INFORMATION SYSTEMS MANAGEMENT IN PRACTICE

Third Edition

Ralph H. Sprague, Jr.
Barbara C. McNurlin

INFORMATION SYSTEMS MANAGEMENT IN PRACTICE

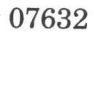
Third Edition

Ralph H. Sprague, Jr.

University of Hawaii

Barbara C. McNurlin

Writer – Information Systems



PRENTICE HALL, Englewood Cliffs, New Jersey 07632

Library of Congress Cataloging–in–Publication Data
Information systems management in practice /Ralph H.
Sprague, Jr., Barbara C. McNurlin. — 3rd ed.
p. cm.
Includes bibliographical references and index.
ISBN 0-13-465477-3 :
1. Management information systems. 2. Information resources management.
I. Sprague, Ralph H. II. McNurlin,.Barbara C.
T58.64.I54 1993 92-37505
658.4'038—dc20 CIP

Editorial/ProductionSupervision: *Kris Ann E. Cappelluti*
Acquisitions Editor: *P. J. Boardman*
Prepress Buyer: *Trudy Pisciotti*
Manufacturing Buyer: *Patrice Fraccio*
Reprint Editor: *Virginia Livsey*
Electronic Page Makeup: *John Jordan*

© 1993 by Barbara C. McNurlin
Published by Prentice-Hall, Inc.
A Simon & Schuster Company
Englewood Cliffs, New Jersey 07632

All rights reserved. No part of this book may be
reproduced, in any form or by any means,
without permission in writing from the publisher.

Printed in the United States of America

10 9 8 7 6 5 4 3

ISBN 0-13-465477-3

Prentice-Hall International (UK) Limited, London
Prentice-Hall of Australia Pty. Limited, Sydney
Prentice-Hall Canada Inc., Toronto
Prentice-Hall Hispanoamericana, S.A., Mexico
Prentice-Hall of India Private Limited, New Delhi
Prentice-Hall of Japan, Inc., Tokyo
Simon & Schuster Asia Pte. Ltd., Singapore
Editora Prentice-Hall do Brasil, Ltda., Rio de Janeiro

Preface

This book deals with the management of information technology (IT) as it is being practiced in organizations today. Successfully managing IT has become crucial for several reasons:

- Information technology is now a strategic asset that is being used to mold competitive strategies and change organizational processes.
- The situations in which organizations are applying IT have increased in complexity, including more inter-organizational environments.
- The complexity and capabilities of IT are also increasing, at an increasing rate.
- As IT and its uses become more complex, developing strategies and systems to "deliver" the technology has become more difficult.

The net result is a growing need for guidance on the issues, strategies, and tactics for managing the use of IT. To partially satisfy this need, universities and colleges are developing courses that focus on the management of information technology. Textual material for these courses has been sparse for two particularly troublesome reasons.

First, IT is changing so rapidly that textbook authors, technicians, practitioners, researchers, and academics are having a difficult time staying current. For example, in just the past three years, since the second edition of this book was published, the IT field has seen a major revolution in computing architectures (from mainframe-centered to workstation-based) and uses of IT (from outward-looking strategic uses to inward-looking reengineering of business processes). These are just two of the recent upheavals. As a result, courses have had to rely on periodical literature and newspapers.

Second, the principles and strategies of effective management are evolving out of the experiences of practicing managers. Merely collecting reports from the current literature fails to provide the interaction to articulate and codify these principles. Current developments and experiences need interpretation and coalescence to provide the guidance that new and existing managers need to further develop their knowledge and managerial skills.

CONTRIBUTION OF THIS BOOK

We believe this book makes a unique contribution to both of these problems. The primary resource for this book is work we recently performed for several organizations—*I/S Analyzer*, Andersen Consulting, Nielsen Advanced Information Technology Center, Institute for the Future, and Office of the Future. Our writing for these organizations does not merely report current developments and practices, it includes thoughtful interpretation, to provide guidance, principles, and strategies for information systems executives.

Our objective in this book is to capture the material of most current importance to information systems executives—organizing IT around a framework that provides guidance for information systems management. A key element of our writing continues to be company case examples. This book includes over 50 company case examples.

USE OF THIS BOOK BY PRACTICING MANAGERS AND CONSULTANTS

In the management of information technology, this book is useful to several levels of managers.

1. Senior executives who want an overview of the issues and strategies in managing IT, with examples of what other companies are doing
2. Information systems executives who must implement IT as a strategic resource, to help their organizations attain their overall goals and objectives
3. Information systems managers who are responsible for major technical areas, such as system development, technology planning, and operations
4. Managers of functional units who (1) want to better understand the issues and processes of providing IT support for their areas of responsibility, or (2) are now responsible for overseeing the management of IT in their function

We believe that practicing managers of all types will find this book valuable. By focusing on issues and strategies, while explaining technical concepts, this book provides an overview of information systems management for corporate executives and managers. By combining the experiences of successful executives in "the real world," this book provides a unique perspective for all information systems managers.

Consultants to executives and managers will also find this book a useful reference, for staying up-to-date on important current issues in the field.

此为试读，需要完整PDF请访问：www.ertongbook.com

USE OF THIS BOOK AS A TEXT

Future information systems managers who are graduate or undergraduate students will find that this book presents a view of what "the real world" has in store. As a text, it is intended for students who have had at least one information systems course.

At the graduate level, it serves as a second course, beyond the required MIS course. It is especially well suited for the final course in a graduate curriculum on information systems management. In this course, the book gives students conceptual and practical guidelines for dealing with the management of the modern information systems function.

At the undergraduate level, the book can serve as a text for a course dealing specifically with the management of IT, or in the capstone course that summarizes the practice of information systems for students about to begin their careers. Most undergraduate majors in MIS take entry level positions in the information systems department, but their careers will lead them into management. In the short term, they will work with information systems managers who are facing the problems and using the principles dealt with in this book.

This book is not particularly aimed at students majoring in other areas, although non-information systems majors are taking information systems courses in increasing numbers, to better understand how to deal with systems professionals. The chapters on the strategic use of information systems, the expanding universe of computing, system development, and people issues, will be especially pertinent to them.

At the end of each chapter are three types of questions and exercises to reinforce the material in the text.

- *Review questions* are based directly on the material in the chapter, allowing the reader to assess comprehension of the chapter's key principles, topics, and ideas.
- *Discussion questions* are based on one or two topics in the chapter for which there is a legitimate basis for a difference of opinion. These questions focus discussion on these issues when the book is used in a seminar or classroom setting.
- *Exercises* provide an opportunity for the reader to put some of the concepts and ideas into practice on a small scale. In particular, one exercise in each chapter requires a student, or a team of students, to visit a local company and discover how the ideas in the chapter are being implemented in that company.

THE INSTRUCTOR'S GUIDE

We accompany this third edition with an Instructor's Guide, prepared by Jerome McBride of Marist College in Poughkeepsie, New York. The purposes of the guide are (1) to help instructors prepare a strategy and outline for conducting an advanced systems course using this text, and (2) to provide support materials and techniques to enhance the course.

We believe there are five approaches for using this text. The five course modes are:

- A lecture-based course
- A seminar-based course
- A directed study course
- An independent study course
- An action research course

In the Instructor's Guide, McBride suggests some interesting resources to use in these different course approaches. For example, he explains how he has used a computer-based simulation game to help his students understand the consequences of their actions, as they try to introduce technology innovation into an organization.

The Instructor's Guide includes:

1. Outlines for the five course approaches
2. An overview for each chapter
4. References to Harvard Business School case studies for each chapter
5. Transparency masters for all the figures in the text
6. Suggestions on how to conduct site visit exercises
7. Several sample syllabi
8. An approach to using simulation software
9. Critical questions for each chapter, and how to create them

These critical questions deserve a short explanation. Like the discussion questions in the text, critical questions are designed to stimulate critical thinking and discussion among students. McBride has his students create critical questions for each chapter as part of their homework. In the Instructor's Guide, we present critical questions for each chapter, as well as an explanation of how McBride helps his students create them, thereby stimulating their critical thinking.

The advanced course in IT can be exciting—to teach and to take. We have provided the Instructor's Guide to make this one of those exciting courses.

FORMAT AND CONTENTS

This book is divided into six major parts, each dealing with a major portion of the field of information technology. Chapter One precedes Part I, because it serves as the framework around which the rest of the book is built. it traces the growing importance of information systems management and presents a conceptual model to show the key areas, how they fit together, and the principal issues for executives in each area. It also presents a case example of how these ideas are being implemented in a company.

Part I deals with leadership issues, including the role of information system executives, the strategic uses of the technology, and approaches to systems planning. Part II treats the all-important issues in managing the essential information technologies: distributed systems, telecommunications, information resources, and operations. Part III deals with managing system

development; its evolution continues to present management with important, yet risky, challenges. Part IV explores the expanding universe of computing, including the technologies and the needed support from the systems department. Part V deals with support systems, that is, systems aimed mainly at supporting professionals and work groups. And finally, Part VI treats several aspects of information technology's impact on people.

Throughout the book, our objectives have been to keep the material practical, to give examples, and to derive guidance for today's and tomorrow's information systems executives based on the experiences of others. To that end, chapters are sprinkled with company examples. These are not so much case studies that require "solutions" or recommendations; rather, they are case examples that show how companies have put some of the ideas in a chapter into practice.

ACKNOWLEDGMENTS

We wish to acknowledge the contribution of Richard G. Canning. His insight and foresight made this book possible. In the early 1960s, he recognized data processing executives' need for case studies, practical research findings, and thoughtful analysis. Through publishing and editing *EDP Analyzer* (now *I/S Analyzer*) from 1963 until his retirement in 1986, Dick Canning devoted a major portion of his professional career to that purpose. His ideas still permeate this book.

We also wish to thank the organizations that have allowed us to draw on work we performed for them—Andersen Consulting, *I/S Analyzer*, Nielsen Advanced Information Technology Center, Institute for the Future, and Office of the Future.

Finally, we thank Tracia McNurlin, who acted as our secretary. Without her assistance, this third edition would not have been completed so quickly.

Ralph H. Sprague, Jr.
Barbara Canning McNurlin
May, 1993

Contents

PREFACE xv

1 THE IMPORTANCE OF INFORMATION SYSTEMS MANAGEMENT 1

INTRODUCTION 1
A LITTLE HISTORY 2
The Classic Infrastructure, 3
Pressures for Integration, 5
THE TECHNOLOGY ENVIRONMENT 6
Hardware Trends, 6
Software Trends, 7
Data Trends, 8
Communication Trends, 9
THE BUSINESS ENVIRONMENT 10
The Changing Marketplace, 10
The Changing Work Environment, 12
THE MISSION OF INFORMATION SYSTEMS 13
A SIMPLE MODEL 14
A BETTER MODEL 16
The Technologies, 16
The Users, 17
Bridging the Gap, 18
INFORMATION SYSTEMS MANAGEMENT 21
The Information Systems Department, 21
ORGANIZATION OF THIS BOOK 21
Case Example: Mead Corporation, 23
QUESTIONS AND EXERCISES 33
REFERENCES 34

PART I LEADERSHIP ISSUES

2 INFORMATION SYSTEMS MANAGEMENT'S LEADERSHIP ROLE 35

INTRODUCTION 35

THE CIO'S RESPONSIBILITIES 38
- Understand the Business, 38
- Establish Systems Department Credibility, 42
- Increase the Technological Maturity of the Firm, 43
- Create a Vision of the Future and Sell It, 43
- Implement an Information System Architecture, 46
- *Case Example: The Boeing Company, 48*

THE EVOLVING SYSTEMS FUNCTION 51
- The Escalating Benefits of Information Systems, 52
- *Case Example: The SABRE System, 54*
- CEO's Attitudes Toward Information Systems, 54
- Where Are Systems Organizations Headed?, 57
- Building Relationships with Line Departments, 60
- *Case Example: Federal-Mogul, 62*

CONCLUSION 64

QUESTIONS AND EXERCISES 65

REFERENCES 66

3 THE STRATEGIC ROLE OF INFORMATION SYSTEMS 68

INTRODUCTION 68

AS COMPETITIVE TOOLS 69
- To Stay in Business, 69;
- *Case Example: The Shipping Industry, 71*
- To Gain Market Share, 72
- *Case Example: Federal Express, 72*
- Uncovering Strategic Uses of Systems, 78
- *Case Example: GTE, 80*

TO REENGINEER BUSINESS PROCESSES 82
- Where Are We Headed? 83
- Using Information Technology as a Catalyst for Change, 85
- *Case Example: Otis Elevator, 85*
- Principles for Guiding Business Reengineering, 87
- Lessons about Reengineering, 89;
- *Case Example: U.K. Department of Social Security, 90*
- The Role of the Systems Department, 93

FOR INTERORGANIZATIONAL LINKAGE 94
- Characteristics of Interorganizational Systems, 95
- Electronic Data Interchange, 97

Case Example: TradeNet, 98
Electronic Markets, 99
Case Example: TELCOT, 100
CONCLUSION 102
REVIEW QUESTIONS 102
DISCUSSION QUESTIONS 103
EXERCISES 103
REFERENCES 103

4 INFORMATION SYSTEMS PLANNING 105

INTRODUCTION 105
A Typical Planning Cycle, 106
Linking Business and Systems Planning, 107
VARIOUS APPROACHES TO SYSTEMS PLANNING 109
Stages of Growth, 109
Critical Success Factors, 110
Investment Strategy Analysis, 111
The Scenario Approach, 114
Case Example: Denny's Inc., 118
Linkage Analysis Planning, 119
Case Example: Electric Power Research Institute, 122
Creative Problem-Solving, 124
Enterprise Modeling, 126
Case Example: United Technologies Microelectronics Center, 127
CONCLUSION 136
REVIEW QUESTIONS 137
DISCUSSION QUESTIONS 138
EXERCISES 138
REFERENCES 138

***PART II* MANAGING THE ESSENTIAL TECHNOLOGIES**

5 DISTRIBUTED SYSTEMS: THE OVERALL ARCHITECTURE 140

INTRODUCTION 140
What Is a Distributed System? 141
Evolving toward Cooperative Processing, 144
Four Attributes of Distributed Systems, 147
The Changing Meaning of "Open Systems," 148
When to Distribute Computing Responsibilities, 149
Two Guiding Frameworks, 150

此为试读，需要完整PDF请访问：www.ertongbook.com

COOPERATIVE PROCESSING 155
Five Forms of Cooperative Processing, 155
Why Cooperative Processing Is Important, 156
Case Example: Northwest Airlines, 158
Components of Cooperative Systems, 161
Case Example: Charles Schwab & Co., 162
MIGRATING TO DISTRIBUTED SYSTEMS 165
CONCLUSION 167
REVIEW QUESTIONS 167
DISCUSSION QUESTION 168
EXERCISES 168
REFERENCES 168

6 BUILDING THE TELECOMMUNICATIONS HIGHWAY SYSTEM 169

INTRODUCTION 169
THE EVOLVING TELECOMMUNICATIONS SCENE 170
The Status of Telecommunications Today, 170
The Coming Era of Broadband, 174
The Promise of Wireless Communications, 179
BUILDING NETWORKS OF THE FUTURE: INTERNETS 182
Creating an Overall Architecture, 182
Emphasizing Connectivity, 184
OPEN SYSTEMS INTERCONNECTION (OSI) 188
Open Versus Closed Networks, 188
The OSI Model, 188
Migrating to OSI, 190
Case Example: Northrop's Research and Technology Center, 191
SUMMARY 193
QUESTIONS AND EXERCISES 193
REFERENCES 194

7 MANAGING INFORMATION RESOURCES 196

INTRODUCTION 196
GETTING CORPORATE DATA INTO SHAPE 197
The Problem: Inconsistent Data Definitions, 197
The Role of Data Administration, 198
Managing the Data Resource, 200
Case Example: MIT Center for Information Systems Research (CISR) Study, 200
THE EVOLUTION OF DATABASE MANAGEMENT SYSTEMS 206
The Three-Level Database Model, 206
Three Traditional Data Models, 208
Next-Generation Database Management Systems, 209

THE COMING CHALLENGE: DISTRIBUTING DATA 213
"True" Distributed Databases, 213
Technical Issues in Distributing Data, 216
Alternatives to "True" Distributed Databases, 218
TOWARD MANAGING INFORMATION 219
Four Types of Information, 220
Internal Record-Based Information, 221
Internal Document-Based Information, 221
External Record-Based Information, 222
Case Example: Profit Impact of Market Strategy (PIMS), 223
External Document-Based Information, 224
Emphasis on Information Management, 226
SUMMARY 226
REVIEW QUESTIONS 227
DISCUSSION QUESTIONS 227
EXERCISES 227
REFERENCES 228

8 MANAGING INFORMATION SYSTEMS OPERATIONS 230

INTRODUCTION 230
WHAT ARE OPERATIONS? 231
Why Talk about Operations? 231
Solving Operational Problems, 231
Operational Measures, 232
The Importance of Good Management, 232
IMPROVING DATA CENTER OPERATIONS 233
Running Efficient Data Centers, 234
Case Example: Mutual of Omaha, 235
Toward Unattended Computer Centers, 236
Case Example: US West, 240
OUTSOURCING INFORMATION SYSTEMS FUNCTIONS 242
The Driving Forces Behind Outsourcing, 243
The Expanding Scope of Vendor Options, 243
Contractual Choices in Outsourcing, 245
Recommendations to Management, 245
MANAGING TODAY'S COMPLEX NETWORKS 246
The Scope of Network Management, 246
Trends in Network Management, 247
Guidelines for Building a Network Management System, 250
DISASTER RECOVERY FOR DISTRIBUTED SYSTEMS 252
Using Internal Resources, 254
Summary, 256
Case Example: US West, 256
CONCLUSION 260
REVIEW QUESTIONS 260
DISCUSSION QUESTIONS 260
EXERCISES 261
REFERENCES 261

PART III MANAGING SYSTEM DEVELOPMENT

9 THE EVOLVING SYSTEM DEVELOPMENT SPECTRUM 263

INTRODUCTION 263
THE 1950s THROUGH THE 1970s 264
Goals of Traditional Structured Development, 265
Emphasis on the Early Phases, 266
THE EARLY 1980s 267
Fourth Generation Languages, 267
Software Prototyping, 268
Case Example: Santa Fe Railroad, 269
A Controversy: Evolution or Revolution? 271
THE LATE 1980s 272
Computer-Aided Software Engineering, 272
Case Example: Du Pont Cable Management Services, 274
Lessons Learned about CASE, 275
Object-Oriented Development, 278
Case Example: Brooklyn Union Gas, 281
THE EARLY 1990s 284
The Drive for Flexibility, 284
Building Open Applications, 285
Case Example: Owens-Corning Fiberglas, 291
CONCLUSION 295
REVIEW QUESTIONS 296
DISCUSSION QUESTION 296
EXERCISES 296
REFERENCES 297

10 MANAGEMENT ISSUES IN SYSTEM DEVELOPMENT 299

INTRODUCTION 299
HOW CAN PROGRAMMER PRODUCTIVITY BE MEASURED? 300
Function Point Analysis, 300
HOW CAN SYSTEM BENEFITS BE MEASURED? 302
Distinguish between the Different Roles of Systems, 303
Measure What Is Important to Management , 305
Use "Anchor Measures," 306
Assess Investments Across Organizational Levels, 307
Case Example: A Large Chemical Conglomerate, 307
Benefits of the HRIS System 308
HOW CAN HIGHER-QUALITY SYSTEMS BE DEVELOPED? 310
Manage the Data, 311
Focus on the "Right" Work, 312

Experiment with Promising New Ideas, 313
Case Example: Wiscope, 315
Reuse the Work of Others, 316
Case Example: KPL Gas Service, 317
Develop a Maintenance Strategy, 318
HOW CAN LEGACY SYSTEMS BE IMPROVED? 320
Rewrite Legacy Systems, 320
Replace Them with Purchased Packages, 320
Refurbish Legacy Systems, 321
Restructure Legacy Systems, 323
Reengineer Legacy Systems, 324
Case Example: GTE Directories, 325
The Blueprint Project, 326
A Reuse Project, 327
Rejuvenate Legacy Systems, 327
Case Example: ITT Diversified Credit Corporation, 327
CONCLUSION 329
REVIEW QUESTIONS 329
DISCUSSION QUESTIONS 330
EXERCISES 330
REFERENCES 331

PART IV MANAGING THE NEW UNIVERSE OF COMPUTING

11 THE EXPANDING UNIVERSE OF COMPUTING 333

INTRODUCTION 333
THE WORLD OF MOBILE COMPUTING 334
The Incredible, Shrinking Computer, 334
Case Example: Kraft Foodservice, 340
Wireless Wide Area Communication Systems, 340
The New Role of Electronic Mail, 342
Uses of Electronic Mail, 343
Types of Electronic Mail Systems, 344
THE IMPORTANCE OF MULTIMEDIA 344
Current Status and Future Direction, 345
Multimedia Tools, 345
Developing a Multimedia Application, 346
Two Future Multimedia Interfaces, 347
Case Example: Sabrevision, 348
Douglas Englebart's Ideas, 351
CONCLUSION 353
QUESTIONS AND EXERCISES 353
REFERENCES 354

12 SUPPORTING THE EXPANDING UNIVERSE OF COMPUTING 356

INTRODUCTION 356
SUPPORTING TRADITIONAL END USER COMPUTING 358
Yesterday's Response: Information Centers, 358
Today's Environment and Response, 359
Case Example: County of Los Angeles, California, 360
SERVING THE NEW END USERS 363
The New Frontier: Field Force Automation, 363
Case Example: Nissan Motor Corporation / USA, 363
The Next Frontier: Reaching Out to Consumers, 364
Case Example: Huntington Bankshares, 365
GUIDING THE EXPANSION OF ELECTRONIC MAIL 366
Create the Infrastructure, 367
Increase Awareness of Potential Uses and Benefits, 368
Build Some Mail-Enabled Applications, 369
ENCOURAGING USE OF MULTIMEDIA 370
To Cope with Complexity, 370
For a More Knowledgeable Staff, 372
Case Example: A Training Course from Codex, 373
Recommendations to Management, 374
SUMMARY 377
QUESTIONS AND EXERCISES 377
REFERENCES 378

***PART V* SUPPORT SYSTEMS**

13 DECISION SUPPORT SYSTEMS AND EXECUTIVE INFORMATION SYSTEMS 380

INTRODUCTION 380
DSS BACKGROUND 381
THE CURRENT STATUS OF DSS 383
Typical Examples, 383
The Role of Computer Graphics, 386
Case Example: Marine Terminals Corporation, 388
Spreadsheets for Decision Support, 389
Distributed DSS, 389
Intelligent DSS, 389
Summary, 390
EXECUTIVE INFORMATION SYSTEMS 390
Executives Do Use Computers! 390
Doing It Wrong, 392
CSFs for EIS, 393
Achieving Successful EIS, 394
Why Install an EIS? 394

What Should It Do? 395
What Data Sources? 396
Case Example: Lockheed-Georgia, 397
CONCLUSION 401
QUESTIONS AND EXERCISES 402
REFERENCES 403

14 GROUP SUPPORT SYSTEMS 404

INTRODUCTION 404
WHAT ARE GROUP SYSTEMS? 405
Case Example: Burr-Brown Corporation, 407
WHY ARE GROUP SYSTEMS IMPORTANT? 410
Teams: The Basis of Future Organizations? 410
Coordination Theory, 411
Group Computing as New Frontier, 412
Characteristics of Groups, 413
Types of Groups, 413
TYPES OF GROUP SUPPORT SYSTEMS 415
The Groupware Matrix, 415
The Technology Infrastructure, 416
Meeting Support, 417
Case Example: Boeing Aircraft, 421
Communication Support, 422
GUIDELINES FOR GROUP SUPPORT 424
Build on Electronic Mail, 424
Enhanced Electronic Mail 425
Support Frequent Communication, 427
Expect Changes in Group Work, 427
Accommodate Psychological Factors, 429
Be Sure the System Fits the Culture, 430
THE FUTURE 432
QUESTIONS AND EXERCISES 433
REFERENCES 434

15 THE GROWING IMPORTANCE OF INTELLIGENT SYSTEMS 436

INTRODUCTION 436
WHAT IS AN EXPERT SYSTEM? 437
Components of Expert Systems, 438
Knowledge Representation, 438
Case Example: Tulare County, California, 444
Degrees of Expertise, 446
Types of Expert Systems, 446

此为试读，需要完整PDF请访问：www.ertongbook.com