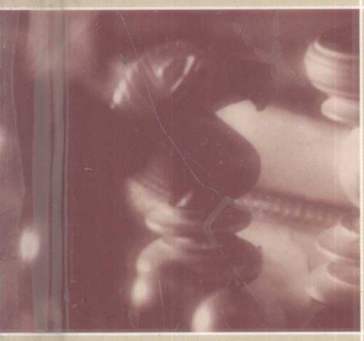
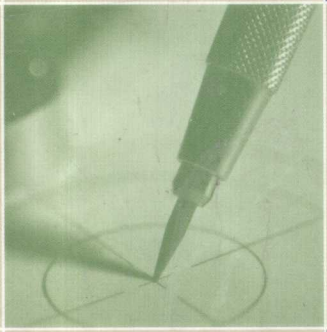
systems analysis & design methods

sixth edition





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Systems Analysis and Design Methods

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SIXTH EDITION

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Dedication

To my lovely wife Cheryl and my children Robert, Heath, and Coty. To my coauthor and good friend Jeff and our twenty years of writing side by side.

–Lonnie

To my father. You instilled in me the work ethic, perseverance, and curiosity for knowledge that has made this book possible.

–Jeff

To my loving and caring wife Diana and my children Brandon, Bryan, Andrew, and Ashley. To my father Robert, who taught me my set of values—to work hard and look for the best in people. And to Jeff and Lonnie—thanks for the opportunity.

–Kevin

Preface

Intended Audience

Systems Analysis and Design Methods, sixth edition, is intended to support one or more practical courses in information systems development. These courses are normally taught to both information systems and business majors at the sophomore, junior, senior, or graduate level.

We recommend that students take a computer- and information systems–literacy course before using this text. While not required or assumed, a programming course can significantly enhance the learning experience provided by this textbook.

Why We Wrote This Book

More than ever, today's students are "consumer-oriented," due in part to the changing world economy, which promotes quality, competition, and professional currency. They expect to walk away from a course with more than a grade and a promise that they'll someday appreciate what they've learned. They want to "practice" the application of concepts, not just study applications of concepts. We wrote this book to (1) balance the coverage of concepts, tools, techniques, and their application, (2) provide the most examples of system analysis and design deliverables available in any book, and (3) balance the coverage of classic methods (such as *structured analysis* and *information engineering*) and emerging methods (e.g., *object-oriented analysis, agile development,* and *rapid application development*). Additionally, our goal is to serve the reader by providing a postcourse, professional reference for the best current practices.

We have written the book using a lively, conversational tone. This approach (and the numerous examples) delivers a comprehensive text that still connects with the student throughout the learning process.

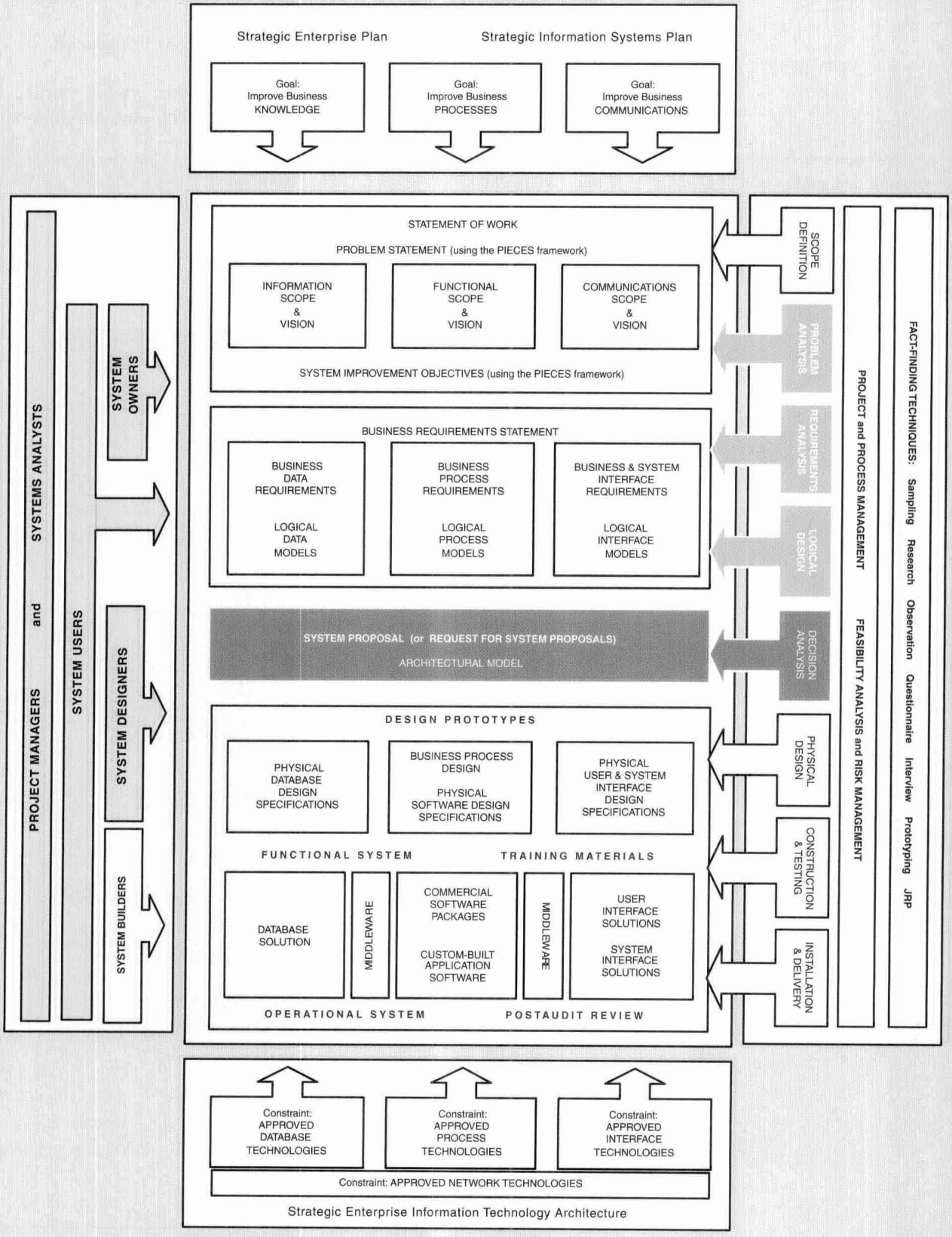
Changes for the Sixth Edition

We have preserved the features that were well received in the previous editions, and in the spirit of continuous advancement we have made the following improvements:

- **Integrated Object-Oriented Coverage:** Based on feedback from the previous edition, the object-oriented analysis and object-oriented design chapters have been integrated into the main body of the book. Chapters 11 and 18 have been expanded to include coverage of the most common UML tools and techniques that are applied during systems analysis and systems design.
- **Use Cases:** The sixth edition includes a new chapter devoted to use cases as a requirements specification tool. While use cases are often mistakenly viewed as being an object-oriented tool, in Chapter 7 we demonstrate how use cases are used throughout systems development to complement the variety of systems development methods.
- **Simplified Presentation of Zachman's Framework:** The matrix framework based on Zachman's Framework for Information Systems Architecture continues to organize the subject's conceptual foundations. The sixth edition's framework has been updated (and simplified!) to reflect contemporary technologies and methods. The framework has been visually integrated both into the textbook's system development methodology and into every chapter as a chapter opening home page. The home page shows which aspects of the framework are relevant to the chapter. Columns now represent the three fundamental goals of an information system: (1) improved information and knowledge management, (2) improved business processes, and (3) improved communication within and between organizations.
- **Improved Technology Coverage:** This edition presents expanded coverage of mobile computing and telecommuting and discussion of the role of today's

Chapter Map

Every chapter opens with a chapter home page created to demonstrate coverage in the specific chapter. This diagram tells students "where they are" in the framework of the text.



analyst as an architect and integrator. We also include new roles of graphic artists and website designers in systems development. This can be seen in the Analysts in Action boxes which precede nearly every chapter.

- **Clearer Presentation of Development Options:** The revised systems development coverage makes project identification and selection more visible. This coverage includes demonstration of a taxonomy of systems development paradigms and methodologies, with explanations of their advantages and disadvantages, to better compare development paradigms.
- **Broader Coverage of Alternative Methods:** New methods introduced include extreme programming and agile development.
- **Improved Coverage of Emerging Applications:** The sixth edition further emphasizes systems analysis and design techniques for developing *client/server*

Analysts in Action

Almost every chapter opens with an Analysts in Action box designed to illustrate how technology is used to impact business decisions.

SOUNDSTAGE ENTERTAINMENT CLUB

Analysts in Action
Episode 10

Episode Ten

Analysts in Action

SCENE

This episode begins soon after the project's executive sponsor (the person who pays for the system to be built) approved the business requirements that came out of the requirements analysis phase. Sandra and Bob are planning the design phases for the project. We join Sandra and Bob in a small conference room.

SANDRA

OK, Bob, here's what I think we should do. Our *FAST* methodology calls for the completion of the design phase. Let's agree on what needs to be done and then determine how we're going to get the job done.

BOB

Sounds good to me. Oh yeah . . . I wanted to remind you that we better not forget that Dick Krieger (director of Warehouse Operations) told us the warehousing operations are using bar-coding technology. He is really concerned that we are going to come up with some design that does not integrate with their bar-coding system.

SANDRA

According to our *FAST* methodology we need to begin by designing the application architecture. It was a miserable rainy weekend and I was bored, so I took the liberty to attack this first design task. Here are the physical data flow diagrams I developed to show how the system data and processes are to be distributed across the various business locations. These diagrams are going to be our blueprints for completing the remaining design tasks. We can use the diagrams to split up the design work.

BOB

Great. How do you want to proceed?

SANDRA

First, I hope you agree that we should use a prototyping approach to completing the design phase.

BOB

Do you think the users will be willing to participate in reviewing the screens that we design?

SANDRA

Don't you remember, we already discussed this with the people at our launch meeting? They assured us that they will encourage the users to participate.

BOB

Sure. Actually I would prefer to prototype the design.

SANDRA

Good. I was going to suggest that you build our prototype database. I think that is a one-person job. When you are finished, let me know. We can then meet to decide which inputs and outputs we want to design and how we want to go about designing the overall interface for the system.

BOB

Sounds good to me. I'm hungry. Let's go eat. I want to hurry back and get going on the prototype design.

Discussion Questions

1. How would you characterize the focus of the design phase of this project?
2. How could Sandra and Bob present their hardware and software to the managers without overwhelming them with technical jargon?
3. Why would Sandra want to commit to prototyping (building models) as the approach to use in completing the design and integration phase for their project?

and *web-centric applications*. This includes the emergence of the Internet, corporate intranets, and intercorporate extranets as legitimate application architectures.
- **Improved Coverage of Automated Tools:** The use of automated tools (such as CASE and RAD) for systems analysis, design, and construction is once again reinforced throughout the book. Some of the tools demonstrated in the sixth edition include *Visio Professional, System Architect, Project*, and *Visual Basic*.
- **Better Project Management Coverage:** The project management chapter has been updated to include more coverage of CMM and industry usage. Chapter 4 introduces the concepts of a project office and virtual teaming and includes additional coverage of risk management, change management, and expectations management.

Pedagogical Use of Color

The sixth edition continues the use of full color applied to an adaptation of Zachman's *Framework for Information Systems Architecture*. The color mappings are displayed in the inside front cover of the textbook.

The information systems building blocks matrix uses these colors to introduce recurring concepts. System models then reinforce those concepts with a consistent use of the same colors.

Organization

Systems Analysis and Design Methods, sixth edition, is divided into four parts. The text's organization is flexible enough to allow instructors to omit and resequence chapters according to what they feel is important to their audience. Every effort has been made to decouple chapters from one another as much as possible to assist in resequencing the material—even to the extent of reintroducing selected concepts and terminology.

Part One, *The Context of Systems Development Projects,* presents the information systems development scenario and process. Chapters 1 through 4 introduce the student to systems analysts, other project team members (including users and management), information systems building blocks (based on the Zachman framework), a

Information Systems Framework
Color is used consistently throughout the text's framework to introduce recurring concepts.

represents methods

represents data and/or knowledge

represents process

represents communication/interface

represents people

contemporary systems development life cycle, and project management. Part One can be covered relatively quickly. Some readers may prefer to omit project management or delay it until the end of the book.

Part Two, *Systems Analysis Methods,* covers the front-end life-cycle activities, tools, and techniques for analyzing business problems, specifying business requirements for an information system, and proposing a business and system solution. Coverage in Chapters 5 through 11 includes requirements gathering, use cases, data modeling with entity-relationship diagrams, process modeling with data flow diagrams, solution identification and the system proposal, and object-oriented analysis.

Part Three, *Systems Design Methods*, covers the middle life-cycle activities, tools, and techniques. Chapters 12 through 18 include coverage of both general and detailed design, with a particular emphasis on application architecture, rapid development and prototyping, external design (inputs, outputs, and interfaces), internal design (e.g., database and software engineering), and object-oriented design.

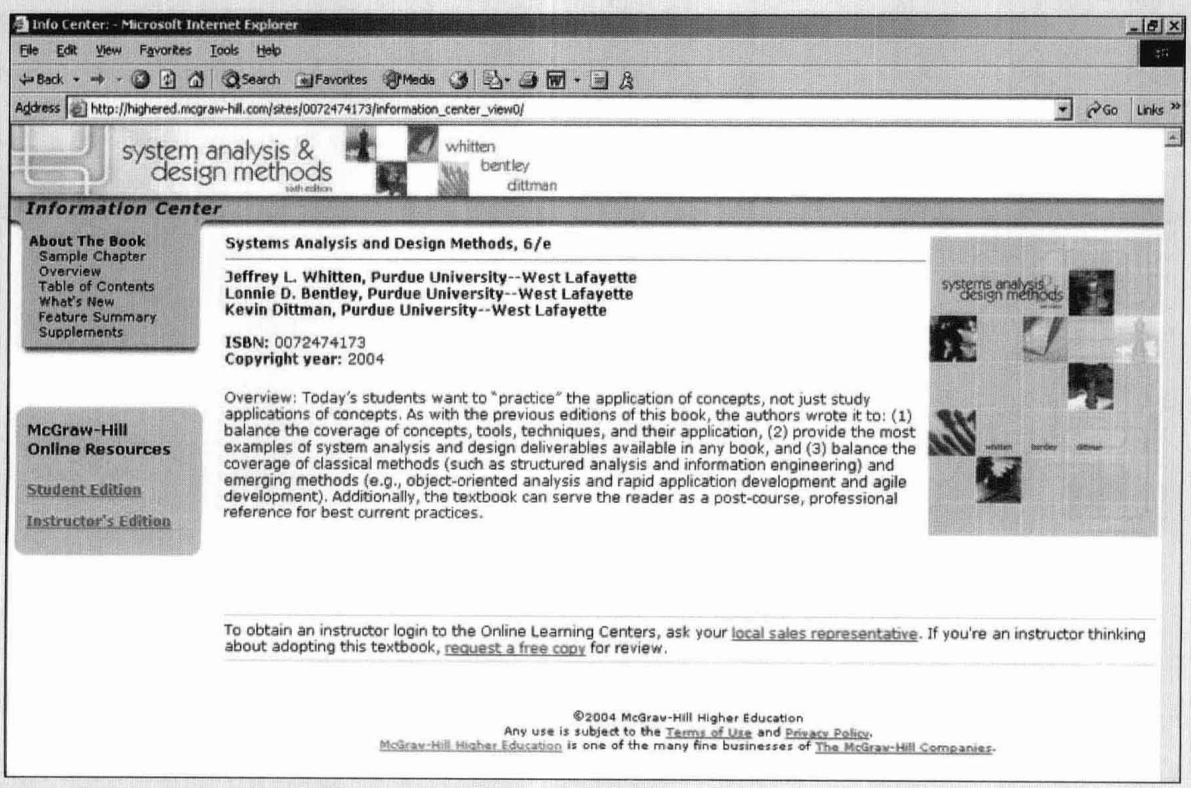
Part Four, *Beyond Systems Analysis and Design*, is a capstone unit that places systems analysis and design into perspective by surveying the back-end life-cycle activities. Specifically, Chapters 19 and 20 examine system implementation, support, maintenance, and reengineering.

Supplements and Instructional Resources

It has always been our intent to provide a complete course, not just a textbook. We are especially excited about this edition's comprehensive support package. It includes web-hosted support, software bundles, and other resources for both the student and the instructor. The supplements for the sixth edition include the following components.

Website/OLC

A completely redesigned website provides easy-to-find resources for instructors and students.



For the Instructor

Website/OLC

The book's website at www.mhhe.com/whitten provides resources for instructors and students using the text. The Online Learning Center (OLC) builds on the book's pedagogy and features with self-assessment quizzes, extra material not found in the text, web links, and other resources. The instructor side of the site offers a *secure* location for downloading the latest supplemental resources.

Instructor's Manual with PowerPoint Presentations

The instructor's manual is offered on the *Instructor's CD-ROM*, as well as on the book's website. This manual includes course planning materials, teaching guidelines and PowerPoint slides, templates, and answers to end-of-chapter problems, exercises, and minicases.

The PowerPoint presentations on the CD-ROM include over 400 slides. All slides are complete with instructor notes that provide teaching guidelines and tips. Instructors can (1) pick and choose the slides they wish to use, (2) customize slides to their own preferences, and (3) add new slides. Slides can be organized into electronic presentations or be printed as transparencies or transparency masters.

Test Bank

The *Instructor's CD-ROM* also includes an electronic test bank covering all the chapters. Computerized/Network Testing with Brownstone Diploma software is fully networkable for LAN test administration. Each chapter offers 75 questions in the following formats: true/false, multiple choice, sentence completion, and matching. The test bank and answers are cross-referenced to the page numbers in the textbook. A level-of-difficulty rating is also assigned to each question.

Packages

Student Resource CD

Each text includes a student CD with two case projects, templates and forms for the projects, the same PowerPoint® slides provided to the instructor, and a 120-day evaluation copy of **Microsoft Project**® accompanied by a step-by-step tutorial.

System Architect Student Edition Version 8

An optional package combines the textbook, Student Resource CD, and a student version of System Architect. System Architect is a powerful, repository-based enterprise modeling tool which supports a comprehensive set of diagramming techniques and features including: all nine UML diagram types, business enterprise modeling, data modeling, business modeling with IDEFO and IDEF3 notations, plus many more.

Visible Analyst Workbench

Another optional package combines the textbook, Student Resource CD, and Visible Analyst Workbench. This tool integrates business function analysis, data modeling and database design, process modeling, and object modeling in one easy-to-use package. Print versions of each case can be ordered through McGraw-Hill's Custom Publishing group by visiting www.primiscontentcenter.com. A *build your own project* model is retained for instructors and students who want to maximize value by leveraging students' past and current work experience or for use with a live-client project.

Primis Content Center

Primis Online

Print versions of projects and cases, as well as other MIS content, can be ordered through McGraw-Hill's Custom Publishing Group.

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Jeffrey L. Whitten
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Kevin C. Dittman

Brief Contents

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