

IEEE Guide— Adoption of the Project Management Institute (PMI®) Standard

A Guide to the Project Management Body of Knowledge (PMBOK® Guide) —Fourth Edition

IEEE Computer Society

Sponsored by the
Software & Systems Engineering Standards Committee

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New York, NY 10016-5997
USA

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**Software & Systems Engineering Standards Committee
of the
IEEE Computer Society**

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Abstract: The PMI standard, A Guide to the Project Management Body of Knowledge (PMBOK® Guide)—Fourth Edition, is adopted in this standard.

Keywords: adoption, IEEE 1490, PMBOK, project management

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Project Management Institute

A GUIDE TO THE PROJECT MANAGEMENT BODY OF KNOWLEDGE

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Project Management Institute, Inc.
14 Campus Boulevard
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Phone: +1-610-356-4600
Fax: +1-610-356-4647
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PREFACE TO THE FOURTH EDITION

This document supersedes *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* – Third Edition. In the time since its publication, the Project Management Institute (PMI) received thousands of valuable recommendations for improvements to the *PMBOK® Guide* – Third Edition that have been reviewed and, as appropriate, incorporated into the fourth edition.

As a result of those inputs and growth of the Project Management Body of Knowledge, PMI volunteers prepared an updated version of the *PMBOK® Guide*. The project charter to update the *PMBOK® Guide* – Third Edition was to:

1. Revise the standard so that it would not conflict with any other PMI standards.
2. Ensure that the information contained in the standard was cohesive in concept and clear in writing style, and that terminology was well defined and congruous with the other publications' terminology.
3. Research the way life cycles are currently being used in projects and revise or expand them as necessary.
4. Examine the five Project Management Process Groups and the 44 project management description processes to determine whether combining, deleting, or adding new processes would add clarity to the standard.
5. Ensure that Knowledge Area updates are congruent with the work done in defining the processes, inputs, and outputs defined by the standards group.

The major differences between the Third Edition and the Fourth Edition are summarized below:

1. All process names are in a verb–noun format.
2. A standard approach to discussing enterprise environmental factors and organizational process assets was employed.
3. A standard approach for discussing requested changes, preventive actions, corrective actions, and defect repairs was employed.
4. The processes decreased from 44 to 42. Two processes were deleted, two processes were added, and 6 processes were reconfigured into 4 processes in the Project Procurement Management Knowledge Area.
5. To provide clarity, a distinction was made between the project management plan and project documents used to manage the project.

6. The distinction between the information in the Project Charter and the Project Scope Statement was clarified.
7. The process flow diagrams at the beginning of Chapters 4 through 12 have been deleted.
8. A data flow diagram for each process has been created to show the related processes for the inputs and outputs.
9. A new appendix was added that addresses key interpersonal skills that a project manager utilizes when managing a project.

The *PMBOK® Guide*—Fourth Edition maintains the organization from the third edition and is organized into three sections:

Section 1, The Project Management Framework, provides a basis for understanding project management. There are two chapters in this section.

Chapter 1, Introduction, presents a basis and purpose for the standard. It defines what a project is and discusses project management and the relationship between project, program, and portfolio management. The role of the project manager is also discussed.

Chapter 2, Project Life Cycle and Organization, provides an overview of the project life cycle and its relationship to the product life cycle. It describes the project phases and their relationship to each other and to the project, and includes an overview of organizational structure that can influence the project and the way the project is managed.

Section 2, The Standard for Project Management, defines the project management processes and defines the inputs and outputs for each process.

Chapter 3, Project Management Processes for a Project, defines the five Process Groups: Initiating, Planning, Executing, Monitoring and Controlling, and Closing. This chapter maps the Project Management Knowledge Areas to the specific Project Management Process Groups.

Section 3, The Project Management Knowledge Areas, describes the Project Management Knowledge Areas; lists the project management processes; and defines the inputs, tools and techniques, and outputs for each area. Each of the nine chapters focuses on a specific Knowledge Area.

Chapter 4, Project Integration Management, defines the processes and activities that integrate the various elements of project management. This chapter includes:

- Develop Project Charter
- Develop Project Management Plan
- Direct and Manage Project Execution
- Monitor and Control Project Work
- Perform Integrated Change Control
- Close Project or Phase

Chapter 5, Project Scope Management, shows the processes involved in ensuring the project includes all the work required, and only the work required, for completing the project successfully. This chapter includes:

- Collect Requirements
- Define Scope
- Create WBS
- Verify Scope
- Control Scope

Chapter 6, Project Time Management, focuses on the processes that are used to help ensure the timely completion of the project. This chapter includes:

- Define Activities
- Sequence Activities
- Estimate Activity Resources
- Estimate Activity Durations
- Develop Schedule
- Control Schedule

Chapter 7, Project Cost Management, describes the processes involved in planning, estimating, budgeting, and controlling costs so that the project can be completed within the approved budget. This chapter includes:

- Estimate Costs
- Determine Budget
- Control Costs

Chapter 8, Project Quality Management, describes the processes involved in planning for, monitoring, controlling, and assuring the quality requirements of the project are achieved. This chapter includes:

- Plan Quality
- Perform Quality Assurance
- Perform Quality Control

Chapter 9, Project Human Resource Management describes the processes involved in the planning, acquisition, development, and management of the project team. This chapter includes:

- Develop Human Resource Plan
- Acquire Project Team
- Develop Project Team
- Manage Project Team

Chapter 10, Project Communications Management, identifies the processes involved in ensuring timely and appropriate generation, collection, dissemination, storage, and ultimate disposition of project information. This chapter includes:

- Identify Stakeholders
- Plan Communications
- Distribute Information
- Manage Stakeholder Expectations
- Report Performance

Chapter 11, Project Risk Management, describes the processes involved with identifying, analyzing, and controlling risks for the project. This chapter includes:

- Plan Risk Management
- Identify Risks
- Perform Qualitative Risk Analysis
- Perform Quantitative Risk Analysis
- Plan Risk Responses
- Monitor and Control Risks

Chapter 12, Project Procurement Management, describes the processes involved with purchasing or acquiring products, services, or results for the project. This chapter includes:

- Plan Procurements
- Conduct Procurements
- Administer Procurements
- Close Procurements

SECTION I

THE PROJECT MANAGEMENT FRAMEWORK

Chapter 1

- Introduction

Chapter 2

- Project Life Cycle and Organization



CHAPTER 1

INTRODUCTION

A *Guide to the Project Management Body of Knowledge (PMBOK® Guide)* is a recognized standard for the project management profession. A standard is a formal document that describes established norms, methods, processes, and practices. As with other professions such as law, medicine, and accounting, the knowledge contained in this standard evolved from the recognized good practices of project management practitioners who contributed to the development of this standard.

The first two chapters of the *PMBOK® Guide* provide an introduction to key concepts in the project management field. Chapter 3 is the standard for project management. As such, it summarizes the processes, inputs, and outputs that are considered good practices on most projects most of the time. Chapters 4 through 12 are the guide to the project management body of knowledge. They expand on the information in the standard by describing the inputs and outputs as well as tools and techniques used in managing projects.

The *PMBOK® Guide* provides guidelines for managing individual projects. It defines project management and related concepts and describes the project management life cycle and the related processes.

This chapter defines several key terms and identifies external environmental and internal organizational factors that surround or influence a project's success. An overview of the *PMBOK® Guide* is in the following sections:

- 1.1 Purpose of the *PMBOK® Guide***
- 1.2 What is a Project?**
- 1.3 What is Project Management?**
- 1.4 Relationships Among Project Management, Program Management, and Portfolio Management**
- 1.5 Project Management and Operations Management**
- 1.6 Role of a Project Manager**
- 1.7 Project Management Body of Knowledge**
- 1.8 Enterprise Environmental Factors**

1.1 Purpose of the *PMBOK® Guide*

The increasing acceptance of project management indicates that the application of appropriate knowledge, processes, skills, tools, and techniques can have a significant impact on project success. The *PMBOK® Guide* identifies that subset of the project management body of knowledge generally recognized as good practice. “Generally recognized” means the knowledge and practices described are applicable to most projects most of the time, and there is consensus about their value and usefulness. “Good practice” means there is general agreement that the application of these skills, tools, and techniques can enhance the chances of success over a wide range of projects. Good practice does not mean the knowledge described should always be applied uniformly to all projects; the organization and/or project management team is responsible for determining what is appropriate for any given project.

The *PMBOK® Guide* also provides and promotes a common vocabulary within the project management profession for discussing, writing, and applying project management concepts. Such a standard vocabulary is an essential element of a professional discipline.

The Project Management Institute (PMI) views this standard as a foundational project management reference for its professional development programs and certifications.

As a foundational reference, this standard is neither complete nor all-inclusive. This standard is a guide rather than a methodology. One can use different methodologies and tools to implement the framework. Appendix D discusses application area extensions, and Appendix E lists sources of further information on project management.

In addition to the standards that establish guidelines for project management processes, tools, and techniques, the *Project Management Institute Code of Ethics and Professional Conduct* guides practitioners of the profession of project management and describes the expectations practitioners have of themselves and others. The *Project Management Institute Code of Ethics and Professional Conduct* is specific about the basic obligation of responsibility, respect, fairness, and honesty. It requires that practitioners demonstrate a commitment to ethical and professional conduct. It carries the obligation to comply with laws, regulations, and organizational and professional policies. Since practitioners come from diverse backgrounds and cultures, the *Code of Ethics and Professional Conduct* applies globally. When dealing with any stakeholder, practitioners should be committed to honest and fair practices and respectful dealings. The *Project Management Institute Code of Ethics and Professional Conduct* is posted on the PMI website (<http://www.pmi.org>). Acceptance of the code is a requirement for the PMP® certification by PMI.

1.2 What is a Project?

A project is a temporary endeavor undertaken to create a unique product, service, or result. The temporary nature of projects indicates a definite beginning and end. The end is reached when the project's objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exists. Temporary does not necessarily mean short in duration. Temporary does not generally apply to the product, service, or result created by the project; most projects are undertaken to create a lasting outcome. For example, a project to build a national monument will create a result expected to last centuries. Projects can also have social, economic, and environmental impacts that far outlast the projects themselves.

Every project creates a unique product, service, or result. Although repetitive elements may be present in some project deliverables, this repetition does not change the fundamental uniqueness of the project work. For example, office buildings are constructed with the same or similar materials or by the same team, but each location is unique—with a different design, different circumstances, different contractors, and so on.

An ongoing work effort is generally a repetitive process because it follows an organization's existing procedures. In contrast, because of the unique nature of projects, there may be uncertainties about the products, services, or results that the project creates. Project tasks can be new to a project team, which necessitates more dedicated planning than other routine work. In addition, projects are undertaken at all organizational levels. A project can involve a single person, a single organizational unit, or multiple organizational units.

A project can create:

- A product that can be either a component of another item or an end item in itself,
- A capability to perform a service (e.g., a business function that supports production or distribution), or
- A result such as an outcome or document (e.g., a research project that develops knowledge that can be used to determine whether a trend is present or a new process will benefit society).

Examples of projects include, but are not limited to:

- Developing a new product or service,
- Effecting a change in the structure, staffing, or style of an organization,
- Developing or acquiring a new or modified information system,
- Constructing a building or infrastructure, or
- Implementing a new business process or procedure.

1.3 What is Project Management?

Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. Project management is accomplished through the appropriate application and integration of the 42 logically grouped project management processes comprising the 5 Process Groups. These 5 Process Groups are:

- Initiating,
- Planning,
- Executing,
- Monitoring and Controlling, and
- Closing.

Managing a project typically includes:

- Identifying requirements,
- Addressing the various needs, concerns, and expectations of the stakeholders as the project is planned and carried out,
- Balancing the competing project constraints including, but not limited to:
 - Scope,
 - Quality,
 - Schedule,
 - Budget,
 - Resources, and
 - Risk.

The specific project will influence the constraints on which the project manager needs to focus.

The relationship among these factors is such that if any one factor changes, at least one other factor is likely to be affected. For example, if the schedule is shortened, often the budget needs to be increased to add additional resources to complete the same amount of work in less time. If a budget increase is not possible, the scope or quality may be reduced to deliver a product in less time for the same budget. Project stakeholders may have differing ideas as to which factors are the most important, creating an even greater challenge. Changing the project requirements may create additional risks. The project team must be able to assess the situation and balance the demands in order to deliver a successful project.

Because of the potential for change, the project management plan is iterative and goes through progressive elaboration throughout the project's life cycle. Progressive elaboration involves continuously improving and detailing a plan as more-detailed and specific information and more accurate estimates become available. Progressive elaboration allows a project management team to manage to a greater level of detail as the project evolves.

1.4 Relationships Among Project Management, Program Management, and Portfolio Management

In mature project management organizations, project management exists in a broader context governed by program management and portfolio management. As Figure 1-1 illustrates, organizational strategies and priorities are linked and have relationships between portfolios and programs, and between programs and individual projects. Organizational planning impacts the projects by means of project prioritization based on risk, funding, and the organization's strategic plan. Organizational planning can direct the funding and support for the component projects on the basis of risk categories, specific lines of business, or general types of projects, such as infrastructure and internal process improvement.

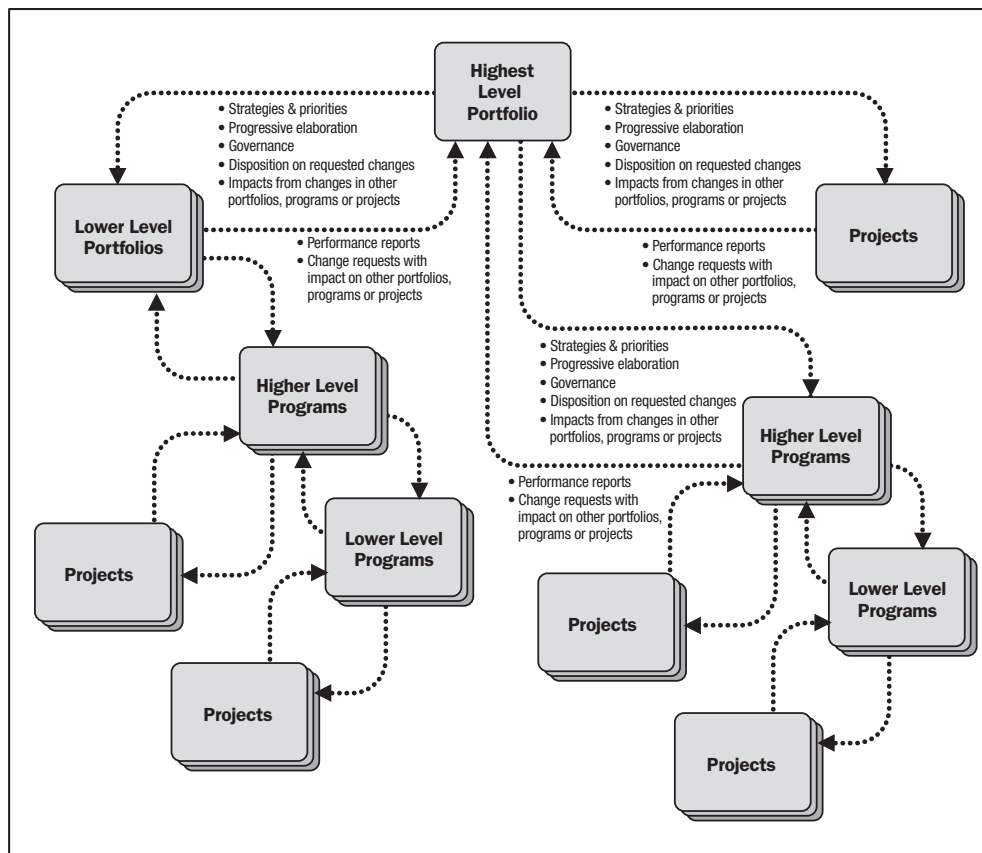


Figure 1-1. Portfolio, Program, and Project Management Interactions

Projects, programs, and portfolios have different approaches. Table 1-1 shows the comparison of project, program, and portfolio views across several domains including change, leadership, management, and others.

1.4.1 Portfolio Management

A portfolio refers to a collection of projects or programs and other work that are grouped together to facilitate effective management of that work to meet strategic business objectives. The projects or programs of the portfolio may not necessarily be interdependent or directly related. For example, an infrastructure firm that has the strategic objective of “maximizing the return on its investments” may put together a portfolio that includes a mix of projects in oil and gas, power, water, roads, rail, and airports. From this mix, the firm may choose to manage related projects as one program. All of the power projects may be grouped together as a power program. Similarly, all of the water projects may be grouped together as a water program.

Portfolio management refers to the centralized management of one or more portfolios, which includes identifying, prioritizing, authorizing, managing, and controlling projects, programs, and other related work, to achieve specific strategic business objectives. Portfolio management focuses on ensuring that projects and programs are reviewed to prioritize resource allocation, and that the management of the portfolio is consistent with and aligned to organizational strategies.

Table 1-1. Comparative Overview of Project, Program, and Portfolio Management

	PROJECTS	PROGRAMS	PORTFOLIOS
Scope	Projects have defined objectives. Scope is progressively elaborated throughout the project life cycle.	Programs have a larger scope and provide more significant benefits.	Portfolios have a business scope that changes with the strategic goals of the organization.
Change	Project managers expect change and implement processes to keep change managed and controlled.	The program manager must expect change from both inside and outside the program and be prepared to manage it.	Portfolio managers continually monitor changes in the broad environment.
Planning	Project managers progressively elaborate high-level information into detailed plans throughout the project life cycle.	Program managers develop the overall program plan and create high-level plans to guide detailed planning at the component level.	Portfolio managers create and maintain necessary processes and communication relative to the aggregate portfolio.
Management	Project managers manage the project team to meet the project objectives.	Program managers manage the program staff and the project managers; they provide vision and overall leadership.	Portfolio managers may manage or coordinate portfolio management staff.
Success	Success is measured by product and project quality, timeliness, budget compliance, and degree of customer satisfaction.	Success is measured by the degree to which the program satisfies the needs and benefits for which it was undertaken.	Success is measured in terms of aggregate performance of portfolio components.
Monitoring	Project managers monitor and control the work of producing the products, services or results that the project was undertaken to produce.	Program managers monitor the progress of program components to ensure the overall goals, schedules, budget, and benefits of the program will be met.	Portfolio managers monitor aggregate performance and value indicators.

1.4.2 Program Management

A program is defined as a group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually. Programs may include elements of related work outside the scope of the discrete projects in the program. A project may or may not be part of a program but a program will always have projects.