

**A Guide to the  
Project  
Management  
Body of  
Knowledge  
(PMBOK® Guide)**

**2000 Edition**

**Project Management Institute**  
Newtown Square, Pennsylvania USA

○ [NAVIGATION LINKS](#)

○ [ACRONYMS LIST](#)

---

Library of Congress Cataloging-in-Publication Data

A guide to the project management body of knowledge (PMBOK® guide).--2000 ed.

p. cm.

Includes bibliographical references and index.

ISBN 1-880410-22-2 (alk. paper)--ISBN 1-880410-23-0 (pbk. : alk. paper)

1. Industrial project management. I. Title: PMBOK® guide. II. Project Management Institute.

HD69.P75 G845 2001

658.4'04--dc21

00-051727

CIP

ISBN: 1-880410-23-0 (paperback)

ISBN: 1-880410-22-2 (hardcover)

ISBN: 1-880410-25-7 (CD-ROM)

Published by: Project Management Institute, Inc.

Four Campus Boulevard

Newtown Square, Pennsylvania 19073-3299 USA

Phone: 610-356-4600 or Visit our website: [www.pmi.org](http://www.pmi.org)

E-mail: [pmihq@pmi.org](mailto:pmihq@pmi.org)

© 2000 Project Management Institute, Inc. All rights reserved.

PMI Publishing Division welcomes corrections and comments on its documents. In addition to comments directed to PMI about the substance of *A Guide to the Project Management Body of Knowledge*, please feel free to send comments on typographical, formatting, or other errors. Simply make a copy of the relevant page of the *PMBOK® Guide*, mark the error, and send it to: PMI Publishing Division, Forty Colonial Square, Sylva, North Carolina 28779 USA, phone: 828/586-3715, fax: 828/586-4020, e-mail: [booked@pmi.org](mailto:booked@pmi.org).

"PMI" and the PMI logo are service and trademarks registered in the United States and other nations; "PMP" and the PMP logo are certification marks registered in the United States and other nations; "PMBOK", "PM Network", and "PMI Today" are trademarks registered in the United States and other nations; and "Project Management Journal" and "Building professionalism in project management." are trademarks of the Project Management Institute, Inc.

PMI® books are available at special quantity discounts to use as premiums and sales promotions, or for use in corporate training programs. For more information, please write to the Business Manager, PMI Publishing Division, Forty Colonial Square, Sylva, NC 28779 USA. Or contact your local bookstore.

Printed in the United States of America. No part of this work may be reproduced or transmitted in any form or by any means, electronic, manual, photocopying, recording, or by any information storage and retrieval system, without prior written permission of the publisher.

The paper used in this book complies with the Permanent Paper Standard issued by the National Information Standards Organization (Z39.48--1984).

Printed and bound by Automated Graphic Systems, White Plains, Maryland, USA.

10 9 8 7 6 5 4 3 2 1

○ NAVIGATION LINKS

○ ACRONYMS LIST

# **A Guide to the Project Management Body of Knowledge (PMBOK® Guide) 2000 Edition**

- |                                       |                                    |
|---------------------------------------|------------------------------------|
| <input type="radio"/> START           | <input type="radio"/> CHAPTER 7    |
| <input type="radio"/> CONTENTS        | <input type="radio"/> CHAPTER 8    |
| <input type="radio"/> LIST OF FIGURES | <input type="radio"/> CHAPTER 9    |
| <input type="radio"/> PREFACE         | <input type="radio"/> CHAPTER 10   |
| <input type="radio"/> CHAPTER 1       | <input type="radio"/> CHAPTER 11   |
| <input type="radio"/> CHAPTER 2       | <input type="radio"/> CHAPTER 12   |
| <input type="radio"/> CHAPTER 3       | <input type="radio"/> APPENDICES * |
| <input type="radio"/> CHAPTER 4       | <input type="radio"/> GLOSSARY     |
| <input type="radio"/> CHAPTER 5       | <input type="radio"/> DEFINITIONS  |
| <input type="radio"/> CHAPTER 6       | <input type="radio"/> INDEX        |

Sections in Blue are viewable in total or in part.

Sections in Black are not available.

\* Only Appendix G is available

# Contents

|                                                                |           |
|----------------------------------------------------------------|-----------|
| List of Figures .....                                          | vii       |
| Preface to the 2000 Edition .....                              | ix        |
| <b>Section I—The Project Management Framework .....</b>        | <b>1</b>  |
| <b>Chapter 1—Introduction .....</b>                            | <b>3</b>  |
| 1.1 Purpose of This Guide .....                                | 3         |
| 1.2 What Is a Project? .....                                   | 4         |
| 1.3 What Is Project Management? .....                          | 6         |
| 1.4 Relationship to Other Management Disciplines .....         | 9         |
| 1.5 Related Endeavors .....                                    | 10        |
| <b>Chapter 2—The Project Management Context .....</b>          | <b>11</b> |
| 2.1 Project Phases and the Project Life Cycle .....            | 11        |
| 2.2 Project Stakeholders .....                                 | 16        |
| 2.3 Organizational Influences .....                            | 18        |
| 2.4 Key General Management Skills .....                        | 21        |
| 2.5 Social-Economic-Environmental Influences .....             | 26        |
| <b>Chapter 3—Project Management Processes .....</b>            | <b>29</b> |
| 3.1 Project Processes .....                                    | 29        |
| 3.2 Process Groups .....                                       | 30        |
| 3.3 Process Interactions .....                                 | 32        |
| 3.4 Customizing Process Interactions .....                     | 37        |
| 3.5 Mapping of Project Management Processes .....              | 38        |
| <b>Section II—The Project Management Knowledge Areas .....</b> | <b>39</b> |
| <b>Chapter 4—Project Integration Management .....</b>          | <b>41</b> |
| 4.1 Project Plan Development .....                             | 42        |
| 4.2 Project Plan Execution .....                               | 46        |
| 4.3 Integrated Change Control .....                            | 47        |
| <b>Chapter 5—Project Scope Management .....</b>                | <b>51</b> |
| 5.1 Initiation .....                                           | 53        |
| 5.2 Scope Planning .....                                       | 55        |
| 5.3 Scope Definition .....                                     | 57        |
| 5.4 Scope Verification .....                                   | 61        |
| 5.5 Scope Change Control .....                                 | 62        |
| <b>Chapter 6—Project Time Management .....</b>                 | <b>65</b> |
| 6.1 Activity Definition .....                                  | 65        |
| 6.2 Activity Sequencing .....                                  | 68        |
| 6.3 Activity Duration Estimating .....                         | 71        |
| 6.4 Schedule Development .....                                 | 73        |
| 6.5 Schedule Control .....                                     | 79        |
| <b>Chapter 7—Project Cost Management .....</b>                 | <b>83</b> |
| 7.1 Resource Planning .....                                    | 85        |
| 7.2 Cost Estimating .....                                      | 86        |
| 7.3 Cost Budgeting .....                                       | 89        |
| 7.4 Cost Control .....                                         | 90        |

|                                                                                                      |                |
|------------------------------------------------------------------------------------------------------|----------------|
| <b>Chapter 8—Project Quality Management</b>                                                          | <b>95</b>      |
| 8.1 Quality Planning                                                                                 | 97             |
| 8.2 Quality Assurance                                                                                | 101            |
| 8.3 Quality Control                                                                                  | 102            |
| <b>Chapter 9—Project Human Resource Management</b>                                                   | <b>107</b>     |
| 9.1 Organizational Planning                                                                          | 108            |
| 9.2 Staff Acquisition                                                                                | 112            |
| 9.3 Team Development                                                                                 | 114            |
| <b>Chapter 10—Project Communications Management</b>                                                  | <b>117</b>     |
| 10.1 Communications Planning                                                                         | 119            |
| 10.2 Information Distribution                                                                        | 121            |
| 10.3 Performance Reporting                                                                           | 122            |
| 10.4 Administrative Closure                                                                          | 125            |
| <b>Chapter 11—Project Risk Management</b>                                                            | <b>127</b>     |
| 11.1 Risk Management Planning                                                                        | 129            |
| 11.2 Risk Identification                                                                             | 131            |
| 11.3 Qualitative Risk Analysis                                                                       | 133            |
| 11.4 Quantitative Risk Analysis                                                                      | 137            |
| 11.5 Risk Response Planning                                                                          | 140            |
| 11.6 Risk Monitoring and Control                                                                     | 144            |
| <b>Chapter 12—Project Procurement Management</b>                                                     | <b>147</b>     |
| 12.1 Procurement Planning                                                                            | 149            |
| 12.2 Solicitation Planning                                                                           | 152            |
| 12.3 Solicitation                                                                                    | 153            |
| 12.4 Source Selection                                                                                | 155            |
| 12.5 Contract Administration                                                                         | 156            |
| 12.6 Contract Closeout                                                                               | 158            |
| <br><b>Section III—Appendices</b>                                                                    | <br><b>161</b> |
| Appendix A—The Project Management Institute<br>Standards-Setting Process                             | 163            |
| Appendix B—Evolution of PMI's <i>A Guide to the<br/>        Project Management Body of Knowledge</i> | 167            |
| Appendix C—Contributors and Reviewers of<br>PMBOK® Guide 2000 Edition                                | 175            |
| Appendix D—Notes                                                                                     | 179            |
| Appendix E—Application Area Extensions                                                               | 181            |
| Appendix F—Additional Sources of Information on<br>Project Management                                | 185            |
| Appendix G—Summary of Project Management<br>Knowledge Areas                                          | 189            |
| <br><b>Section IV—Glossary and Index</b>                                                             | <br><b>193</b> |
| Glossary                                                                                             | 195            |
| Index                                                                                                | 211            |

# List of Figures

|              |                                                                                                                 |     |
|--------------|-----------------------------------------------------------------------------------------------------------------|-----|
| Figure 1-1.  | Overview of Project Management Knowledge Areas and Project Management Processes                                 | 8   |
| Figure 1-2.  | Relationship of Project Management to Other Management Disciplines                                              | 9   |
| Figure 2-1.  | Sample Generic Life Cycle                                                                                       | 13  |
| Figure 2-2.  | Representative Life Cycle for Defense Acquisition, per US DODI 5000.2<br>(Final Coordination Draft, April 2000) | 14  |
| Figure 2-3.  | Representative Construction Project Life Cycle, per Morris                                                      | 15  |
| Figure 2-4.  | Representative Life Cycle for a Pharmaceuticals Project, per Murphy                                             | 16  |
| Figure 2-5.  | Representative Software Development Life Cycle, per Muench                                                      | 17  |
| Figure 2-6.  | Organizational Structure Influences on Projects                                                                 | 19  |
| Figure 2-7.  | Functional Organization                                                                                         | 20  |
| Figure 2-8.  | Projectized Organization                                                                                        | 21  |
| Figure 2-9.  | Weak Matrix Organization                                                                                        | 22  |
| Figure 2-10. | Balanced Matrix Organization                                                                                    | 22  |
| Figure 2-11. | Strong Matrix Organization                                                                                      | 23  |
| Figure 2-12. | Composite Organization                                                                                          | 23  |
| Figure 3-1.  | Links among Process Groups in a Phase                                                                           | 31  |
| Figure 3-2.  | Overlap of Process Groups in a Phase                                                                            | 31  |
| Figure 3-3.  | Interaction between Phases                                                                                      | 31  |
| Figure 3-4.  | Relationships among the Initiating Processes                                                                    | 32  |
| Figure 3-5.  | Relationships among the Planning Processes                                                                      | 33  |
| Figure 3-6.  | Relationships among the Executing Processes                                                                     | 35  |
| Figure 3-7.  | Relationships among the Controlling Processes                                                                   | 36  |
| Figure 3-8.  | Relationships among the Closing Processes                                                                       | 37  |
| Figure 3-9.  | Mapping of Project Management Processes to the Process Groups and Knowledge Areas                               | 38  |
| Figure 4-1.  | Project Integration Management Overview                                                                         | 42  |
| Figure 4-2.  | Coordinating Changes Across the Entire Project                                                                  | 48  |
| Figure 5-1.  | Project Scope Management Overview                                                                               | 52  |
| Figure 5-2.  | Sample Work Breakdown Structure for Defense Material Items                                                      | 58  |
| Figure 5-3.  | Sample Work Breakdown Structure Organized by Phase                                                              | 59  |
| Figure 5-4.  | Sample Work Breakdown Structure for Wastewater Treatment Plant                                                  | 60  |
| Figure 6-1.  | Project Time Management Overview                                                                                | 66  |
| Figure 6-2.  | Network Logic Diagram Drawn Using the Precedence Diagramming Method                                             | 69  |
| Figure 6-3.  | Network Logic Diagram Drawn Using the Arrow Diagramming Method                                                  | 70  |
| Figure 6-4.  | PERT Duration Calculation for a Single Activity                                                                 | 76  |
| Figure 6-5.  | Project Network Diagram with Dates                                                                              | 77  |
| Figure 6-6.  | Bar (Gantt) Chart                                                                                               | 78  |
| Figure 6-7.  | Milestone Chart                                                                                                 | 79  |
| Figure 7-1.  | Project Cost Management Overview                                                                                | 84  |
| Figure 7-2.  | Illustrative Cost Baseline Display                                                                              | 90  |
| Figure 8-1.  | Project Quality Management Overview                                                                             | 96  |
| Figure 8-2.  | Cause-and-Effect Diagram                                                                                        | 99  |
| Figure 8-3.  | Sample Process Flowchart                                                                                        | 100 |
| Figure 8-4.  | Control Chart of Project Schedule Performance                                                                   | 104 |
| Figure 8-5.  | Pareto Diagram                                                                                                  | 105 |

|              |                                                     |     |
|--------------|-----------------------------------------------------|-----|
| Figure 9-1.  | Project Human Resource Management Overview          | 108 |
| Figure 9-2.  | Responsibility Assignment Matrix                    | 111 |
| Figure 9-3.  | Illustrative Resource Histogram                     | 112 |
| Figure 10-1. | Project Communications Management Overview          | 118 |
| Figure 10-2. | Illustrative Graphic Performance Report             | 124 |
| Figure 10-3. | Illustrative Tabular Performance Report             | 124 |
| Figure 11-1. | Project Risk Management Overview                    | 128 |
| Figure 11-2. | Rating Impacts for a Risk                           | 136 |
| Figure 11-3. | Probability-Impact Matrix                           | 137 |
| Figure 11-4. | Cost Estimates and Ranges from the Risk Interview   | 139 |
| Figure 11-5. | Examples of Commonly Used Probability Distributions | 140 |
| Figure 11-6. | Decision Tree Analysis                              | 141 |
| Figure 11-7. | Cost Risk Simulation                                | 142 |
| Figure 12-1. | Project Procurement Management Overview             | 148 |

# Preface to the 2000 Edition

This document supersedes the Project Management Institute's (PMI®) *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)*, published in 1996.

The scope of the project to update the 1996 publication was to:

- Add new material reflecting the growth of the knowledge and practices in the field of project management by capturing those practices, tools, techniques, and other relevant items that have become generally accepted. (*Generally accepted* means being applicable to most projects most of the time and having widespread consensus about their value and usefulness.)
- Add clarification to text and figures to make this document more beneficial to users.
- Correct existing errors in the predecessor document.

To assist users of this document, who may be familiar with its predecessor, we have summarized the major differences here.

1. Throughout the document, we clarified that projects manage to requirements, which emerge from needs, wants, and expectations.

2. We strengthened linkages to organizational strategy throughout the document.

3. We provided more emphasis on progressive elaboration in Section 1.2.3.

4. We acknowledged the role of the Project Office in Section 2.3.4.

5. We added references to project management involving developing economies, as well as social, economic, and environmental impacts, in Section 2.5.4.

6. We added expanded treatment of Earned Value Management in Chapter 4 (Project Integration Management), Chapter 7 (Project Cost Management), and Chapter 10 (Project Communications Management).

7. We rewrote Chapter 11 (Project Risk Management). The chapter now contains six processes instead of the previous four processes. The six processes are Risk Management Planning, Risk Identification, Qualitative Risk Analysis, Quantitative Risk Analysis, Risk Response Planning, and Risk Monitoring and Control.

8. We moved scope verification from an executing process to a controlling process.

9. We changed the name of Process 4.3 from Overall Change Control to Integrated Change Control to emphasize the importance of change control throughout the entirety of the project.

10. We added a chart that maps the thirty-nine Project Management processes against the five Project Management Process Groups and the nine Project Management Knowledge Areas in Figure 3-9.

11. We standardized terminology throughout the document from "supplier" to "seller."

12. We added several Tools and Techniques:

- Chapter 4 (Project Integration Management)
  - ◆ Earned Value Management (EVM)
  - ◆ Preventive Action



- Chapter 5 (Project Scope Management)
  - ◆ Scope Statement Updates
  - ◆ Project Plan
  - ◆ Adjusted Baseline
- Chapter 6 (Project Time Management)
  - ◆ Quantitatively Based Durations
  - ◆ Reserve Time (contingency)
  - ◆ Coding Structure
  - ◆ Variance Analysis
  - ◆ Milestones
  - ◆ Activity Attributes
  - ◆ Computerized Tools
- Chapter 7 (Project Cost Management)
  - ◆ Estimating Publications
  - ◆ Earned Value Measurement
- Chapter 8 (Project Quality Management)
  - ◆ Cost of Quality
- Chapter 10 (Project Communications Management)
  - ◆ Project Reports
  - ◆ Project Presentations
  - ◆ Project Closure
- Chapter 11 (Project Risk Management— this chapter is rewritten)

The body of knowledge of the project management profession continues to grow, and PMI intends to update the *PMBOK® Guide* on a periodic basis. Therefore, if you have any comments about this document or suggestions about how this document can be improved, please send them to:

PMI Project Management Standards Program  
 Project Management Institute  
 Four Campus Boulevard  
 Newtown Square, PA 19073-3299 USA  
 Phone: +610-356-4600  
 Fax: +610-356-4647  
 Email: [pmihq@pmi.org](mailto:pmihq@pmi.org)  
 Internet: <http://www.pmi.org>

# SECTION I

## THE PROJECT MANAGEMENT FRAMEWORK

1. Introduction
2. The Project Management Context
3. Project Management Processes

## Chapter 1

# Introduction

The *Project Management Body of Knowledge* (PMBOK®) is an inclusive term that describes the sum of knowledge within the profession of project management. As with other professions such as law, medicine, and accounting, the body of knowledge rests with the practitioners and academics that apply and advance it. The full project management body of knowledge includes knowledge of proven traditional practices that are widely applied, as well as knowledge of innovative and advanced practices that have seen more limited use, and includes both published and unpublished material.

This chapter defines and explains several key terms and provides an overview of the rest of the document. It includes the following major sections:

- 1.1 Purpose of This Guide**
- 1.2 What Is a Project?**
- 1.3 What Is Project Management?**
- 1.4 Relationship to Other Management Disciplines**
- 1.5 Related Endeavors**

### 1.1 PURPOSE OF THIS GUIDE

Project management is an emerging profession. The primary purpose of this document is to identify and describe that subset of the PMBOK® that is generally accepted. *Generally accepted* means that the knowledge and practices described are applicable to most projects most of the time, and that there is widespread consensus about their value and usefulness. Generally accepted does not mean that the knowledge and practices described are or should be applied uniformly on all projects; the project management team is always responsible for determining what is appropriate for any given project.

This document is also intended to provide a common lexicon within the profession and practice for talking and writing about project management. Project management is a relatively young profession, and while there is substantial commonality around what is done, there is relatively little commonality in the terms used.

This document provides a basic reference for anyone interested in the profession of project management. This includes, but is not limited to:

- Senior executives.
- Managers of project managers.
- Project managers and other project team members.
- Project customers and other project stakeholders.
- Functional managers with employees assigned to project teams.
- Educators teaching project management and related subjects.
- Consultants and other specialists in project management and related fields.
- Trainers developing project management educational programs.

As a basic reference, this document is neither comprehensive nor all inclusive. Appendix E discusses application area extensions while Appendix F lists sources of further information on project management.

This document is also used by the Project Management Institute as a basic reference about project management knowledge and practices for its professional development programs including:

- Certification of Project Management Professionals (PMP®).
- Accreditation of educational programs in project management.

## 1.2 WHAT IS A PROJECT?

Organizations perform work. Work generally involves either operations or projects, although the two may overlap. Operations and projects share many characteristics; for example, they are:

- Performed by people.
- Constrained by limited resources.
- Planned, executed, and controlled.

Projects are often implemented as a means of achieving an organization's strategic plan. Operations and projects differ primarily in that operations are ongoing and repetitive while projects are temporary and unique. A project can thus be defined in terms of its distinctive characteristics—a *project is a temporary endeavor undertaken to create a unique product or service*. *Temporary* means that every project has a definite beginning and a definite end. *Unique* means that the product or service is different in some distinguishing way from all other products or services. For many organizations, projects are a means to respond to those requests that cannot be addressed within the organization's normal operational limits.

Projects are undertaken at all levels of the organization. They may involve a single person or many thousands. Their duration ranges from a few weeks to more than five years. Projects may involve a single unit of one organization or may cross organizational boundaries, as in joint ventures and partnering. Projects are critical to the realization of the performing organization's business strategy because projects are a means by which strategy is implemented. Examples of projects include:

- Developing a new product or service.
- Effecting a change in structure, staffing, or style of an organization.
- Designing a new transportation vehicle.
- Developing or acquiring a new or modified information system.
- Constructing a building or facility.
- Building a water system for a community in a developing country.
- Running a campaign for political office.
- Implementing a new business procedure or process.

### 1.2.1 Temporary

*Temporary* means that every project has a definite beginning and a definite end. The end is reached when the project's objectives have been achieved, or when it becomes clear that the project objectives will not or cannot be met, or the need for the project no longer exists and the project is terminated. Temporary does not necessarily mean short in duration; many projects last for several years. In every case, however, the duration of a project is finite; projects are not ongoing efforts.

In addition, temporary does not generally apply to the product or service created by the project. Projects may often have intended and unintended social, economic, and environmental impacts that far outlast the projects themselves. Most projects are undertaken to create a lasting result. For example, a project to erect a national monument will create a result expected to last centuries. A series of projects and/or complementary projects in parallel may be required to achieve a strategic objective.

The objectives of projects and operations are fundamentally different. The objective of a project is to attain the objective and close the project. The objective of an ongoing nonprojectized operation is normally to sustain the business. Projects are fundamentally different because the project ceases when its declared objectives have been attained, while nonproject undertakings adopt a new set of objectives and continue to work.

The temporary nature of projects may apply to other aspects of the endeavor as well:

- The opportunity or market window is usually temporary—most projects have a limited time frame in which to produce their product or service.
- The project team, as a team, seldom outlives the project—most projects are performed by a team created for the sole purpose of performing the project, and the team is disbanded when the project is complete.

### 1.2.2 Unique Product, Service, or Result

Projects involve doing something that has not been done before and which is, therefore, *unique*. A product or service may be unique even if the category to which it belongs is large. For example, many thousands of office buildings have been developed, but each individual facility is unique—different owner, different design, different location, different contractors, and so on. The presence of repetitive elements does not change the fundamental uniqueness of the project work. For example:

- A project to develop a new commercial airliner may require multiple prototypes.
- A project to bring a new drug to market may require thousands of doses of the drug to support clinical trials.
- A real estate development project may include hundreds of individual units.
- A development project (e.g., water and sanitation) may be implemented in five geographic areas.

### 1.2.3 Progressive Elaboration

Progressive elaboration is a characteristic of projects that integrates the concepts of temporary and unique. Because the product of each project is unique, the characteristics that distinguish the product or service must be progressively elaborated. *Progressively* means “proceeding in steps; continuing steadily by increments,”

while *elaborated* means “worked out with care and detail; developed thoroughly” (1). These distinguishing characteristics will be broadly defined early in the project, and will be made more explicit and detailed as the project team develops a better and more complete understanding of the product.

Progressive elaboration of product characteristics must be carefully coordinated with proper project scope definition, particularly if the project is performed under contract. When properly defined, the scope of the project—the work to be done—should remain constant even as the product characteristics are progressively elaborated. The relationship between product scope and project scope is discussed further in the introduction to Chapter 5.

The following two examples illustrate progressive elaboration in two different application areas.

*Example 1.* Development of a chemical processing plant begins with process engineering to define the characteristics of the process. These characteristics are used to design the major processing units. This information becomes the basis for engineering design, which defines both the detail plant layout and the mechanical characteristics of the process units and ancillary facilities. All of these result in design drawings that are elaborated to produce fabrication drawings (construction isometrics). During construction, interpretations and adaptations are made as needed and subject to proper approval. This further elaboration of the characteristics is captured by *as-built* drawings. During test and turnover, further elaboration of the characteristics is often made in the form of final operating adjustments.

*Example 2.* The product of an economic development project may initially be defined as: “Improve the quality of life of the lowest income residents of community X.” As the project proceeds, the products may be described more specifically as, for example: “Provide access to food and water to 500 low income residents in community X.” The next round of progressive elaboration might focus exclusively on increasing agriculture production and marketing, with provision of water deemed to be secondary priority to be initiated once the agriculture component is well under way.

## 1.3 WHAT IS PROJECT MANAGEMENT?

*Project management* is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. Project management is accomplished through the use of the processes such as: initiating, planning, executing, controlling, and closing. The project team manages the work of the projects, and the work typically involves:

- Competing demands for: scope, time, cost, risk, and quality.
- Stakeholders with differing needs and expectations.
- Identified requirements.

It is important to note that many of the processes within project management are iterative in nature. This is in part due to the existence of and the necessity for progressive elaboration in a project throughout the project life cycle; i.e., the more you know about your project, the better you are able to manage it.

The term *project management* is sometimes used to describe an organizational approach to the management of ongoing operations. This approach, more properly called *management by projects*, treats many aspects of ongoing operations as projects to apply project management techniques to them. Although an

understanding of project management is critical to an organization that is managing by projects, a detailed discussion of the approach itself is outside the scope of this document.

Knowledge about project management can be organized in many ways. This document has two major sections and twelve chapters, as described below.

### 1.3.1 The Project Management Framework

Section I, The Project Management Framework, provides a basic structure for understanding project management.

Chapter 1, **Introduction**, defines key terms and provides an overview of the rest of the document.

Chapter 2, **The Project Management Context**, describes the environment in which projects operate. The project management team must understand this broader context—managing the day-to-day activities of the project is necessary for success but not sufficient.

Chapter 3, **Project Management Processes**, describes a generalized view of how the various project management processes commonly interact. Understanding these interactions is essential to understanding the material presented in Chapters 4 through 12.

### 1.3.2 The Project Management Knowledge Areas

Section II, The Project Management Knowledge Areas, describes project management knowledge and practice in terms of their component processes. These processes have been organized into nine knowledge areas, as described below and as illustrated in **Figure 1-1**.

Chapter 4, **Project Integration Management**, describes the processes required to ensure that the various elements of the project are properly coordinated. It consists of project plan development, project plan execution, and integrated change control.

Chapter 5, **Project Scope Management**, describes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. It consists of initiation, scope planning, scope definition, scope verification, and scope change control.

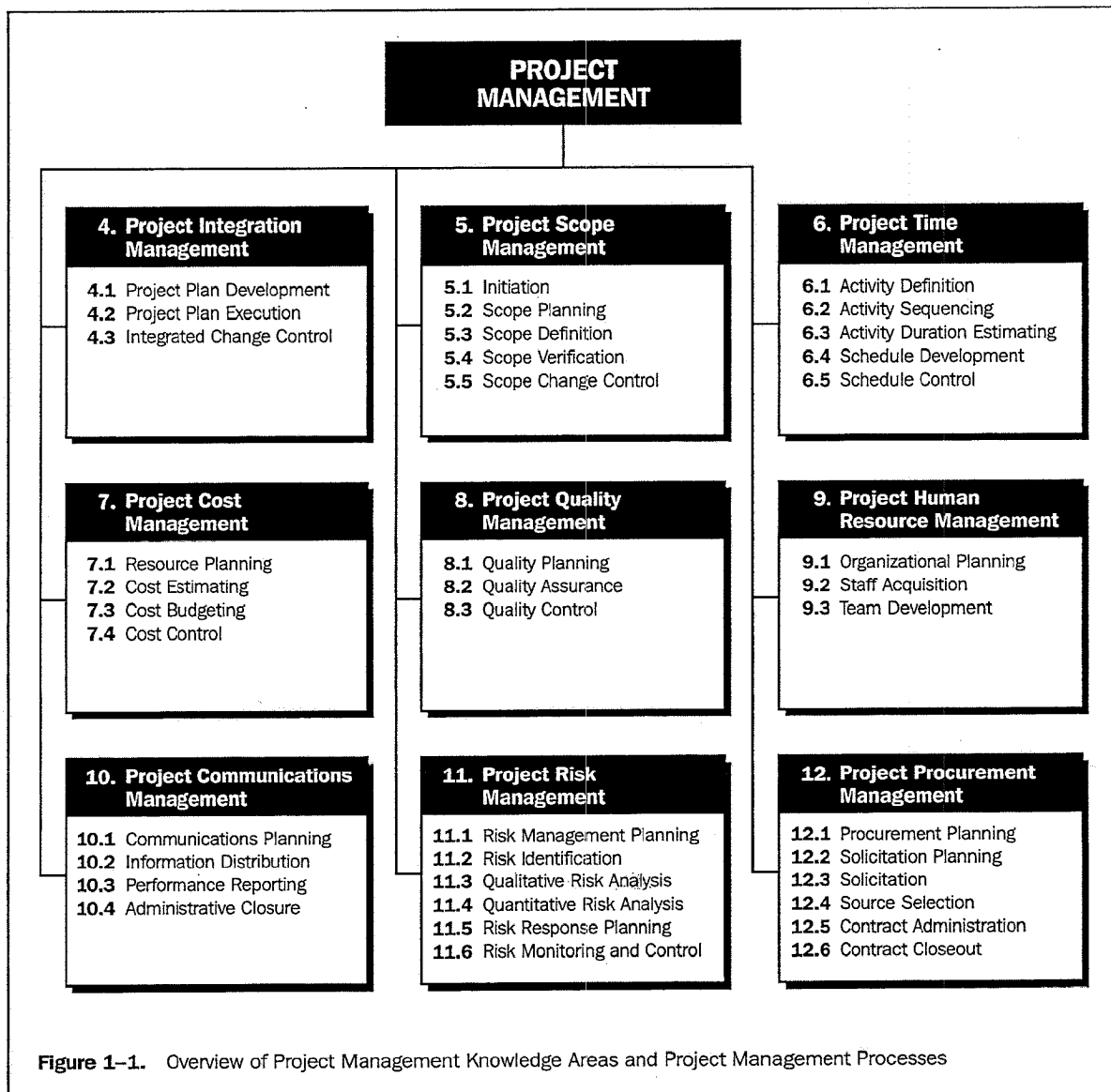
Chapter 6, **Project Time Management**, describes the processes required to ensure timely completion of the project. It consists of activity definition, activity sequencing, activity duration estimating, schedule development, and schedule control.

Chapter 7, **Project Cost Management**, describes the processes required to ensure that the project is completed within the approved budget. It consists of resource planning, cost estimating, cost budgeting, and cost control.

Chapter 8, **Project Quality Management**, describes the processes required to ensure that the project will satisfy the needs for which it was undertaken. It consists of quality planning, quality assurance, and quality control.

Chapter 9, **Project Human Resource Management**, describes the processes required to make the most effective use of the people involved with the project. It consists of organizational planning, staff acquisition, and team development.

Chapter 10, **Project Communications Management**, describes the processes required to ensure timely and appropriate generation, collection, dissemination,

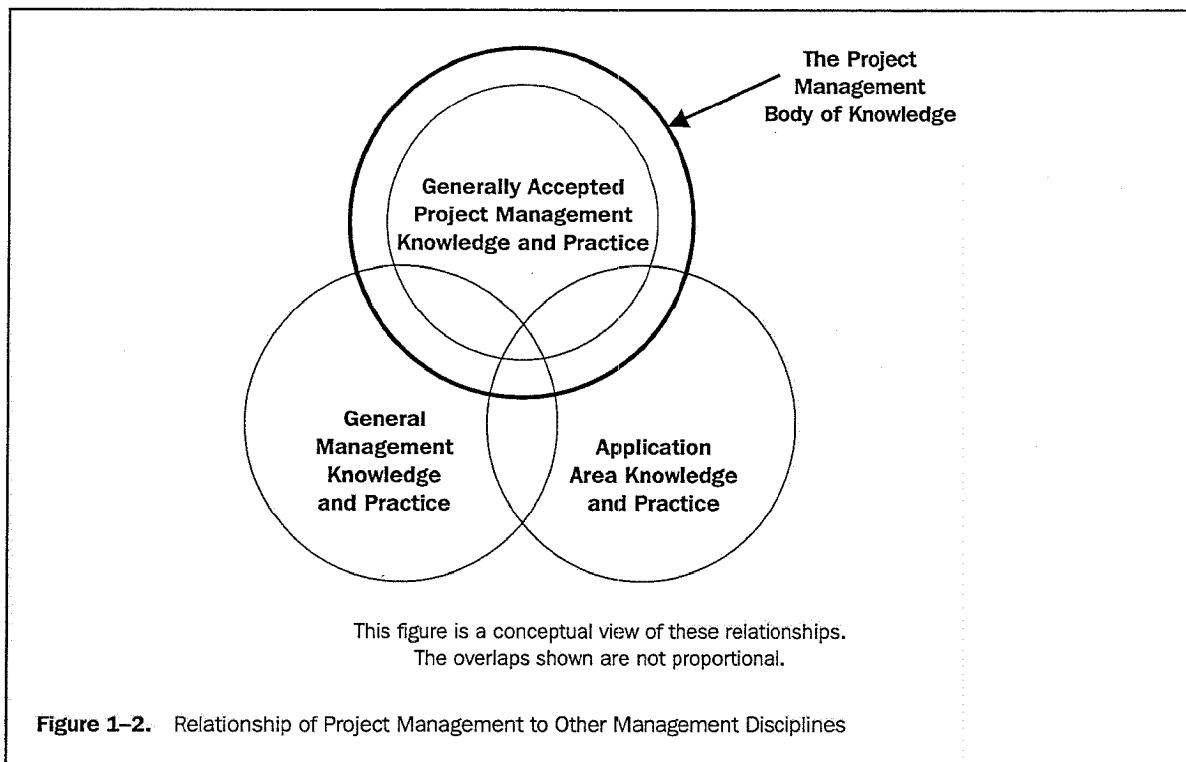


storage, and ultimate disposition of project information. It consists of communications planning, information distribution, performance reporting, and administrative closure.

Chapter 11, **Project Risk Management**, describes the processes concerned with identifying, analyzing, and responding to project risk. It consists of risk management planning, risk identification, qualitative risk analysis, quantitative risk analysis, risk response planning, and risk monitoring and control.

Chapter 12, **Project Procurement Management**, describes the processes required to acquire goods and services from outside the performing organization. It consists of procurement planning, solicitation planning, solicitation, source selection, contract administration, and contract closeout.





## 1.4 RELATIONSHIP TO OTHER MANAGEMENT DISCIPLINES

Much of the knowledge needed to manage projects is unique to project management (e.g., critical path analysis and work breakdown structures). However, the PMBOK® does overlap other management disciplines, as illustrated in Figure 1-2.

*General management* encompasses planning, organizing, staffing, executing, and controlling the operations of an ongoing enterprise. General management also includes supporting disciplines such as law, strategic planning, logistics, and human resources management. The PMBOK® overlaps or modifies general management in many areas—organizational behavior, financial forecasting, and planning techniques, to name just a few. Section 2.4 provides a more detailed discussion of general management.

*Application areas* are categories of projects that have common elements significant in such projects, but are not needed or present in all projects. Application areas are usually defined in terms of:

- Functional departments and supporting disciplines, such as legal, production and inventory management, marketing, logistics and personnel.
- Technical elements, such as software development, pharmaceuticals, water and sanitation engineering, or construction engineering.
- Management specializations, such as government contracting, community development, or new product development.
- Industry groups, such as automotive, chemicals, agriculture, or financial services.

Appendix E includes a more detailed discussion of project management application areas.

## 1.5 RELATED ENDEAVORS

Certain types of endeavors are closely related to projects. There is often a hierarchy of strategic plan, program, project, and subproject, in which a program consisting of several associated projects will contribute to the achievement of a strategic plan. These related undertakings are described below.

*Programs.* A *program* is a group of projects managed in a coordinated way to obtain benefits not available from managing them individually (2). Many programs also include elements of ongoing operations. For example:

- The “XYZ airplane program” includes both the project or projects to design and develop the aircraft, as well as the ongoing manufacturing and support of that craft in the field.
- Many electronics firms have *program managers* who are responsible for both individual product releases (projects) and the coordination of multiple releases over time (an ongoing operation).

Programs may also involve a series of repetitive or cyclical undertakings; for example:

- Utilities often speak of an annual “construction program,” a regular, ongoing operation that involves many projects.
- Many nonprofit organizations have a “fundraising program,” an ongoing effort to obtain financial support that often involves a series of discrete projects, such as a membership drive or an auction.
- Publishing a newspaper or magazine is also a program—the periodical itself is an ongoing effort, but each individual issue is a project.

In some application areas, program management and project management are treated as synonyms; in others, project management is a subset of program management. This diversity of meaning makes it imperative that any discussion of *program* management versus *project* management be preceded by agreement on a clear and consistent definition of each term.

*Subprojects.* Projects are frequently divided into more manageable components or subprojects. *Subprojects* are often contracted to an external enterprise or to another functional unit in the performing organization. Examples include:

- Subprojects based on the project process, such as a single phase.
- Subprojects according to human resource skill requirements, such as the installation of plumbing or electrical fixtures on a construction project.
- Subprojects involving technology, such as automated testing of computer programs on a software development project.

Subprojects are typically referred to as projects and managed as such.

*Project Portfolio Management.* Project portfolio management refers to the selection and support of projects or program investments. These investments in projects and programs are guided by the organization’s strategic plan and available resources.

This preview version of  
*A Guide to the Project Management Body of  
Knowledge (PMBOK® Guide) 2000 Edition*  
does not include Chapter 2.

To order copies of the *PMBOK® Guide* 2000 Edition in hardback, paperback or CD-ROM format  
visit <http://www.pmibookstore.org> or call +412-741-6206

Return

## Chapter 3

# Project Management Processes

Project management is an integrative endeavor—an action, or failure to take action, in one area will usually affect other areas. The interactions may be straightforward and well understood, or they may be subtle and uncertain. For example, a scope change will almost always affect project cost, but it may or may not affect team morale or product quality.

These interactions often require tradeoffs among project objectives—performance in one area may be enhanced only by sacrificing performance in another. The specific performance tradeoffs may vary from project to project and organization to organization. Successful project management requires actively managing these interactions. Many project management practitioners refer to the project triple constraint as a framework for evaluating competing demands. The project triple constraint is often depicted as a triangle where either the sides or corners represent one of the parameters being managed by the project team.

To help in understanding the integrative nature of project management, and to emphasize the importance of integration, this document describes project management in terms of its component processes and their interactions. This chapter provides an introduction to the concept of project management as a number of interlinked processes, and thus provides an essential foundation for understanding the process descriptions in Chapters 4 through 12. It includes the following major sections:

- 3.1 Project Processes**
- 3.2 Process Groups**
- 3.3 Process Interactions**
- 3.4 Customizing Process Interactions**
- 3.5 Mapping of Project Management Processes**

### 3.1 PROJECT PROCESSES

Projects are composed of processes. A process is “a series of actions bringing about a result” (1). Project processes are performed by people and generally fall into one of two major categories:

- *Project management processes* describe, organize, and complete the work of the project. The project management processes that are applicable to most projects, most of the time, are described briefly in this chapter and in detail in Chapters 4 through 12.
- *Product-oriented processes* specify and create the project's product. Product-oriented processes are typically defined by the project life cycle (discussed in Section 2.1) and vary by application area (discussed in Appendix E).

Project management processes and product-oriented processes overlap and interact throughout the project. For example, the scope of the project cannot be defined in the absence of some basic understanding of how to create the product.

## 3.2 PROCESS GROUPS

Project management processes can be organized into five groups of one or more processes each:

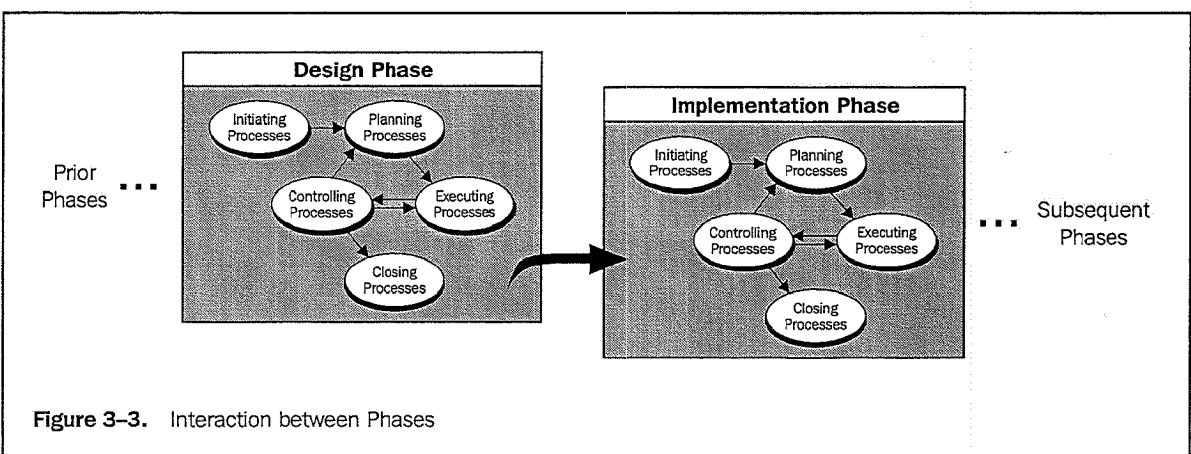
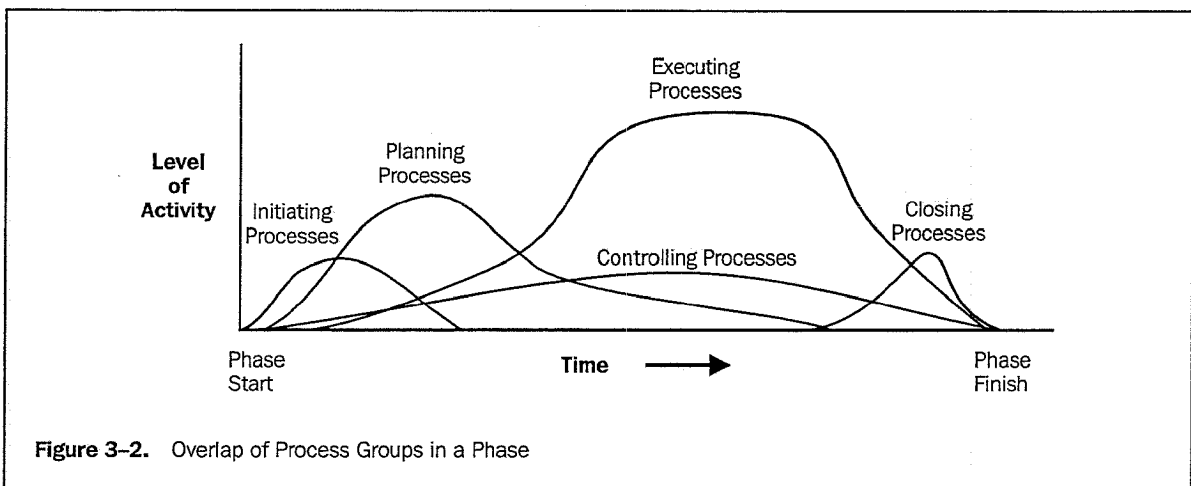
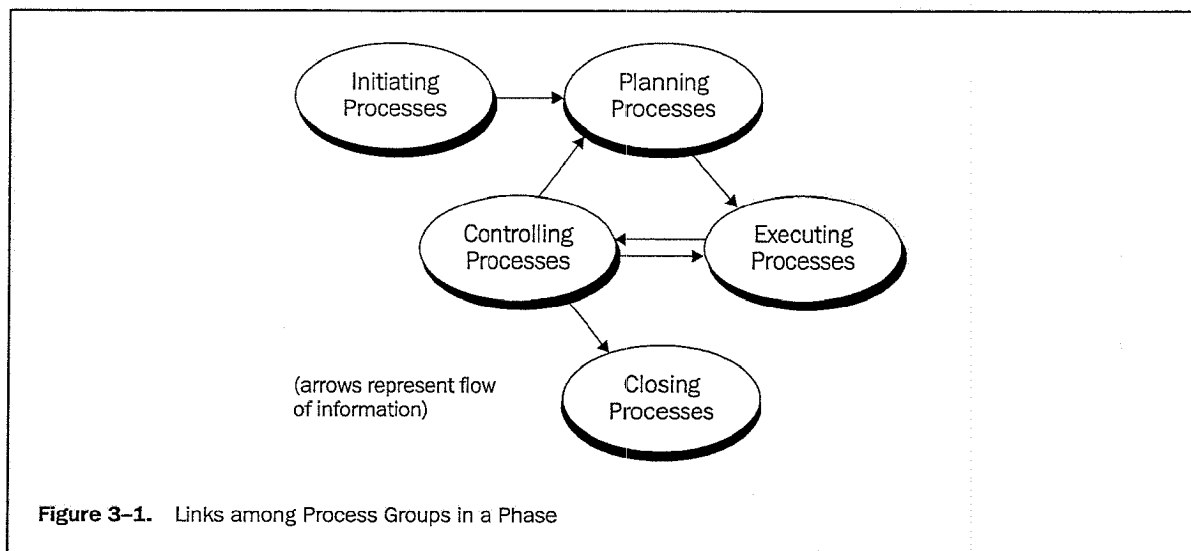
- *Initiating processes*—authorizing the project or phase.
- *Planning processes*—defining and refining objectives and selecting the best of the alternative courses of action to attain the objectives that the project was undertaken to address.
- *Executing processes*—coordinating people and other resources to carry out the plan.
- *Controlling processes*—ensuring that project objectives are met by monitoring and measuring progress regularly to identify variances from plan so that corrective action can be taken when necessary.
- *Closing processes*—formalizing acceptance of the project or phase and bringing it to an orderly end.

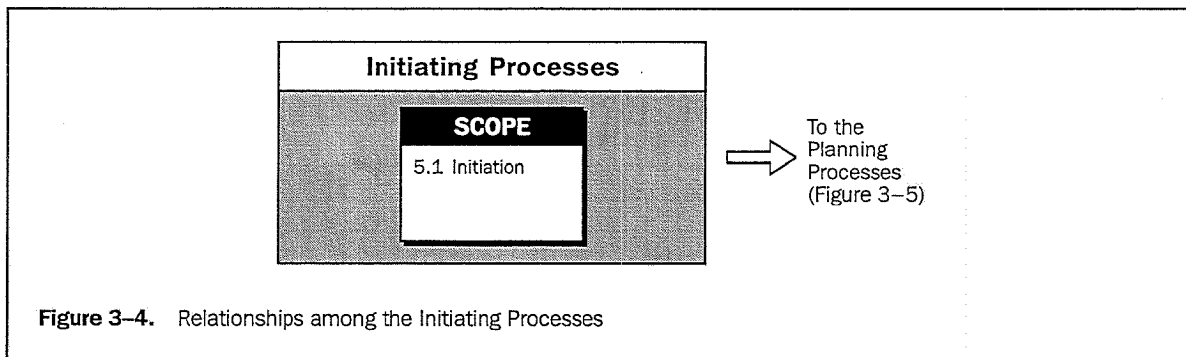
The process groups are linked by the results they produce—the result or outcome of one often becomes an input to another. Among the central process groups, the links are iterated—planning provides executing with a documented project plan early on, and then provides documented updates to the plan as the project progresses. These connections are illustrated in **Figure 3-1**. In addition, the project management process groups are not discrete, one-time events; they are overlapping activities that occur at varying levels of intensity throughout each phase of the project. **Figure 3-2** illustrates how the process groups overlap and vary within a phase.

Finally, the process group interactions also cross phases such that closing one phase provides an input to initiating the next. For example, closing a design phase requires customer acceptance of the design document. Simultaneously, the design document defines the product description for the ensuing implementation phase. This interaction is illustrated in **Figure 3-3**.

Repeating the initiation processes at the start of each phase helps to keep the project focused on the business need that it was undertaken to address. It should also help ensure that the project is halted if the business need no longer exists, or if the project is unlikely to satisfy that need. Business needs are discussed in more detail in the introduction to Section 5.1, Initiation.

It is important to note that the actual inputs and outputs of the processes depend upon the phase in which they are carried out. Although **Figure 3-3** is drawn with discrete phases and discrete processes, in an actual project there will be many overlaps. The planning process, for example, must not only provide details





**Figure 3-4.** Relationships among the Initiating Processes

of the work to be done to bring the current phase of the project to successful completion, but must also provide some preliminary description of work to be done in later phases. This progressive detailing of the project plan is often called *rolling wave planning*, indicating that planning is an iterative and ongoing process.

Involving stakeholders in the project phases generally improves the probability of satisfying customer requirements and realizes the *buy-in* or shared ownership of the project by the stakeholders, which is often critical to project success.

### 3.3 PROCESS INTERACTIONS

Within each process group, the individual processes are linked by their inputs and outputs. By focusing on these links, we can describe each process in terms of its:

- Inputs—documents or documentable items that will be acted upon.
- Tools and techniques—mechanisms applied to the inputs to create the outputs.
- Outputs—documents or documentable items that are a result of the process.

The project management processes common to most projects in most application areas are listed here and described in detail in Chapters 4 through 12. The numbers in parentheses after the process names identify the chapter and section where each is described. The process interactions illustrated here are also typical of most projects in most application areas. Section 3.4 discusses customizing both process descriptions and interactions.

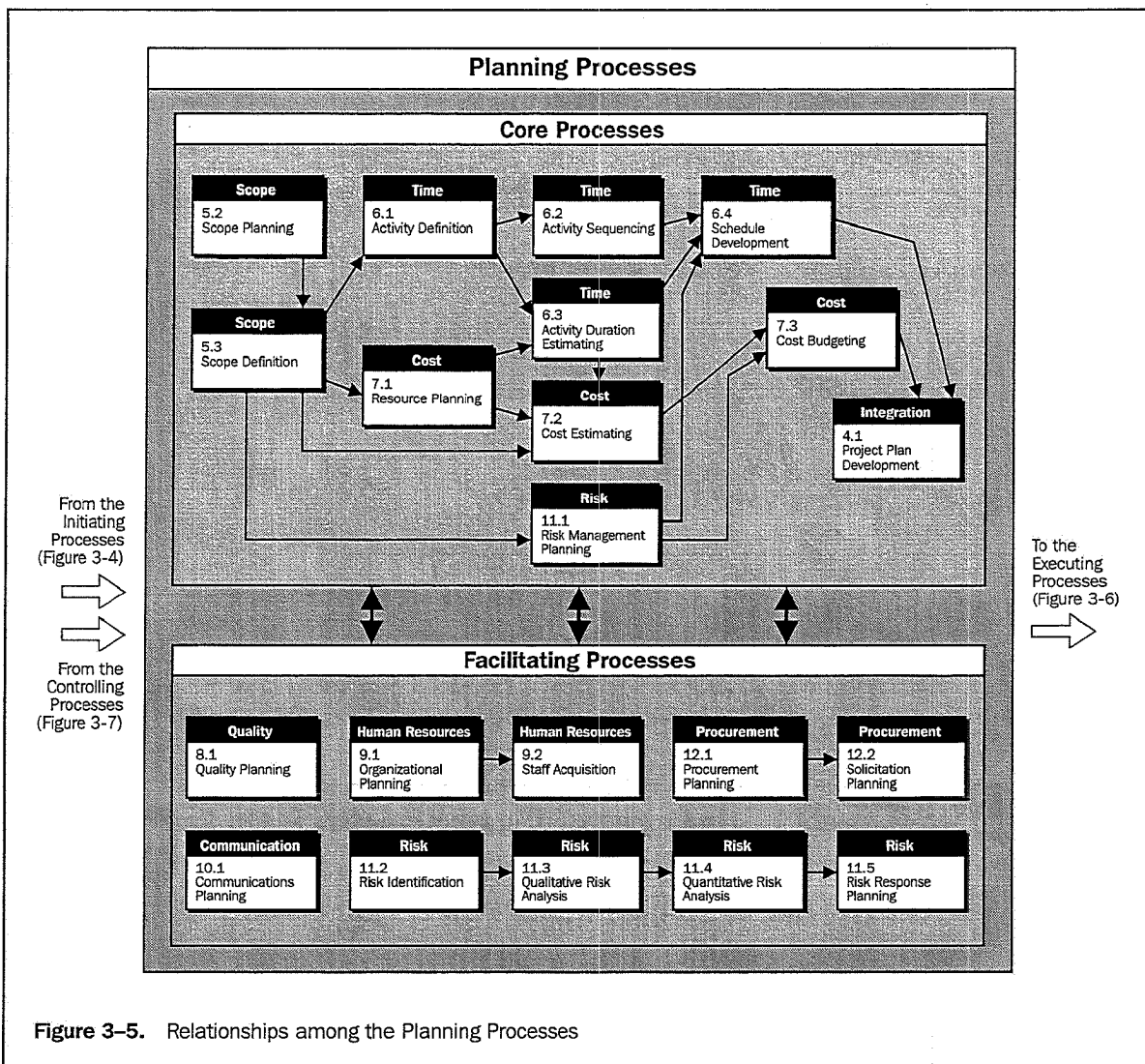
#### 3.3.1 Initiating Processes

Figure 3-4 illustrates the single process in this process group.

- Initiation (5.1)—authorizing the project or phase is part of project scope management.

#### 3.3.2 Planning Processes

Planning is of major importance to a project because the project involves doing something that has not been done before. As a result, there are relatively more processes in this section. However, the number of processes does not mean that project management is primarily planning—the amount of planning performed should be commensurate with the scope of the project and the usefulness of the information developed. Planning is an ongoing effort throughout the life of the project.



The relationships among the project planning processes are shown in **Figure 3-5** (this chart is an explosion of the ellipse labeled “Planning Processes” in **Figure 3-1**). These processes are subject to frequent iterations prior to completing the project plan. For example, if the initial completion date is unacceptable, project resources, cost, or even scope may need to be redefined. In addition, planning is not an exact science—two different teams could generate very different plans for the same project.

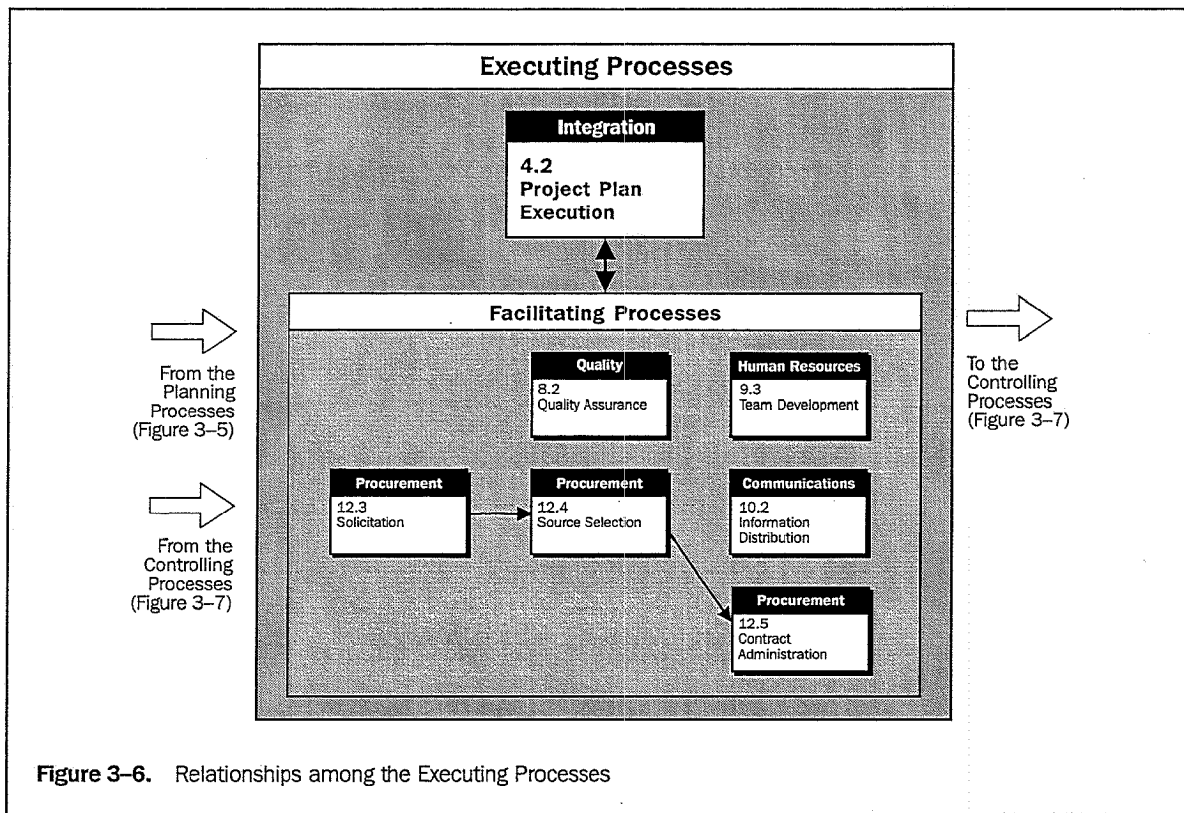
*Core processes.* Some planning processes have clear dependencies that require them to be performed in essentially the same order on most projects. For example, activities must be defined before they can be scheduled or costed. These *core planning processes* may be iterated several times during any one phase of a project. They include:



- Scope Planning (5.2)—developing a written scope statement as the basis for future project decisions.
- Scope Definition (5.3)—subdividing the major project deliverables into smaller, more manageable components.
- Activity Definition (6.1)—identifying the specific activities that must be performed to produce the various project deliverables.
- Activity Sequencing (6.2)—identifying and documenting interactivity dependencies.
- Activity Duration Estimating (6.3)—estimating the number of work periods that will be needed to complete individual activities.
- Schedule Development (6.4)—analyzing activity sequences, activity durations, and resource requirements to create the project schedule.
- Risk Management Planning (11.1)—deciding how to approach and plan for risk management in a project.
- Resource Planning (7.1)—determining what resources (people, equipment, materials, etc.) and what quantities of each should be used to perform project activities.
- Cost Estimating (7.2)—developing an approximation (estimate) of the costs of the resources required to complete project activities.
- Cost Budgeting (7.3)—allocating the overall cost estimate to individual work packages.
- Project Plan Development (4.1)—taking the results of other planning processes and putting them into a consistent, coherent document.

*Facilitating processes.* Interactions among the other planning processes are more dependent on the nature of the project. For example, on some projects, there may be little or no identifiable risk until after most of the planning has been done and the team recognizes that the cost and schedule targets are extremely aggressive and thus involve considerable risk. Although these *facilitating processes* are performed intermittently and as needed during project planning, they are not optional. They include:

- Quality Planning (8.1)—identifying which quality standards are relevant to the project and determining how to satisfy them.
- Organizational Planning (9.1)—identifying, documenting, and assigning project roles, responsibilities, and reporting relationships.
- Staff Acquisition (9.2)—getting the human resources needed assigned to and working on the project.
- Communications Planning (10.1)—determining the information and communications needs of the stakeholders: who needs what information, when will they need it, and how will it be given to them.
- Risk Identification (11.2)—determining which risks are likely to affect the project and documenting the characteristics of each.
- Qualitative Risk Analysis (11.3)—performing a qualitative analysis of risks and conditions to prioritize their effects on project objectives.
- Quantitative Risk Analysis (11.4)—measuring the probability and impact of risks and estimating their implications for project objectives.
- Risk Response Planning (11.5)—developing procedures and techniques to enhance opportunities and to reduce threats to the project's objectives from risk.



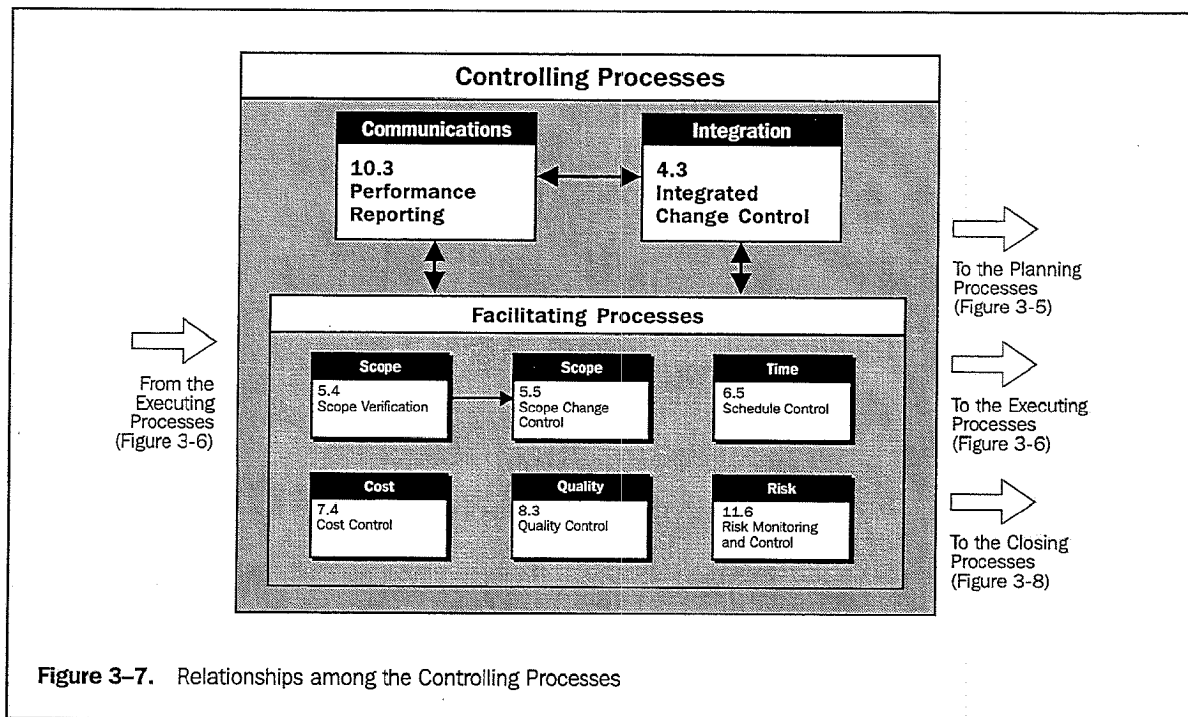
**Figure 3-6.** Relationships among the Executing Processes

- **Procurement Planning (12.1)**—determining what to procure, how much to procure, and when.
- **Solicitation Planning (12.2)**—documenting product requirements and identifying potential sources.

### 3.3.3 Executing Processes

The executing processes include core processes and facilitating processes. Figure 3-6 illustrates how the following core and facilitating processes interact:

- **Project Plan Execution (4.2)**—carrying out the project plan by performing the activities included therein.
- **Quality Assurance (8.2)**—evaluating overall project performance on a regular basis to provide confidence that the project will satisfy the relevant quality standards.
- **Team Development (9.3)**—developing individual and group skills/competencies to enhance project performance.
- **Information Distribution (10.2)**—making needed information available to project stakeholders in a timely manner.
- **Solicitation (12.3)**—obtaining quotations, bids, offers, or proposals as appropriate.
- **Source Selection (12.4)**—choosing from among potential sellers.
- **Contract Administration (12.5)**—managing the relationship with the seller.



**Figure 3-7.** Relationships among the Controlling Processes

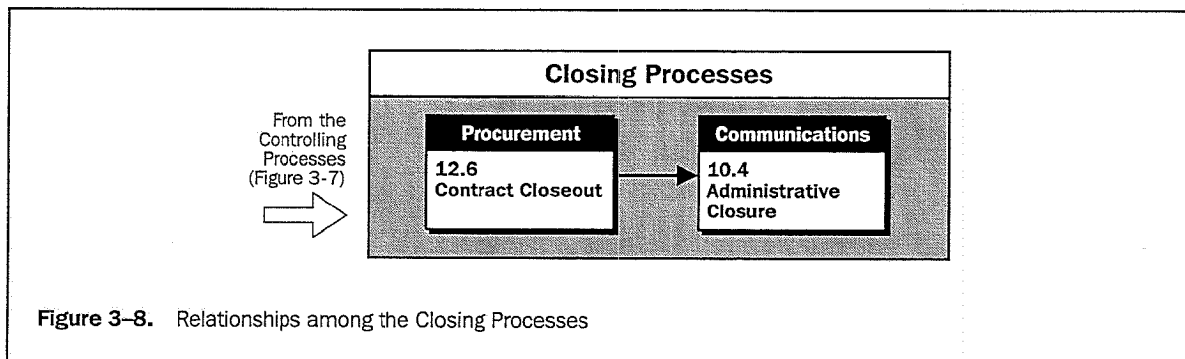
### 3.3.4 Controlling Processes

Project performance must be monitored and measured regularly to identify variances from the plan. Variances are fed into the control processes in the various knowledge areas. To the extent that significant variances are observed (i.e., those that jeopardize the project objectives), adjustments to the plan are made by repeating the appropriate project planning processes. For example, a missed activity finish date may require adjustments to the current staffing plan, reliance on overtime, or tradeoffs between budget and schedule objectives. Controlling also includes taking preventive action in anticipation of possible problems.

The controlling process group contains core processes and facilitating processes.

Figure 3-7 illustrates how the following core and facilitating processes interact:

- Integrated Change Control (4.3)—coordinating changes across the entire project.
- Scope Verification (5.4)—formalizing acceptance of the project scope.
- Scope Change Control (5.5)—controlling changes to project scope.
- Schedule Control (6.5)—controlling changes to the project schedule.
- Cost Control (7.4)—controlling changes to the project budget.
- Quality Control (8.3)—monitoring specific project results to determine if they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory performance.
- Performance Reporting (10.3)—collecting and disseminating performance information. This includes status reporting, progress measurement, and forecasting.
- Risk Monitoring and Control (11.6)—keeping track of identified risks, monitoring residual risks and identifying new risks, ensuring the execution of risk plans, and evaluating their effectiveness in reducing risk.



### 3.3.5 Closing Processes

Figure 3-8 illustrates how the following core processes interact:

- Contract Closeout (12.6)—completion and settlement of the contract, including resolution of any open items.
- Administrative Closure (10.4)—generating, gathering, and disseminating information to formalize phase or project completion, including evaluating the project and compiling lessons learned for use in planning future projects or phases.

## 3.4 CUSTOMIZING PROCESS INTERACTIONS

The processes and interactions in Section 3.3 meet the test of general acceptance—they apply to most projects most of the time. However, not all of the processes will be needed on all projects, and not all of the interactions will apply to all projects. For example:

- An organization that makes extensive use of contractors may explicitly describe where in the planning process each procurement process occurs.
- The absence of a process does not mean that it should not be performed. The project management team should identify and manage all the processes that are needed to ensure a successful project.
- Projects that are dependent on unique resources (commercial software development, biopharmaceuticals, etc.) may define roles and responsibilities prior to scope definition, since what can be done may be a function of who will be available to do it.
- Some process outputs may be predefined as constraints. For example, management may specify a target completion date, rather than allowing it to be determined by the planning process. An imposed completion date may increase project risk, add cost, and compromise quality.
- Larger projects may need relatively more detail. For example, risk identification might be further subdivided to focus separately on identifying cost risks, schedule risks, technical risks, and quality risks.
- On subprojects and smaller projects, relatively little effort will be spent on processes whose outputs have been defined at the project level (e.g., a subcontractor may ignore risks explicitly assumed by the prime contractor), or on processes that provide only marginal utility (e.g., there may be no formal communications plan on a four-person project).

| Process Groups<br>Knowledge Area      | Initiating     | Planning                                                                                                                                                      | Executing                                                                  | Controlling                                        | Closing                     |
|---------------------------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------|-----------------------------|
| 4. Project Integration Management     |                | 4.1 Project Plan Development                                                                                                                                  | 4.2 Project Plan Execution                                                 | 4.3 Integrated Change Control                      |                             |
| 5. Project Scope Management           | 5.1 Initiation | 5.2 Scope Planning<br>5.3 Scope Definition                                                                                                                    |                                                                            | 5.4 Scope Verification<br>5.5 Scope Change Control |                             |
| 6. Project Time Management            |                | 6.1 Activity Definition<br>6.2 Activity Sequencing<br>6.3 Activity Duration Estimating<br>6.4 Schedule Development                                            |                                                                            | 6.5 Schedule Control                               |                             |
| 7. Project Cost Management            |                | 7.1 Resource Planning<br>7.2 Cost Estimating<br>7.3 Cost Budgeting                                                                                            |                                                                            | 7.4 Cost Control                                   |                             |
| 8. Project Quality Management         |                | 8.1 Quality Planning                                                                                                                                          | 8.2 Quality Assurance                                                      | 8.3 Quality Control                                |                             |
| 9. Project Human Resource Management  |                | 9.1 Organizational Planning<br>9.2 Staff Acquisition                                                                                                          | 9.3 Team Development                                                       |                                                    |                             |
| 10. Project Communications Management |                | 10.1 Communications Planning                                                                                                                                  | 10.2 Information Distribution                                              | 10.3 Performance Reporting                         | 10.4 Administrative Closure |
| 11. Risk Project Management           |                | 11.1 Risk Management Planning<br>11.2 Risk Identification<br>11.3 Qualitative Risk Analysis<br>11.4 Quantitative Risk Analysis<br>11.5 Risk Response Planning |                                                                            | 11.6 Risk Monitoring and Control                   |                             |
| 12. Project Procurement Management    |                | 12.1 Procurement Planning<br>12.2 Solicitation Planning                                                                                                       | 12.3 Solicitation<br>12.4 Source Selection<br>12.5 Contract Administration |                                                    | 12.6 Contract Closeout      |

**Figure 3-9.** Mapping of Project Management Processes to the Process Groups and Knowledge Areas

### 3.5 MAPPING OF PROJECT MANAGEMENT PROCESSES

Figure 3-9 reflects the mapping of the thirty-nine project management processes to the five project management process groups of initiating, planning, executing, controlling, and closing and the nine project management knowledge areas in Chapters 4–12.

This diagram is not meant to be exclusive, but to indicate generally where the project management processes fit into both the project management process groups and the project management knowledge areas.

This preview version of  
*A Guide to the Project Management Body of  
Knowledge (PMBOK® Guide) 2000 Edition*  
does not include Chapters 4-12 nor Appendices A-F

To order copies of the *PMBOK® Guide* 2000 Edition in hardback, paperback or CD-ROM format  
visit <http://www.pmi bookstore.org> or call +412-741-6206

Return

## Appendix G

# Summary of Project Management Knowledge Areas

### PROJECT INTEGRATION MANAGEMENT

A subset of project management that includes the processes required to ensure that the various elements of the project are properly coordinated. It consists of:

- Project plan development—integrating and coordinating all project plans to create a consistent, coherent document.
- Project plan execution—carrying out the project plan by performing the activities included therein.
- Integrated change control—coordinating changes across the entire project.

### PROJECT SCOPE MANAGEMENT

A subset of project management that includes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. It consists of:

- Initiation—authorizing the project or phase.
- Scope planning—developing a written scope statement as the basis for future project decisions.
- Scope definition—subdividing the major project deliverables into smaller, more manageable components.
- Scope verification—formalizing acceptance of the project scope.
- Scope change control—controlling changes to project scope.

## PROJECT TIME MANAGEMENT

A subset of project management that includes the processes required to ensure timely completion of the project. It consists of:

- Activity definition—identifying the specific activities that must be performed to produce the various project deliverables.
- Activity sequencing—identifying and documenting interactivity dependencies.
- Activity duration estimating—estimating the number of work periods that will be needed to complete individual activities.
- Schedule development—analyzing activity sequences, activity durations, and resource requirements to create the project schedule.
- Schedule control—controlling changes to the project schedule.

## PROJECT COST MANAGEMENT

A subset of project management that includes the processes required to ensure that the project is completed within the approved budget. It consists of:

- Resource planning—determining what resources (people, equipment, materials) and what quantities of each should be used to perform project activities.
- Cost estimating—developing an approximation (estimate) of the costs of the resources needed to complete project activities.
- Cost budgeting—allocating the overall cost estimate to individual work activities.
- Cost control—controlling changes to the project budget.

## PROJECT QUALITY MANAGEMENT

A subset of project management that includes the processes required to ensure that the project will satisfy the needs for which it was undertaken. It consists of:

- Quality planning—identifying which quality standards are relevant to the project and determining how to satisfy them.
- Quality assurance—evaluating overall project performance on a regular basis to provide confidence that the project will satisfy the relevant quality standards.
- Quality control—monitoring specific project results to determine if they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory performance.

## PROJECT HUMAN RESOURCE MANAGEMENT

A subset of project management that includes the processes required to make the most effective use of the people involved with the project. It consists of:

- Organizational planning—identifying, documenting, and assigning project roles, responsibilities, and reporting relationships.
- Staff acquisition—getting the needed human resources assigned to and working on the project.
- Team development—developing individual and group skills to enhance project performance.



## PROJECT COMMUNICATIONS MANAGEMENT

A subset of project management that includes the processes required to ensure timely and appropriate generation, collection, dissemination, storage, and ultimate disposition of project information. It consists of:

- Communications planning—determining the information and communications needs of the stakeholders: who needs what information, when they will need it, and how it will be given to them.
- Information distribution—making needed information available to project stakeholders in a timely manner.
- Performance reporting—collecting and disseminating performance information. This includes status reporting, progress measurement, and forecasting.
- Administrative closure—generating, gathering, and disseminating information to formalize phase or project completion.

## PROJECT RISK MANAGEMENT

Risk management is the systematic process of identifying, analyzing, and responding to project risk. It includes maximizing the probability and consequences of positive events and minimizing the probability and consequences of adverse events to project objectives. It includes:

- Risk management planning—deciding how to approach and plan the risk management activities for a project.
- Risk identification—determining which risks might affect the project and documenting their characteristics.
- Qualitative risk analysis—performing a qualitative analysis of risks and conditions to prioritize their effects on project objectives.
- Quantitative risk analysis—measuring the probability and consequences of risks and estimating their implications for project objectives.
- Risk response planning—developing procedures and techniques to enhance opportunities and reduce threats from risk to the project's objectives.
- Risk monitoring and control—monitoring residual risks, identifying new risks, executing risk reduction plans, and evaluating their effectiveness throughout the project life cycle.

## PROJECT PROCUREMENT MANAGEMENT

A subset of project management that includes the processes required to acquire goods and services to attain project scope from outside the performing organization. It consists of:

- Procurement planning—determining what to procure and when.
- Solicitation planning—documenting product requirements and identifying potential sources.
- Solicitation—obtaining quotations, bids, offers, or proposals, as appropriate.
- Source selection—choosing from among potential sellers.
- Contract administration—managing the relationship with the seller.
- Contract closeout—completion and settlement of the contract, including resolution of any open items.

# SECTION IV

## GLOSSARY AND INDEX

Glossary

Index

# Glossary

## 1. INCLUSIONS AND EXCLUSIONS

This glossary includes terms that are:

- Unique or nearly unique to project management (e.g., scope statement, work package, work breakdown structure, critical path method).
- Not unique to project management, but used differently or with a narrower meaning in project management than in general everyday usage (e.g., early start date, activity, task).

This glossary generally does not include:

- Application area-specific terms (e.g., project prospectus as a legal document—unique to real estate development).
- Terms whose use in project management do not differ in any material way from everyday use (e.g., calendar).
- Compound terms whose meaning are clear from the combined meanings of the component parts.
- Variants when the meaning of the variant is clear from the base term (e.g., exception report is included, exception reporting is not).

As a result of the above inclusions and exclusions, this glossary includes:

- A preponderance of terms related to Project Scope Management, Project Time Management, and Project Risk Management, since many of the terms used in these knowledge areas are unique or nearly unique to project management.
- Many terms from Project Quality Management, since these terms are used more narrowly than in their everyday usage.
- Relatively few terms related to Project Human Resource Management and Project Communications Management, since most of the terms used in these knowledge areas do not differ significantly from everyday usage.
- Relatively few terms related to Project Cost Management and Project Procurement Management, since many of the terms used in these knowledge areas have narrow meanings that are unique to a particular application area.

## 2. COMMON ACRONYMS

|               |                                                            |
|---------------|------------------------------------------------------------|
| <b>AC</b>     | Actual Cost                                                |
| <b>ACWP</b>   | Actual Cost of Work Performed                              |
| <b>AD</b>     | Activity Description                                       |
| <b>ADM</b>    | Arrow Diagramming Method                                   |
| <b>AF</b>     | Actual Finish date                                         |
| <b>AOA</b>    | Activity-on-Arrow                                          |
| <b>AON</b>    | Activity-on-Node                                           |
| <b>AS</b>     | Actual Start date                                          |
| <b>BAC</b>    | Budget at Completion                                       |
| <b>BCWP</b>   | Budgeted Cost of Work Performed                            |
| <b>BCWS</b>   | Budgeted Cost of Work Scheduled                            |
| <b>CAP</b>    | Control Account Plan (previously called Cost Account Plan) |
| <b>CCB</b>    | Change Control Board                                       |
| <b>CPFF</b>   | Cost-Plus-Fixed-Fee                                        |
| <b>CPI</b>    | Cost Performance Index                                     |
| <b>CPIF</b>   | Cost-Plus-Incentive-Fee                                    |
| <b>CPM</b>    | Critical Path Method                                       |
| <b>CV</b>     | Cost Variance                                              |
| <b>DD</b>     | Data Date                                                  |
| <b>DU</b>     | Duration                                                   |
| <b>EAC</b>    | Estimate at Completion                                     |
| <b>EF</b>     | Early Finish date                                          |
| <b>ES</b>     | Early Start date                                           |
| <b>ETC</b>    | Estimate to Complete                                       |
| <b>EV</b>     | Earned Value                                               |
| <b>EVM</b>    | Earned Value Management                                    |
| <b>FF</b>     | Free Float or Finish-to-Finish                             |
| <b>FFP</b>    | Firm Fixed-Price                                           |
| <b>FPIF</b>   | Fixed-Price-Incentive-Fee                                  |
| <b>FS</b>     | Finish-to-Start                                            |
| <b>GERT</b>   | Graphical Evaluation and Review Technique                  |
| <b>IFB</b>    | Invitation for Bid                                         |
| <b>LF</b>     | Late Finish date                                           |
| <b>LOE</b>    | Level of Effort                                            |
| <b>LS</b>     | Late Start date                                            |
| <b>OBS</b>    | Organization(al) Breakdown Structure                       |
| <b>PC</b>     | Percent Complete                                           |
| <b>PDM</b>    | Precedence Diagramming Method                              |
| <b>PERT</b>   | Program Evaluation and Review Technique                    |
| <b>PF</b>     | Planned Finish date                                        |
| <b>PM</b>     | Project Management or Project Manager                      |
| <b>PMBOK®</b> | Project Management Body of Knowledge                       |
| <b>PMP®</b>   | Project Management Professional                            |
| <b>PS</b>     | Planned Start date                                         |
| <b>PV</b>     | Planned Value                                              |
| <b>QA</b>     | Quality Assurance                                          |
| <b>QC</b>     | Quality Control                                            |
| <b>RAM</b>    | Responsibility Assignment Matrix                           |
| <b>RDU</b>    | Remaining Duration                                         |

|            |                                          |
|------------|------------------------------------------|
| <b>RFP</b> | Request for Proposal                     |
| <b>RFQ</b> | Request for Quotation                    |
| <b>SF</b>  | Scheduled Finish date or Start-to-Finish |
| <b>SOW</b> | Statement of Work                        |
| <b>SPI</b> | Schedule Performance Index               |
| <b>SS</b>  | Scheduled Start date or Start-to-Start   |
| <b>SV</b>  | Schedule Variance                        |
| <b>TC</b>  | Target Completion date                   |
| <b>TF</b>  | Total Float or Target Finish date        |
| <b>TQM</b> | Total Quality Management                 |
| <b>TS</b>  | Target Start date                        |
| <b>VE</b>  | Value Engineering                        |
| <b>WBS</b> | Work Breakdown Structure                 |

### 3. DEFINITIONS

Many of the words defined here have broader, and in some cases different, dictionary definitions.

The definitions use the following conventions:

- Terms used as part of the definitions and that are defined in the glossary are shown in *italics*.
- When synonyms are included, no definition is given and the reader is directed to the preferred term (i.e., see *preferred term*).
- Related terms that are not synonyms are cross-referenced at the end of the definition (i.e., see also *related term*).

**Accountability Matrix.** See *responsibility assignment matrix*.

**Activity.** An element of work performed during the course of a *project*. An activity normally has an expected *duration*, an expected cost, and expected resource requirements. Activities can be subdivided into *tasks*.

**Activity Definition.** Identifying the specific *activities* that must be performed to produce the various project *deliverables*.

**Activity Description (AD).** A short phrase or label used in a *project network diagram*. The activity description normally describes the *scope* of work of the *activity*.

**Activity Duration Estimating.** Estimating the number of work periods that will be needed to complete individual *activities*.

**Activity-on-Arrow (AOA).** See *arrow diagramming method*.

**Activity-on-Node (AON).** See *precedence diagramming method*.

**Activity Sequencing.** Identifying and documenting interactivity logical relationships.

**Actual Cost (AC).** Total costs incurred that must relate to whatever cost was budgeted within the *planned value* and *earned value* (which can sometimes be direct labor hours alone, direct costs alone, or all costs including indirect costs) in accomplishing work during a given time period. See also *earned value*.

**Actual Cost of Work Performed (ACWP).** This term has been replaced with the term *actual cost*.

**Actual Finish Date (AF).** The point in time that work actually ended on an *activity*. (Note: In some *application areas*, the activity is considered "finished" when work is "substantially complete.")

**Actual Start Date (AS).** The point in time that work actually started on an *activity*.

**Administrative Closure.** Generating, gathering, and disseminating information to formalize *phase* or *project* completion.

**Application Area.** A category of projects that have common elements not present in all projects. Application areas are usually defined in terms of either the product of the **project** (i.e., by similar technologies or industry sectors) or the type of customer (e.g., internal versus external, government versus commercial). Application areas often overlap.

**Arrow.** The graphic presentation of an **activity**. See also **arrow diagramming method**.

**Arrow Diagramming Method (ADM).** A network diagramming technique in which activities are represented by arrows. The tail of the **arrow** represents the start, and the head represents the finish of the **activity** (the length of the arrow does not represent the expected **duration** of the activity). Activities are connected at points called **nodes** (usually drawn as small circles) to illustrate the sequence in which the activities are expected to be performed. See also **precedence diagramming method**.

**As-of Date.** See **data date**.

**Assumptions.** Assumptions are factors that, for planning purposes, are considered to be true, real, or certain. Assumptions affect all aspects of project planning, and are part of the progressive elaboration of the **project**. Project teams frequently identify, document, and validate assumptions as part of their planning process. Assumptions generally involve a degree of **risk**.

**Assumptions analysis.** A technique that explores the assumptions' accuracy and identifies **risks** to the **project** from inaccuracy, inconsistency, or incompleteness of assumptions.

**Backward Pass.** The calculation of **late finish dates** and **late start dates** for the uncompleted portions of all network activities. Determined by working backwards through the **network logic** from the **project's** end date. The end date may be calculated in a **forward pass** or set by the customer or sponsor. See also **network analysis**.

**Bar Chart.** A graphic display of schedule-related information. In the typical bar chart, **activities** or other project elements are listed down the left side of the chart, dates are shown across the top, and activity **durations** are shown as date-placed horizontal bars. Also called a **Gantt chart**.

**Baseline.** The original approved plan (for a **project**, a **work package**, or an **activity**), plus or minus approved **scope** changes. Usually used with a modifier (e.g., cost **baseline**, schedule baseline, **performance measurement baseline**).

**Baseline Finish Date.** See **scheduled finish date**.

**Baseline Start Date.** See **scheduled start date**.

**Brainstorming.** A general creativity technique that can be used to identify **risks** using a group of team members or subject-matter experts. Typically, a brainstorming session is structured so that each participant's ideas are recorded for later analysis. A tool of the **risk identification process**.

**Budget at Completion (BAC).** The sum of the total budgets for a **project**.

**Budget Estimate.** See **estimate**.

**Budgeted Cost of Work Performed (BCWP).** This term has been replaced with the term **earned value**.

**Budgeted Cost of Work Scheduled (BCWS).** This term has been replaced with the term **planned value**.

**Buffer.** See **reserve**.

**Calendar Unit.** The smallest unit of time used in scheduling the **project**. Calendar units are generally in hours, days, or weeks, but can also be in shifts or even in minutes. Used primarily in relation to **project management software**.

**Change Control Board (CCB).** A formally constituted group of **stakeholders** responsible for approving or rejecting changes to the project **baselines**.

**Chart of Accounts.** Any numbering system used to monitor project costs by category (e.g., labor, supplies, materials, and equipment). The project chart of accounts is usually based upon the corporate chart of accounts of the primary performing organization. See also **code of accounts**.

**Charter.** See **project charter**.

**Checklist.** A listing of many possible risks that might occur on a **project**. It is used as a tool in the **risk identification process**. Checklists are comprehensive, listing several types of **risk** that have been encountered on prior projects.

**Code of Accounts.** Any numbering system used to uniquely identify each element of the *work breakdown structure*. See also *chart of accounts*.

**Communications Planning.** Determining the information and communications needs of the project *stakeholders*: who needs what information, when they will need it, and how it will be given to them.

**Component.** A constituent part, an element.

**Constraint.** Applicable restriction that will affect the performance of the *project*. Any factor that affects when an *activity* can be scheduled.

**Contingencies.** See *reserve* and *contingency planning*.

**Contingency Allowance.** See *reserve*.

**Contingency Planning.** The development of a management plan that identifies alternative strategies to be used to ensure *project* success if specified *risk* events occur.

**Contingency Reserve.** The amount of money or time needed above the *estimate* to reduce the *risk* of overruns of *project* objectives to a level acceptable to the organization.

**Contract.** A contract is a mutually binding agreement that obligates the *seller* to provide the specified product and obligates the buyer to pay for it. Contracts generally fall into one of three broad categories:

- **Fixed-price** or lump-sum contracts—this category of contract involves a fixed total price for a well-defined product. Fixed-price contracts may also include incentives for meeting or exceeding selected project objectives, such as schedule targets.
- **Cost-reimbursable** contracts—this category of contract involves payment (reimbursement) to the contractor for its actual costs. Costs are usually classified as direct costs (costs incurred directly by the project, such as wages for members of the project team) and indirect costs (costs allocated to the project by the performing organization as a cost of doing business, such as salaries for corporate executives). Indirect costs are usually calculated as a percentage of direct costs. Cost-reimbursable contracts often include incentives for meeting or exceeding selected project objectives, such as schedule targets or total cost.
- **Time and material** contracts—time and material contracts are a hybrid type of contractual arrangement that contain aspects of both cost-reimbursable and fixed-price-type arrangements. Time and material contracts resemble cost-type arrangements in that they are open ended, because the full value of the arrangement is not defined at the time of the award. Thus, time and material contracts can grow in contract value as if they were cost-reimbursable-type arrangements. Conversely, time and material arrangements can also resemble fixed-unit arrangements when, for example, the unit rates are preset by the buyer and seller, as when both parties agree on the rates for the category of “senior engineers.”

**Contract Administration.** Managing the relationship with the *seller*.

**Contract Closeout.** Completion and settlement of the *contract*, including resolution of any open items.

**Control.** The process of comparing actual performance with planned performance, analyzing variances, evaluating possible alternatives, and taking appropriate corrective action as needed.

**Control Account Plan (CAP).** Previously called a Cost Account Plan. The CAP is a management control point where the integration of *scope* and budget and schedule takes place, and where the measurement of performance will happen. CAPs are placed at selected management points of the *work breakdown structure*.

**Control Charts.** Control charts are a graphic display of the results, over time and against established control limits, of a process. They are used to determine if the process is “in control” or in need of adjustment.

**Corrective Action.** Changes made to bring expected future performance of the *project* in line with the plan.

**Cost Budgeting.** Allocating the cost estimates to individual work *activities*.

**Cost Control.** Controlling changes to the project budget.

**Cost Estimating.** Developing an approximation (*estimate*) of the cost of the resources needed to complete project *activities*.

- Cost of Quality.** The costs incurred to ensure quality. The cost of quality includes *quality planning*, *quality control*, *quality assurance*, and *rework*.
- Cost Performance Index (CPI).** The cost efficiency ratio of *earned value* to *actual costs*. CPI is often used to predict the magnitude of a possible cost overrun using the following formula:  $BAC/CPI = \text{projected cost at completion}$ .  $CPI = EV \text{ divided by } AC$ .
- Cost-Plus-Fixed-Fee (CPFF) Contract.** A type of *contract* where the buyer reimburses the *seller* for the seller's allowable costs (allowable costs are defined by the contract) plus a fixed amount of profit (fee).
- Cost-Plus-Incentive-Fee (CPIF) Contract.** A type of *contract* where the buyer reimburses the *seller* for the seller's allowable costs (allowable costs are defined by the contract), and the seller earns its profit if it meets defined performance criteria.
- Cost Variance (CV).** 1) Any difference between the budgeted cost of an *activity* and the *actual cost* of that activity. 2) In *earned value*,  $EV \text{ less } ACWP = CV$ .
- Crashing.** Taking action to decrease the total project *duration* after analyzing a number of alternatives to determine how to get the maximum *duration compression* for the least cost.
- Critical Activity.** Any *activity* on a *critical path*. Most commonly determined by using the *critical path method*. Although some activities are "critical," in the dictionary sense, without being on the *critical path*, this meaning is seldom used in the project context.
- Critical Path.** The series of *activities* that determines the *duration* of the *project*. In a deterministic model, the critical path is usually defined as those activities with *float* less than or equal to a specified value, often zero. It is the longest path through the project. See *critical path method*.
- Critical Path Method (CPM).** A *network analysis* technique used to predict project *duration* by analyzing which sequence of *activities* (which path) has the least amount of scheduling flexibility (the least amount of *float*). Early dates are calculated by means of a *forward pass*, using a specified *start date*. Late dates are calculated by means of a *backward pass*, starting from a specified completion date (usually the forward pass' calculated project *early finish date*).
- Current Finish Date.** The current *estimate* of the point in time when an *activity* will be completed.
- Current Start Date.** The current *estimate* of the point in time when an *activity* will begin.
- Data Date (DD).** The date at which, or up to which, the project's reporting system has provided actual status and accomplishments. Also called *as-of date*.
- Decision Tree Analysis.** The decision tree is a diagram that describes a decision under consideration and the implications of choosing one or another of the available alternatives. It incorporates probabilities or *risks* and the costs or rewards of each logical path of events and future decisions.
- Definitive Estimate.** See *estimate*.
- Deliverable.** Any measurable, tangible, verifiable outcome, result, or item that must be produced to complete a *project* or part of a project. Often used more narrowly in reference to an external *deliverable*, which is a deliverable that is subject to approval by the project sponsor or customer.
- Dependency.** See *logical relationship*.
- Dummy Activity.** An *activity* of zero *duration* used to show a *logical relationship* in the *arrow diagramming method*. Dummy activities are used when logical relationships cannot be completely or correctly described with regular activity arrows. Dummies are shown graphically as a dashed line headed by an *arrow*.
- Duration (DU).** The number of work periods (not including holidays or other nonworking periods) required to complete an *activity* or other project element. Usually expressed as workdays or workweeks. Sometimes incorrectly equated with elapsed time. See also *effort*.
- Duration Compression.** Shortening the *project schedule* without reducing the *project scope*. Duration compression is not always possible and often requires an increase in project cost.



**Early Finish Date (EF).** In the *critical path method*, the earliest possible point in time on which the uncompleted portions of an *activity* (or the *project*) can finish, based on the *network logic* and any schedule constraints. Early finish dates can change as the project progresses and changes are made to the *project plan*.

**Early Start Date (ES).** In the *critical path method*, the earliest possible point in time on which the uncompleted portions of an *activity* (or the *project*) can start, based on the *network logic* and any schedule constraints. Early start dates can change as the project progresses and changes are made to the *project plan*.

**Earned Value (EV).** The physical work accomplished plus the authorized budget for this work. The sum of the approved cost estimates (may include overhead allocation) for activities (or portions of activities) completed during a given period (usually project-to-date). Previously called the budgeted cost of work performed (BCWP) for an *activity* or group of activities.

**Earned Value Management (EVM).** A method for integrating *scope*, schedule, and resources, and for measuring project performance. It compares the amount of work that was planned with what was actually earned with what was actually spent to determine if cost and schedule performance are as planned.

**Effort.** The number of labor units required to complete an *activity* or other project element. Usually expressed as staff hours, staff days, or staff weeks. Should not be confused with *duration*.

**Element.** One of the parts, substances, or principles that make up a compound or complex whole.

**Estimate.** An assessment of the likely quantitative result. Usually applied to project costs and *durations* and should always include some indication of accuracy (e.g.,  $\pm x$  percent). Usually used with a modifier (e.g., preliminary, conceptual, feasibility). Some *application areas* have specific modifiers that imply particular accuracy ranges (e.g., *order-of-magnitude estimate*, budget estimate, and definitive estimate in engineering and construction projects).

**Estimate at Completion (EAC).** The expected total cost of an *activity*, a group of activities, or the *project* when the defined *scope* of work has been completed. Most techniques for forecasting EAC include some adjustment of the original cost estimate, based on actual project performance to date.

**Estimate to Complete (ETC).** The expected additional cost needed to complete an *activity*, a group of activities, or the *project*. Most techniques for forecasting ETC include some adjustment to the original *estimate*, based on project performance to date. Also called "estimated to complete." See also *earned value* and *estimate at completion*.

**Event-on-Arrow.** A network diagramming technique in which events are represented by boxes (or *nodes*) connected by *arrows* to show the sequence in which the events are to occur. Used in the original *program evaluation and review technique*.

**Exception Report.** Document that includes only major variations from plan (rather than all variations).

**Fast Tracking.** Compressing the *project schedule* by overlapping *activities* that would normally be done in sequence, such as design and construction.

**Finish Date.** A point in time associated with an *activity's* completion. Usually qualified by one of the following: actual, planned, estimated, scheduled, early, late, baseline, target, or current.

**Finish-to-Finish (FF).** See *logical relationship*.

**Finish-to-Start (FS).** See *logical relationship*.

**Firm Fixed-Price (FFP) Contract.** A type of *contract* where the buyer pays the *seller* a set amount (as defined by the contract), regardless of the seller's costs.

**Fixed-Price Contract.** See *firm fixed-price contract*.

**Fixed-Price-Incentive-Fee (FPIF) Contract.** A type of *contract* where the buyer pays the *seller* a set amount (as defined by the contract), and the seller can earn an additional amount if it meets defined performance criteria.

- Float.** The amount of time that an **activity** may be delayed from its **early start** without delaying the project **finish date**. Float is a mathematical calculation, and can change as the **project** progresses and changes are made to the **project plan**. Also called **slack**, total float, and path float. See also **free float**.
- Forecast Final Cost.** See **estimate at completion**.
- Forward Pass.** The calculation of the **early start** and **early finish dates** for the uncompleted portions of all network activities. See also **network analysis** and **backward pass**.
- Fragnet.** See **subnet**.
- Free Float (FF).** The amount of time that an **activity** can be delayed without delaying the **early start** of any immediately following activities. See also **float**.
- Functional Manager.** A manager responsible for **activities** in a specialized department or function (e.g., engineering, manufacturing, marketing).
- Functional Organization.** An organization structure in which staff are grouped hierarchically by specialty (e.g., production, marketing, engineering, and accounting at the top level; with engineering, further divided into mechanical, electrical, and others).
- Gantt Chart.** See **bar chart**.
- Grade.** A category or rank used to distinguish items that have the same functional use (e.g., "hammer"), but do not share the same requirements for quality (e.g., different hammers may need to withstand different amounts of force).
- Graphical Evaluation and Review Technique (GERT).** A **network analysis** technique that allows for conditional and probabilistic treatment of **logical relationships** (i.e., some **activities** may not be performed).
- Hammock.** An aggregate or summary **activity** (a group of related activities is shown as one and reported at a summary level). A hammock may or may not have an internal sequence. See also **subproject** and **subnet**.
- Hanger.** An unintended break in a **network path**. Hangers are usually caused by missing **activities** or missing **logical relationships**.
- Information Distribution.** Making needed information available to project **stakeholders** in a timely manner.
- Initiation.** Authorizing the **project** or phase.
- Integrated Change Control.** Coordinating changes across the entire **project**.
- Integrated Cost/Schedule Reporting.** See **earned value**.
- Invitation for Bid (IFB).** Generally, this term is equivalent to **request for proposal**. However, in some **application areas**, it may have a narrower or more specific meaning.
- Key Event Schedule.** See **master schedule**.
- Lag.** A modification of a **logical relationship** that directs a delay in the successor **task**. For example, in a finish-to-start dependency with a ten-day lag, the successor **activity** cannot start until ten days after the predecessor has finished. See also **lead**.
- Late Finish Date (LF).** In the **critical path method**, the latest possible point in time that an **activity** may be completed without delaying a specified **milestone** (usually the project **finish date**).
- Late Start Date (LS).** In the **critical path method**, the latest possible point in time that an **activity** may begin without delaying a specified **milestone** (usually the project **finish date**).
- Lead.** A modification of a **logical relationship** that allows an acceleration of the successor **task**. For example, in a finish-to-start dependency with a ten-day lead, the successor **activity** can start ten days before the predecessor has finished. See also **lag**.
- Lessons Learned.** The learning gained from the process of performing the **project**. Lessons learned may be identified at any point. Also considered a project record.
- Level of Effort (LOE).** Support-type **activity** (e.g., vendor or customer liaison) that does not readily lend itself to measurement of discrete accomplishment. It is generally characterized by a uniform rate of activity over a period of time determined by the activities it supports.
- Leveling.** See **resource leveling**.

- Life-Cycle Costing.** The concept of including acquisition, operating, and disposal costs when evaluating various alternatives.
- Line Manager.** 1) The manager of any group that actually makes a product or performs a service. 2) A *functional manager*.
- Link.** See *logical relationship*.
- Logic.** See *network logic*.
- Logic Diagram.** See *project network diagram*.
- Logical Relationship.** A dependency between two project activities, or between a project *activity* and a *milestone*. See also *precedence relationship*. The four possible types of *logical relationships* are:
- Finish-to-start—the initiation of work of the successor depends upon the completion of work of the predecessor.
  - Finish-to-finish—the completion of the work of the successor cannot finish until the completion of work of the predecessor.
  - Start-to-start—the initiation of work of the successor depends upon the initiation of the work of the predecessor.
  - Start-to-finish—the completion of the successor is dependent upon the initiation of the predecessor.
- Loop.** A *network path* that passes the same *node* twice. Loops cannot be analyzed using traditional *network analysis* techniques such as *critical path method* and *program evaluation and review technique*. Loops are allowed in *graphical evaluation and review technique*.
- Master Schedule.** A summary-level schedule that identifies the major *activities* and key *milestones*. See also *milestone schedule*.
- Mathematical Analysis.** See *network analysis*.
- Matrix Organization.** Any organizational structure in which the *project manager* shares responsibility with the *functional managers* for assigning priorities and for directing the work of individuals assigned to the *project*.
- Milestone.** A significant event in the *project*, usually completion of a major *deliverable*.
- Milestone Schedule.** A summary-level schedule that identifies the major *milestones*. See also *master schedule*.
- Mitigation.** See *risk mitigation*.
- Monitoring.** The capture, analysis, and reporting of project performance, usually as compared to plan.
- Monte Carlo Analysis.** A technique that performs a project simulation many times to calculate a distribution of likely results. See *simulation*.
- Near-Critical Activity.** An *activity* that has low total *float*.
- Network.** See *project network diagram*.
- Network Analysis.** The process of identifying *early* and *late start* and *finish dates* for the uncompleted portions of project *activities*. See also *critical path method*, *program evaluation and review technique*, and *graphical evaluation and review technique*.
- Network Logic.** The collection of *activity* dependencies that makes up a *project network diagram*.
- Network Path.** Any continuous series of connected *activities* in a *project network diagram*.
- Node.** One of the defining points of a network; a junction point joined to some or all of the other dependency lines. See also *arrow diagramming method* and *precedence diagramming method*.
- Order-of-Magnitude Estimate.** See *estimate*.
- Organizational Breakdown Structure (OBS).** A depiction of the project organization arranged so as to relate *work packages* to organizational units.
- Organizational Planning.** Identifying, documenting, and assigning project roles, responsibilities, and reporting relationships.
- Overlap.** See *lead*.

- Parametric Estimating.** An estimating technique that uses a statistical relationship between historical data and other variables (e.g., square footage in construction, lines of code in software development) to calculate an *estimate*.
- Pareto Diagram.** A histogram, ordered by frequency of occurrence, that shows how many results were generated by each identified cause.
- Path.** A set of sequentially connected *activities* in a *project network diagram*.
- Path Convergence.** The *node* in the schedule where parallel paths merge or join. At that node, delays or elongation or any converging path can delay the *project*. In *quantitative risk analysis* of a schedule, significant *risk* may occur at this point.
- Path Float.** See *float*.
- Percent Complete (PC).** An *estimate*, expressed as a percent, of the amount of work that has been completed on an *activity* or a group of activities.
- Performance Measurement Baseline.** An approved plan against which deviations are compared for management control.
- Performance Reporting.** Collecting and disseminating performance information. This includes status reporting, progress measurement, and forecasting.
- Performing Organization.** The enterprise whose employees are most directly involved in doing the work of the *project*.
- PERT Chart.** The term is commonly used to refer to a *project network diagram*. See *program evaluation and review technique* for the traditional definition of PERT.
- Phase.** See *project phase*.
- Planned Finish Date (PF).** See *scheduled finish date*.
- Planned Start Date (PS).** See *scheduled start date*.
- Planned Value (PV).** The physical work scheduled, plus the authorized budget to accomplish the scheduled work. Previously, this was called the budgeted costs for work scheduled (BCWS).
- Precedence Diagramming Method (PDM).** A network diagramming technique in which *activities* are represented by boxes (or *nodes*). Activities are linked by *precedence relationships* to show the sequence in which the activities are to be performed.
- Precedence Relationship.** The term used in the *precedence diagramming method* for a *logical relationship*. In current usage, however, precedence relationship, *logical relationship*, and dependency are widely used interchangeably, regardless of the diagramming method in use.
- Predecessor Activity.** 1) In the *arrow diagramming method*, the *activity* that enters a *node*. 2) In the *precedence diagramming method*, the "from" activity.
- Probability and Impact Matrix.** A common way to determine whether a *risk* is considered low, moderate, or high by combining the two dimensions of a risk, its probability of occurrence, and its impact on objectives if it occurs.
- Procurement Planning.** Determining what to procure and when.
- Product Scope.** The features and functions that characterize a product or service.
- Program.** A group of related *projects* managed in a coordinated way. Programs usually include an element of ongoing work.
- Program Evaluation and Review Technique (PERT).** An event-oriented *network analysis* technique used to estimate program *duration* when there is uncertainty in the individual *activity duration estimates*. PERT applies the *critical path method* using durations that are computed by a weighted average of optimistic, pessimistic, and most likely duration estimates. PERT computes the standard deviation of the completion date from those of the path's activity durations. Also known as the Method of Moments Analysis.
- Project.** A temporary endeavor undertaken to create a unique product, service, or result.
- Project Charter.** A document issued by senior management that formally authorizes the existence of a *project*. And it provides the *project manager* with the authority to apply organizational resources to project activities.

- Project Communications Management.** A subset of *project management* that includes the processes required to ensure timely and appropriate generation, collection and dissemination, storage and ultimate disposition of project information. It consists of communications planning, *information distribution*, *performance reporting*, and *administrative closure*.
- Project Cost Management.** A subset of *project management* that includes the processes required to ensure that the *project* is completed within the approved budget. It consists of *resource planning*, *cost estimating*, *cost budgeting*, and *cost control*.
- Project Human Resource Management.** A subset of *project management* that includes the processes required to make the most effective use of the people involved with the *project*. It consists of *organizational planning*, *staff acquisition*, and *team development*.
- Project Integration Management.** A subset of *project management* that includes the processes required to ensure that the various elements of the *project* are properly coordinated. It consists of *project plan development*, *project plan execution*, and *integrated change control*.
- Project Life Cycle.** A collection of generally sequential *project phases* whose name and number are determined by the control needs of the organization or organizations involved in the *project*.
- Project Management (PM).** The application of knowledge, skills, tools, and techniques to project *activities* to meet the project requirements.
- Project Management Body of Knowledge (PMBOK®).** An inclusive term that describes the sum of knowledge within the profession of *project management*. As with other professions—such as law, medicine, and accounting—the body of knowledge rests with the practitioners and academics that apply and advance it. The PMBOK® includes proven, traditional practices that are widely applied, as well as innovative and advanced ones that have seen more limited use.
- Project Management Professional (PMP®).** An individual certified as such by the Project Management Institute (PMI®).
- Project Management Software.** A class of computer applications specifically designed to aid with planning and controlling project costs and schedules.
- Project Management Team.** The members of the project team who are directly involved in project management *activities*. On some smaller projects, the project management team may include virtually all of the *project team members*.
- Project Manager (PM).** The individual responsible for managing a *project*.
- Project Network Diagram.** Any schematic display of the *logical relationships* of project *activities*. Always drawn from left to right to reflect project chronology. Often referred to as a *PERT chart*.
- Project Phase.** A collection of logically related project *activities*, usually culminating in the completion of a major *deliverable*.
- Project Plan.** A formal, approved document used to guide both project execution and project control. The primary uses of the project plan are to document planning assumptions and decisions, facilitate communication among *stakeholders*, and document approved scope, cost, and schedule *baselines*. A project plan may be summary or detailed.
- Project Plan Development.** Integrating and coordinating all project plans to create a consistent, coherent document.
- Project Plan Execution.** Carrying out the *project plan* by performing the *activities* included therein.
- Project Planning.** The development and maintenance of the *project plan*.
- Project Procurement Management.** A subset of *project management* that includes the processes required to acquire goods and services to attain *project scope* from outside the performing organization. It consists of *procurement planning*, *solicitation planning*, *solicitation*, *source selection*, *contract administration*, and *contract closeout*.
- Project Quality Management.** A subset of *project management* that includes the processes required to ensure that the project will satisfy the needs for which it was undertaken. It consists of *quality planning*, *quality assurance*, and *quality control*.

**Project Risk Management.** Risk management is the systematic process of identifying, analyzing, and responding to project *risk*. It includes maximizing the probability and consequences of positive events and minimizing the probability and consequences of events adverse to project objectives. It includes the processes of *risk management planning*, *risk identification*, *qualitative risk analysis*, *quantitative risk analysis*, *risk response planning*, and *risk monitoring and control*.

**Project Schedule.** The planned dates for performing *activities* and the planned dates for meeting *milestones*.

**Project Scope.** The work that must be done to deliver a product with the specified features and functions.

**Project Scope Management.** A subset of *project management* that includes the processes required to ensure that the *project* includes all of the work required, and only the work required, to complete the project successfully. It consists of *initiation*, *scope planning*, *scope definition*, *scope verification*, and *scope change control*.

**Project Team Members.** The people who report either directly or indirectly to the *project manager*.

**Project Time Management.** A subset of *project management* that includes the processes required to ensure timely completion of the *project*. It consists of *activity definition*, *activity sequencing*, *activity duration estimating*, *schedule development*, and *schedule control*.

**Projectized Organization.** Any organizational structure in which the *project manager* has full authority to assign priorities and to direct the work of individuals assigned to the *project*.

**Qualitative Risk Analysis.** Performing a qualitative analysis of risks and conditions to prioritize their effects on project objectives. It involves assessing the probability and impact of project *risk(s)* and using methods such as the *probability and impact matrix* to classify risks into categories of high, moderate, and low for prioritized *risk response planning*.

**Quantitative Risk Analysis.** Measuring the probability and consequences of risks and estimating their implications for project objectives. Risks are characterized by probability distributions of possible outcomes. This process uses quantitative techniques such as *simulation* and *decision tree analysis*.

**Quality Assurance (QA).** 1) The process of evaluating overall project performance on a regular basis to provide confidence that the *project* will satisfy the relevant quality standards. 2) The organizational unit that is assigned responsibility for quality assurance.

**Quality Control (QC).** 1) The process of monitoring specific *project* results to determine if they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory performance. 2) The organizational unit that is assigned responsibility for quality control.

**Quality Planning.** Identifying which quality standards are relevant to the *project*, and determining how to satisfy them.

**Remaining Duration (RDU).** The time needed to complete an *activity*.

**Request for Proposal (RFP).** A type of bid document used to solicit proposals from prospective *sellers* of products or services. In some *application areas*, it may have a narrower or more specific meaning.

**Request for Quotation (RFQ).** Generally, this term is equivalent to *request for proposal*. However, in some *application areas*, it may have a narrower or more specific meaning.

**Reserve.** A provision in the *project plan* to mitigate cost and/or schedule *risk*. Often used with a modifier (e.g., management reserve, *contingency reserve*) to provide further detail on what types of risk are meant to be mitigated. The specific meaning of the modified term varies by *application area*.

**Residual Risk.** A *risk* that remains after risk responses have been implemented.

**Resource Leveling.** Any form of *network analysis* in which scheduling decisions (*start* and *finish dates*) are driven by resource management concerns (e.g., limited resource availability or difficult-to-manage changes in resource levels).

- Resource-Limited Schedule.** A *project schedule* whose *start* and *finish dates* reflect expected resource availability. The final project schedule should always be resource limited.
- Resource Planning.** Determining what resources (people, equipment, materials) are needed in what quantities to perform project *activities*.
- Responsibility Assignment Matrix (RAM).** A structure that relates the project organization structure to the *work breakdown structure* to help ensure that each element of the project's *scope* of work is assigned to a responsible individual.
- Responsibility Chart.** See *responsibility assignment matrix*.
- Responsibility Matrix.** See *responsibility assignment matrix*.
- Retainage.** A portion of a *contract* payment that is held until contract completion to ensure full performance of the contract terms.
- Rework.** Action taken to bring a defective or nonconforming item into compliance with requirements or specifications.
- Risk.** An uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives.
- Risk Acceptance.** This technique of the *risk response planning process* indicates that the project team has decided not to change the *project plan* to deal with a *risk*, or is unable to identify any other suitable response strategy.
- Risk Avoidance.** Risk avoidance is changing the *project plan* to eliminate the *risk* or to protect the project objectives from its impact. It is a tool of the *risk response planning process*.
- Risk Category.** A source of potential *risk* reflecting technical, project management, organizational, or external sources.
- Risk Database.** A repository that provides for collection, maintenance, and analysis of data gathered and used in the *risk management processes*. A *lessons-learned* program uses a risk database. This is an output of the *risk monitoring and control process*.
- Risk Event.** A discrete occurrence that may affect the project for better or worse.
- Risk Identification.** Determining which *risks* might affect the *project* and documenting their characteristics. Tools used include *brainstorming* and *checklists*.
- Risk Management Plan.** Documents how the *risk* processes will be carried out during the *project*. This is the output of *risk management planning*.
- Risk Management Planning.** Deciding how to approach and plan risk management activities for a *project*.
- Risk Mitigation.** Risk mitigation seeks to reduce the probability and/or impact of a *risk* to below an acceptable threshold.
- Risk Monitoring and Control.** Monitoring residual risks, identifying new risks, executing risk reduction plans, and evaluating their effectiveness throughout the project life cycle.
- Risk Register.** See *risk response plan*.
- Risk Response Plan.** A document detailing all identified *risks*, including description, cause, probability of occurring, impact(s) on objectives, proposed responses, owners, and current status. Also known as *risk register*.
- Risk Response Planning.** Developing procedures and techniques to enhance opportunities and reduce threats to the project's objectives. The tools include avoidance, mitigation, transference, and acceptance.
- Risk Transference.** Risk transference is seeking to shift the impact of a *risk* to a third party together with ownership of the response.
- S-Curve.** Graphic display of cumulative costs, labor hours, percentage of work, or other quantities, plotted against time. The name derives from the S-like shape of the curve (flatter at the beginning and end, steeper in the middle) produced on a *project* that starts slowly, accelerates, and then tails off. Also a term for the cumulative likelihood distribution that is a result of a *simulation*, a tool of *quantitative risk analysis*.
- Schedule.** See *project schedule*.
- Schedule Analysis.** See *network analysis*.
- Schedule Compression.** See *duration compression*.

- Schedule Control.** Controlling changes to the *project schedule*.
- Schedule Development.** Analyzing *activity* sequences, activity *durations*, and resource requirements to create the *project schedule*.
- Schedule Performance Index (SPI).** The schedule efficiency ratio of *earned value* accomplished against the *planned value*. The SPI describes what portion of the planned schedule was actually accomplished. The  $SPI = EV \text{ divided by } PV$ .
- Schedule Variance (SV).** 1) Any difference between the scheduled completion of an *activity* and the actual completion of that activity. 2) In *earned value*,  $EV \text{ less } BCWS = SV$ .
- Scheduled Finish Date (SF).** The point in time that work was scheduled to finish on an *activity*. The scheduled finish date is normally within the range of dates delimited by the *early finish date* and the *late finish date*. It may reflect leveling or scarce resources.
- Scheduled Start Date (SS).** The point in time that work was scheduled to start on an *activity*. The scheduled start date is normally within the range of dates delimited by the *early start date* and the *late start date*. It may reflect leveling of scarce resources.
- Scope.** The sum of the products and services to be provided as a *project*. See *project scope* and *product scope*.
- Scope Baseline.** See *baseline*.
- Scope Change.** Any change to the *project scope*. A scope change almost always requires an adjustment to the project cost or schedule.
- Scope Change Control.** Controlling changes to *project scope*.
- Scope Definition.** Subdividing the major *deliverables* into smaller, more manageable components to provide better control.
- Scope Planning.** The process of progressively elaborating the work of the *project*, which includes developing a written *scope statement* that includes the project justification, the major *deliverables*, and the project objectives.
- Scope Statement.** The scope statement provides a documented basis for making future project decisions and for confirming or developing common understanding of *project scope* among the *stakeholders*. As the project progresses, the scope statement may need to be revised or refined to reflect approved changes to the *scope* of the *project*.
- Scope Verification.** Formalizing acceptance of the *project scope*.
- Secondary Risk.** A *risk* that arises as a direct result of implementing a risk response.
- Seller.** The provider of goods or services to an organization.
- Should-Cost Estimate.** An *estimate* of the cost of a product or service used to provide an assessment of the reasonableness of a prospective contractor's proposed cost.
- Simulation.** A simulation uses a project model that translates the uncertainties specified at a detailed level into their potential impact on objectives that are expressed at the level of the total *project*. Project simulations use computer models and estimates of *risk* at a detailed level, and are typically performed using the *Monte Carlo* technique.
- Slack.** Term used in *arrow diagramming method* for *float*.
- Solicitation.** Obtaining quotations, bids, offers, or proposals as appropriate.
- Solicitation Planning.** Documenting product requirements and identifying potential sources.
- Source Selection.** Choosing from among potential *sellers*.
- Staff Acquisition.** Getting needed human resources assigned to and working on the *project*.
- Stakeholder.** Individuals and organizations that are actively involved in the project, or whose interests may be positively or negatively affected as a result of project execution or project completion. They may also exert influence over the project and its results.
- Start Date.** A point in time associated with an *activity's* start, usually qualified by one of the following: actual, planned, estimated, scheduled, early, late, target, baseline, or current.
- Start-to-Finish (SF).** See *logical relationship*.
- Start-to-Start (SS).** See *logical relationship*.
- Statement of Work (SOW).** A narrative description of products or services to be supplied under *contract*.