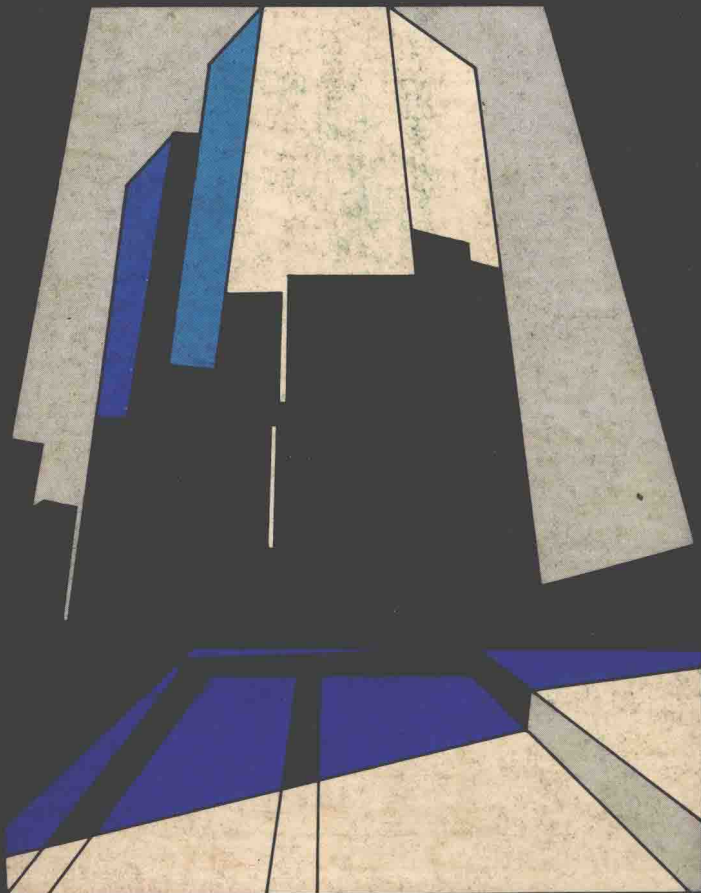


# Understanding Information Systems

Foundations  
for Control

Bonita J. Campbell



Wintthrop Management Series

# Understanding Information Systems

*Foundations  
for Control*

Bonita J. Campbell

Winthrop Publishers, Inc.  
Cambridge, Massachusetts

Library of Congress Cataloging in Publication Data

Campbell, Bonita J

Understanding information systems.

(Winthrop management series)

Includes bibliographical references.

1. Management information systems. I. Title.

HF5548.2.C24

658.4'03

77-4963

ISBN 0-87626-889-0

Cover illustration by Ruth Williams.

Photographs by Meg Malone.

Cartoons by David B. Close.

© 1977 by Winthrop Publishers, Inc.

17 Dunster Street, Cambridge, Massachusetts 02138

*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 2 1

# **Understanding Information Systems**

WINTHROP MANAGEMENT SERIES

William H. Brickner, *Series Editor*

BRICKNER AND COPE

*The Planning Process*

CAMPBELL

*Understanding Information Systems: Foundations for Control*

ENDS AND PAGE

*Organizational Team Building*

ROCKEY

*Communicating in Organizations*

SANFORD AND ADELMAN

*Management Decisions: A Behavioral Approach*

SCHAEFER

*The Motivation Process*

**To Gene**

---

# editor's preface

---

Energy crisis! Political crisis! Personal crisis! Economic crisis! . . . . . I believe they all have a common element: *mismanagement*. It may be mismanagement of resources, mismanagement of everyday activities, mismanagement of organizations large and small, or mismanagement of societies in general; however, it is becoming increasingly clear that many people do not manage well.

If we define management as planning and using resources such as time, money, energy, etc. to attain stated objectives (goals), then the ability to manage well can have a significant impact on almost every life experience. We conceived the Winthrop Management Series with the idea that the basic skills and principles necessary for successful managing are not complicated; almost anyone can learn them. With a basic understanding of these skills and principles, people can become more effective managers at all levels: in large organizations, in small groups, or in their personal lives.

WHO NEEDS 'EM? (MORE BOOKS ON MANAGEMENT,  
THAT IS)

We have directed the books in this series primarily toward those people who would like to do a better job of managing, yet who have neither the time nor the inclination to enroll in a full program of management courses at the university

level. The authors have written the books to be used individually, or as a set, in industrial training programs, community colleges, university extension classes, or as focused readings in undergraduate or graduate management courses. In addition, the authors hope that the books will provide useful self-study material for those people who learn on their own by reading daily.

Organizations in all areas of society are growing larger and more complex. As a result, individuals with a wide variety of backgrounds and vocations are recognizing the need to learn the principles of good management. Hopefully they can benefit from the Winthrop Management Series. Experienced professional managers also may see these volumes as an aid in successfully carrying out one of the most important managerial duties, that of helping subordinates to manage *their* jobs more effectively.

## WHAT THIS SERIES IS ABOUT

The books in the series are concerned with those skills which experienced managers find most critical for developing a successful managerial career. The results of a nationwide questionnaire to 266 top and middle managers in business, government, and nonprofit organizations are shown in the following table. The managers ranked these skills and per-

<i>Skills</i>		<i>Personal Attributes</i>	
Leadership and Motivation	18.7%*	Ability to Work with Others	22.5%*
Information Systems	11.6%	Drive, Energy	21.7%
Communication	11.2%	Adaptability to Change	11.9%
Understanding Human Behavior	10.8%	Intellectual Capacity	11.9%
Finance	10.4%	Ability to Communicate	10.4%
Awareness of Environment	7.1%	Integrity	8.4%
Planning	6.4%		

\*Shows relative weight assigned from 100% total.



sonal attributes as most important for long-term managerial success in the future.<sup>1</sup> Accordingly, the authors have examined many of these skills and attributes in these six series volumes:

1. *The Planning Process* by Brickner and Cope.
2. *Understanding Information Systems: Foundations for Control* by Campbell.
3. *Organizational Team Building* by Ends and Page.
4. *Communicating in Organizations* by Rockey.
5. *Management Decisions: A Behavioral Approach* by Sanford and Adelman.
6. *The Motivation Process* by Schaefer.

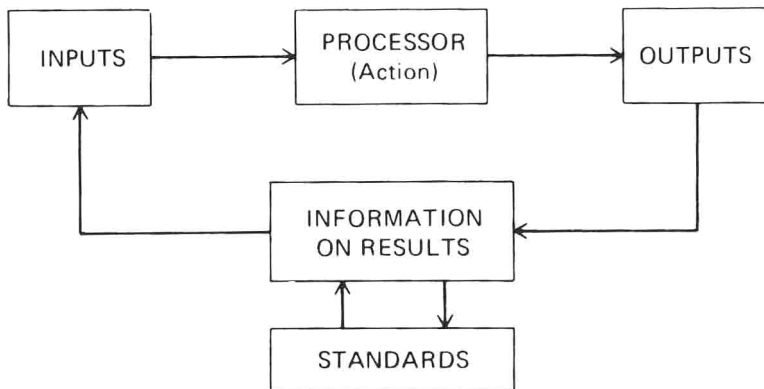
Communication, decision making, and the ability to motivate oneself and others are process skills important to all managers. The books on planning, organization building, and control through information systems include the most important functions that managers perform. Although the six books do not discuss all of the many topics involved in management, we feel that they cover the most important ones.

## MAJOR SERIES THEMES

One of the main themes of the Winthrop Management Series is the concept of *systems* or *processes*. Management is not a series of unrelated activities. Like the universe, management is an interlocking rational system governed by "laws." The fact that many of these laws are "undiscovered" should not detract from the principle that management is an ongoing process. This process involves inputs of resources and infor-

<sup>1</sup> Brickner, W.H. *The Managers of Today Look at Those of Tomorrow*. Presented at the National Meeting of the Academy of Management, Seattle, Wash., August, 1974.

mation, the shape and form of which are changed, resulting in some outcome. Information about the outcome (feedback) is then compared with the desired outcome (objective). If the comparison is unsatisfactory, the inputs or the processor are changed. The following diagram illustrates this concept:



Each of the topics covered in this series is actually a smaller system, or process, that is a part of the overall system of management.

Another key concept in organizing the material for these books is *Pareto's Law*. This "law" states that a relatively small percentage of the inputs creates a large percentage of the outcomes. (For example, 20 percent of a firm's customers may be responsible for 80 percent of its sales volume.) With regard to the series, each author has organized each book around a few specific ideas which he or she believes to be the major keys for successfully mastering each basic process discussed.

The application of principles and theories to real-world situations is an extremely difficult problem for many people. To help bridge the gap between theory and practice, each volume contains a *Panel Discussion* of several successful management practitioners. They are individuals with varied backgrounds who in their careers have successfully used whatever management process they were talking about. The

panelists addressed themselves to the problems and opportunities which could result from applying the theories discussed by the author in the preceding chapter of the book. The resulting dialogues are rich in insights and guides that can aid both novice and experienced managers.

## ACKNOWLEDGMENTS

Many people have been involved in the creation of the Winthrop Management Series. However, one person above all made it possible. My personal gratitude goes to Michael Meehan, our editor at Winthrop Publishers, Inc. Mike provided early encouragement when the series was but a faint idea. Subsequently as this idea became more tangible, he was willing to "put his money where his mouth is" and support the publishing of the six volumes.

The help which these books will provide to managers is the result of the unstinting efforts of a creative team of authors and panelists, each of whom contributed to the series the knowledge of a lifetime of managerial experience. They all took time out from very busy professional lives to share this knowledge with others. My thanks to each of them.

William H. Brickner  
Series Editor  
Los Altos, California

---

# author's preface

---

Three important ideas underlie the philosophical approach in this small volume:

1. Managers need information systems to control their operations.
2. Managers must understand information systems to use them effectively and efficiently.
3. Managers do not need to be experts in “computerese” to understand and use information systems.

The validity of these premises has been confirmed in courses that I have taught to managers and aspiring managers over the past several years. This volume is, in fact, based primarily on those courses.

We begin our inquiry into the topic of information systems by considering the concept of a system—something which means everything to everyone. We then consider the use of systems concepts in problem solving—something we generally refer to as the systems approach. Once we have thought about systems in general, it then becomes appropriate to discuss a particular type of system—an information system. What is an information system? How do we go about designing one? What is involved in analyzing one?

When we have attained a degree of comfort with information systems in general, we then consider information systems which just happen to have a computer in them. After

all, there are many such systems, they can be quite good for some applications, and we should feel comfortable with them. Finally, we consider the impact that information systems have had in the past and provide some speculation about future impact.

But that's not all! Those readers who are unfamiliar with "computerese" are invited to look at the Appendices. Appendix A provides an introduction to hardware—the monstrous machines; Appendix B provides an introduction to software—the programming of those monstrous machines.

As usual, I must accept full responsibility for both the virtues and the flaws in the content of this book. Nothing, however, is produced in a vacuum, and there are those whose assistance I wish to acknowledge. Dr. Harvey Adelman, of the School of Business and Management at Pepperdine University, and Dr. William H. Brickner, of the School of Business at San Jose State University, gave me the opportunity to write this volume. Dr. Ralph F. Miles, Jr., of the Jet Propulsion Laboratory at the California Institute of Technology, provided extremely valuable counsel. Mr. Dennis Tibbetts and Ms. Pat Wiggenghorn, both of the School of Engineering and Computer Science at California State University, Northridge, picked up the pieces many a time. Last, but by no means least, I wish to thank those who contributed their time and experience as panel members: Professor Nadine Malcolm, of the School of Engineering and Computer Science at California State University, Northridge; Dr. Edward Sanford, of the School of Business and Management at Pepperdine University; and Captain Oliver Taylor, of the Los Angeles County Sheriff's Department.

Bonita J. Campbell

# **Understanding Information Systems**

---

# contents

---

Editor's Preface xi

Author's Preface xvii

## one

<b>Basic Systems Concepts</b>	<b>1</b>
Learning Objectives	2
Introduction	2
What Is a System?	3
Basic Components of a System	6
The System and Its Environment	7
Basic Types of Systems	7
Using Systems Concepts	9
Summary	12
Glossary	13
Assignments	14
Panel Discussion	16

## two

<b>The Systems Approach</b>	<b>27</b>
Learning Objectives	28

Introduction	28
What Is the Systems Approach?	28
Steps in Applying the Systems Approach	32
A Note on Procedure	35
Summary	36
Glossary	37
Assignments	37
Panel Discussion	39

## **three**

### **Basic Concepts of Information Systems 43**

Learning Objectives	44
Introduction	44
Data and Information	44
The Role of Information in Decision Making	45
Data Processing	46
Information Systems	47
Levels of Management and Information	48
A General Information System Model	52
Summary	53
Glossary	54
Assignments	55
Panel Discussion	57

## **four**

### **Information Systems Analysis and Design 63**

Learning Objectives	64
Introduction	64
Information Systems Analysis	65



Performing an Analysis	67
Result of Analysis	72
Information Systems Design	72
Approaches to Design	73
The Design Process	73
General Considerations	75
Result of Design	77
Summary	77
Glossary	78
Assignments	79
Panel Discussion	82

## **five**

### **Information Systems and the Computer 89**

Learning Objectives	90
Introduction	90
Elements of a Computer-based Information System	91
The Integrated Data Base	92
Operation of the System	93
Management and the System	95
Summary	97
Glossary	97
Assignments	98
Panel Discussion	101

## **six**

### **Epilogue 113**

Panel Discussion	117
------------------	-----