Project Management Institute

A GUIDE TO THE PROJECT MANAGEMENT BODY OF KNOWLEDGE (PMBOK® GUIDE) — FIFTH EDITION

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14 Campus Boulevard
Newtown Square, Pennsylvania 19073-3299 USA
Phone: +610-356-4600
Fax: +610-356-4647
Email: customercare@pmi.org
Internet: www.PMI.org

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INTRODUCTION

A Guide to the Project Management Body of Knowledge (*PMBOK® Guide)* – Fifth Edition provides guidelines for managing individual projects and defines project management related concepts. It also describes the project management life cycle and its related processes, as well as the project life cycle.

The *PMBOK® Guide* contains the globally recognized standard and guide for the project management profession (found in Annex A1). A standard is a formal document that describes established norms, methods, processes, and practices. As with other professions, the knowledge contained in this standard has evolved from the recognized good practices of project management practitioners who have contributed to the development of this standard.

The first two sections of the *PMBOK® Guide* provide an introduction to key concepts in the project management field. Section 3 summarizes the Process Groups and provides an overview of process interactions among the ten Knowledge Areas and five Process Groups. Sections 4 through 13 are the guide to the project management body of knowledge. These sections expand on the information in the standard by describing the inputs and outputs, as well as tools and techniques used in managing projects. Annex A1 is the standard for project management and presents the processes, inputs, and outputs that are considered to be good practice on most projects most of the time.

This section defines several key terms and the relationship among portfolio management, program management, project management and organizational project management. An overview of the *PMBOK®* Guide is found within 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 Portfolio Management, Program Management, Project Management, and Organizational Project Management

1.5 Relationship Between Project Management, Operations Management, and Organizational Strategy

1.6 Business Value

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1.1 Purpose of the *PMBOK® Guide*

The acceptance of project management as a profession indicates that the application of 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 that is 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 the knowledge, skills, tools, and techniques can enhance the chances of success over many projects. "Good practice" does not mean that 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 using and applying project management concepts. A common vocabulary is an essential element of a professional discipline. The *PMI Lexicon of Project Management Terms* provides the foundational professional vocabulary that can be consistently used by project, program, and portfolio managers and other stakeholders.

Annex A1 is a foundational reference for PMI's project management professional development programs. Annex A1 continues to evolve along with the profession, and is therefore not all-inclusive; this standard is a guide rather than a specific methodology. One can use different methodologies and tools (e.g., agile, waterfall, PRINCE2) to implement the project management framework. Appendix D discusses application area extensions while Appendix E lists sources of further information on project management.

In addition to the standards that establish guidelines for project management processes, the *Project Management Institute Code of Ethics and Professional Conduct* guides practitioners of the profession and describes the expectations that practitioners should hold for 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. Practitioners come from diverse backgrounds and cultures, and the *Project Management Institute Code of Ethics and Professional Conduct* applies globally. When interacting with any stakeholder, practitioners should be committed to honest, responsible, fair practices and respectful dealings. Acceptance of the code is essential for project managers, and is a requirement for the following PMI® exams:

- Certified Associate in Project Management (CAPM)®
- Project Management Professional (PMP)®
- Program Management Professional (PgMP)®
- PMI Agile Certified Practitioner (PMI-ACP)℠
- PMI Risk Management Professional (PMI-RMP)®
- PMI Scheduling Professional (PMI-SP)®

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 that a project has 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. A project may also be terminated if the client (customer, sponsor, or champion)

wishes to terminate the project. Temporary does not necessarily mean the duration of the project is short. It refers to the project's engagement and its longevity. Temporary does not typically 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 for centuries. Projects can also have social, economic, and environmental impacts that far outlive the projects themselves.

Every project creates a unique product, service, or result. The outcome of the project may be tangible or intangible. Although repetitive elements may be present in some project deliverables and activities, this repetition does not change the fundamental, unique characteristics of the project work. For example, office buildings can be constructed with the same or similar materials and by the same or different teams. However, each building project remains unique with a different location, different design, different circumstances and situations, different stakeholders, and so on.

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

A project can create:

- A product that can be either a component of another item, an enhancement of an item, or an end item in itself;
- A service or a capability to perform a service (e.g., a business function that supports production or distribution);
- An improvement in the existing product or service lines (e.g., A Six Sigma project undertaken to reduce defects); 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 exists or a new process will benefit society).

Examples of projects include, but are not limited to:

- Developing a new product, service, or result;
- Effecting a change in the structure, processes, staffing, or style of an organization;
- Developing or acquiring a new or modified information system (hardware or software);
- Conducting a research effort whose outcome will be aptly recorded;
- Constructing a building, industrial plant, or infrastructure; or
- Implementing, improving, or enhancing existing business processes and procedures.

1.2.1. The Relationships Among Portfolios, Programs, and Projects

The relationship among portfolios, programs, and projects is such that a portfolio refers to a collection of projects, programs, subportfolios, and operations managed as a group to

achieve strategic objectives. Programs are grouped within a portfolio and are comprised of subprograms, projects, or other work that are managed in a coordinated fashion in support of the portfolio. Individual projects that are either within or outside of a program are still considered part of a portfolio. Although the projects or programs within the portfolio may not necessarily be interdependent or directly related, they are linked to the organization's strategic plan by means of the organization's portfolio.

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 other considerations relevant to the organization's strategic plan. Organizational planning can direct the management of resources, 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 process improvement.

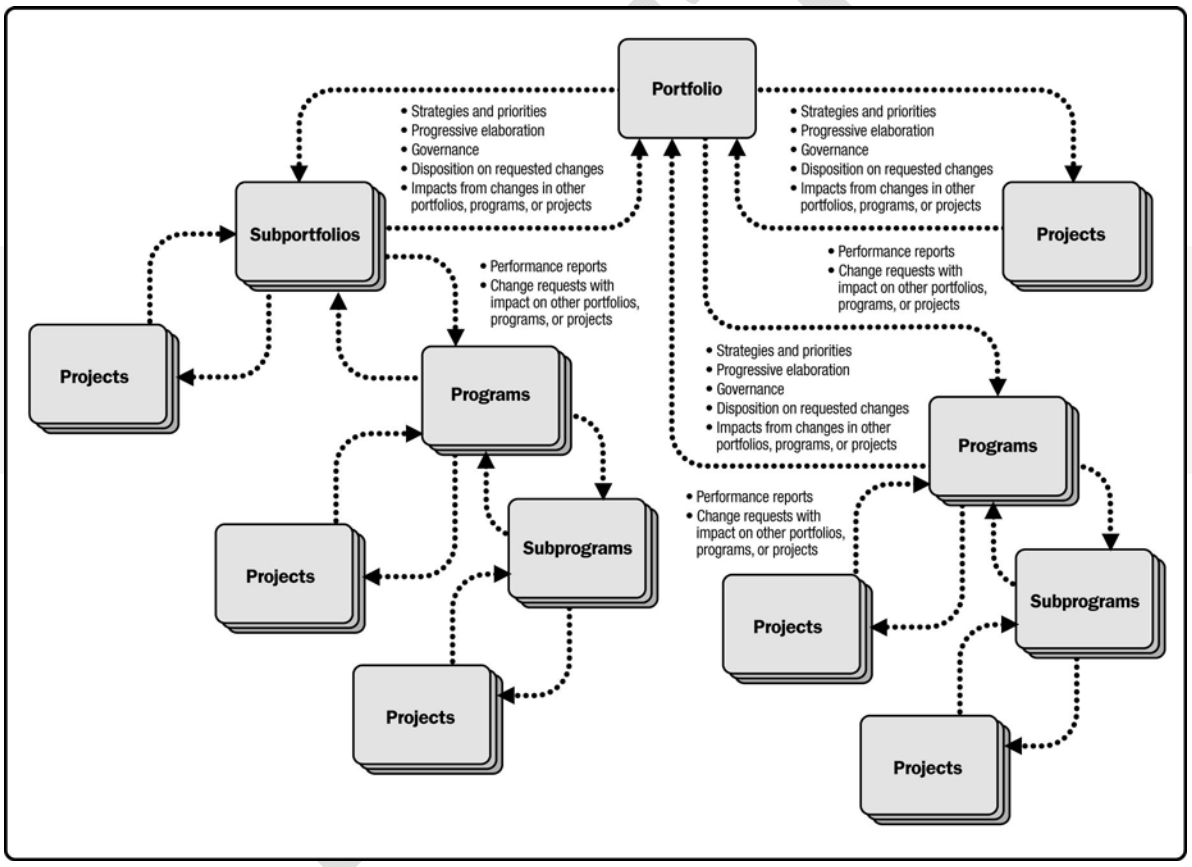

Figure 1-1. Portfolio, Program, and Project Management Interactions

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 47 logically grouped project management processes, which are categorized into five Process Groups. These five Process Groups are:

- Initiating,

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

Managing a project typically includes, but is not limited to:

- Identifying requirements;
- Addressing the various needs, concerns, and expectations of the stakeholders in planning and executing the project;
- Setting up, maintaining, and carrying out communication among stakeholders that is active, effective, and collaborative in nature;
- Managing stakeholders towards meeting project requirements and creating project deliverables;
- Balancing the competing project constraints, which include, but are not limited to:
    - Scope,
    - Quality,
    - Schedule,
    - Budget,
    - Resources, and
    - Risks.

The specific project characteristics and circumstances can influence the constraints on which the project management team 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 targeted quality may be reduced to deliver the project's end result in less time within the same budget amount. Project stakeholders may have differing ideas as to which factors are the most important, creating an even greater challenge. Changing the project requirements or objectives may create additional risks. The project team needs to be able to assess the situation, balance the demands, and maintain proactive communication with stakeholders in order to deliver a successful project.

Due to the potential for change, the development of the project management plan is an iterative activity and is progressively elaborated 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 define work and manage it to a greater level of detail as the project evolves.

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

In order to understand portfolio, program, and project management, it is important to recognize the similarities and differences among these disciplines. It is also helpful to understand how they relate to organizational project management (OPM). OPM is a strategy execution framework utilizing project, program, and portfolio management as well as organizational enabling practices to consistently and predictably deliver organizational strategy producing better performance, better results, and a sustainable competitive advantage.

Portfolio, program, and project management are aligned with or driven by organizational strategies. Conversely, portfolio, program, and project management differ in the way each contributes to the achievement of strategic goals. Portfolio management aligns with organizational strategies by selecting the right programs or projects, prioritizing the work, and providing the needed resources, whereas program management harmonizes its projects and program components and controls interdependencies in order to realize specified benefits. Project management develops and implements plans to achieve a specific scope that is driven by the objectives of the program or portfolio it is subjected to and, ultimately, to organizational strategies. OPM advances organizational capability by linking project, program, and portfolio management principles and practices with organizational enablers (e.g. structural, cultural, technological, and human resource practices) to support strategic goals. An organization measures its capabilities, then plans and implements improvements towards the systematic achievement of best practices.

Table 1-1 shows the comparison of project, program, and portfolio views across several dimensions within the organization.

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

Organizational Project 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 an organizational scope that changes with the strategic objectives of the organization.
Change	Project managers expect change and implement processes to keep change managed and controlled.	Program managers expect change from both inside and outside the program and are prepared to manage it.	Portfolio managers continuously monitor changes in the broader internal and external 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, or program and project staff that may have reporting responsibilities into the aggregate portfolio.
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 the aggregate investment performance and benefit realization of the portfolio.
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 strategic changes and aggregate resource allocation, performance results, and risk of the portfolio.

1.4.1 Program Management

A program is defined as a group of related projects, subprograms, and program activities managed in a coordinated way to obtain benefits 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.

Program management is the application of knowledge, skills, tools, and techniques to a program in order to meet the program requirements and to obtain benefits and control not available by managing projects individually.

Projects within a program are related through the common outcome or collective capability. If the relationship between projects is only that of a shared client, seller, technology, or resource, the effort should be managed as a portfolio of projects rather than as a program.

Program management focuses on the project interdependencies and helps to determine the optimal approach for managing them. Actions related to these interdependencies may include:

- Resolving resource constraints and/or conflicts that affect multiple projects within the program,
- Aligning organizational/strategic direction that affects project and program goals and objectives, and
- Resolving issues and change management within a shared governance structure.

An example of a program is a new communications satellite system with projects for design of the satellite and the ground stations, the construction of each, the integration of the system, and the launch of the satellite.

1.4.2 Portfolio Management

A portfolio refers to projects, programs, subportfolios, and operations managed as a group to achieve strategic 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. Thus, the power program and the water program become integral components of the enterprise portfolio of the infrastructure firm.

Portfolio management refers to the centralized management of one or more portfolios to achieve strategic 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.

1.4.3 Projects and Strategic Planning

Projects are often utilized as a means of directly or indirectly achieving objectives within an organization's strategic plan. Projects are typically authorized as a result of one or more of the following strategic considerations:

- Market demand (e.g., a car company authorizing a project to build more fuel-efficient cars in response to gasoline shortages);
- Strategic opportunity/business need (e.g., a training company authorizing a project to create a new course to increase its revenues);
- Social need (e.g., a nongovernmental organization in a developing country authorizing a project to provide potable water systems, latrines, and sanitation education to communities suffering from high rates of infectious diseases);
- Environmental consideration (e.g., a public company authorizing a project to create a new service of electric car sharing to reduce pollution);
- Customer request (e.g., an electric utility authorizing a project to build a new substation to serve a new industrial park);

- Technological advance (e.g., an electronics firm authorizing a new project to develop a faster, cheaper, and smaller laptop based on advances in computer memory and electronics technology); and
- Legal requirement (e.g., a chemical manufacturer authorizing a project to establish guidelines for proper handling of a new toxic material).

Projects, within programs or portfolios, are a means of achieving organizational goals and objectives, often in the context of a strategic plan. Although a group of projects within a program can have discrete benefits, they can also contribute to the benefits of the program, to the objectives of the portfolio, and to the strategic plan of the organization.

Organizations manage portfolios based on their strategic plan. One goal of portfolio management is to maximize the value of the portfolio through careful examination of its components—the constituent programs, projects, and other related work. Those components contributing the least to the portfolio's strategic objectives may be excluded. In this way, an organization's strategic plan becomes the primary factor guiding investments in projects. At the same time, projects provide feedback to programs and portfolios by means of status reports, lessons learned, and change requests that may help to identify impacts to other projects, programs, or portfolios. The needs of the projects, including the resource needs, are rolled up and communicated back to the portfolio level, which in turn sets the direction for organizational planning.

1.4.4 Project Management Office

A project management office (PMO) is a management structure that standardizes the project-related governance processes and facilitates the sharing of resources, methodologies, tools, and techniques. The responsibilities of a PMO can range from providing project management support functions to actually being responsible for the direct management of one or more projects.

There are several types of PMO structures in organizations, each varying in the degree of control and influence they have on projects within the organization, such as:

- **Supportive.** Supportive PMOs provide a consultative role to projects by supplying templates, best practices, training, access to information and lessons learned from other projects. This type of PMO serves as a project repository. The degree of control provided by the PMO is low.
- **Controlling.** Controlling PMOs provide support and require compliance through various means. Compliance may involve adopting project management frameworks or methodologies, using specific templates, forms and tools, or conformance to governance. The degree of control provided by the PMO is moderate.
- **Directive.** Directive PMOs take control of the projects by directly managing the projects. The degree of control provided by the PMO is high.

The PMO integrates data and information from corporate strategic projects and evaluates how higher level strategic objectives are being fulfilled. The PMO is the natural liaison between the organization's portfolios, programs, projects, and the corporate measurement systems (e.g. balanced scorecard).

The projects supported or administered by the PMO may not be related, other than by being managed together. The specific form, function, and structure of a PMO are dependent upon the needs of the organization that it supports.

A PMO may have the authority to act as an integral stakeholder and a key decision maker throughout the life of each project, to make recommendations, or to terminate projects or take other actions, as required, to remain aligned with the business objectives. In addition, the PMO may be involved in the selection, management, and deployment of shared or dedicated project resources.

A primary function of a PMO is to support project managers in a variety of ways which may include, but are not limited to:

- Managing shared resources across all projects administered by the PMO;
- Identifying and developing project management methodology, best practices, and standards;
- Coaching, mentoring, training, and oversight;
- Monitoring compliance with project management standards, policies, procedures, and templates by means of project audits;
- Developing and managing project policies, procedures, templates, and other shared documentation (organizational process assets); and
- Coordinating communication across projects.

Project managers and PMOs pursue different objectives and, as such, are driven by different requirements. All of these efforts are aligned with the strategic needs of the organization. Differences between the role of project managers and a PMO may include the following:

- The project manager focuses on the specified project objectives, while the PMO manages major program scope changes, which may be seen as potential opportunities to better achieve business objectives.
- The project manager controls the assigned project resources to best meet project objectives, while the PMO optimizes the use of shared organizational resources across all projects.
- The project manager manages the constraints (scope, schedule, cost, quality, etc.) of the individual projects, while the PMO manages the methodologies, standards, overall risks/opportunities, metrics, and interdependencies among projects at the enterprise level.

1.5 Relationship Between Project Management, Operations Management, and Organizational Strategy

Operations management is responsible for overseeing, directing, and controlling business operations. Operations evolve to support the day-to-day business, and are necessary to achieve strategic and tactical goals of the business. Examples include: production operations, manufacturing operations, accounting operations, software support, and maintenance.

Though temporary in nature, projects can help achieve the organizational goals when they are aligned with the organization's strategy. Organizations sometimes change their

operations, products, or systems by creating strategic business initiatives that are developed and implemented through projects. Projects require project management activities and skill sets, while operations require business process management, operations management activities, and skill sets.

1.5.1 Operations and Project Management

Changes in business operations may be the focus of a dedicated project—especially if there are substantial changes to business operations as a result of a new product or service delivery. Ongoing operations are outside of the scope of a project; however, there are intersecting points where the two areas cross.

Projects can intersect with operations at various points during the product life cycle, such as:

- At each closeout phase;
- When developing a new product, upgrading a product, or expanding outputs;
- While improving operations or the product development process; or
- Until the end of the product life cycle.

At each point, deliverables and knowledge are transferred between the project and operations for implementation of the delivered work. This implementation occurs through a transfer of project resources to operations toward the end of the project, or through a transfer of operational resources to the project at the start.

Operations are ongoing endeavors that produce repetitive outputs, with resources assigned to do basically the same set of tasks according to the standards institutionalized in a product life cycle. Unlike the ongoing nature of operations, projects are temporary endeavors.

1.5.1.1 Operations Management

Operations management is a subject area that is outside the scope of formal project management as described in this standard.

Operations management is an area of management concerned with ongoing production of goods and/or services. It involves ensuring that business operations continue efficiently by using the optimum resources needed and meeting customer demands. It is concerned with managing processes that transform inputs (e.g., materials, components, energy, and labor) into outputs (e.g., products, goods, and/or services).

1.5.1.2 Operational Stakeholders in Project Management

While operations management is different from project management (see 1.5.1.1), the needs of stakeholders who perform and conduct business operations are important considerations in projects that will affect their future work and endeavors. Project managers who consider and appropriately include operational stakeholders in all phases of projects, gain insight and avoid unnecessary issues that often arise when their input is overlooked.

Operational stakeholders should be engaged and their needs identified as part of the stakeholder register, and their influence (positive or negative) should be addressed as part of the risk management plan.

The following list includes examples of operational stakeholders (depending upon the business):

- Plant operators,
- Manufacturing line supervisors,
- Help desk staff,
- Production system support analysts,
- Customer service representative,
- Salespersons,
- Maintenance workers,
- Telephone sales personnel,
- Call center personnel,
- Retail workers,
- Line managers, and
- Training officers.

1.5.2 Organizations and Project Management

Organizations use governance to establish strategic direction and performance parameters. The strategic direction provides the purpose, expectations, goals, and actions necessary to guide business pursuit and is aligned with business objectives. Project management activities should be aligned with top-level business direction, and if there is a change, then project objectives need to be realigned. In a project environment, changes to project objectives affect project efficiency and success. When the business alignment for a project is constant, the chance for project success greatly increases because the project remains aligned with the strategic direction of the organization. Should something change, projects should change accordingly.

1.5.2.1 Project-Based Organizations

Project-based organizations (PBOs) refer to various organizational forms that create temporary systems for carrying out their work. PBOs can be created by different types of organizations (i.e., functional, matrix, or projectized (see 2.1.3)). The use of PBOs may diminish the hierarchy and bureaucracy inside the organizations as the success of the work is measured by the final result rather than by position or politics.

PBOs conduct the majority of their work as projects and/or provide project rather than functional approaches. PBOs can refer to either entire firms (as in telecommunications, oil and gas, construction, consultancy, and professional services) multi-firm consortia, or networks; it is also possible that some large project-based organizations have functional support areas or that the PBO is nested within subsidiaries or divisions of larger corporations.

1.5.2.2 The Link Between Project Management and Organizational Governance

Projects (and programs) are undertaken to achieve strategic business outcomes, for which many organizations now adopt formal organizational governance processes and procedures. Organizational governance criteria can impose constraints on projects—particularly if the project delivers a service which will be subject to strict organizational governance.

Because project success may be judged on the basis of how well the resultant product or service supports organizational governance, it is important for the project manager to be knowledgeable about corporate/organizational governance policies and procedures pertaining to the subject matter of the product or service (e.g., if an organization has adopted policies in support of sustainability practices and the project involves construction of a new office building, the project manager should be aware of sustainability requirements related to building construction.)

1.5.2.3 The Relationship Between Project Management and Organizational Strategy

Organizational strategy should provide guidance and direction to project management—especially when one considers that projects exist to support organizational strategies. Often it is the project sponsor or the portfolio or program manager who identifies alignment or potential conflicts between organizational strategies and project goals and then communicates these to the project manager. If the goals of a project are in conflict with an established organizational strategy, it is incumbent upon the project manager to document and identify such conflicts as early as possible in the project. At times, the development of an organizational strategy could be the goal of a project rather than a guiding principle. In such a case, it is important for the project to specifically define what constitutes an appropriate organizational strategy that will sustain the organization.

1.6 Business Value

Business value is a concept that is unique to each organization. Business value is defined as the entire value of the business; the total sum of all tangible and intangible elements. Examples of tangible elements include monetary assets, fixtures, stockholder equity, and utility. Examples of intangible elements include good will, brand recognition, public benefit, and trademarks. Depending on the organization, business value scope can be short-, medium-, or long-term. Value may be created through the effective management of ongoing operations. However, through the effective use of portfolio, program, and project management, organizations will possess the ability to employ reliable, established processes to meet strategic objectives and obtain greater business value from their project investments. While not all organizations are business driven, all organizations conduct business-related activities. Whether an organization is a government agency or a nonprofit organization, all organizations focus on attaining business value for their activities.

Successful business value realization begins with comprehensive strategic planning and management. Organizational strategy can be expressed through the organization's mission and vision, including orientation to markets, competition, and other environmental factors. Effective organizational strategy provides defined directions for development and growth, in addition to performance metrics for success. In order to bridge the gap between organizational strategy and successful business value realization, the use of portfolio, program, and project management techniques is essential.

Portfolio management aligns components (projects, programs, or operations) to the organizational strategy, organized into portfolios or subportfolios to optimize project or program objectives, dependencies, costs, timelines, benefits, resources, and risks. This allows organizations to have an overall view of how the strategic goals are reflected in the portfolio,

institute appropriate governance management, and authorize human, financial, or material resources to be allocated based on expected performance and benefits.

Using program management, organizations have the ability to align multiple projects for optimized or integrated costs, schedule, effort, and benefits. Program management focuses on project interdependencies and helps to determine the optimal approach for managing and realizing the desired benefits.

With project management, organizations have the ability to apply knowledge, processes, skills, and tools and techniques that enhance the likelihood of success over a wide range of projects. Project management focuses on the successful delivery of products, services, or results. Within programs and portfolios, projects are a means of achieving organizational strategy and objectives.

Organizations can further facilitate the alignment of these portfolio, program, and project management activities by strengthening organizational enablers such as structural, cultural, technological, and human resource practices. By continuously conducting portfolio strategic alignment and optimization, performing business impact analyses, and developing robust organizational enablers, organizations can achieve successful transitions within the portfolio, program, and project domains and attain effective investment management and business value realization.

1.7 Role of the Project Manager

The project manager is the person assigned by the performing organization to lead the team that is responsible for achieving the project objectives. The role of a project manager is distinct from a functional manager or operations manager. Typically the functional manager is focused on providing management oversight for a functional or a business unit, and operations managers are responsible for ensuring that business operations are efficient.

Depending on the organizational structure, a project manager may report to a functional manager. In other cases, a project manager may be one of several project managers who report to a program or portfolio manager who is ultimately responsible for enterprise-wide projects. In this type of structure, the project manager works closely with the program or portfolio manager to achieve the project objectives and to ensure the project management plan aligns with the overarching program plan. The project manager also works closely and in collaboration with other roles, such as a business analyst, quality assurance manager, and subject matter experts.

1.7.1 Responsibilities and Competencies of the Project Manager

In general, project managers have the responsibility to satisfy the needs: task needs, team needs, and individual needs. As project management is a critical strategic discipline, the project manager becomes the link between the strategy and the team. Projects are essential to the growth and survival of organizations. Projects create value in the form of improved business processes, are indispensable in the development of new products and services, and make it easier for companies to respond to changes in the environment, competition, and the marketplace. The project manager's role therefore becomes increasingly strategic. However, understanding and applying the knowledge, tools, and techniques that are recognized as good practice are not sufficient for effective project management. In addition to any area-specific skills and general management proficiencies required for the project, effective project management requires that the project manager possess the following competencies:

- **Knowledge**—Refers to what the project manager knows about project management.
- **Performance**—Refers to what the project manager is able to do or accomplish while applying his or her project management knowledge.
- **Personal**—Refers to how the project manager behaves when performing the project or related activity. Personal effectiveness encompasses attitudes, core personality characteristics, and leadership, which provides the ability to guide the project team while achieving project objectives and balancing the project constraints.

1.7.2 Interpersonal Skills of a Project Manager

Project managers accomplish work through the project team and other stakeholders. Effective project managers require a balance of ethical, interpersonal, and conceptual skills that help them analyze situations and interact appropriately. Appendix X6 on Interpersonal Skills describes important interpersonal skills, such as:

- Leadership,
- Team building,
- Motivation,
- Communication,
- Influencing,
- Decision making,
- Political and cultural awareness,
- Negotiation,
- Trust building,
- Conflict management, and
- Coaching.

1.8 Project Management Body of Knowledge

The *PMBOK® Guide* contains the standard for managing most projects most of the time across many types of industries. The standard, included in Annex A1, describes the project management processes used to manage a project toward a more successful outcome.

This standard is unique to the project management field and has interrelationships to other project management disciplines such as program management and portfolio management.

Project management standards do not address all details of every topic. This standard is limited to individual projects and the project management processes that are generally recognized as good practice. Other standards may be consulted for additional information on the broader context in which projects are accomplished, such as:

- *The Standard for Program Management* addresses the management of programs,
- *The Standard for Portfolio Management* addresses the management of portfolios,
- *Organizational Project Management Maturity Model (OPM3®)* examines an enterprise's project management process capabilities.

2

ORGANIZATIONAL INFLUENCES AND PROJECT LIFE CYCLE

Projects and project management take place in an environment that is broader than that of the project itself. Understanding this broader context helps ensure that work is carried out in alignment with the organization's goals and managed in accordance with the organization's established practices. This section describes how organizational influences affect the methods used for staffing, managing, and executing the project. It discusses the influence of stakeholders on the project and its governance, the project team's structure and membership, and different approaches to the phasing and relationship of activities within the project's life cycle. The following major sections are addressed:

2.1 Organizational Influences on Project Management

2.2 Project Stakeholders and Governance

2.3 Project Team

2.4 Project Life Cycle

2.1 Organizational Influences on Project Management

An organization's culture, style, and structure influence how its projects are performed. The organization's level of project management maturity and its project management systems can also influence the project. When a project involves external entities such as those that are part of a joint venture or partnering agreement, the project will be influenced by more than one organization. The following sections describe organizational characteristics, factors, and assets within an enterprise that are likely to influence the project.

2.1.1 Organizational Cultures and Styles

Organizations are systematic arrangements of entities (persons and/or departments) aimed at accomplishing a purpose, which may involve undertaking projects. An organization's culture and style affect how it conducts projects. Cultures and styles are group phenomena known as cultural norms, which develop over time. The norms include established approaches to initiating and planning projects, the means considered acceptable for getting the work done, and recognized authorities who make or influence decisions.

Organizational culture is shaped by the common experiences of members of the organization and most organizations have developed unique cultures over time by practice and common usage. Common experiences include, but are not limited to:

- Shared visions, mission, values, beliefs, and expectations;
- Regulations, policies, methods, and procedures;
- Motivation and reward systems;

- Risk tolerance;
- View of leadership, hierarchy, and authority relationships;
- Code of conduct, work ethic, and work hours; and
- Operating environments.

The organization's culture is an enterprise environmental factor, as described in Section 2.1.5. Cultures and styles are learned and shared and may have a strong influence on a project's ability to meet its objectives. A project manager should therefore understand the different organizational styles and cultures that may affect a project. The project manager needs to know which individuals in the organization are the decision makers or influencers and work with them to increase the probability of project success.

In light of globalization, understanding the impact of cultural influences is critical in projects involving diverse organizations and locations around the world. Culture becomes a critical factor in defining project success, and multi-cultural competence becomes critical for the project manager.

2.1.2 Organizational Communications

Project management success in an organization is highly dependent on an effective organizational communication style, especially in the face of globalization of the project management profession. Organizational communications capabilities have great influence on how projects are conducted. As a consequence, project managers in distant locations are able to more effectively communicate with all relevant stakeholders within the organizational structure to facilitate decision making. Stakeholders and project team members can also use electronic communications (including e-mail, texting, instant messaging, social media, video and web conferencing, and other forms of electronic media) to communicate with the project manager formally or informally.

2.1.3 Organizational Structures

Organizational structure is an enterprise environmental factor, which can affect the availability of resources and influence how projects are conducted (see also Section 2.1.5). Organizational structures range from functional to projectized, with a variety of matrix structures in between. Table 2-1 shows key project-related characteristics of the major types of organizational structures.

Table 2-1. Influence of Organizational Structures on Projects

Organization Structure / Project Characteristics	Functional	Matrix			Projectized
		Weak Matrix	Balanced Matrix	Strong Matrix	
Project Manager's Authority	Little or None	Low	Low to Moderate	Moderate to High	High to Almost Total
Resource Availability	Little or None	Low	Low to Moderate	Moderate to High	High to Almost Total
Who manages the project budget	Functional Manager	Functional Manager	Mixed	Project Manager	Project Manager
Project Manager's Role	Part-time	Part-time	Full-time	Full-time	Full-time
Project Management Administrative Staff	Part-time	Part-time	Part-time	Full-time	Full-time

The classic functional organization, shown in Figure 2-1, is a hierarchy where each employee has one clear superior. Staff members are grouped by specialty, such as production, marketing, engineering, and accounting at the top level. Specialties may be further subdivided into focused functional units, such as mechanical and electrical engineering. Each department in a functional organization will do its project work independently of other departments.

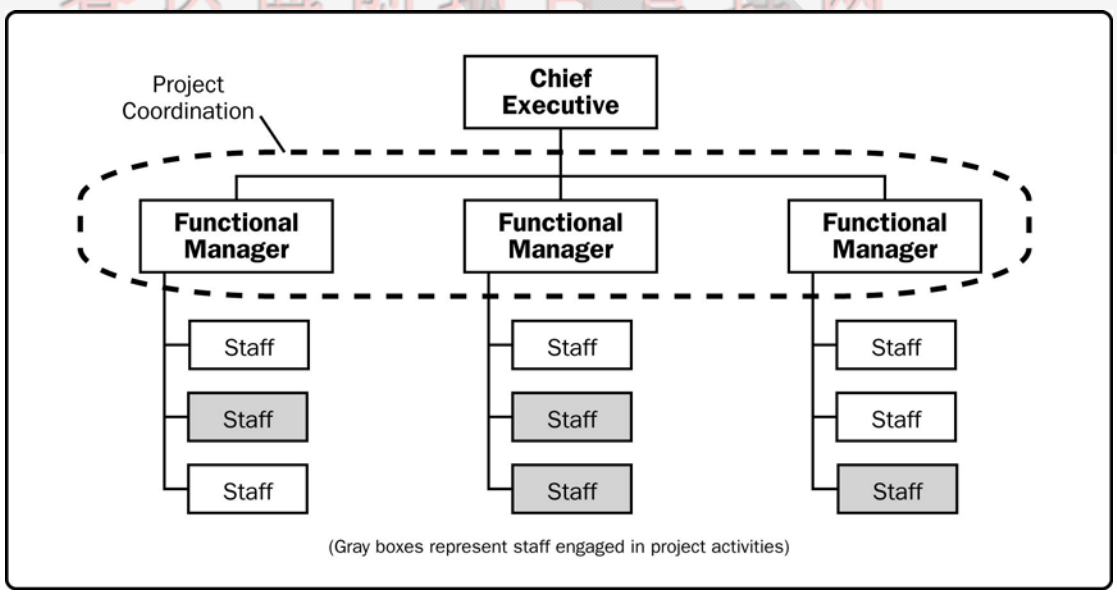

Figure 2-1. Functional Organization

Matrix organizations, as shown in Figures 2-2 through 2-4, reflect a blend of functional and projectized characteristics. Matrix organizations can be classified as weak, balanced, or strong depending on the relative level of power and influence between functional and project managers. Weak matrix organizations maintain many of the characteristics of a functional organization, and the role of the project manager is more of a coordinator or expediter. A project expediter works as staff assistant and communications coordinator. The expediter cannot

personally make or enforce decisions. Project coordinators have power to make some decisions, have some authority, and report to a higher-level manager. Strong matrix organizations have many of the characteristics of the projectized organization, and have full-time project managers with considerable authority and full-time project administrative staff. While the balanced matrix organization recognizes the need for a project manager, it does not provide the project manager with the full authority over the project and project funding. Table 2-1 provides additional details of the various matrix organizational structures.

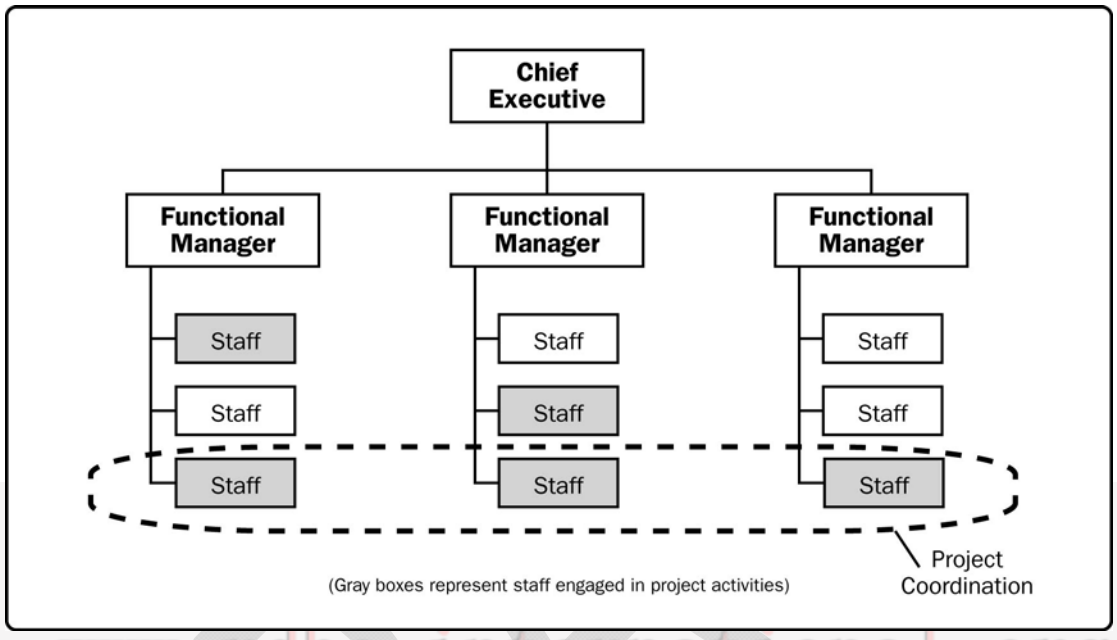

Figure 2-2. Weak Matrix Organization

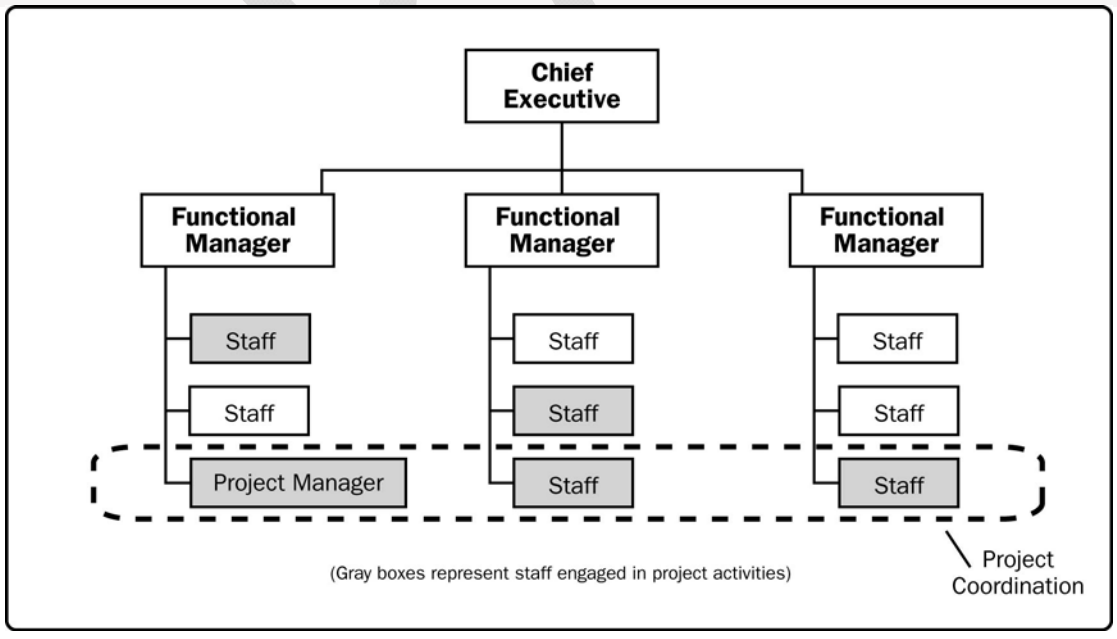

Figure 2-3. Balanced Matrix Organization

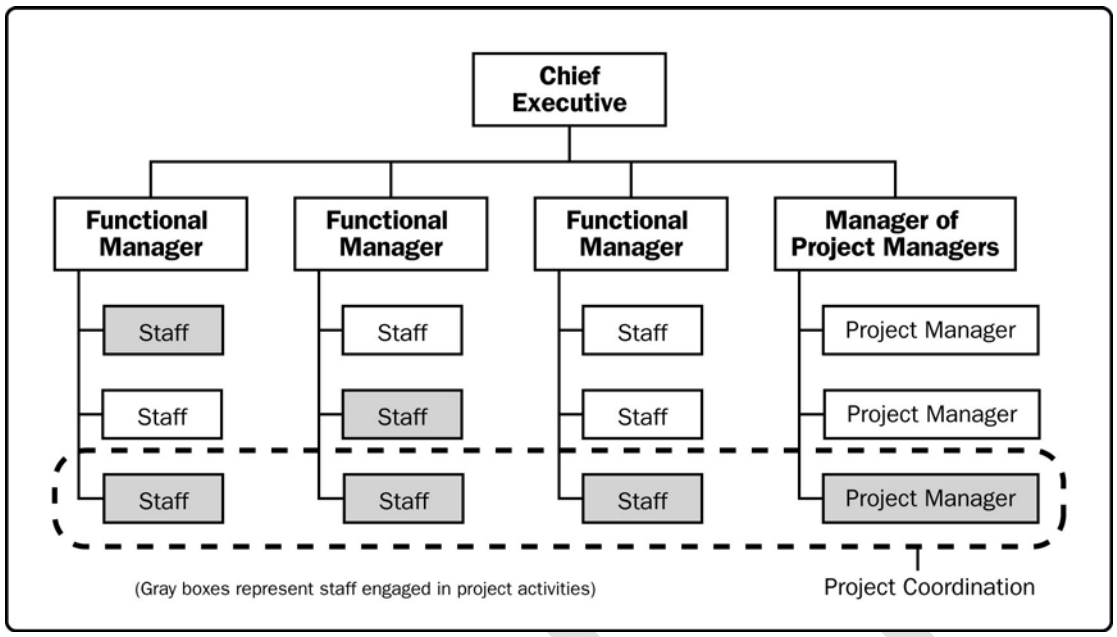

Figure 2-4. Strong Matrix Organization

At the opposite end of the spectrum to the functional organization is the projectized organization, shown in Figure 2-5. In a projectized organization, team members are often collocated. Most of the organization's resources are involved in project work, and project managers have a great deal of independence and authority. Virtual collaboration techniques are often used to accomplish the benefits of collocated teams. Projectized organizations often have organizational units called departments, but they can either report directly to the project manager or provide support services to the various projects.

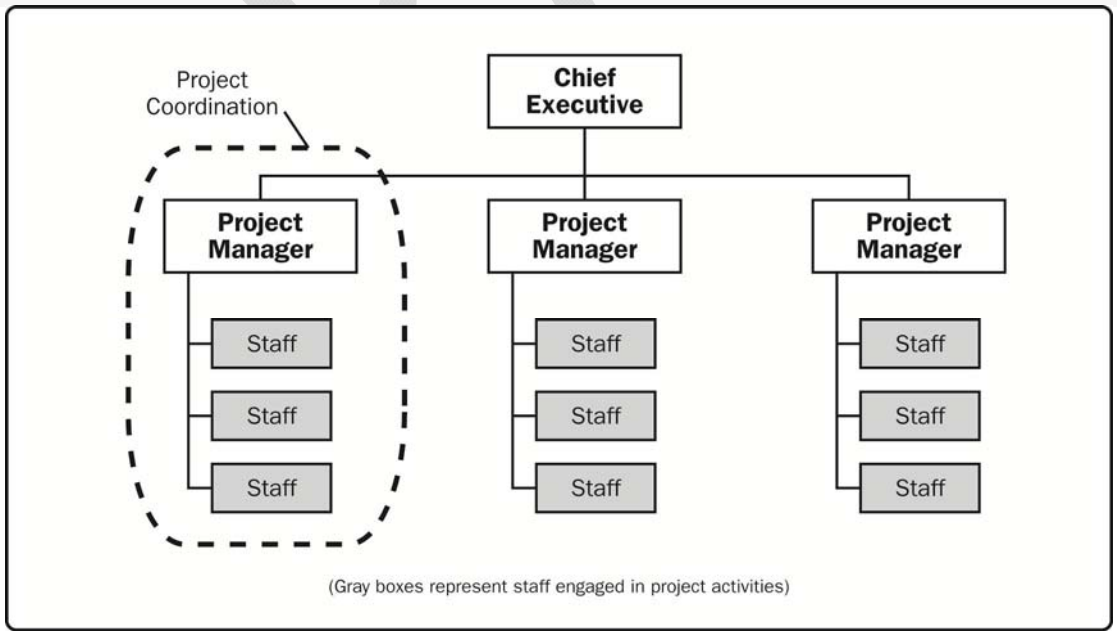

Figure 2-5. Projectized Organization

Many organizations involve all these structures at various levels, often referred to as a composite organization, as shown in Figure 2-6. For example, even a fundamentally functional organization may create a special project team to handle a critical project. Such a team may have many of the characteristics of a project team in a projectized organization. The team may include full-time staff from different functional departments, may develop its own set of operating procedures, and may even operate outside of the standard, formalized reporting structure during the project. Also, an organization may manage most of its projects in a strong matrix, but allow small projects to be managed by functional departments.

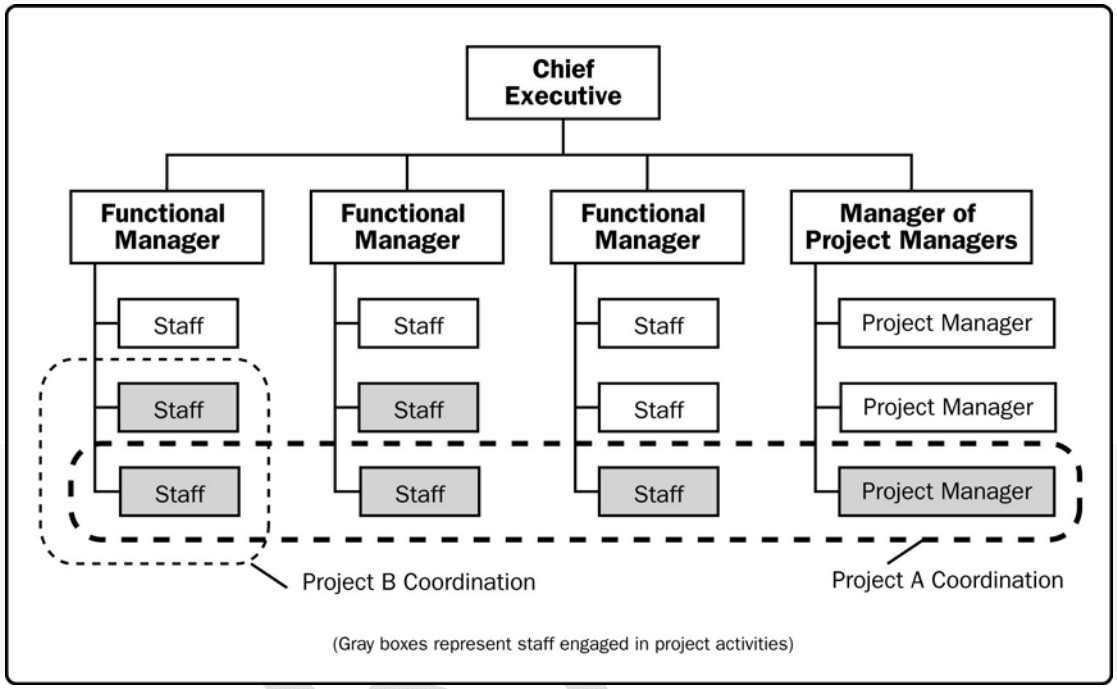

Figure 2-6. Composite Organization

Many organizational structures include strategic, middle management, and operational levels. The project manager may interact with all three levels depending on factors such as:

- Strategic importance of the project,
- Capacity of stakeholders to exert influence on the project
- Degree of project management maturity,
- Project management systems, and
- Organizational communications.

This interaction determines project characteristics such as:

- Project manager's level of authority,
- Resource availability and management,
- Entity controlling the project budget,
- Project manager's role, and
- Project team composition.

2.1.4 Organizational Process Assets

Organizational process assets are the plans, processes, policies, procedures and knowledge bases, specific to and used by the performing organization. They include any artifact, practice, or knowledge from any or all of the organizations involved in the project that can be used to perform or govern the project. These process assets include formal and informal plans, processes, policies, procedures, and knowledge bases, specific to and used by the performing organization. The process assets also include the organization's knowledge bases such as lessons learned and historical information. Organizational process assets may include completed schedules, risk data, and earned value data. Organizational process assets are inputs to most planning processes. Throughout the project the project team members may update and add to the organizational process assets as necessary. Organizational process assets may be grouped into two categories: (1) processes and procedures, and (2) corporate knowledge base.

2.1.4.1 Processes and Procedures

The organization's processes and procedures for conducting project work include, but are not limited to:

- *Initiating and Planning*:
  - Guidelines and criteria for tailoring the organization's set of standard processes and procedures to satisfy the specific needs of the project;
  - Specific organizational standards such as policies (e.g., human resources policies, health and safety policies, ethics policies, and project management policies), product and project life cycles, and quality policies and procedures (e.g., process audits, improvement targets, checklists, and standardized process definitions for use in the organization); and
  - Templates (e.g., risk register, work breakdown structure, project schedule network diagram, and contract templates).
- *Executing, Monitoring and Controlling:*
  - Change control procedures, including the steps by which performing organization standards, policies, plans, and procedures or any project documents will be modified, and how any changes will be approved and validated;
  - Financial controls procedures (e.g., time reporting, required expenditure and disbursement reviews, accounting codes, and standard contract provisions);
  - Issue and defect management procedures defining issue and defect controls, issue and defect identification and resolution, and action item tracking;
  - Organizational communication requirements (e.g., specific communication technology available, authorized communication media, record retention policies, and security requirements);
  - Procedures for prioritizing, approving, and issuing work authorizations;
  - Risk control procedures, including risk categories, risk statement templates, probability and impact definitions, and probability and impact matrix; and
  - Standardized guidelines, work instructions, proposal evaluation criteria, and performance measurement criteria.

- *Closing:*
  - Project closure guidelines or requirements (e.g., lessons learned, final project audits, project evaluations, product validations, and acceptance criteria).

2.1.4.2 Corporate Knowledge Base

The organizational knowledge base for storing and retrieving information includes, but is not limited to:

- Configuration management knowledge bases containing the versions and baselines of all performing organization standards, policies, procedures, and any project documents;
- Financial databases containing information such as labor hours, incurred costs, budgets. and any project cost overruns;
- Historical information and lessons learned knowledge bases (e.g., project records and documents, all project closure information and documentation, information regarding both the results of previous project selection decisions and previous project performance information, and information from risk management activities);
- Issue and defect management databases containing issue and defect status, control information, issue and defect resolution, and action item results;
- Process measurement databases used to collect and make available measurement data on processes and products; and
- Project files from previous projects (e.g., scope, cost, schedule, and performance measurement baselines, project calendars, project schedule network diagrams, risk registers, planned response actions, and defined risk impact).

2.1.5 Enterprise Environmental Factors

Enterprise environmental factors refer to conditions, not under the control of the project team, that influence, constrain, or direct the project. Enterprise environmental factors are considered inputs to most planning processes, may enhance or constrain project management options, and may have a positive or negative influence on the outcome.

Enterprise environmental factors vary widely in type or nature. Enterprise environmental factors include, but are not limited to:

- Organizational culture, structure, and governance;
- Geographic distribution of facilities and resources;
- Government or industry standards (e.g., regulatory agency regulations, codes of conduct, product standards, quality standards, and workmanship standards);
- Infrastructure (e.g., existing facilities and capital equipment);
- Existing human resources (e.g., skills, disciplines, and knowledge, such as design, development, legal, contracting, and purchasing);
- Personnel administration (e.g., staffing and retention guidelines, employee performance reviews and training records, reward and overtime policy, and time tracking);
- Company work authorization systems;
- Marketplace conditions;

- Stakeholder risk tolerances;
- Political climate;
- Organization's established communications channels;
- Commercial databases (e.g., standardized cost estimating data, industry risk study information, and risk databases); and
- Project management information system (e.g., an automated tool, such as a scheduling software tool, a configuration management system, an information collection and distribution system, or web interfaces to other online automated systems).

2.2 Project Stakeholders and Governance

A stakeholder is an individual, group, or organization who may affect, be affected by, or perceive itself to be affected by a decision, activity, or outcome of a project. Stakeholders may be actively involved in the project or have interests that may be positively or negatively affected by the performance or completion of the project. Different stakeholders may have competing expectations that might create conflicts within the project. Stakeholders may also exert influence over the project, its deliverables, and the project team in order to achieve a set of outcomes that satisfy strategic business objectives or other needs. Project governance—the alignment of the project with stakeholders' needs or objectives—is critical to the successful management of stakeholder engagement and the achievement of organizational objectives. Project governance enables organizations to consistently manage projects and maximize the value of project outcomes and align the projects with business strategy. It provides a framework in which the project manager and sponsors can make decisions that satisfy both stakeholder needs and expectations and organizational strategic objectives or address circumstances where these may not be in alignment.

2.2.1 Project Stakeholders

Stakeholders include all members of the project team as well as all interested entities that are internal or external to the organization. The project team identifies internal and external, positive and negative, and performing and advising stakeholders in order to determine the project requirements and the expectations of all parties involved. The project manager should manage the influences of these various stakeholders in relation to the project requirements to ensure a successful outcome. Figure 2-7 illustrates the relationship between the project, the project team, and various stakeholders.

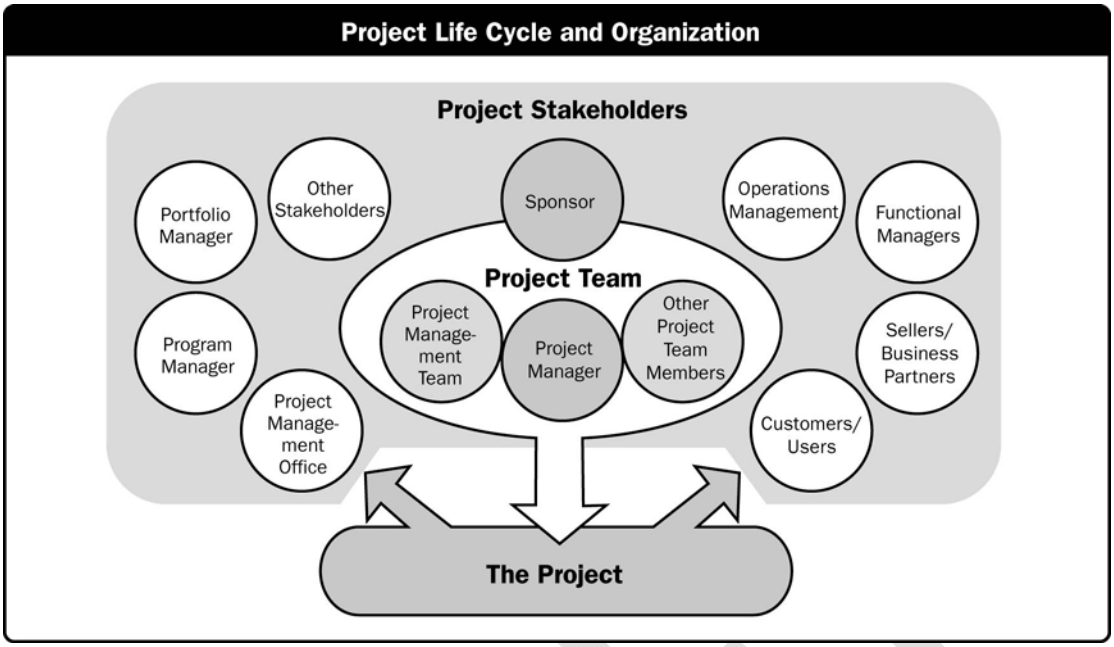

Figure 2-7. The Relationship Between Stakeholders and the Project

Stakeholders have varying levels of responsibility and authority when participating on a project. This level can change over the course of the project's life cycle. Their involvement may range from occasional contributions in surveys and focus groups to full project sponsorship which includes providing financial, political, or other support. Some stakeholders may also detract from the success of the project, either passively or actively. These stakeholders require the project manager's attention throughout the project's life cycle, as well as planning to address any issues they may raise.

Stakeholder identification is a continuous process throughout the entire project life cycle. Identifying stakeholders, understanding their relative degree of influence on a project, and balancing their demands, needs, and expectations is critical to the success of the project. Failure to do so can lead to delays, cost increases, unexpected issues, and other negative consequences including project cancellation. An example is late recognition that the legal department is a significant stakeholder, which results in delays and increased expenses due to legal requirements that are required to be met before the project can be completed or the product scope is delivered.

Just as stakeholders can positively or adversely impact a project's objectives, a project can be perceived by the stakeholders as having positive or negative results. For example, business leaders from a community who will benefit from an industrial expansion project will see positive economic benefits to the community in the form of additional jobs, supporting infrastructure, and taxes. In the case of stakeholders with positive expectations for the project, their interests are best served by making the project successful. In contrast, the interests of negatively affected stakeholders, such as nearby homeowners or small business owners who may lose property, be forced to relocate, or accept unwanted changes in the local environment, are served by impeding the project's progress. Overlooking negative stakeholder interests can result in an increased likelihood of failures, delays, or other negative consequences to the project.

An important part of a project manager's responsibility is to manage stakeholder expectations, which can be difficult because stakeholders often have very different or conflicting

objectives. Part of the project manager's responsibility is to balance these interests and ensure that the project team interacts with stakeholders in a professional and cooperative manner. Project managers may involve the project's sponsor or other team members from different locations to identify and manage stakeholders that could be dispersed around the world.

The following are some examples of project stakeholders:

- **Sponsor.** A sponsor is the person or group who provides resources and support for the project and is accountable for enabling success. The sponsor may be external or internal to the project manager's organization. From initial conception through project closure, the sponsor promotes the project. This includes serving as spokesperson to higher levels of management to gather support throughout the organization and promoting the benefits the project brings. The sponsor leads the project through the initiating processes until formally authorized, and plays a significant role in the development of the initial scope and charter. For issues that are beyond the control of the project manager, the sponsor serves as an escalation path. The sponsor may also be involved in other important issues such as authorizing changes in scope, phase-end reviews, and go/no-go decisions when risks are particularly high. The sponsor also ensures a smooth transfer of the project's deliverables into the business of the requesting organization after project closure.
- **Customers and users.** Customers are the persons or organizations who will approve and manage the project's product, service, or result. Users are the persons or organizations who will use the project's product, service, or result. Customers and users may be internal or external to the performing organization and may also exist in multiple layers. For example, the customers for a new pharmaceutical product could include the doctors who prescribe it, the patients who use it and the insurers who pay for it. In some application areas, customers and users are synonymous, while in others, customers refer to the entity acquiring the project's product, and users refer to those who will directly utilize the project's product.
- **Sellers.** Sellers, also called vendors, suppliers, or contractors, are external companies that enter into a contractual agreement to provide components or services necessary for the project.
- **Business partners.** Business partners are external organizations that have a special relationship with the enterprise, sometimes attained through a certification process. Business partners provide specialized expertise or fill a specified role such as installation, customization, training, or support.
- **Organizational groups.** Organizational groups are internal stakeholders who are affected by the activities of the project team. Examples of various business elements of an organization that may be affected by the project include marketing and sales, human resources, legal, finance, operations, manufacturing, and customer service. These groups support the business environment where projects are executed, and are therefore affected by the activities of the project. As a result, there is generally a significant amount of interaction between the various business elements of an organization and the project team as they work together to achieve project goals. These groups may provide input to requirements and accept deliverables necessary for a smooth transition to production or related operations.

- **Functional managers.** Functional managers are key individuals who play a management role within an administrative or functional area of the business, such as human resources, finance, accounting, or procurement. They are assigned their own permanent staff to carry out the ongoing work, and they have a clear directive to manage all tasks within their functional area of responsibility. The functional manager may provide subject matter expertise or their function may provide services to the project.
- **Other stakeholders.** Additional stakeholders, such as procurement entities, financial institutions, government regulators, subject matter experts, consultants, and others, may have a financial interest in the project, contribute inputs to the project, or have an interest in the outcome of the project.

Project stakeholders and stakeholder engagement is further defined in Section 13 on Project Stakeholder Management.

2.2.2 Project Governance

Project governance is an oversight function that is aligned with the organization's governance model and that encompasses the project life cycle. Project governance framework provides the project manager and team with structure, processes, decision-making models and tools for managing the project, while supporting and controlling the project for successful delivery. Project governance is a critical element of any project, especially on complex and risky projects. It provides a comprehensive, consistent method of controlling the project and ensuring its success by defining and documenting and communicating reliable, repeatable project practices. It includes a framework for making project decisions; defines roles, responsibilities, and accountabilities for the success of the project; and determines the effectiveness of the project manager. A project's governance is defined by and fits within the larger context of the portfolio, program, or organization sponsoring it but is separate from organizational governance.

For project governance, the PMO may also play some decisive role. Project governance involves stakeholders as well as documented policies, procedures, and standards; responsibilities; and authorities. Examples of the elements of a project governance framework include:

- Project success and deliverable acceptance criteria;
- Process to identify, escalate, and resolve issues that arise during the project;
- Relationship among the project team, organizational groups, and external stakeholders;
- Project organization chart that identifies project roles;
- Processes and procedures for the communication of information;
- Project decision-making processes;
- Guidelines for aligning project governance and organizational strategy;
- Project life cycle approach;
- Process for stage gate or phase reviews;
- Process for review and approval for changes to budget, scope, quality, and schedule which are beyond the authority of the project manager; and
- Process to align internal stakeholders with project process requirements.

Within those constraints, as well as the additional limitations of time and budget, it is up to the project manager and the project team to determine the most appropriate method of carrying out the project. While project governance is the framework in which the project team performs, the team is still responsible for planning, executing, controlling, and closing the project. The project governance approach should be described in the project management plan. Decisions are made regarding who will be involved, the escalation procedures, what resources are necessary, and the general approach to completing the work. Another important consideration is whether more than one phase will be involved and, if so, the specific life cycle for the individual project.

2.2.3 Project Success

Since projects are temporary in nature, the success of the project should be measured in terms of completing the project within the constraints of scope, time, cost, quality, resources, and risk as approved between the project managers and senior management. To ensure realization of benefits for the undertaken project, a test period (such as soft launch in services) can be part of the total project time before handing it over to the permanent operations. Project success should be referred to the last baselines approved by the authorized stakeholders.

The project manager is responsible and accountable for setting realistic and achievable boundaries for the project and to accomplish the project within the approved baselines.

2.3 Project Team

The project team includes the project manager and the group of individuals who act together in performing the work of the project to achieve its objectives. The project team includes the project manager, project management staff, and other team members who carry out the work but who are not necessarily involved with management of the project. This team is comprised of individuals from different groups with specific subject matter knowledge or with a specific skill set to carry out the work of the project. The structure and characteristics of a project team can vary widely, but one constant is the project manager's role as the leader of the team, regardless of what authority the project manager may have over its members.

Project teams include roles such as:

- **Project management staff.** The members of the team who perform project management activities such as scheduling, budgeting, reporting and control, communications, risk management and administrative support. This role may be performed or supported by a project management office (PMO).
- **Project staff.** The members of the team who carry out the work of creating the project deliverables.
- **Supporting experts.** Supporting experts perform activities required to develop or execute the project management plan. These can include such roles as contracting, financial management, logistics, legal, safety, engineering, test, or quality control. Depending on the size of the project and level of support required, supporting experts may be assigned to work full time or may just participate on the team when their particular skills are required.
- **User or Customer Representatives.** Members of the organization who will accept the deliverables or products of the project may be assigned to act as representatives or

liaisons to ensure proper coordination, advise on requirements, or validate the acceptability of the project's results.

- **Sellers.** Sellers, also called vendors, suppliers, or contractors, are external companies that enter into a contractual agreement to provide components or services necessary for the project. The project team is often assigned the responsibility to oversee the performance and acceptance of sellers' deliverables or services. If the sellers bear a large share of the risk for delivering the project's results, they may play a significant role on the project team.
- **Business partner members.** Members of business partners' organizations may be assigned as members of the project team to ensure proper coordination.
- **Business partners.** Business partners are also external companies, but they have a special relationship with the enterprise, sometimes attained through a certification process. Business partners provide specialized expertise or fill a specified role such as installation, customization, training, or support.

2.3.1 Composition of Project Teams

The composition of project teams varies based on factors such as organizational culture, scope, and location. The relationship between the project manager and the team varies depending on the authority of the project manager. In some cases, a project manager may be the team's line manager, with full authority over its members. In other cases, a project manager may have little or no direct organizational authority over the team members and may have been brought in to lead the project on a part-time basis or under contract. The following are examples of basic project team compositions:

- **Dedicated.** In a dedicated team, all or a majority of the project team members are assigned to work full-time on the project. The project team may be collocated or virtual and usually reports directly to the project manager. This is the simplest structure for a project manager, as the lines of authority are clear and team members can focus on the project's objectives.
- **Part-Time.** Some projects are established as temporary additional work, with the project manager and team members working on the project while remaining in their existing organizations and continuing to carry out their normal functions. The functional managers maintain control over the team members and the resources allocated to the project, and the project manager is likely to continue performing other management duties. Part-time team members may also be assigned to more than one project at a time.

Dedicated and part-time project team compositions may exist in any of the organizational structures. Dedicated project teams are often seen in projectized organizations, where most of the organization's resources are involved in project work and project managers have a great deal of independence and authority. Part-time project teams are common within functional organizations, and matrix organizations use both dedicated and part-time project teams. Other members who have limited involvement at various stages of a project can be thought of as part-time project team members.

Project team composition may also vary based on organizational structure. An example of this is a partnership based project. A project may be established as a partnership, joint venture, consortium or alliance among several organizations through contracts or agreements. In this structure, one organization takes the lead and assigns a project manager to coordinate the efforts among the partners. Partnership-based projects can offer flexibility at lower cost. These

advantages may be offset by the project manager's lower degree of control over team members and the need for strong mechanisms for communication and monitoring progress. Partnership projects may be set up to exploit industrial synergies, to undertake ventures that one partner could not afford alone, or for other political and strategic reasons.

Project team composition may also vary based on the geographic location of its members. An example of this is virtual project teams. Communication technologies allow team members in different locations or countries to work as virtual teams. Virtual teams rely on collaborative tools, such as shared online workspaces and video conferences, to coordinate their activities and exchange information about the project. A virtual team can exist with any type of organizational structure and team composition. Virtual teams are often necessary for projects where resources are located onsite or offsite or both, depending on the project activities. A project manager who is leading a virtual team needs to accommodate differences in the culture, working hours, time zones, local conditions, and languages.

2.4 Project Life Cycle

A project life cycle is the series of phases that a project passes through from its initiation to its closure. The phases are generally sequential, and their names and numbers are determined by the management and control needs of the organization or organizations involved in the project, the nature of the project itself, and its area of application. The phases can be broken down by functional or partial objectives, intermediate results or deliverables, specific milestones within the overall scope of work, or financial availability. Phases are generally time bounded, with a start and ending or control point. A life cycle can be documented within a methodology. The project life cycle can be determined or shaped by the unique aspects of the organization, industry, or technology employed. While every project has a definite start and a definite end, the specific deliverables and activities that take place in between will vary widely with the project. The life cycle provides the basic framework for managing the project, regardless of the specific work involved.

Project life cycles can range along a continuum from predictive or plan-driven approaches at one end to adaptive or change-driven approaches at the other. In a predictive life cycle (Section 2.4.2.2), the product and deliverables are defined at the beginning of the project and any changes to scope are carefully managed. In an adaptive life cycle (Section 2.4.2.4), the product is developed over multiple iterations and detailed scope is defined for each iteration only as the iteration begins.

2.4.1 Characteristics of the Project Life Cycle

Projects vary in size and complexity. All projects can be mapped to the following generic life cycle structure (see Figure 2-8):

- Starting the project,
- Organizing and preparing,
- Carrying out the project work, and
- Closing the project.

This generic life cycle structure is often referred to when communicating with upper management or other entities less familiar with the details of the project. It should not be confused with the Project Management Process Groups, because the processes in a Process

Group consist of activities that may be performed and recur within each phase of a project as well as for the project as a whole. The project life cycle is independent from the life cycle of the product produced by or modified by the project. However, the project should take the current life-cycle phase of the product into consideration. This high-level view can provide a common frame of reference for comparing projects—even if they are dissimilar in nature.

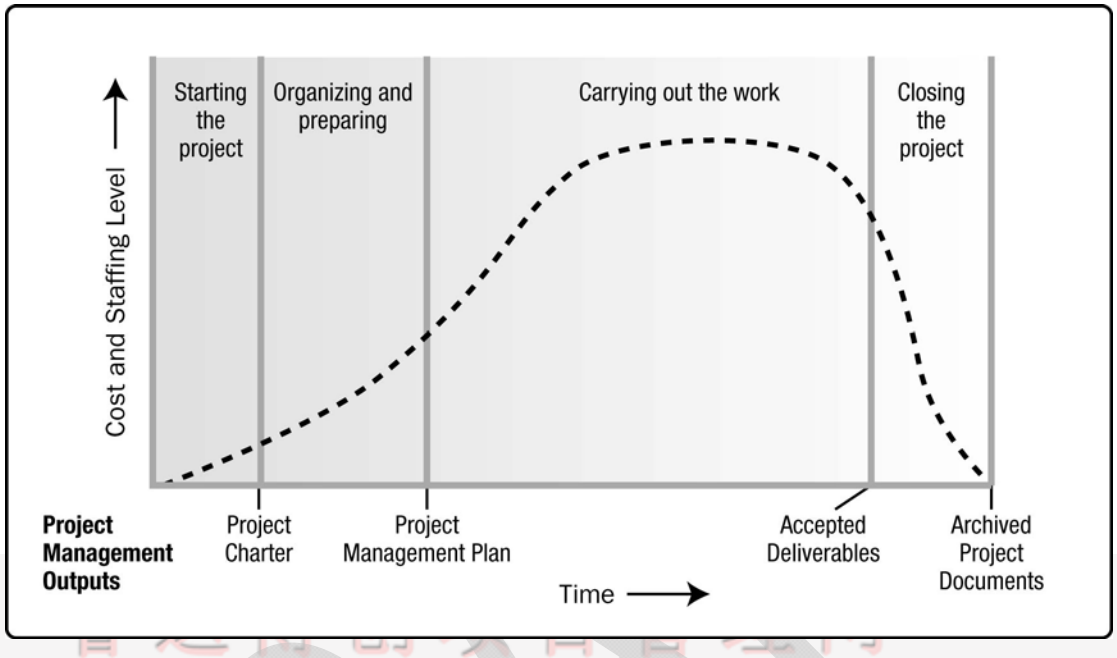

Figure 2-8. Typical Cost and Staffing Levels Across a Generic Project Life Cycle Structure

The generic life cycle structure generally displays the following characteristics:

- Cost and staffing levels are low at the start, peak as the work is carried out, and drop rapidly as the project draws to a close. Figure 2-8 illustrates this typical pattern.
- The typical cost and staffing curve above may not apply to all projects. A project may require significant expenditures to secure needed resources early in its life cycle, for instance, or be fully staffed from a point very early in its life cycle.
- Risk and uncertainty (as illustrated in Figure 2-9) are greatest at the start of the project. These factors decrease over the life of the project as decisions are reached and as deliverables are accepted.
- The ability to influence the final characteristics of the project's product, without significantly impacting cost, is highest at the start of the project and decreases as the project progresses towards completion. Figure 2-9 illustrates the idea that the cost of making changes and correcting errors typically increases substantially as the project approaches completion.

While these characteristics remain present to some extent in almost all project life cycles, they are not always present to the same degree. Adaptive life cycles, in particular, are developed with the intent of keeping stakeholder influences higher and the costs of changes lower throughout the life cycle than in predictive life cycles.

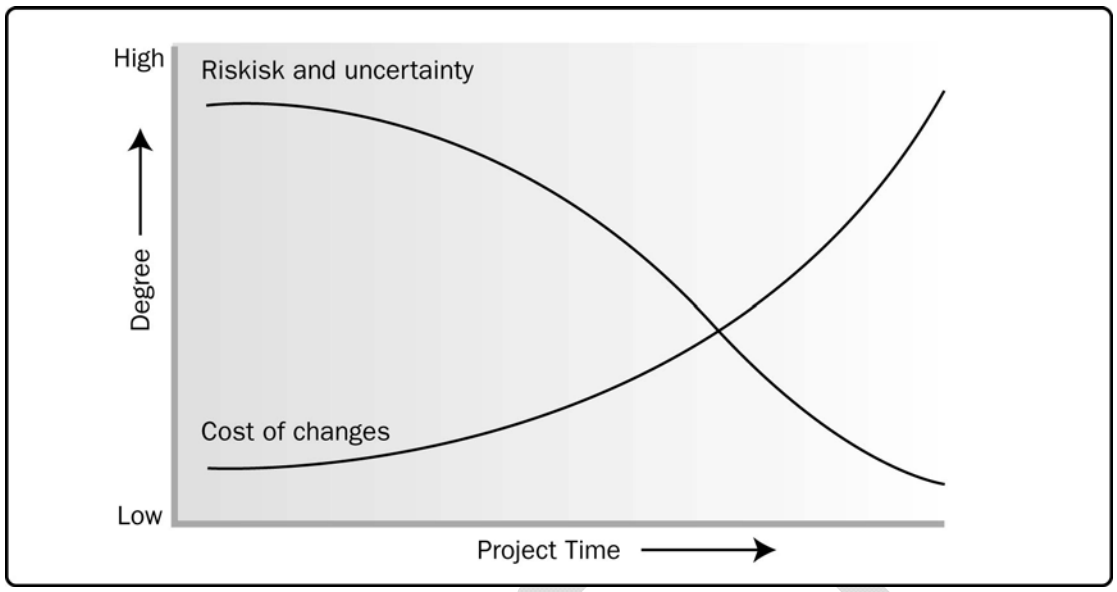

Figure 2-9. Impact of Variable Based on Project Time

Within the context of the generic life cycle structure, a project manager may determine the need for more effective control over certain deliverables or that certain deliverables are required to be completed before the project scope can be completely defined. Large and complex projects in particular may require this additional level of control. In such instances, the work carried out to complete the project's objective may benefit from being formally divided into phases.

2.4.2 Project Phases

A project may be divided into any number of phases. A project phase is a collection of logically related project activities that culminates in the completion of one or more deliverables. Project phases are used when the nature of the work to be performed is unique to a portion of the project, and are typically linked to the development of a specific major deliverable. A phase may emphasize processes from a particular Project Management Process Group, but it is likely that most or all processes will be executed in some form in each phase. Project phases typically are completed sequentially, but can overlap in some project situations. Different phases typically have a different duration or effort. The high-level nature of project phases makes them an element of the project life cycle.

The phase structure allows the project to be segmented into logical subsets for ease of management, planning, and control. The number of phases, the need for phases, and the degree of control applied depend on the size, complexity, and potential impact of the project. Regardless of the number of phases comprising a project, all phases have similar characteristics:

- The work has a distinct focus that differs from any other phase. This often involves different organizations, locations, and skill sets.
- Achieving the primary deliverable or objective of the phase requires controls or processes unique to the phase or its activities. The repetition of processes across all five Process Groups, as described in Section 3, provides an additional degree of control and defines the boundaries of the phase.

- The closure of a phase ends with some form of transfer or hand-off of the work product produced as the phase deliverable. This phase end represents a natural point to reassess the activities underway and to change or terminate the project if necessary. This point may be referred to as a stage gate, milestone, phase review, phase gate or kill point. In many cases, the closure of a phase is required to be approved in some form before it can be considered closed.

There is no single ideal structure that will apply to all projects. Although industry common practices will often lead to the use of a preferred structure, projects in the same industry—or even in the same organization—may have significant variation. Some will have only one phase, as shown in Figure 2-10. Other projects may have two or more phases.

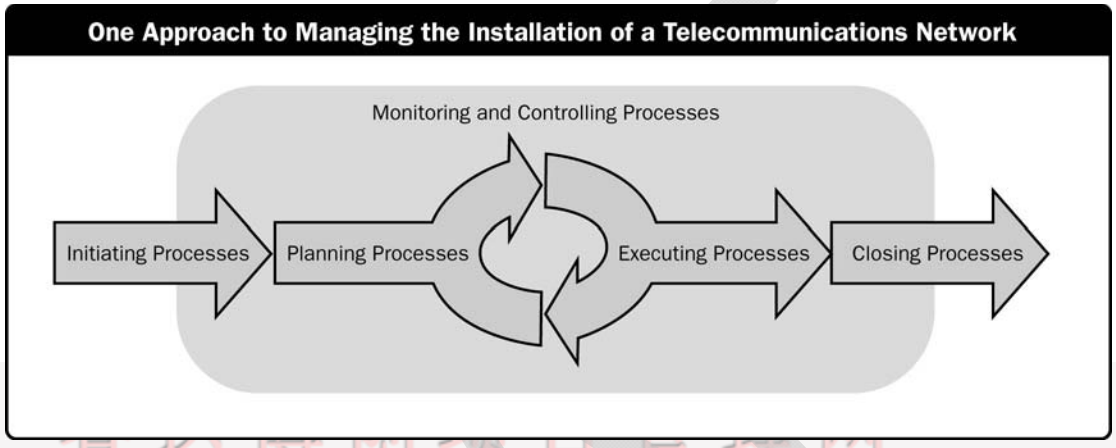

Figure 2-10. Example of a Single-Phase Project

Some organizations have established policies that standardize all projects, while others allow the project team to choose and tailor the most appropriate approach for their individual project. For instance, one organization may treat a feasibility study as routine pre-project work, another may treat it as the first phase of a project, and a third may treat the feasibility study as a separate, stand-alone project. Likewise, one project team may divide a project into two phases whereas another project team may choose to manage all the work as a single phase. Much depends on the nature of the specific project and the style of the project team or organization.

2.4.2.1 Phase-to-Phase Relationships

When projects have more than one phase, the phases are part of a generally sequential process designed to ensure proper control of the project and attain the desired product, service, or result. However, there are situations when a project might benefit from overlapping or concurrent phases.

There are two basic types of phase-to-phase relationships:

- **Sequential relationship.** In a sequential relationship, a phase starts only when the previous phase is complete. Figure 2-11 shows an example of a project with three entirely sequential phases. The step-by-step nature of this approach reduces uncertainty, but may eliminate options for reducing the overall schedule.

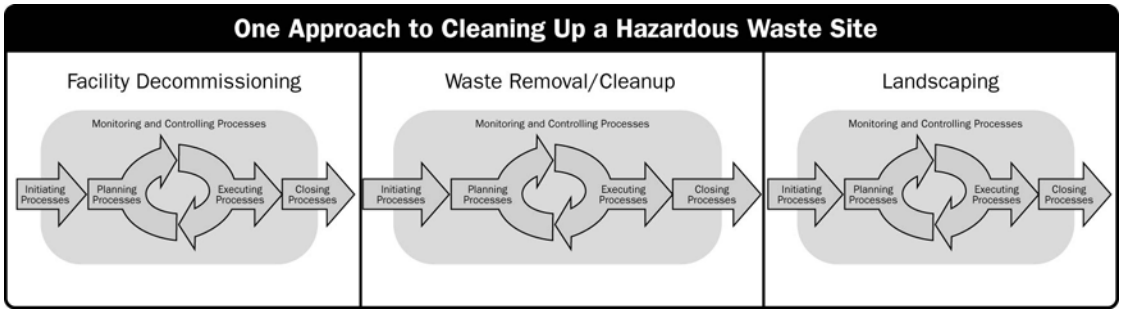

Figure 2-11. Example of a Three-Phase Project

- **Overlapping relationship.** In an overlapping relationship, a phase starts prior to completion of the previous one (see Figure 2-12). This can sometimes be applied as an example of the schedule compression technique called fast tracking. Overlapping phases may require additional resources to allow work to be done in parallel, increase risk and can result in rework if a subsequent phase progresses before accurate information is available from the previous phase.

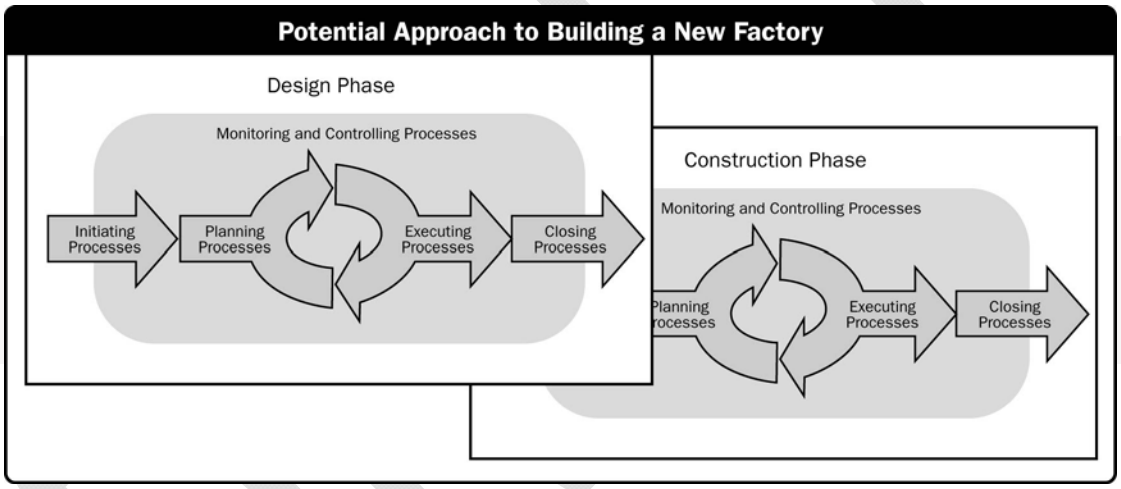

Figure 2-12. Example of a Project with Overlapping Phases

For projects with more than one phase, there may be different relationships (overlapping, sequential, parallel) between individual phases. Considerations such as level of control required, effectiveness, and degree of uncertainty determine the relationship to be applied between phases. Based on those considerations, both relationships could occur between different phases of a single project.

2.4.2.2 Predictive Life Cycles

Predictive life cycles (also known as fully plan-driven) are ones in which the project scope, and the time and cost required to deliver that scope, are determined as early in the project life cycle as practically possible. As shown in Figure 2-13, these projects proceed through a series of sequential or overlapping phases, with each phase generally focusing on a subset of project activities and project management processes. The work performed in each phase is usually different in nature to that in the preceding and subsequent phases, therefore, the makeup and skills required of the project team may vary from phase to phase.