

# Business Processes and Information Technology

Ulric J. Gelinas, Jr.  
Steve G. Sutton  
Jane Federowicz

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For any questions about this text, please email: [drexel@uga.edu](mailto:drexel@uga.edu)

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## **Dedication**

To our spouses Roxanne, Vicky, and Michael and to Jane's sons Andrew and Billy, with grateful appreciation for their patience and support throughout this project.

**Ulric J. (Joe) Gelinas, Jr., Ph.D.**, is Associate Professor of Accountancy and Davis Educational Foundation Fellow at Bentley College, Waltham, Massachusetts. He received his A.B. in Economics from St. Michael's College, Winooski Park, Vermont, and his M.B.A. and Ph.D. from the University of Massachusetts, Amherst. Professor Gelinas has also taught at the University of Tennessee and at Vesalius College, Vrije Universiteit Brussel in Brussels, Belgium. As a Captain in the United States Air Force, he was Officer-in-Charge of IT Operations. Professor Gelinas was the founding editor of the *Journal of Accounting and Computers* (formerly the *Kent/Bentley Journal of Accounting and Computers* and the *Kent/Bentley Review*). Professor Gelinas has published articles on accounting information systems, computers in accounting education, technical communications, and information privacy. In 2000 he received the John W. Beveridge Achievement Award from the New England Chapter of the Information Systems Audit and Control Association for outstanding contributions to the IS Audit and Control profession. He has made presentations and conducted workshops at the International Conference of the Information Systems Audit & Control Association (ISACA), ISACA's Computer Audit, Control and Security (CACS) conferences, as well as other professional groups. He is a member of the American Accounting Association, the Information Systems Audit & Control Association, Beta Alpha Psi, and Beta Gamma Sigma. Professor Gelinas was a member of the U.S. expert panel that reviewed *Control Objectives for Information and Related Technology* (COBIT) and has conducted COBIT workshops in North America and Europe. He was the author of a portion of *Implementation Tool Set*, a volume that accompanies the second and third editions of COBIT. In his spare time, Professor Gelinas is engaged in his favorite activities: sailing, scuba diving, and bird watching.

**Steve G. Sutton, Ph.D., CPA**, is Professor of Accounting Information Systems at the University of Connecticut, Storrs, Connecticut and Professorial Fellow in Business Information Systems at the University of Melbourne, Victoria, Australia. He received his BSA, MA and Ph.D. from the University of Missouri—Columbia. Professor Sutton has taught at the University of Calgary, Arizona State University West, Texas Tech University, Oklahoma State University, and Bryant College. His audit and information systems consulting experience with Mayer Hoffman McCann, CPAs, and KPMG (and a pre-merger KMG Main Hurdman), along with experience as a computer operator with Deere & Co., support his teaching and research interests in information systems, auditing, and business education. Professor Sutton is the founding and continuing editor of the *International Journal of Accounting Information Systems* and its predecessor publication, *Advances in Accounting Information Systems*. In addition, he is a founding and continuing co-chair of the annual Accounting Information Systems Research Symposium and the sponsoring journal editor for the International Research Symposium on Accounting Information Systems. Professor Sutton is also a co-author of the monograph, *Productivity and Quality Measurement Systems for Internal Auditing* (Institute of Internal Auditors Research Foundation) and co-editor of two American Accounting Association monographs, *Behavioral Accounting Research: Foundations and Frontiers* and *Researching Accounting as an Information Systems Discipline*. Professor Sutton has published over 70 journal articles and made over 70 conference presentations on accounting information systems, auditing, and computers in accounting education. He has made continuing education presentations for both

the international association and Phoenix Chapter of the Institute of Internal Auditors and the American Public Power Association, as well as several public accounting firms. Professor Sutton is a member of the Association for Information Systems, American Accounting Association, Canadian Academic Accounting Association, Accounting and Finance Association of Australia and New Zealand, European Accounting Association, American Institute of CPAs, Decision Sciences Institute, Beta Alpha Psi, and Beta Gamma Sigma. He is a past chair of the Information Systems Section of the American Accounting Association. Among Professor Sutton's hobbies are 3-on-3 basketball tournaments, travel, skiing, and hiking.

[Jane Fedorowicz](#), the Rae D. Anderson Chair of Accounting and Information Systems, holds appointments in both the Accountancy and Computer Information Systems departments at Bentley College. Her expertise in integrating IT into business degree programs has been instrumental in launching several initiatives at the College, notably, undergraduate and graduate programs in Accounting Information Systems and the e-business concentration in the MBA program. She took a leading role in developing Bentley's Accounting Center for Electronic Learning and Business Measurement (ACELAB), a hands-on, state-of-the-art technology facility. Professor Fedorowicz holds MS and Ph.D. degrees in Systems Sciences from Carnegie Mellon University and a BS from the University of Connecticut. Before joining the Bentley faculty in 1994, she taught at Carnegie Mellon University, Northwestern University, Boston University, and the University of Massachusetts at Boston. She is a member of the AICPA Precertification Education Executive Committee. She is Vice President of Affiliated Organizations for the Association for Information Systems (AIS), Northeast regional representative for the Emerging Technologies Section of the American Accounting Association, and co-general chair for the 2001 Americas Conference for Information Systems of AIS. Professor Fedorowicz has published over 60 articles in refereed journals and conference proceedings. Her research spans a wide range of IT issues and technologies impacting individual and organizational effectiveness. The American Accounting Association recognized Professor Fedorowicz with the 1997 Notable Contribution to the Information Systems Literature Award, and she was recently selected as Bentley College's Scholar of the Year for 2000.

*Business Processes and Information Technology* prepares students to effectively use, manage, and participate in the development of information technology applications in support of common business processes. The text focuses on the interconnections among an organization's management, business processes, information systems, and information technology. An emphasis is given throughout the text to the governance, control, and security of business processes and information systems, especially underlying financial information systems. After studying this text, a student will walk away with an understanding of the foundation tools and knowledge required for the analysis, design, and control of IT-driven business processes using current and emergent technologies.

## Unique Features of the Book

*Business Processes and Information Technology* takes a business process focus towards understanding and managing operations, information systems, and management/decision making in contemporary organizations. A wide range of information technologies in business processes are integrated throughout.

**Three Themes** Three themes connect our discussions to topics that are currently of great interest to business professionals. These themes are *enterprise systems*—such as those sold by SAP, JD Edwards, Oracle, and PeopleSoft; *E-Business*—including retail (Business-to-Consumer, or B2C) e-businesses such as Amazon.com and Business-to-Business (B2B) marketplaces such as Covisint.com (operated by auto manufacturers); and *information technology*—state-of-the-art hardware and software applications that keep an organization heading toward achievement of its objectives. Icons have been added to the text to identify discussions of these themes.



**Enterprise systems** are software packages designed to provide complete integration of an organization's business information processing systems and all related data. Data is shared across the systems to support the operation and management of the organization. Enterprise systems are introduced in Chapter 3 and then discussed throughout the remainder of the text. For example, in Chapter 10 you will find a diagram that depicts how the order fulfillment process would be implemented with an enterprise system. Similar diagrams are also in the other business process chapters. Additionally, examples of screens from enterprise systems have been included throughout the text to demonstrate business process information acquisition and presentation in contemporary organizations.



**E-Business** is the application of electronic networks (including the Internet) to undertake business processes between organizations and either individuals or other organizations. E-business has created entirely new ways of working within and across organizations. For example, organizations are buying and selling goods and services at virtual marketplaces. This changes how organizations identify customers and select vendors. It changes the cost of acquiring goods from a vendor and the price they should charge their customers for their products. E-business and its closely related concept, e-commerce, are explained more fully in Chapter 4 and discussed throughout the remainder of the book.



**Information Technology**, indicated by the Technology icon at left, encompasses any hardware, software, or communications technology that might be adopted by an organization to support or control a business process, enable management decisions, or provide a competitive advantage. Technology icons signal that an electronic mechanism is being discussed that is either in wide use, representative of the state of the art, or advocated for business adoption in the near future.

We present emerging technology examples and other current topics in sidebars, which are typeset to make them stand out from the text. Since the unique design allows you to easily locate the sidebars within each chapter, you can read about a particular technology separate from the remainder of the chapter. There are three types of sidebars:

1. *Technology Insights* define and discuss a major topic. For example, Technology Insight 4.1 describes Extensible Markup Language (XML), a Web-based language that enables information to be easily shared over the Web.
2. *Technology Applications* present short examples—taken from actual practice—of technology in use. For example, Technology Application 10.2 describes real-world examples of e-business in global markets.
3. *Technology Excerpts* contain article reprints. For example, Technology Excerpt 7.2 summarizes experts' criteria for selecting an application service provider (ASP). ASPs are external organizations that host, manage, and provide access to application software over the Internet to multiple customers.

The issues of **governance, internal control, and security** have received greater attention in the last few years as management has realized the importance of internal control to the effective governance of organizations and the IT that drives organizations. Enron, WorldCom, and 9/11 have brought these issues into the homes and offices of many of us. Chapter 8 introduces these topics, including such control frameworks as COSO and COBIT\*, and pervasive exposures such as hacking and denial of service attacks. Chapter 9 introduces a specific control framework for use in analyzing business processes and discusses technology-related controls that are key to well-controlled business processes. The framework and controls from Chapters 8 and 9 are then applied in the business process chapters—Chapters 10 through 14.

**Documentation Tools** Chapter 2 includes a comprehensive coverage of how to read and prepare data flow diagrams (DFDs) and systems flowcharts. The chapter also describes how to read entity-relationship (E-R) diagrams (the drawing of E-R diagrams is covered in Chapter 3).

**Case Studies and Capsule Cases** Several short cases describe typical business processes at the end of Chapters 2, 10, 11, and 12. These process narratives provide ample opportunity for students to practice application of the various tools and techniques discussed in the book. Several capsule cases, adapted from actual real-world systems, may be found at the end of Chapters 10–12. These system descrip-

\* The *Committee of Sponsoring Organizations of the Treadway Commission* (COSO) supports a framework for structuring control objectives. *Control Objectives for Information and Related Technology* (COBIT) is a framework for control of advanced technology-based business information systems.

tions are shorter than those in the short cases, to provide another vehicle for students to acquire proficiency in documenting systems.

## How This Textbook Presents Information Systems

This textbook is divided into five parts. Part I, *Business Processes and IS Foundations*, introduces IS, basic systems concepts, and documentation tools. Part II, *Technology for Business Processes and IS*, introduces the design and use of database management systems and reviews current advances in e-business and decision-making support technologies. Part III, *Development of IS*, presents the tools and techniques used to develop and implement information systems. Part IV, *Internal Control for Business Processes and IS*, introduces control concepts, pervasive controls, IT control processes, and technology-related application controls. Part V, *Core Business Processes*, presents views of IS application to support key business activities.

**Part I** Chapter 1 introduces information systems and relates them to key business process concepts with emphasis on the importance of these subjects to today's business professional. Information systems are described as key enablers of an organization's successful operation of its important business processes. Chapter 2 shows how to read and prepare documentation to portray aspects of a business process, including operational and information systems processes. The chapter consists of modular discussions that compartmentalize the coverage of reading versus preparing each type of documentation.

**Part II** Chapter 3 focuses on the issues surrounding the management of data storage, retrieval, and security in contemporary organizations. While the chapter includes an overview of traditional data file structures and data storage management, the primary emphasis of the chapter material is on relational database management systems. Chapter 4 describes the emergence of electronic business (e-business) and the radical change in organizational thinking that has resulted. The evolution of information processing to its contemporary emphasis on instantaneous recording, reporting, and accessibility of business information is described. Enabling technologies such as XML and advanced data communications networks are also explored. Chapter 5 examines the evolution of business intelligence and knowledge management and their role in supporting information systems initiatives. The nature of each of these strategic initiatives is explored as well as the development and use of each to support decision making.

**Part III** Chapter 6 introduces the systems development process as an activity that must be undertaken successfully for an organization to effectively reengineer its business processes and make effective use of information technology. The initial phases in systems development—the feasibility study and systems analysis—are described. Chapter 7 explores several alternative sources for the development and acquisition of hardware and software. In addition, the final phases in systems development process—design and implementation—are described.

**Part IV** Chapter 8 explores the importance of effective management and control of IT in contemporary corporate governance. Control frameworks such as COSO and

COBIT are introduced. These can provide management, business process owners, and other interested parties assurance that an organization's essential business processes and information technology resources are directed at achieving organizational objectives. Chapter 9 presents a detailed framework for the analysis of internal control. Physical implementations are used as contexts for discussing controls that are typically applied in business processes.

**Part V** Chapters 10 through 14 describe the typical business processes found in a variety of organizations. For each process, there is a description of the organizational context (e.g., departments, managers), the business operations being performed (e.g., order fulfillment, revenue collection), information for decision making, and IT typically applied in support of these elements. In addition, these chapters also describe the management processes that will ensure achievement of the organization's objectives for each process, including the nature, functions, purpose, control goals, and control plans for both the *operations* process and its *information* process.

## To The Student

To be successful in this course and with this text, we ask you to accept that in this field there are no right and wrong answers. You will be asked to solve problems—that is, to identify what the problem is, to consider alternative solutions, to select a solution, and then to defend your choice.

Another measure of success will be your ability and willingness to accept change as the only real constant in life and to prepare yourself to deal with change in your career. Because technology is rapidly outdated, learning facts about the current state of affairs will pay dividends only in the short run. What's important for your long-term success is that, at the university, you “learn how to learn,” and that you continue to learn for the rest of your life. This text can help you to learn *how to learn* about information technology and business processes.

## Instructional Supplements

Our text includes the following supplemental materials to assist the student and the instructor:

- ◇ The *Instructor's Resource Manual* includes chapter overview, outline, and teaching suggestions.
- ◇ The *Test Bank* will include a variety of types of questions including true/false, multiple-choice, short answer, and problems. An electronic test bank, *ExamView*, is also available so that instructors can easily customize their tests.
- ◇ A *Solutions Manual* providing all answers to in-text problems is available to instructors.
- ◇ *PowerPoint* slides cover all major concepts and key terms and are presented in an appealing way designed to hold students' interest.

- ◇ We also invite you to visit the Web site for this text at <http://gelinas.swlearning.com>. Here you will find additional materials as well as the *Instructor's Resource Manual*, the *Solutions Manual*, and the *PowerPoint* slides.

We trust that you will find the teaching package both flexible and enjoyable to use. We earnestly solicit your feedback on both the text and the ancillaries and appreciate knowing your criticisms and suggestions for improving the materials. In turn, we stand ready to respond to any questions or problems you may encounter. Please feel free to contact us through Thomson Learning/South-Western, directly through our academic institutions, or through our respective e-mail addresses: [ugelinas@bentley.edu](mailto:ugelinas@bentley.edu), [steve.sutton@business.uconn.edu](mailto:steve.sutton@business.uconn.edu), and [jfedorowicz@bentley.edu](mailto:jfedorowicz@bentley.edu). We wish you success. Enjoy!

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*Ulric J. Gelinas, Jr.  
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Jane Fedorowicz*

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