Jack R. Meredith
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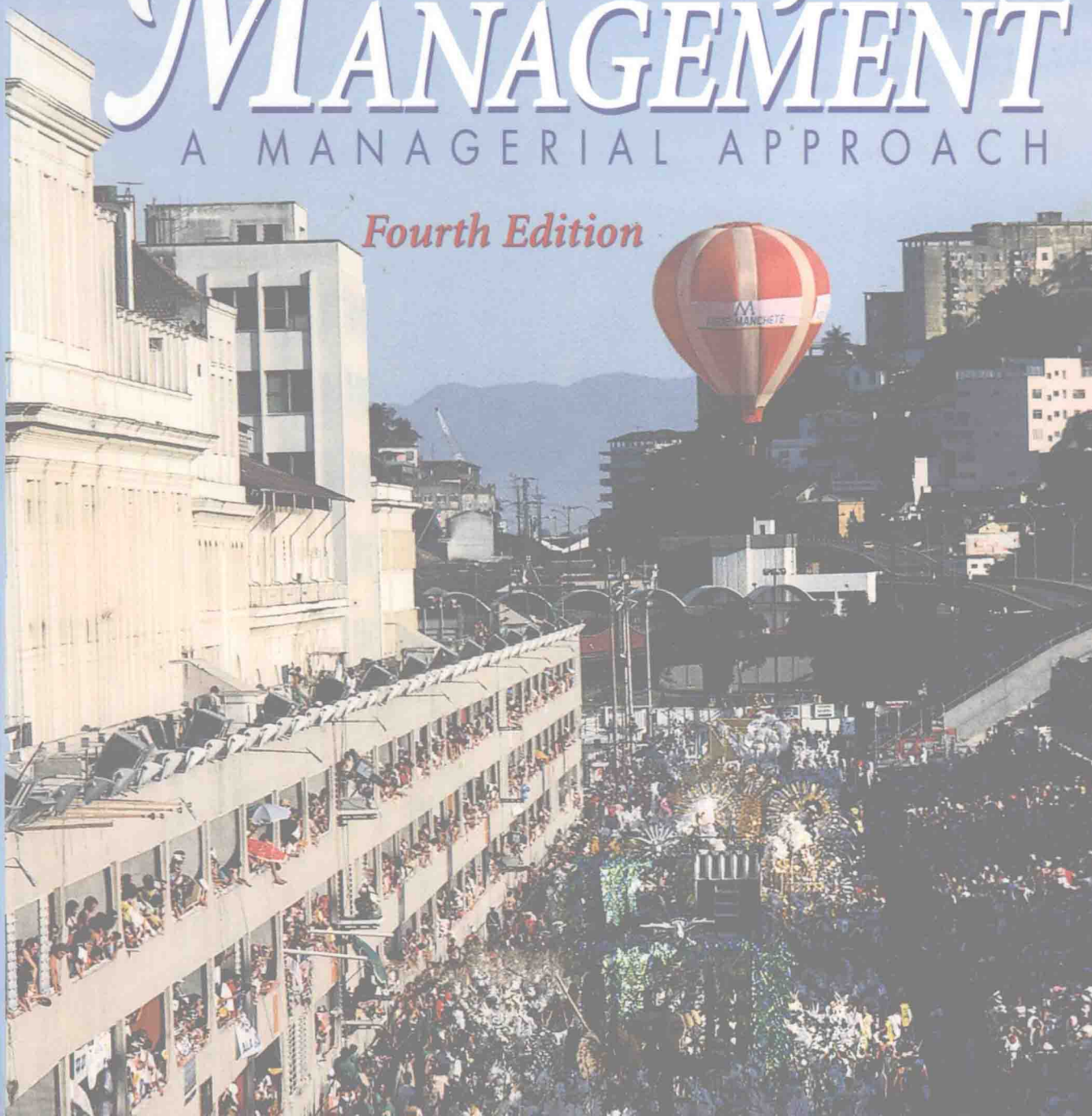
PROJECT MANAGEMENT

A MANAGERIAL APPROACH

Fourth Edition



FOURTH EDITION

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A MANAGERIAL APPROACH

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To Avery, who made me
a granddad while I
was still trying
to get used to the idea
of being a dad.
J. R. M.

To my seven children, with respect and love.
S. J. M., Jr.

Preface

APPROACH

The use of projects and project management continues to grow in our society and its organizations. We are able to achieve goals through project organization that could be achieved only with the greatest of difficulty if organized in traditional ways. Though project management has existed since before the days of the great pyramids, it has enjoyed a surge of popularity beginning in the 1960s. A project put U.S. astronaut Neil Armstrong on the moon. A project called Desert Storm freed the nation of Kuwait. An annual project brings us Girl Scout cookies every spring. The use of project management to accomplish the many and diverse aims of society's varied organizations continues to grow.

Businesses regularly use project management to accomplish unique outcomes with limited resources under critical time constraints. In the service sector of the economy, the use of project management to achieve an organization's goals is even more common. Advertising campaigns, voter registration drives, political campaigns, a family's annual summer vacation, and even seminars on the subject of project management are organized as projects. A relatively new growth area in the use of project management is the use of projects as a way of accomplishing organizational reorganization and change. Indeed, there is a rapid increase in the number of firms that use projects as the preferred way of accomplishing almost everything they undertake. Not even the most optimistic prognosticators foresaw the explosive growth that has occurred in the field.

As the field has grown, so has its literature. There are "cookbooks" that describe in detail the specific steps required to carry out a project, but they do not address the *whys* nor do they usually discuss how and why the parts fit together. Another type of book focuses on scheduling networks. These are quite helpful for scheduling, but scheduling is only one of the serious problems a project manager must face. There are books on earned value calculations, cost estimating, team building, purchasing, and similar subjects. These are valuable for experienced project managers who can profit from an advanced education in specific areas of knowledge, but one cannot learn to manage projects from these specialized sources. There are also handbooks—collections of articles written mainly by academics and consultants on selected topics of interest to project managers. Handbooks do not, nor do they pretend to, offer broad coverage of the things project managers need to know. Like the second category pre-

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viously described, once the project manager has been educated on the basics of project management, these handbooks often represent valuable collections of relevant readings.

What is needed is a book that addresses project management from a *management* perspective rather than a cookbook, special area treatise, or collection of loosely associated articles. Such a book should address the basic nature of managing all types of projects—public, business, engineering, information systems, and so on—as well as the specific techniques and insights required to carry out this unique way of getting things done. It should deal with the problems of selecting projects, initiating them, and operating and controlling them. It should discuss the demands made on the project manager and the nature of the manager's interaction with the rest of the parent organization. The book should cover the difficult problems associated with conducting a project using people and organizations that represent different cultures and may be separated by considerable distances. Finally, it should even cover the issues arising when the decision is made to terminate a project.

This managerial perspective is the view we have taken here. On occasion, we are advised to "cut the BS," apparently a reference to any aspect of project management that is not mathematical, technical, or governed by strict rules of procedure. The argument is that "management is just common sense." It is quite possible that such a statement is true, but if so, the word "common" is used in the sense of "common carrier"—something available to everyone. Sadly, everyone does not seem to have managerial common sense. If everyone did, there would be no market for Scott Adam's *Dilbert*.

The book is primarily intended for use as a college textbook for teaching project management at the advanced undergraduate or master's level. The book is also intended for current and prospective project managers who wish to share our insights and ideas about the field. We have drawn freely on our personal experiences working with project managers and on the experience of friends and colleagues who have spent much of their working lives serving as project managers in what they like to call the "real world." Thus, in contrast to the books described earlier *about* project management, this book teaches students how to *do* project management.

As well as being a text that is equally appropriate for classes on the management of service, product, or engineering projects, we have found that information systems (IS) students in our classes find the material particularly helpful for managing their IS projects. Thus, we have included some coverage of material concerning information systems and how IS projects differ from and are similar to regular business projects.

ORGANIZATION AND CONTENT

Given this managerial perspective, we have arranged the book to use the *project life cycle* as the primary organizational guideline. We have found it to be a comfortable framework for the reader. Following an introductory chapter that comments on the role and importance of projects in our society and discusses project management as a potential career for aspiring managers, the book covers the major events and issues arising during the management of projects in the order in which they usually occur in

the life of a project. *Part I, Project Initiation* describes how projects are selected for implementation. It also covers the role of the project manager, the various ways that projects can be organized, and the special requirements for managing a cross-cultural project. This is followed by a description of the project planning process and some tools used in project planning. Part I concludes with a topic of major importance to the project manager: negotiation.

Project budgeting, scheduling, resource allocation, monitoring/information systems, and controlling are then discussed in *Part II, Project Implementation*. Finally, *Part III, Project Termination* concludes the discussion with a description of project auditing and termination. The book ends with an epilogue that comments on our ideas about the state of the field and notes three fundamental problems that must be solved if project management is to progress beyond its current state of sophistication.

We have relegated the discussion of two important aspects of projects that usually occur very early in the project life cycle—creativity/idea generation and technological forecasting—to the book's new website. Although few project managers engage in either of these tasks (typically being appointed to project leadership after these activities have taken place), we believe that a knowledge of these subjects will make the project manager more effective.

Any way chosen to organize knowledge carries with it an implication of neatness and order that rarely occurs in reality. We are quite aware that projects almost never proceed in an orderly linear way through the stages and events we describe here. The need to deal with change is the one constant task for the project manager. We have tried to reflect this in repeated references to the organizational, interpersonal, economic, and technical glitches that create crises in the life cycle of every project, and thus in the life of every project manager.

Finally, although we use a life-cycle approach to organization, the chapters include material concerning the major areas of the Project Management Body of Knowledge (PMBOK) as defined by the Project Management Institute. Anyone wishing to prepare thoroughly in some of these areas may have to go beyond the information covered in this text.

PEDAGOGY

This book is primarily a textbook, and we have included numerous pedagogical aids to foster this purpose. As in earlier editions, *short summaries* appear at the end of the text of each chapter, followed by *glossaries* defining key terms and concepts introduced in the chapter. End-of-chapter materials also include *review questions* and *problems* revisiting the materials covered in the chapter. The answers (though not the detailed solutions) to the even-numbered problems are in Appendix C in the back of the book. There are also sets of conceptual *discussion questions* intended to broaden the students' perspectives and to force them to think beyond the chapter materials to its implications. New to this edition are questions covering the Project Management in Practice application examples located throughout the chapters.

As in the past, we include *incidents for discussion*, which are brief "caselettes" oriented primarily toward the specific subjects covered in the chapter, but sometimes al-

low use of materials and concepts covered in earlier chapters. And at the end of each chapter we offer a *directed reading*, which may be more qualitative for the discussion chapters or more quantitative and case-like for the more technical chapters, with questions concerning the directed readings or cases at the end. (Some of the *cases* from the previous edition are included in the Instructor's Manual, should the instructor wish to copy these for class handouts and discussion.)

The end-of-chapter bibliographies were becoming unwieldy, and we have shortened them somewhat by removing most of the references dated prior to 1980. We have retained a few classic references from the earlier years and have, of course, added many from recent years. To the kind readers who have thanked us for our comprehensive bibliographies, we apologize and suggest that they retain a copy of the third edition. Last, in addition to the usual compliment of supplements (noted below), this edition now includes a website as noted earlier.

We have made some assumptions about both student and professional readers in writing this text. First, we assume that all readers have taken an elementary course in management or have had equivalent experience. The reader with a background in management theory or practice will note that many of the principles of good project management are also principles of good general administrative management. Project management and administrative management are not entirely distinct. Further, we assume that readers are familiar with the fundamental principles of accounting, behavioral science, finance, and statistics as a typical manager would be. Because the assumption concerning statistics is not always met, we include Appendix B on probability and statistics as an initial tutorial or as a refresher for rusty knowledge.

WHAT'S NEW

In this fourth edition, we have updated every chapter by adding relevant current research findings and new examples of practice. Beyond that, in accord with suggestions from reviewers, we have extended our treatment of scheduling by adding examples of AON networks such as those now commonly shown in computer software exhibits. We have added more emphasis on the sources of conflict in projects, and suggest that a major source of conflict has been largely ignored. Coverage of earned value analysis has been extended, and risk management has received greatly increased attention. These changes and additions are scattered throughout the entire text, sometimes amounting to a few words and sometimes to whole sections of a chapter.

Chapter 3 has been extended to discuss international and multicultural issues that project managers often face in managing projects these days. There is a new way of calculating the tracking signal (Chapter 7) that allows one to mix data with dissimilar dimensions, thereby speeding the process of getting an estimate of forecast bias. Similarly, we show a way of using optimistic and pessimistic PERT time estimates made at levels of precision much lower than the usual 99+ percent. Both of these changes were made in response to requests from practicing project managers.

Since the last edition, Microsoft Project® has become the dominant application software in the field, outselling its closest competitor about 4 to 1. We are happy to announce that a free 120-day trial version of Microsoft Project 98® is included on a

CD in every copy of the book. Our coverage of software tends, therefore, to be centered on Microsoft Project 98®, but includes discussion of the many "add-ons" that are now available to supplement Project 98® and its competitors. We have also added some exercises to the end-of-chapter material that can utilize computer software. Similar material is also available on the new Web site.

In the past, we considered placing Microsoft Project® and Excel® printouts throughout the book, particularly in those chapters discussing topics for which standard, preprogrammed printouts were readily available. We found, however, that this was more confusing than helpful—when trying to understand a breakdown structure, it is not helpful to be forced to learn computerese simultaneously. Moreover, there is the danger that human nature, operating in its normal discreet mode, will shift that task of learning project management to that of learning project management software. Many projects have failed because the project manager started managing the software instead of the project. It seemed to us (and our students) easier to learn most of the basic project management and *then* see (in Chapter 10) how they are integrated in a project management software package with its various printouts and reports.

SUPPLEMENTS

The *Instructor's Resource Guide* provides additional assistance to the project management instructor. In addition to the answers/solutions to the problems, questions, and directed readings, this edition includes references to relevant external cases and readings, teaching tips, a test bank, and other such pedagogically helpful material. The books' accompanying website (www.wiley.com/college/project@MGT) contains the following valuable resources: an electronic version of the Instructor's Resource Guide for Downloading, Power Point presentation, data sets, a glossary, and additional cases, topics, and incidents for discussion.

ACKNOWLEDGMENTS

We owe a debt of gratitude to all those who have helped us with this book. First, we thank the managers and students who helped us solidify our ideas about proper methods for managing projects and proper ways of teaching the subject. Second, we thank the project teams and leaders in all of our project management classes. We are especially grateful to Margaret Sutton and Scott Shafer whose creative ideas, extensive skills with software, and ability to sniff out inconsistencies saved us countless hours of fumbling and potential embarrassment.

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Contents

CHAPTER

1

Projects in Contemporary Organizations

The past several decades have been marked by rapid growth in the use of project management as a means by which organizations achieve their objectives. Project management provides an organization with powerful tools that improve its ability to plan, implement, and control its activities as well as the ways in which it utilizes its people and resources.

It is popular to ask, "Why can't they run government the way I run my business?" In the case of project management, however, business and other organizations learned from government, not the other way around. A lion's share of the credit for the development of the techniques and practices of project management belongs to the military, which faced a series of major tasks that simply were not achievable by traditional organizations operating in traditional ways. The United States Navy's Polaris program, NASA's Apollo space program, and more recently, the space shuttle and the development of "smart" bombs and missiles are a few of the many instances of the application of these specially developed management approaches to extraordinarily complex projects. Following such examples, nonmilitary government sectors, private industry, public service agencies, and volunteer organizations have all used project management to increase their effectiveness. Almost all firms in the computer software business routinely develop their output as projects or groups of projects.

Project management has emerged because the characteristics of our turn-of-the-century society demand the development of new methods of management. Of the many forces involved, three are paramount: (1) the exponential expansion of human knowledge; (2) the growing demand for a broad range of complex, sophisticated, customized goods and services; and (3) the evolution of worldwide competitive markets for the production and consumption of goods and services. All three forces combine to mandate the use of teams to solve problems that used to be solvable by individuals. These three forces combine to increase greatly the complexity of goods and ser-

vices produced plus the complexity of the processes used to produce them. This, in turn, leads to the need for more sophisticated systems to control both outcomes and processes.

Forces Fostering Project Management

First, the expansion of knowledge allows an increasing number of academic disciplines to be used in solving problems associated with the development, production, and distribution of goods and services. Second, satisfying the continuing demand for more complex and customized products and services depends on our ability to make product design an integrated and inherent part of our production and distribution systems. Third, worldwide markets force us to include cultural and environmental differences in our managerial decisions about what, where, when, and how to produce and distribute output. The requisite knowledge does not reside in any one individual, no matter how well-educated or knowledgeable. Thus, under these conditions, teams are used for making decisions and taking action. This calls for a high level of coordination and cooperation between groups of people not particularly used to such interaction. Largely geared to the mass production of simpler goods, traditional organizational structures and management systems are simply not adequate to the task. Project management is.

The organizational response to the forces noted above cannot take the form of an instantaneous transformation from the old to the new. To be successful, the transition must be systematic, but it tends to be slow and tortuous for most enterprises. Accomplishing organizational change is a natural application of project management, and many firms have set up projects to implement their goals for strategic and tactical change.

Another important societal force is the intense competition among institutions, both profit and not-for-profit, fostered by our economic system. This puts extreme pressure on organizations to make their complex, customized outputs available as quickly as possible. "Time-to-market" is critical. Responses must come faster, decisions must be made sooner, and results must occur more quickly. Imagine the communications problems alone. Information and knowledge are growing explosively, but the time permissible to locate and use the appropriate knowledge is decreasing.

In addition, these forces operate in a society that assumes that technology can do anything. The fact is, this assumption is reasonably true, within the bounds of nature's fundamental laws. The problem lies not in this assumption so much as in a concomitant assumption that allows society to ignore both the economic and noneconomic costs associated with technological progress until some dramatic event focuses our attention on the costs (e.g., the Chernobyl nuclear accident, the *Exxon Valdez* oil spill, or the possibility of global warming). At times, our faith in technology is disturbed by difficulties and threats arising from its careless implementation, as in the case of industrial waste, but on the whole we seem remarkably tolerant of technological change. For a case in point, consider California farm workers who waited more than 20 years to challenge a University of California research program devoted to the development of labor-saving farm machinery [26]. The acceptance of technological advancement is so strong it took more than two decades to muster the legal attack. Consider also the easy acceptance of communication by e-mail and shopping on the Internet.

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