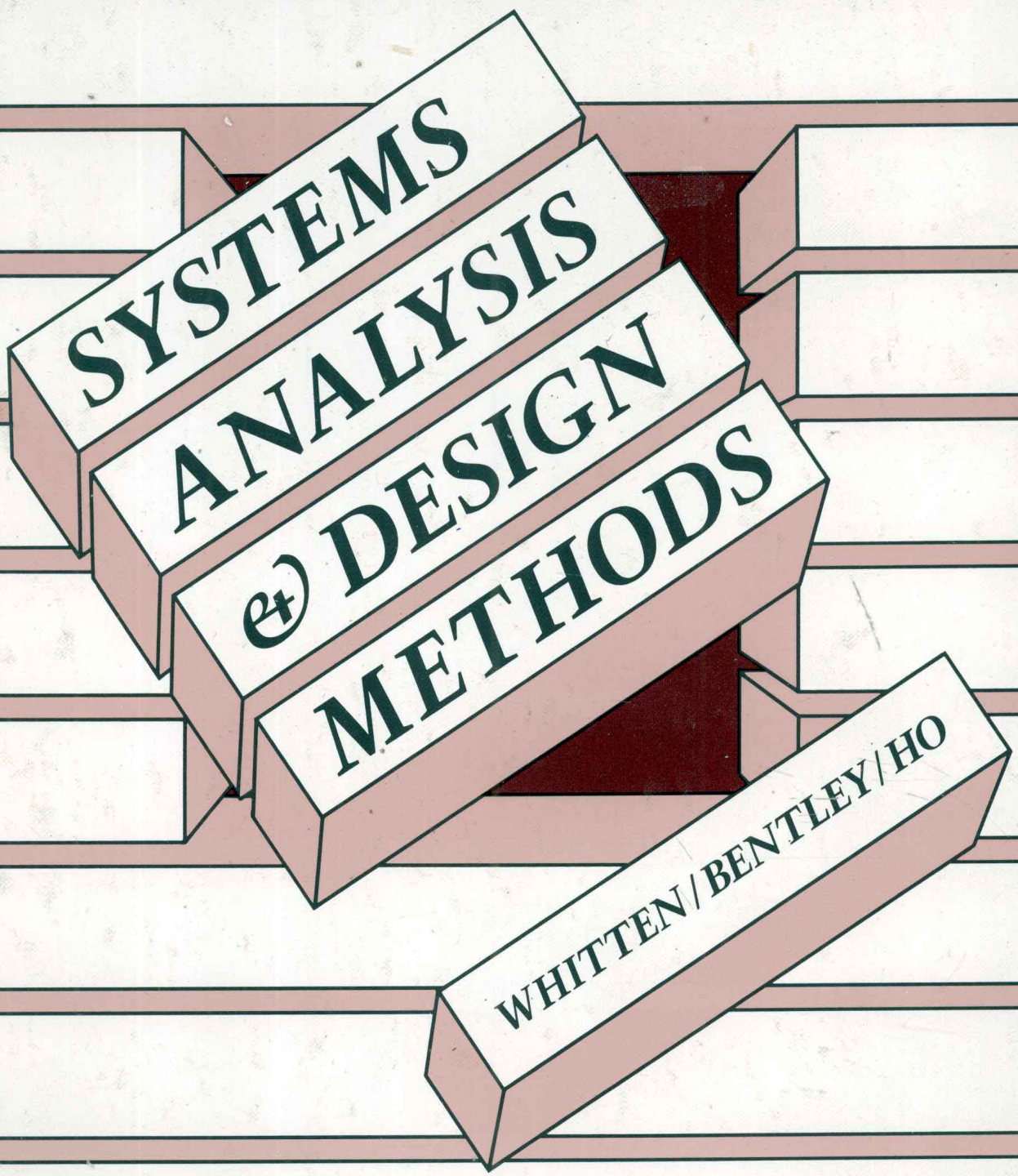
SYSTEMS
ANALYSIS
& DESIGN
METHODS
WHITTEN / BENTLEY / HO

SYSTEMS ANALYSIS & DESIGN METHODS

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Dedication

To my Mother and Father, who have always been my source of inspiration.—Jeff

To my lovely wife Cheryl and son Robert.—Lonnie

To Jeff and Lonnie, who are accomplishing what we believe.—Tom

To the students of the Computer Technology Department. May all your experiences be successes.—Jeff, Lonnie, and Tom

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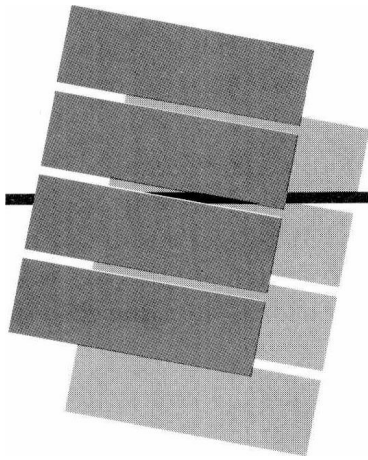

Preface

The Intended Audience for this Book

Systems Analysis and Design Methods is intended to support a practical first course in computer information systems development. This course is normally taught at the sophomore or junior level in two and four year colleges and trade schools. We recommend that students have taken an introductory data processing or computer concepts course and at least one computer programming course before using this book. The book can be used for any introductory systems course in either the DPMA, ACM, or independent computer science or computer information systems curriculum.

Why We Wrote This Book

Today's students have become "consumer-oriented"—they want their money's worth for every course. They expect to walk away from a course with more than just a grade and the promise that someday they'll appreciate the concepts and knowledge. They want to leave a course having practiced and mastered career-oriented skills. Thus, like most instructors, we require practical projects for our systems analysis and design course. Our enthusiasm for teaching this subject, however, has been tempered by student and instructor dissatisfaction with the available textbooks. We wrote this book to solve the problems we found in other books. Specifically, we note the following:

- *Many books are too conceptual.* Students perceive concepts as "fillers." Actually most books do reinforce the concepts, but this reinforcement is not immediately apparent to the naive and inexperienced student.
- *Other books are very practical, but too mechanical.* These books leave students with the impression that systems analysis is only tools and techniques, and they do not get a sense of the "people side" of systems analysis and design—working with users, resolving conflicts, facing frustrations, fulfilling responsibilities to users.
- *Most books perpetuate the myth that classical and structured tools are mutually exclusive.* To the practitioner, nothing could be further from the truth. Both classical and structured tools and techniques offer advantages and disadvantages. Furthermore, they can and should be applied in a complementary strategy to build more effective information systems.
- *Virtually all books lack sufficient examples to demonstrate the practical requirements of projects.* Students consistently complain that examples are too few, too simple, not interrelated, etc. This problem places tremendous office and classtime burdens on faculty, who feel compelled to "fill in the holes."
- *Most books do not offer a glimpse into the future of systems work.* The next generation of systems analysis and design will be very different from the current generation. Students know this because they read trade journals regularly; but they find correlating the trends with specific jobs and career options difficult, as the trade journals are written to a more experienced audience.

Why We Think You Should Consider This Book

Like most authors, we are excited about our book. We really believe that it is different and that you should consider adopting this textbook for your course because:

- *Instructors provided market research for this book.* Before we began writing our publisher solicited more than 1500 detailed questionnaires from systems analysis and design instructors all over the country. Their responses helped us appreciate the variety in systems analysis and design courses and significantly in-

fluenced the structure and content of our work. This book reflects what instructors want.

- *This book is more complete than other texts.* We cover several subjects that receive no coverage or only partial coverage in many other books. For example, we provide *entire* chapters on:
  - Terminal dialogue design for on-line systems
  - Data dictionaries and codes
  - Data flow diagrams
  - On-line systems design
  - Interpersonal skills
- *We present both concepts and tools as important to systems analysis and design.* The book's organization provides a solid learning path from concepts and trends to tools and techniques. Concepts are reinforced throughout the book via a visual model (the pyramid) and via the systems development life cycle orientation.
- *Our book is skills oriented and practical, but not mechanical.* We emphasize the role of the analyst, as well as people skills, human engineering considerations and user interaction — so necessary throughout the systems development life cycle.
- *We integrate the use of classical and structured tools and techniques.* Students are not likely to graduate into the pure structured shop, pure classical shop, or any other strict advocate of a single methodology. So, unlike any other book, we show how to make the transition from the newer structured tools of systems analysis to the tried-and-true tools of classical systems design. Further, this is the only book that demonstrates the packaging of classical design specifications around the tools and techniques of structured design.
- *We have included many more examples than other systems texts.* Reviewers have consistently noted the abundance of practical examples provided by this text. Students learn by doing; any good manager will tell you (and every instructor knows) that employees (and students) can't master something that hasn't been adequately demonstrated.
- *This book is up to date and points to the future of systems analysis and design.* We cover (not just mention) all the latest tools and topics. Through our *Next Generation* box feature we give valuable insight into future applications, methods, tools and

techniques — such as prototyping, productivity tools and information systems issues. The *Next Generation* is intended to be more thought-provoking than informative and to sensitize students to the need to "keep current" in this rapidly changing field.

- *This book offers flexibility of topic coverage.* Specialized skills that overlap multiple phases of systems development (such as fact finding, cost-benefit analysis, interpersonal communications and so on) or that are not included in all first courses are presented as "modules" in a separate unit that may be taught any time after Chapter 5.

- *Our in-text learning aids have been carefully developed to maximize student learning:*
  1. *Minicases.* Most chapters begin with a minicase and discussion questions to sensitize the reader to the chapter's issues. Some cases demonstrate successes and others demonstrate failures. A few cases issue challenges that intentionally present a problem to students — a problem that can be solved by reading the chapter.
  2. *What Will You Learn in This Chapter?* Each chapter includes behavioral objectives toward which the student can strive. These objectives are specifically tested via the problems and exercises at the end of the chapters and modules. The correspondence between the objectives and the problems and exercises is documented in the Instructor's Guide.
  3. *Problems and Exercises.* Each chapter includes problems and exercises that are specifically patterned after the behavioral objectives for that chapter. Most problems and exercises are designed so they won't burn themselves out — that is, so their effectiveness is not diminished by the buildup of students' files containing answers. This is accomplished by having the student draw upon previous or current work experience, or research and interviews. Several problems offer no single, correct solution and call for some subjective analysis.
  4. *Annotated References and Suggested Readings.* This section is more than a bibliography. Many references are annotated with the authors' insights into their favorite books, some of them competitors.
  5. *A Running Case Study — Analysts in Action.* This case study features a typical project presented in eight episodes. A run-

ning case is not a unique concept, but "Analysts in Action" has two unique and noteworthy differences:

- The case emphasizes the people interaction of systems work, especially interaction between analysts and users. Tools and techniques are demonstrated, but not emphasized, in the episodes.
- The episodes introduce rather than reinforce chapter content to enhance student motivation. The student, having seen the tool in the context of the working environment, is more highly motivated to master that tool.

- *We have written the book using a lively, conversational tone.* Today's students often lose interest in textbooks because they are written in a dry, factual tone. We see no reason to tarnish an exciting subject by writing in a dull, academic style. Therefore, we wrote this text in a conversational, "talk with you, not at you" tone. By making the material more interesting as well as informative and instructional, we believe this text will maintain students' reading interest over a longer period of time.

We hope the reasons above will convince you to consider this book. We hope also that you will discover it to be the systems analysis and design book you've been waiting for.

How to Use This Book

Systems Analysis and Design Methods is divided into four parts. The first three parts are normally covered in sequence although some instructors may prefer to resequence some chapters. Part One, "Systems Anslysis and Design: Concepts, Philosophies, and Trends," presents the information systems development situation. These chapters introduce the systems analyst career option, modern information systems functions and capabilities, and the systems development life cycle. We take great comfort in the fact that the concepts underlying today's trends are not different from those we learned as students — that certainly says something for concepts. We add interest to the presentation of these concepts through the use of practical examples that demonstrate the current state-of-practice in the field. To reinforce concepts, two *visual* models are developed — the information system pyramid and the life cycle. These visual models are repeated throughout the text to reinforce the concepts as they are applied in the skill-oriented chapters.

Parts Two and Three present "Systems Analysis Tools and Techniques" and "Systems Design and Implementation Tools and Techniques." We organized the chapters around the proven roadpath to successful systems, the systems development life cycle. Each part begins with a chapter that takes a more detailed look at the appropriate phases of the life cycle. Subsequent chapters develop specific skills that the student can immediately apply to projects and problems. We place considerable emphasis on the business perspective and human engineering aspects of systems anslysis and design.

Part Four is quite unique! Market research indicated that a set of skills and topics is included in some introductory systems courses but not in others (such as data base, cost/benefit analysis and project management). Our research indicated further that because these skills and topics overlap the traditional analysis, design, and implementation phases, different instructors prefer to introduce the material at different points during the course. We organized these subjects, therefore, into self-contained modules, Part Four. Instructors may elect to cover none or all of the modules, may introduce them at their discretion, and may prefer to review any module at other appropriate times during the course. Any prerequisite chapters are mentioned at the beginning of the modules.

Additional course design alternatives and textbook use guidelines may be found in the *Instructor's Guide* that accompanies our text.

Supplements

It is our purpose to provide instructors with a course, not just a book. The large numbers of part-time instructors, teaching assistants, overworked researchers, and adjunct faculty motivated us to assemble a powerful supplements package.

Instructor's Guide

Not just your everyday combination of key terms, topical outline, problem answers, and transparency masters! Instead, we've written an instructor's guide with substance. Our guide includes:

- *Course planning, design, scheduling, and control suggestions* for both quarter and semester plans of study.
- *Textbook conversion aids* to help instructors convert from their current text to Whitten/Bentley/Ho.

- *Lesson planning guidelines* that offer numerous options for using classroom time. Lessons are designed around student behavioral objectives. For each objective, alternative classroom approaches (i.e., lecture, discussion, lab, workshop, demonstration) are directed to the objective. Evaluation mechanisms, other than those in the book and the *Projects and Cases* supplement, are offered. Instructors can build interesting and varied lessons around these guidelines.
- *Additional references* for the instructor's preparation.
- *Answers or answer guidelines* for textbook discussion questions, challenges, problems, and exercises.
- *Guidelines for using the Projects and Cases supplement.*
- *Chapter enhancements* for higher level classes or very motivated students.
- *Blank forms and charts* with duplication permission. (Permission to duplicate is contingent upon adoption of the textbook or the *Projects and Cases* supplement.)
- *100 transparency masters* of (1) key graphics that appear in the book, (2) of adaptations of textbook graphics, and (3) of totally new illustrations.

Projects and Cases

Not just a case book! The best designed casebooks are usually flawed. This is not the author's fault; it's a problem with the concept of a casebook itself. The author of a case is trying to distill the complexities of a realistic, practical situation and put them on paper using the English language, a tool that analysts have long since abandoned as ambiguous. As a result, cases often contain omissions and discrepancies that the instructor is forced to resolve. Perhaps it's realistic to leave holes in a case, but the instructor often pays the price.

We offer an alternative that has been class tested and proven for ten semesters! Our *Projects and Cases* offers the following distinctive features:

- *Build Your Own Case.* A controlled approach allows students to build a systems analysis and design project from their own work experience (which doesn't have to be in data processing). Students' familiarity with the business environment increases their interest and frees the instructor from case development.

Case development results from the direct application of the concepts and philosophies found in Part One of the text. Meanwhile, carefully conceived guidelines ensure that each student's case is equivalent in size and complexity. These guidelines permit both individual and team projects.

- *Adapt a Case.* Students are provided with an overview of traditional commercial systems applications. Through directed research, the student establishes an industry and business situation using the concepts in Part One of the textbook. Once again, the burden of case development is on the student, who takes an active role in the project's direction.
- *Programming Instruction Cases.* Computer programming instructors often spend as much time debugging their assignment specifications for the students as they do teaching the art of computer programming. This project option directs a small team of students to develop thorough programming assignment specifications using an instructor's course goals and objectives.
- *Milestones.* For each of the above options, this supplement is divided into project milestones that are cross-referenced to our textbook as well as selected other texts. Each milestone describes the assignment and provides a final checklist for common errors and omissions.
- *Forms and Charts.* Blank forms and charts with duplication permission are provided. (Permission to duplicate is contingent upon adoption of the textbook or the *Projects and Cases.*)

Test Bank

A written test bank includes 3000 items using the following formats:

- True/False
- Multiple Choice
- Sentence Completion
- Matching

The test bank includes both correct answers and a unique feature — explanations or rationales for incorrect answers. A computerized testing package, *QUESTBANK,* is available from our publisher for adopters.

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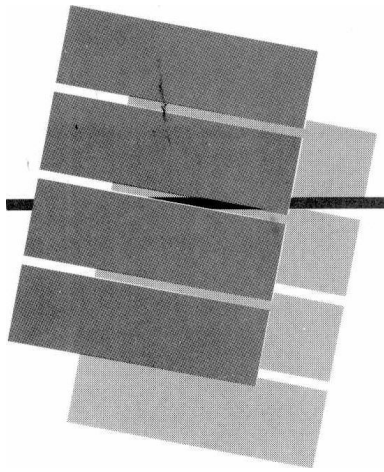
We hope we haven't forgotten anyone. And we assume full responsibility for any inadequacies or errors in this text. Any comments, criticisms, suggestions, or improvements are welcome and appreciated. Write to us in care of Times Mirror/Mosby, 4633 Old Ironsides Drive, Suite 410, Santa Clara, CA 95054.

We think that if you compare *Systems Analysis and Design Methods* to other texts, you will truly "discover the difference." And now we must start the sequel, an exciting, unique approach to the structured systems analysis and design methodology. No rest for the weary. . . .

Jeff Whitten
Lonnie Bentley
Tom Ho



Contents in Brief