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Introduction to Information Systems



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PATRICIA WALLACE

Johns Hopkins University

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To Callie, Julian, and a bright future
of human-centered computing.

About the Author

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Preface

What's New in the 2nd Edition

The information systems field is fast-moving, and this 2nd edition introduces and updates many important concepts and technologies. We changed the title to *Introduction to Information Systems* to better reflect the contents and the course. This edition includes more figures, graphs, and tables to illustrate topics in visual ways, and the references, examples, data, and case studies are all updated. Larger fonts are used for the tables, and the text portion of each chapter has been shortened, most notably by tightening up the chapter introductions to get into the chapter content more quickly. The online simulations are converted to HTML5 so they are accessible from iPads and iPhones, and the scores go into the gradebook.

Major new features for the 2nd edition include the following:

- ▶ Extended coverage of big data and the technologies used to store and analyze it has been added, along with a new “Ethical Factor” box that explores the ethics of big data.
- ▶ Expanded discussion of mobile devices and m-commerce is featured in Chapter 6, including a review of evolving mobile payment technologies using near field communications and strategies for mobile-friendly software development.
- ▶ The “Internet of Things” is highlighted in several chapters because of its growing impact on network architecture and bandwidth, and its rapidly increasing role in data collection, analysis, privacy, and surveillance.
- ▶ The 2nd edition expands the discussion of cloud computing, personal clouds, mobility, and the BYOD (bring your own device) trend, especially as they affect strategic planning for the organization.
- ▶ A new comprehensive case study at the end of the text charts Apple’s disruptive innovations, and encourages students to predict the company’s future business strategy.
- ▶ Twitter’s role in social TV and the “multiscreening” phenomenon are featured in a new case study about Nielsen’s program rating system, so students see how tweeting fits into the entertainment industry’s strategies.

Chapter-Specific Changes

CHAPTER 1: INFORMATION SYSTEMS AND *PEOPLE*

- ▶ Apple’s Siri and competitive advantage
- ▶ New self-quiz on student’s use of technology: “How Productive Are You?”
- ▶ New “Productivity Tip” on digital footprints
- ▶ Revised case study on Nasdaq OMX to include Facebook’s botched public opening
- ▶ Five new figures

CHAPTER 2: INFORMATION SYSTEMS AND *STRATEGY*

- ▶ Updated examples of disruptive innovations
- ▶ Examples of new government policies affecting strategy (e.g., Internet tax)
- ▶ New “Productivity Tip” on personal cloud use
- ▶ Updated IT expenditure benchmarks
- ▶ App.net, example of an ad-free social network
- ▶ Case on GameStop updated with new data

- ▶ Case on Net Neutrality updated with new events and lawsuits
- ▶ Four new figures and several charts updated with recent data

CHAPTER 3: INFORMATION AND COMMUNICATIONS TECHNOLOGIES: *THE ENTERPRISE ARCHITECTURE*

- ▶ New QR code figure for students to read with smartphone app
- ▶ In-memory computing is introduced and described as a key term
- ▶ New “Did You Know?” anecdote on detection of gestures without contact with the screen
- ▶ Expanded discussion on why businesses should be concerned with operating system market shares, especially for mobile devices
- ▶ Updated figures and charts on operating system market shares
- ▶ Simplified discussion of last mile
- ▶ Added 802.11 currently in draft (802.11ac and 802.11ad)
- ▶ Six new or updated figures
- ▶ New Case Study #1: Google Glass and Wearable Technologies
- ▶ Updated Case Study #2 on Sprint Nextel

CHAPTER 4: DATABASES AND DATA WAREHOUSES

- ▶ Improved discussion of relational databases
- ▶ New figure showing data definitions in Access
- ▶ Updated statistics in figures
- ▶ Updated “Productivity Tips”
- ▶ New figure describing characteristics of big data
- ▶ Expanded section on data warehouses to include big data technologies
- ▶ Data scientist described
- ▶ Updated case studies

CHAPTER 5: INFORMATION SYSTEMS FOR THE *ENTERPRISE*

- ▶ Added discussion of machine-readable financial data to improve transparency
- ▶ New figure on paperless workflow
- ▶ Discussion of supply chain fundamentals and collaboration made more concise
- ▶ Updated discussion of virtual worlds for CRM
- ▶ Expanded discussion of mobile CRM strategies
- ▶ New figure describing portals into an ERP for higher education
- ▶ Improved organization of ERP section with subtitles
- ▶ Deleted Supply Chain Operations Reference (SCOR) from key terms
- ▶ Updated case studies with recent information

CHAPTER 6: THE WEB, *E-COMMERCE*, AND *M-COMMERCE*

- ▶ Expanded discussion of how infomediaries take advantage of the growing amount of information in XML format
- ▶ Updated discussion on HTML 5 and its features
- ▶ New discussion of social commerce (s-commerce) relying on social networks
- ▶ New figure comparing mobile apps and mobile-friendly websites
- ▶ New figures illustrating mobile-friendly design, and a list of tips to achieve it
- ▶ Updated discussion of search engine marketing, including Facebook’s Graph Search
- ▶ Updated examples of crowdsourcing
- ▶ New key terms: *mobile commerce (m-commerce)*, *near field communications*
- ▶ Updated Case Study #3 on mobile payments and the digital wallet
- ▶ Updated Case Study #2 on Pandora
- ▶ Clarified steps in E-Project #1

CHAPTER 7: BUSINESS INTELLIGENCE AND DECISION MAKING

- ▶ Updated discussion of data mining to include predictive analytics
- ▶ Expanded discussion of data visualization with new figure of interactive map

- ▶ New “Did You Know?” anecdote about the use of text mining
- ▶ Expanded discussion of AI and data from sensors
- ▶ New figure on website metrics drawn from online simulation (Chocolate Lovers Unite)
- ▶ Key term deleted: executive information system
- ▶ Key term added: predictive analytics
- ▶ New Case Study #1, “Cracking Fraud with Government’s Big Data”
- ▶ New E-Project #2: “Analyzing Nielsen TV Ratings with Excel,” with downloadable TV ratings data for analysis
- ▶ New “Productivity Tip” on managing your own big data

CHAPTER 8: COLLABORATING WITH *TECHNOLOGY*

- ▶ New figure showcasing top corporate blogs
- ▶ New figure on reasons for taking a break from Facebook
- ▶ Discussion of recently introduced collaborative technologies such as Vine and Instagram
- ▶ Revised section on unified communications to feature critical capabilities
- ▶ Major revision of Case Study #1, now called “Telepresence Robots’ Support Remote Collaboration”
- ▶ New Case Study #2, “Yahoo! Bans Telecommuting: Was It the Right Move?”

CHAPTER 9: KNOWLEDGE MANAGEMENT AND *E-LEARNING*

- ▶ Expanded discussion about incentives for knowledge sharing
- ▶ New discussion on technologies to prevent cheating in e-learning courses
- ▶ New “Did You Know?” anecdote about telepresence robots who attend classes
- ▶ New discussion about *massive open online courses* (MOOCs), also added as a key term
- ▶ New “Productivity Tip” about taking an online course
- ▶ New Case Study #1, “Lynda.com: How an E-Learning Entrepreneur Rides Waves of Change”
- ▶ Updated Case Study #2, “Diplopedia: Managing State Department Knowledge with a Wiki”

CHAPTER 10: ETHICS, PRIVACY, AND *SECURITY*

- ▶ New discussion of Apple’s unique approach to music piracy with iTunes Match
- ▶ New figure on recent software piracy survey
- ▶ New discussion on an emerging “right to be forgotten” law, to ensure people can erase their digital footprints
- ▶ New details added to discussion of encryption strategies
- ▶ Expanded discussion of mobile devices and security
- ▶ New Case Study #1: “Zynga Kills Petville and Angers Virtual Pet Owners”
- ▶ Updated Case Study #2 to include recent massive DDoS on Spamhaus
- ▶ Revised and simplified E-Project #1

CHAPTER 11: SYSTEMS DEVELOPMENT AND *PROCUREMENT*

- ▶ New “Did You Know?” anecdote on smartphone app
- ▶ Updated examples of feasibility studies
- ▶ New “Productivity Tip” about clarifying the scope of work to avoid disagreements
- ▶ Updated examples on consulting
- ▶ Updated Case Study #2 with recent research findings on agile methods

CHAPTER 12: PROJECT MANAGEMENT AND *STRATEGIC PLANNING*

- ▶ Tightened up discussion of the five project management processes
- ▶ New figure showing the top strategic technology trends currently underway
- ▶ Updated Case Study #1 with current information on technologies and their location on the hype cycle

- ▶ New figure on hype cycle with current technologies
- ▶ Updated E-Project #1 with more recent Gartner predictions

End-of-Book Comprehensive Case Studies

- ▶ New Case Study #3: “Apple: Can the Company Pull Off Another Disruptive Innovation?” (replaces case on Clearwire)
- ▶ Red Cross case updated to include the Safe and Well Website.
- ▶ Facebook case updated and revised to include uproar over Instagram’s privacy and ownership challenges
- ▶ Updated “Managing the Federal Government’s IT Project Portfolio” to incorporate recent steps by federal government to get control over IT spending

To the Student

Any college student thinking about the job market can’t help but notice how valuable it is to have skills related to information systems. In this course you will learn what information systems are all about and why they are so fundamental to business and society. It will be an exciting journey, filled with revelations about business strategies, technology trends and innovations, and also tips that will help you work smarter as a student. Here are the main features of this text and its supplements:

Learn by Doing: The Interactive, Online Role-Playing Simulations

A course on information systems should tap their power for active, experiential learning. This text includes interactive role-playing simulations in MyMISLab™ (mymislab.com) in which students can apply their knowledge and actually experience what each chapter is about, not just memorize key terms and concepts. You will enter realistic and often tense situations, interacting with the characters via a simulated smartphone or laptop, and using email, text messages, web conferencing, video chat, voicemail, dashboards, ordering screens, and other applications. Each simulation is scored and students receive extensive feedback on the choices they make. Each one also includes key terms from the chapter (with rollover definitions) so you see how they are used in context, which will help you more easily remember their meanings.

The simulations bring the chapter alive, as you enter authentic settings in which people struggle to solve a problem involving information systems. Some examples:

- ▶ In World of Mammals (Chapter 1), you help the harried director of a wild animal preserve interview candidates for the CIO position, after the former CIO leaves abruptly. What skills does a CIO need? What kind of experience would fit best?
- ▶ Chocolate Lovers Unite (Chapter 7) challenges you to resolve a heated debate over which online marketing pitch works best by conducting tests, analyzing the results, and drawing on data-driven decision making.
- ▶ In Green Wheeling, the simulation on software development and procurement (Chapter 11), you join a task force charged with replacing a college’s obsolete fundraising system. You and your team members weigh the pros and cons of “build” or “buy,” and you will see how the outcome can change based on your decisions.
- ▶ Vampire Legends drops you into a fast-paced, tense situation in which the material in Chapter 10 (Ethics, Privacy, and Security) comes to life in an online game company that is racing to launch a sequel. When troubling things begin happening that involve the company’s data center and information security, you will have difficult choices to make.

I’ve done research on games and simulations in education, and have led several projects to create software that draws on the compelling features of these environments for learning. While online flash cards, Q&A games, and other interactive applications can help students memorize terms or review the chapter contents, simulations that immerse

students in a relevant and authentic case can do more. Research shows they create engagement, improve learning outcomes, and build critical thinking skills through active, student-centered involvement. You will find it much easier to learn and remember the material in the textbook when you can engage in simulations like this.

The Human Element in Information Systems

In addition to the simulations, this text brings a fresh perspective to the introductory course in information systems that combines comprehensive and up-to-date coverage with a stronger focus on the human element in businesses, nonprofits, and other organizations. It covers all the major topics for the course in a rigorous way, without skimping on any of the fundamentals. But it enriches those topics with probing discussions about the roles people play in building, shaping, implementing, and sometimes obstructing information systems.

In Chapter 8 on collaborative technologies, for example, students learn how different channels affect the tone of human communications, and how to choose the best channel for each task to support virtual teamwork, management, negotiation, and leadership. Chapter 12 on project management and strategic planning shows how human biases can creep into the process.

The text also stresses the processes and policies that people devise to manage information systems. Why do some high-tech companies ban telecommuting, even though employees have well-equipped home offices? Why do organizations implement surveillance?

Exploring Technology Battlegrounds

Grand battles over technology directions help students understand the close links between competitive business strategies and information systems. The stakes are very high in debates about topics such as net neutrality, 4G standards, wireless spectrum auctions, cloud computing, programming languages, mobile operating systems, mobile payment systems, and social network privacy. Billions of dollars are on the line for winners and losers. Yet most people know little about these battlegrounds because the underlying technology issues are out of reach. After reading this text, students will look at online ads, privacy policies, social networks, and their own smartphones with a new appreciation for the fierce business competitions unfolding before their eyes.

Reaching a Changing Student Body

The text recognizes the growth in the number of women, minorities, international students, online students, and nontraditional students who enroll in this course, drawing on examples and settings that will resonate with them. Devon, for instance, is starting her own web design business, and students learn about relational databases by helping her build one for her small business (Chapter 4). International student Prakash is the cofounder of *Leveling UP!*, a smartphone app that is the centerpiece for the interactive role-playing simulation on business strategy (Chapter 2). In the chapter on knowledge management and e-learning (Chapter 9), Sally takes an online course in nonprofit management as she nears retirement and helps her own company build an e-learning course for the coworkers she's leaving behind.

Balancing Coverage of Business, Government, and Nonprofits

This text broadens the coverage about information systems to include all the varied settings in which students work (or will work). It draws on timely examples from multinational corporations, nonprofits, government agencies, midsized businesses, start-ups, charities, volunteer organizations, student clubs, and other settings. The text highlights how these different organizations launch information systems to fulfill their missions, whether that means generating profits, attracting donations, or serving citizens.

The strategies that underlie cell-phone marketing, for instance, work as effectively for nonprofits that want to mobilize citizens as they do for businesses that tempt new customers with discount coupons. And competitive advantage is not just for business. Charities compete for volunteers and donations, and they benefit from customer relationship management systems.

Changing Student Roles

Just as students are gaining employment in a wide variety of organizations, they are taking on more varied roles within them. Though some will become information systems managers, many more will become consultants, business analysts, accountants, marketing professionals, talent development specialists, volunteers, virtual team leaders, forensic experts, legal advisors, and project managers. The text introduces emerging professions, as well, such as data scientist.

Examples in the text, case studies, and simulations feature all these different roles, showing how successful information systems emerge from a broad base of stakeholders with different perspectives and specialties. Carlos, for instance, is the instructional designer on a corporate e-learning development team, adding his knowledge of usability and accessibility for people with disabilities (Chapter 9). In Chapter 11, Lily is a senior manager for an online grocery who comes up with a clever website to capture a valuable market—busy singles who forgot to buy groceries.

Emphasizing Ethics

Ethical concerns weave throughout the text, touching on very human ethical dilemmas such as the one Wikipedia founder Jimmy Wales faced when asked to delete any posts that mentioned the name of a journalist kidnapped by the Taliban. That action was directly opposed to his site's fervent commitment to free speech, and Wales raised a firestorm within the Wikipedia community when he had to make a choice.

A special feature in each chapter titled “The Ethical Factor” explores timely ethical issues such as corporate responsibility in extended supply chains (Chapter 5), or the ethics of massive surveillance and collection of big data by governments and corporations (Chapter 3). In Chapter 10 on ethics, privacy, and security, students take a survey to learn more about how they judge situations that touch on information ethics. The online simulation for that chapter immerses students in a tense situation in which security is compromised and they face some difficult ethical dilemmas.

Here is a list of all the “Ethical Factor” boxes:

1. Ethical Issues Surrounding Information Systems, p. 55
2. Ethical Responsibility in an Extended Value Chain, p. 77
3. Ethical Implications of Big Data, p. 102
4. Ethical Issues in Database Design: The Case of Ethnic Identification, p. 142
5. Ethics and Talent Management, p. 170
6. Website Accessibility: Why Is Progress So Slow? p. 206
7. The Ethics of Tagging Faces in Photos, p. 234
8. Flash Mobs and Free Speech: Should Police Block Mobile Messaging Services? p. 276
9. Knowledge Sharing in Fast-Paced Industries: The Case of Formula One Racing, p. 301
10. Ethical Dilemmas in a Distributed Denial of Service Attack, p. 334
11. Developing Systems That Promote Ethical Decision Making and Social Responsibility, p. 363
12. Code of Ethics for Project Managers, p. 388

Working Smarter, Not Harder: Productivity Tips for Students

Every chapter includes several “Productivity Tips” that suggest ways students can improve their own productivity by applying what they've learned.

In Chapter 2 on information systems and strategy, for instance, a tip invites students to check out the software trial versions that came preinstalled on their computers to see how companies leverage this valuable product positioning, and then remove them to save space and improve the computer's performance. A tip in the section on neural networks in Chapter 7 advises students to alert their credit card companies before traveling abroad because a neural net may trigger a very ill-timed block on the card. Another tip points to solid productivity gains for people who use two monitors, which is especially helpful for students with laptops.

These tips are not only immediately useful. They help you learn chapter material by applying it so you can work smarter, not harder.

Highlighting Globalization and International Contexts

Information systems play a key role in globalization, especially through the Internet and all the creative destruction it unleashed. Examples abound throughout the text, highlighting how Baidu captured the search engine market in China (Chapter 2) or how Ikea manages a global supply chain (Chapter 5). The global financial crises underscore the important work of the International Accounting Standards Board—to promote transparent and enforceable financial reporting for companies around the world using XBRL tags—from the XML family of standards (Chapter 5). The international emphasis also unfolds in working relationships across national borders. For example, the chapter on collaboration (Chapter 8) follows a team planning a campaign to launch a string of clubs in several major cities, and the team's members hail from Dallas, Texas, and Hong Kong. As they use collaborative technologies that span the Pacific, this dynamic virtual team works through differences in time zones, communication styles, and culture.

Inspiring Students to Pursue Promising Careers

Finally, an important goal of this text and its supplements is to convey the sheer excitement and limitless potential of this field, with an eye toward inspiring students to go further. Inside are countless examples of how savvy men and women leverage information systems to transform organizations of all stripes, and even build new empires. The text includes many job descriptions, job growth rates, and projected salaries, as well.

Some of the excitement comes from groundbreaking technological advances, such as IBM's "Watson"—the supercomputer that competed on "Jeopardy!" and soundly defeated the game's human champs in a dramatic live broadcast. The disruptive innovations that topple some industries and open star-studded paths for others are also part of the excitement. GPS dealt a crushing blow to map makers, and the Internet did the same to print newspapers. But both events opened up vast new territory for innovative start-ups.

To further stimulate interest, each chapter includes short "Did You Know?" snippets to highlight an engaging or amusing application of the chapter's topic. For example, the chapter on hardware, software, and networks (Chapter 3) features a coffee shop whose zany owner constantly renames the free wireless network to different messages, such as "BuyAnotherCupYouCheapskate."

If students catch some of this energy and enthusiasm, they may decide to pursue this field. Those who do will have outstanding career prospects in the private and public sectors, and they'll never be bored.

Supplements

The following supplements are available at the Online Instructor Resource Center, accessible through www.pearsonglobaleditions.com/Wallace:

Instructor's Manual

The Instructor's Manual, assembled by Jollean Sinclair and John Hupp, includes a list of learning objectives and answers to all end-of-chapter questions.

Test Item File

The Test Item File, prepared by ANSR Source, Inc., contains more than 1,300 questions, including multiple choice, true/false, and essay. Each question is followed by the correct answer, the learning objective it ties to, a course learning objective, and difficulty rating. In addition, certain questions are tagged to the appropriate AACSB category.

Powerpoint Presentations

The Instructor PowerPoints, prepared by John Hupp, highlight text learning objectives and key topics and serve as an excellent aid for classroom presentations and lectures.

Image Library

This collection of the figures and tables from the text offers another aid for classroom presentations and PowerPoint slides.

TestGen

Pearson Education's test-generating software is available at the Online Instructor Resource Center, accessible through www.pearsonglobaleditions.com/Wallace. The software is PC compatible and preloaded with all of the Test Item File questions. You can manually or randomly view test questions and drag-and-drop to create a test. You can add or modify test-bank questions as needed.

CourseSmart

CourseSmart eTextbooks* were developed for students looking to save on required or recommended textbooks. Students simply select their eText by title or author and purchase immediate access to the content for the duration of the course using any major credit card. With a CourseSmart eText, students can search for specific keywords or page numbers, take notes online, print out reading assignments that incorporate lecture notes, and bookmark important passages for later review.

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