls out XIAMETER Web sites across the globe, executives can monitor what content is and is not being used whether they are home, travelling, or at the office.

Sunbelt Rentals, based in Fort Mill, South Carolina, is one of the largest equipment rental companies in the United States, with \$2 billion of rental equipment inventory. More than 1200 company employees, including sales staff, field personnel, and executives, are equipped with iPhones to interact with contacts and stay abreast of calendar events. In addition to using iPhones for e-mail, scheduling, and contact management, Sunbelt has deployed a custom application called Mobile SalesPro, which ties multiple systems and databases into a single package for the sales team. This application connects the corporate point-of-sale system, inventory control and management system, and enterprise system, integrating data from many different business functions. Users are able to share sales quotes based on the most up-to-date information on rental rates and equipment availability. With this application, Sunbelt's sales team can respond immediately to customer requests while they are at a job site.

Sources: "Apple iPhone in Business" and "Apple iPad in Business," www.apple.com, accessed September 6, 2012; Erik Eckel, "What the iPhone5 Will Offer Business Users," *TechRepublic*, September 5, 2012; and Doug Henschen, "Mobilizing Enterprise Apps: The Next Big Leap," *InformationWeek*, February 12, 2011; "Ceridian Launches Mobile Payroll App PowerPay," http://www.xydo.com/toolbar/23707720-ceridian_launches_mobile_payroll_app_powerpay, July 6, 2011, accessed July 27, 2011.

Case Study Questions

1. What kinds of applications are described here? What business functions do they support? How do they improve operational efficiency and decision making?
2. Identify the problems that these businesses solved using mobile digital devices.
3. What kinds of businesses are most likely to benefit from equipping their employees with mobile digital devices?
4. One company deploying iPhones has said: "The iPhone is not a game changer, it is an industry changer. It changes the way that you can interact with your customers and with your suppliers." Discuss the implications of this statement.

iPhone and iPad Business Applications:

1. Salesforce Mobile
2. Cisco WebEx
3. iSchedule
4. iWork
5. Documents To Go
6. PDF Reader Pro
7. BizXpenseTracker
8. Dropbox



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Whether attending an online meeting, checking orders, working with files and documents, or obtaining business intelligence, today's mobile devices offer unlimited possibilities for business users. Many of these devices have a stunning multitouch display, full Internet browsing, digital camera, and capabilities for messaging, voice transmission, and document management. These features make them an all-purpose platform for mobile computing.

On the plus side, employment in information systems and the other service occupations is expanding, and wages are stable in non-recessionary years. Outsourcing has actually accelerated the development of new systems in Canada and worldwide.

The challenge for you as a business student is to develop high-level skills through education and on-the-job experience that cannot be outsourced. The challenge for your business is to avoid markets for goods and services that can be produced offshore much less expensively. The opportunities are equally immense. Throughout this book, you will find examples of companies and individuals who either failed or succeeded in using information systems to adapt to this new global environment.

What does globalization have to do with management information systems? That is simple: everything. The emergence of the Internet as a full-blown international communications system has drastically reduced the costs of operating and transacting on a global scale. Communication between a factory floor in Shanghai and a distribution centre in Vancouver, BC, is now instant and virtually free. Customers can now shop in a worldwide marketplace, obtaining price and quality information reliably 24 hours a day. Firms producing goods and services on a global scale achieve extraordinary cost reductions by finding low-cost suppliers and managing production facilities in other countries. Internet service firms, such as Google and eBay, are able to replicate their business models and services in multiple countries without having to redesign their expensive fixed-cost information systems infrastructure. Half of the revenue of eBay (as well as General Motors) in 2011 originated outside the U.S. Several Canadian companies, such as Nygård and Bombardier, also have large global markets. Briefly, information systems enable globalization.

The Emerging Digital Firm

All of the changes we have just described, coupled with equally significant organizational redesign, have created the conditions for a fully digital firm. A **digital firm** can be defined along several dimensions; it is one in which nearly all of the organization's *significant business relationships* with customers, suppliers, and employees are digitally enabled and mediated. *Core business processes* are accomplished through digital networks spanning the entire organization or linking multiple organizations.

Business processes refer to the set of logically related tasks and behaviours that organizations develop over time to produce specific business results and the unique manner in which these activities are organized and coordinated. Developing a new product, generating and fulfilling an order, creating a marketing plan, and hiring an employee are examples of business processes, and the ways organizations accomplish their business processes can be a source of competitive strength. (A detailed discussion of business processes can be found in Chapter 2.)