THE PROJECT MANAGEMENT CONTEXT

2

Projects and project management operate in an environment broader than that of the project itself. The project management team must understand this broader context—managing the day-to-day activities of the project is necessary for success but not sufficient. This chapter describes key aspects of the project management context not covered elsewhere in this document. The topics included here are:

2.1 Project Phases and the Project Life Cycle
2.2 Project Stakeholders
2.3 Organizational Influences
2.4 Key General Management Skills
2.5 Socioeconomic Influences

2.1 PROJECT PHASES AND THE PROJECT LIFE CYCLE

Because projects are unique undertakings, they involve a degree of uncertainty. Organizations performing projects will usually divide each project into several *project phases* to provide better management control and appropriate links to the ongoing operations of the performing organization. Collectively, the project phases are known as the *project life cycle.*

2.1.1 Characteristics of Project Phases

Each project phase is marked by completion of one or more *deliverables.* A deliverable is a tangible, verifiable work product such as a feasibility study, a detail design, or a working prototype. The deliverables, and hence the phases, are part of a generally sequential logic designed to ensure proper definition of the product of the project.

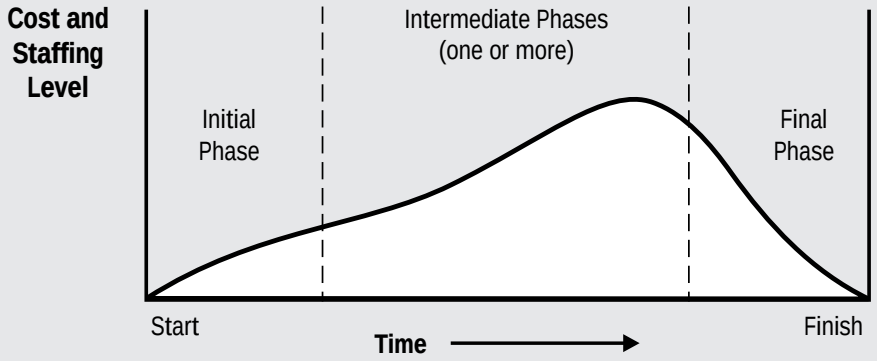
The conclusion of a project phase is generally marked by a review of both key deliverables and project performance in order to (a) determine if the project should continue into its next phase and (b) detect and correct errors cost effectively. These phase-end reviews are often called *phase exits, stage gates,* or *kill points.*

Each project phase normally includes a set of defined work products designed to establish the desired level of management control. The majority of these items are related to the primary phase deliverable, and the phases typically take their names from these items: requirements, design, build, text, start-up, turnover, and others as appropriate. Several representative project life cycles are described in Section 2.1.3.

2.1.2 Characteristics of the Project Life Cycle

The project life cycle serves to define the beginning and the end of a project. For example, when an organization identifies an opportunity that it would like to respond to, it will often authorize a feasibility study to decide if it should undertake a project. The project life cycle definition will determine whether the feasibility study is treated as the first project phase or as a separate, stand-alone project.

Figure 2–1. Sample Generic Life Cycle



The project life cycle definition will also determine which transitional actions at the end of the project are included and which are not. In this manner, the project life cycle definition can be used to link the project to the ongoing operations of the performing organization.

The phase sequence defined by most project life cycles generally involves some form of technology transfer or hand-off such as requirements to design, construction to operations, or design to manufacturing. Deliverables from the preceding phase are usually approved before work starts on the next phase. However, a subsequent phase is sometimes begun prior to approval of the previous phase deliverables when the risks involved are deemed acceptable. This practice of overlapping phases is often called *fast tracking*.

Project life cycles generally define:

- What technical work should be done in each phase (e.g., is the work of the architect part of the definition phase or part of the execution phase?).
- Who should be involved in each phase (e.g., concurrent engineering requires that the implementors be involved with requirements and design).

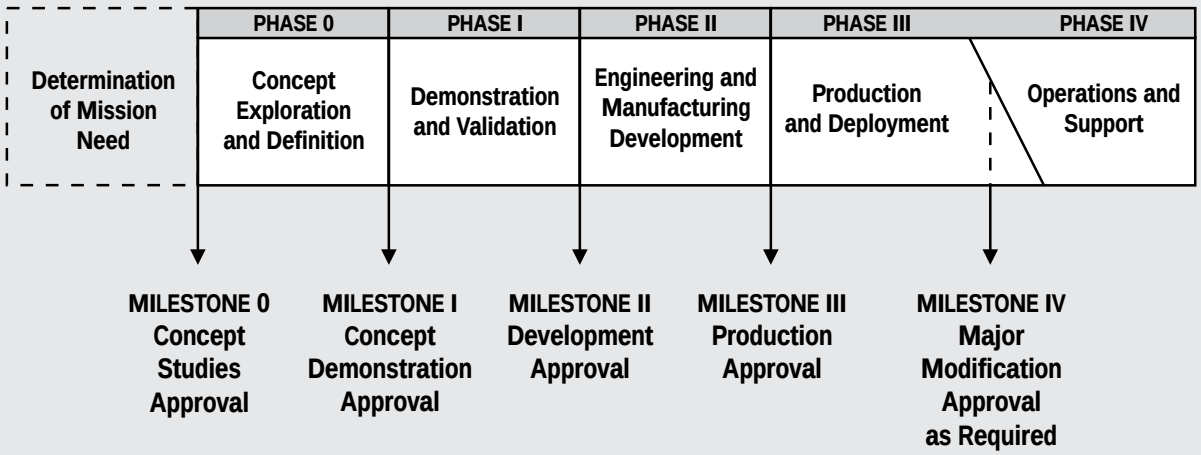
Project life cycle descriptions may be very general or very detailed. Highly detailed descriptions may have numerous forms, charts, and checklists to provide structure and consistency. Such detailed approaches are often called project management methodologies.

Most project life cycle descriptions share a number of common characteristics:

- Cost and staffing levels are low at the start, higher towards the end, and drop rapidly as the project draws to a conclusion. This pattern is illustrated in Figure 2–1.
- The probability of successfully completing the project is lowest, and hence risk and uncertainty are highest, at the start of the project. The probability of successful completion generally gets progressively higher as the project continues.
- The ability of the stakeholders to influence the final characteristics of the project product and the final cost of the project is highest at the start and gets progressively lower as the project continues. A major contributor to this phenomenon is that the cost of changes and error correction generally increases as the project continues.

Care should be taken to distinguish the *project* life cycle from the *product* life cycle. For example, a project undertaken to bring a new desktop computer to market is but one phase or stage of the product life cycle.

Figure 2–2. Representative Life Cycle for Defense Acquisition, per US DOD 5000.2 (Rev. 2/26/93)



Although many project life cycles have similar phase names with similar work products required, few are identical. Most have four or five phases, but some have nine or more. Even within a single application area there can be significant variations—one organization's software development life cycle may have a single design phase while another's has separate phases for functional and detail design.

Subprojects within projects may also have distinct project life cycles. For example, an architectural firm hired to design a new office building is first involved in the owner's definition phase when doing the design and in the owner's implementation phase when supporting the construction effort. The architect's design project, however, will have its own series of phases from conceptual development through definition and implementation to closure. The architect may even treat designing the facility and supporting the construction as separate projects with their own distinct phases.

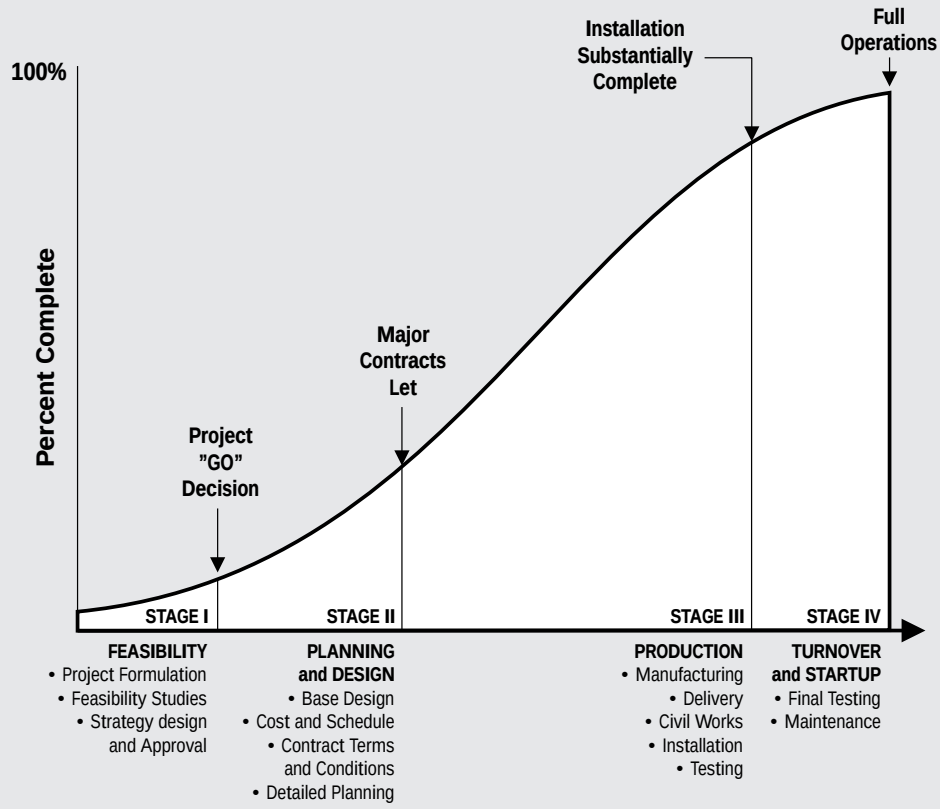
2.1.3 Representative Project Life Cycles

The following project life cycles have been chosen to illustrate the diversity of approaches in use. The examples shown are typical; they are neither recommended nor preferred. In each case, the phase names and major deliverables are those described by the author.

Defense acquisition. The U.S. Department of Defense directive 5000.2, as revised February 1993, describes a series of acquisition milestones and phases as illustrated in Figure 2–2.

- Determination of Mission Need—ends with Concept Studies Approval.
- Concept Exploration and Definition—ends with Concept Demonstration Approval.
- Demonstration and Validation—ends with Development Approval.
- Engineering and Manufacturing Development—ends with Production Approval.
- Production and Deployment—overlaps ongoing Operations and Support.

Figure 2–3. Representative Construction Project Life Cycle, per Morris



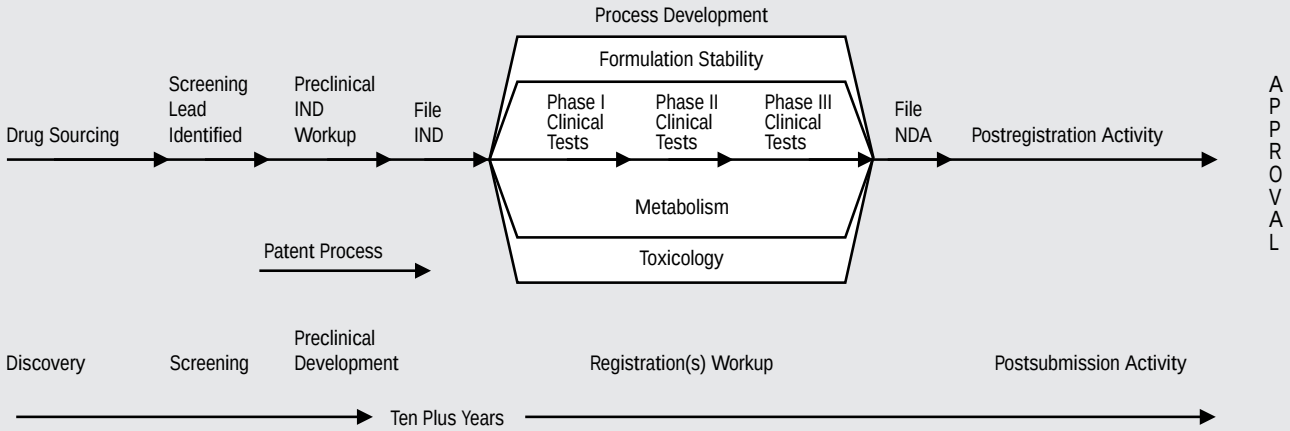
Construction. Morris [1] describes a construction project life cycle as illustrated in Figure 2–3:

- Feasibility—project formulation, feasibility studies, and strategy design and approval. A go/no-go decision is made at the end of this phase.
- Planning and Design—base design, cost and schedule, contract terms and conditions, and detailed planning. Major contracts are let at the end of this phase.
- Production—manufacturing, delivery, civil works, installation, and testing. The facility is substantially complete at the end of this phase.
- Turnover and Start-up—final testing and maintenance. The facility is in full operation at the end of this phase.

Pharmaceuticals. Murphy [2] describes a project life cycle for pharmaceutical new product development in the United States as illustrated in Figure 2–4:

- Discovery and Screening—includes basic and applied research to identify candidates for preclinical testing.
- Preclinical Development—includes laboratory and animal testing to determine safety and efficacy as well as preparation and filing of an Investigational New Drug (IND) application.
- Registration(s) Workup—includes Clinical Phase I, II, and III tests as well as preparation and filing of a New Drug Application (NDA).
- Postsubmission Activity—includes additional work as required to support Food and Drug Administration review of the NDA.

Figure 2–4. Representative Life Cycle for a Pharmaceuticals Project, per Murphy



Software development. Muench, et al. [3] describe a spiral model for software development with four cycles and four quadrants as illustrated in Figure 2–5:

- Proof-of-concept cycle—capture business requirements, define goals for proof-of-concept, produce conceptual system design, design and construct the proof-of-concept, produce acceptance test plans, conduct risk analysis and make recommendations.
- First build cycle—derive system requirements, define goals for first build, produce logical system design, design and construct the first build, produce system test plans, evaluate the first build and make recommendations.
- Second build cycle—derive subsystem requirements, define goals for second build, produce physical design, construct the second build, produce system test plans, evaluate the second build and make recommendations.
- Final cycle—complete unit requirements, final design, construct final build, perform unit, subsystem, system, and acceptance tests.

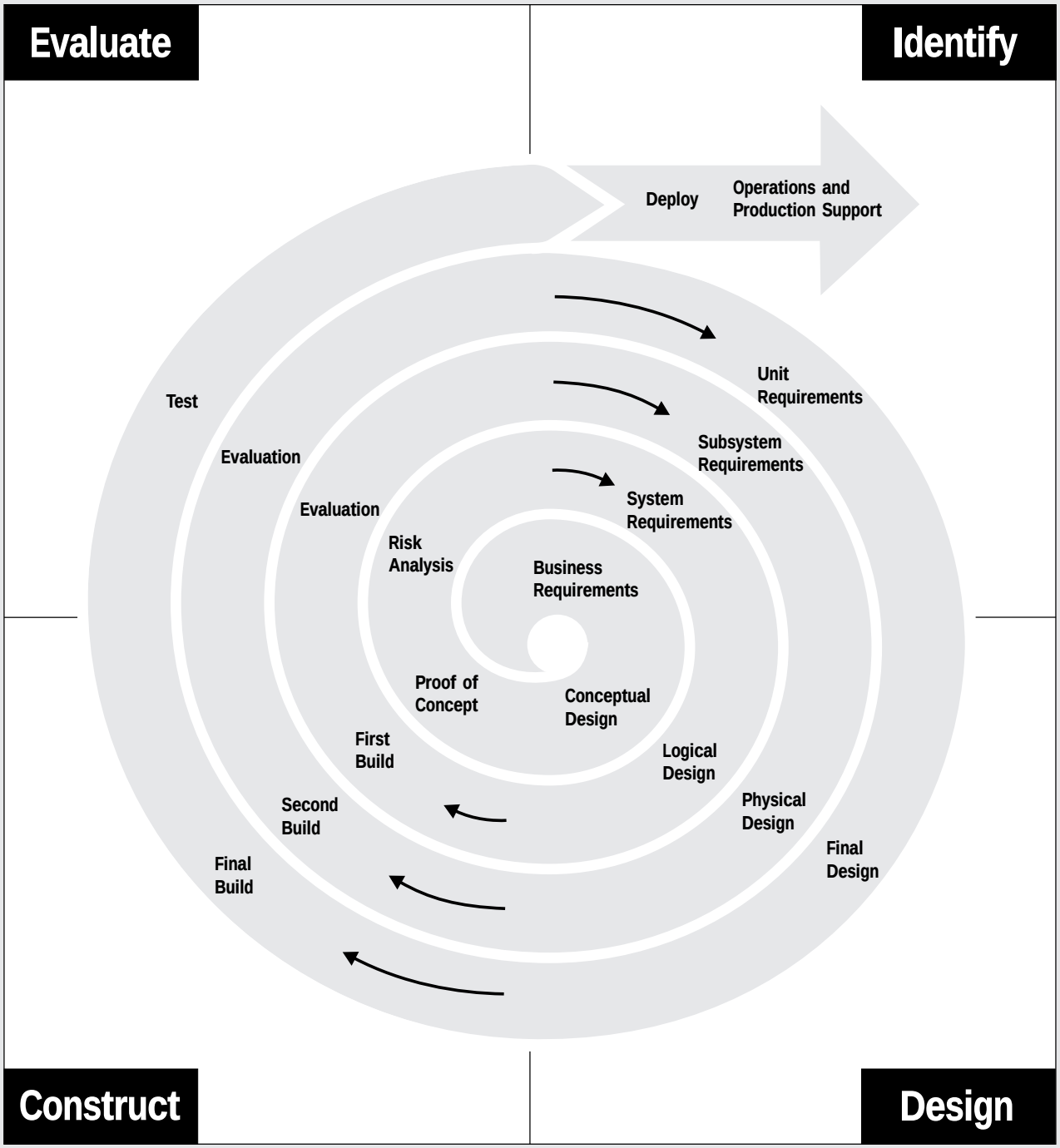
2.2 PROJECT STAKEHOLDERS

Project stakeholders are individuals and organizations who are actively involved in the project, or whose interests may be positively or negatively affected as a result of project execution or successful project completion. The project management team must identify the stakeholders, determine what their needs and expectations are, and then manage and influence those expectations to ensure a successful project. Stakeholder identification is often especially difficult. For example, is an assembly line worker whose future employment depends on the outcome of a new product design project a stakeholder?

Key stakeholders on every project include:

- Project manager—the individual responsible for managing the project.
- Customer—the individual or organization who will use the project product. There may be multiple layers of customers. For example, the customers for a new pharmaceutical product may include the doctors who prescribe it, the patients who take it, and the insurers who pay for it.
- Performing organization—the enterprise whose employees are most directly involved in doing the work of the project.
- Sponsor—the individual or group within the performing organization who provides the financial resources, in cash or in kind, for the project.

Figure 2–5. Representative Software Development Life Cycle, per Muench



In addition to these there are many different names and categories of project stakeholders—internal and external, owners and funders, suppliers and contractors, team members and their families, government agencies and media outlets, individual citizens, temporary or permanent lobbying organizations, and society at large. The naming or grouping of stakeholders is primarily an aid to identifying which individuals and organizations view themselves as stakeholders. Stakeholder roles and responsibilities may overlap, as when an engineering firm provides financing for a plant it is designing.

Managing stakeholder expectations may be difficult because stakeholders often have very different objectives that may come into conflict. For example:

- The manager of a department that has requested a new management information system may desire low cost, the system architect may emphasize technical excellence, and the programming contractor may be most interested in maximizing its profit.
- The vice president of research at an electronics firm may define new product success as state-of-the-art technology, the vice president of manufacturing may define it as world-class practices, and the vice president of marketing may be primarily concerned with the number of new features.
- The owner of a real estate development project may be focused on timely performance, the local governing body may desire to maximize tax revenue, an environmental group may wish to minimize adverse environmental impacts, and nearby residents may hope to relocate the project.

In general, differences between or among stakeholders should be resolved in favor of the customer. This does not, however, mean that the needs and expectations of other stakeholders can or should be disregarded. Finding appropriate resolutions to such differences can be one of the major challenges of project management.

2.3 ORGANIZATIONAL INFLUENCES

Projects are typically part of an organization larger than the project—corporations, government agencies, health care institutions, international bodies, professional associations, and others. Even when the project is the organization (joint ventures, partnering), the project will still be influenced by the organization or organizations that set it up. The following sections describe key aspects of these larger organizational structures that are likely to influence the project.

2.3.1 Organizational Systems

Project-based organizations are those whose operations consist primarily of projects. These organizations fall into two categories:

- Organizations that derive their revenue primarily from performing projects for others—architectural firms, engineering firms, consultants, construction contractors, government contractors, etc.
- Organizations that have adopted *management by projects* (see Section 1.3).

These organizations tend to have management systems in place to facilitate project management. For example, their financial systems are often specifically designed for accounting, tracking, and reporting on multiple simultaneous projects.

Non–project-based organizations—manufacturing companies, financial service firms, etc.—seldom have management systems designed to support project needs efficiently and effectively. The absence of project-oriented systems usually makes project management more difficult. In some cases, non–project-based organizations will have departments or other sub-units that operate as project-based organizations with systems to match.

Figure 2–6. Organizational Structure Influences on Projects

Organization Type / Project Characteristics	*Functional*	*Matrix*			*Projectized*
		Weak Matrix	Balanced Matrix	Strong Matrix	
Project Manager's Authority	Little or None	Limited	Low to Moderate	Moderate to High	High to Almost Total
Percent of Performing Organization's Personnel Assigned Full-time to Project Work	Virtually None	0–25%	15–60%	50–95%	85–100%
Project Manager's Role	Part-time	Part-time	Full-time	Full-time	Full-time
Common Titles for Project Manager's Role	Project Coordinator/ Project Leader	Project Coordinator/ Project Leader	Project Manager/ Project Officer	Project Manager/ Program Manager	Project Manager/ Program Manager
Project Management Administrative Staff	Part-time	Part-time	Part-time	Full-time	Full-time

The project management team should be acutely aware of how the organization's systems affect the project. For example, if the organization rewards its functional managers for charging staff time to projects, the project management team may need to implement controls to ensure that assigned staff are being used effectively on the project.

2.3.2 Organizational Cultures and Style

Most organizations have developed unique and describable cultures. These cultures are reflected in their shared values, norms, beliefs, and expectations; in their policies and procedures; in their view of authority relationships; and in numerous other factors. Organizational cultures often have a direct influence on the project. For example:

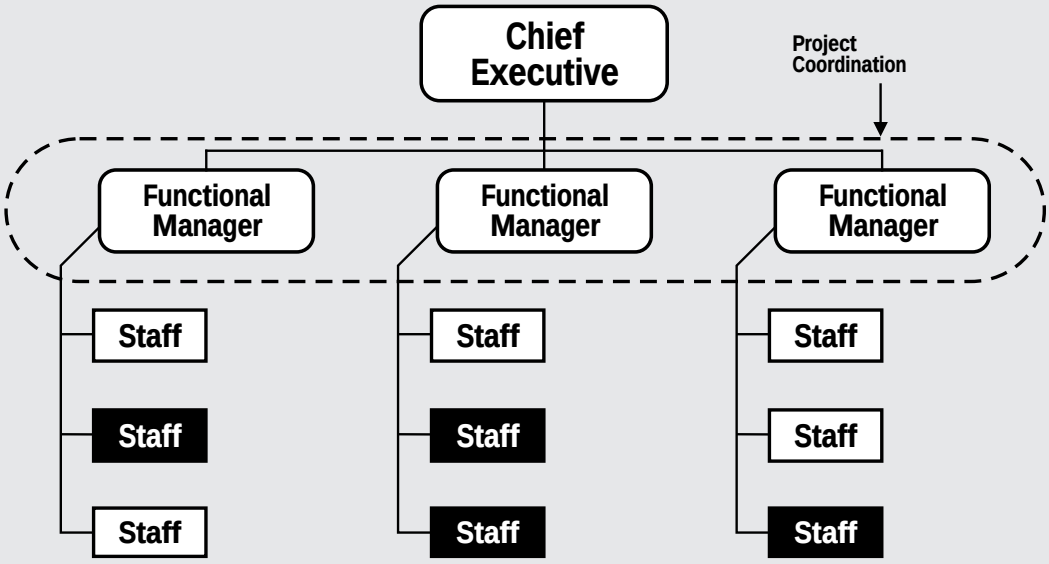
- A team proposing an unusual or high-risk approach is more likely to secure approval in an aggressive or entrepreneurial organization.
- A project manager with a highly participative style is apt to encounter problems in a rigidly hierarchical organization, while a project manager with an authoritarian style will be equally challenged in a participative organization.

2.3.3 Organizational Structure

The structure of the performing organization often constrains the availability of or terms under which resources become available to the project. Organizational structures can be characterized as spanning a spectrum from *functional* to *projectized*, with a variety of matrix structures in between. Figure 2–6 details key project-related characteristics of the major types of enterprise organizational structures. Project organization is discussed in Section 9.1, Organizational Planning.

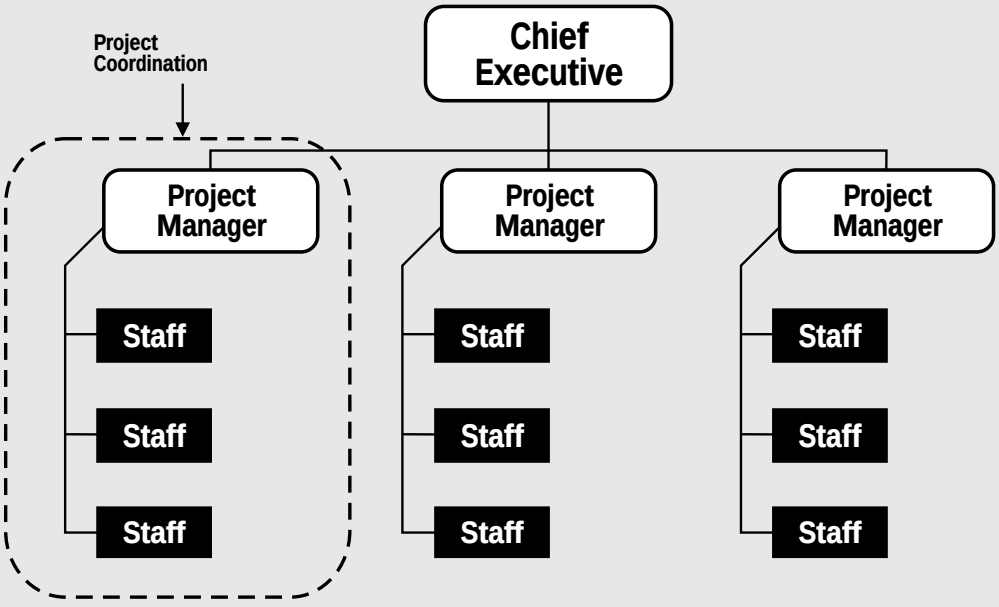
The classic *functional organization* shown in Figure 2–7 is a hierarchy where each employee has one clear superior. Staff are grouped by specialty, such as production, marketing, engineering, and accounting at the top level, with engineering further subdivided into mechanical and electrical. Functional organizations still have projects, but the perceived scope of the project is limited to the boundaries of

Figure 2–7. Functional Organization



(Black boxes represent staff engaged in project activities.)

Figure 2–8. Projectized Organization



(Black boxes represent staff engaged in project activities.)

the function: the engineering department in a functional organization will do its work independent of the manufacturing or marketing departments. For example, when a new product development is undertaken in a purely functional organization, the design phase is often called a "design project" and includes only engineering department staff. If questions about manufacturing arise, they are passed up the hierarchy to the department head who consults with the head of the manufacturing department. The engineering department head then passes the answer back down the hierarchy to the engineering project manager.

At the opposite end of the spectrum is the *projectized organization* shown in Figure 2–8. 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. Projectized organizations often have organizational units called departments, but these groups either report directly to the project manager or provide support services to the various projects.

Matrix organizations as shown in Figures 2–9 through 2–11 are a blend of functional and projectized characteristics. Weak matrices maintain many of the characteristics of a functional organization and the project manager role is more that of a coordinator or expediter than that of a manager. In similar fashion, strong matrices have many of the characteristics of the projectized organization—full-time project managers with considerable authority and full-time project administrative staff.

Most modern organizations involve all these structures at various levels as shown in Figure 2–12. 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 in a projectized organization: it may include full-time staff from different functional departments, it may develop its own set of operating procedures, and it may operate outside the standard, formalized reporting structure.

2.4 KEY GENERAL MANAGEMENT SKILLS

General management is a broad subject dealing with every aspect of managing an ongoing enterprise. Among other topics, it includes:

- Finance and accounting, sales and marketing, research and development, manufacturing and distribution.
- Strategic planning, tactical planning, and operational planning.
- Organizational structures, organizational behavior, personnel administration, compensation, benefits, and career paths.
- Managing work relationships through motivation, delegation, supervision, team building, conflict management, and other techniques.
- Managing oneself through personal time management, stress management, and other techniques.

General management skills provide much of the foundation for building project management skills. They are often essential for the project manager. On any given project, skill in any number of general management areas may be required. This section describes key general management skills that are *highly likely to affect most projects* and that are not covered elsewhere. These skills are well documented in the general management literature and their application is fundamentally the same on a project.

There are also many general management skills that are relevant only on certain projects or in certain application areas. For example, team member safety is critical on virtually all construction projects and of little concern on most software development projects.

Figure 2–9. Weak Matrix Organization

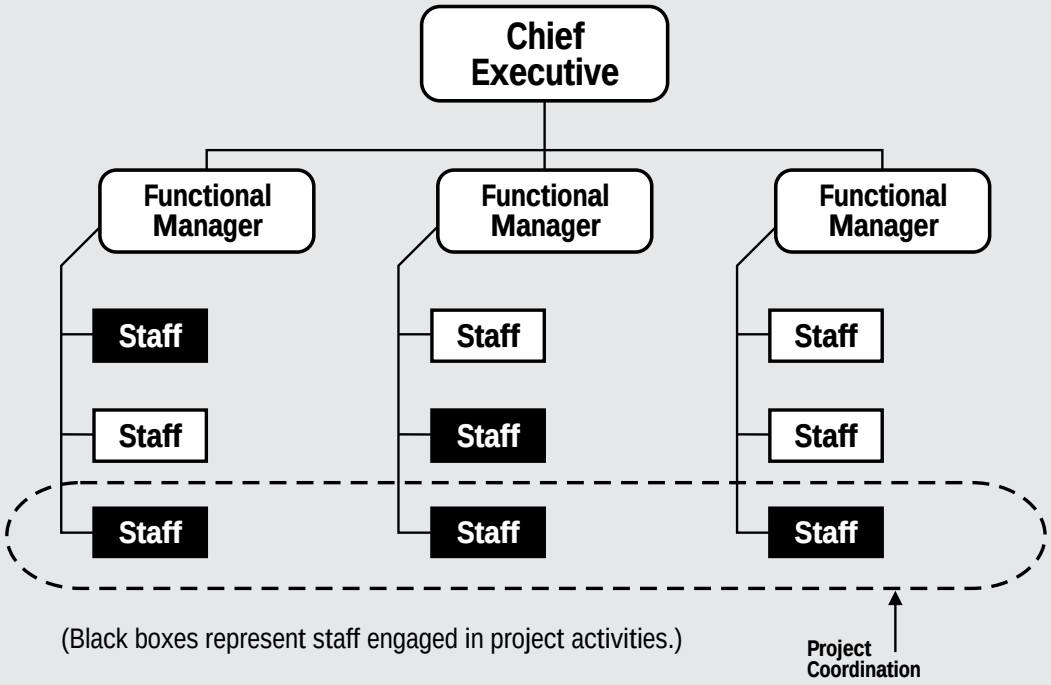


Figure 2–10. Balanced Matrix Organization

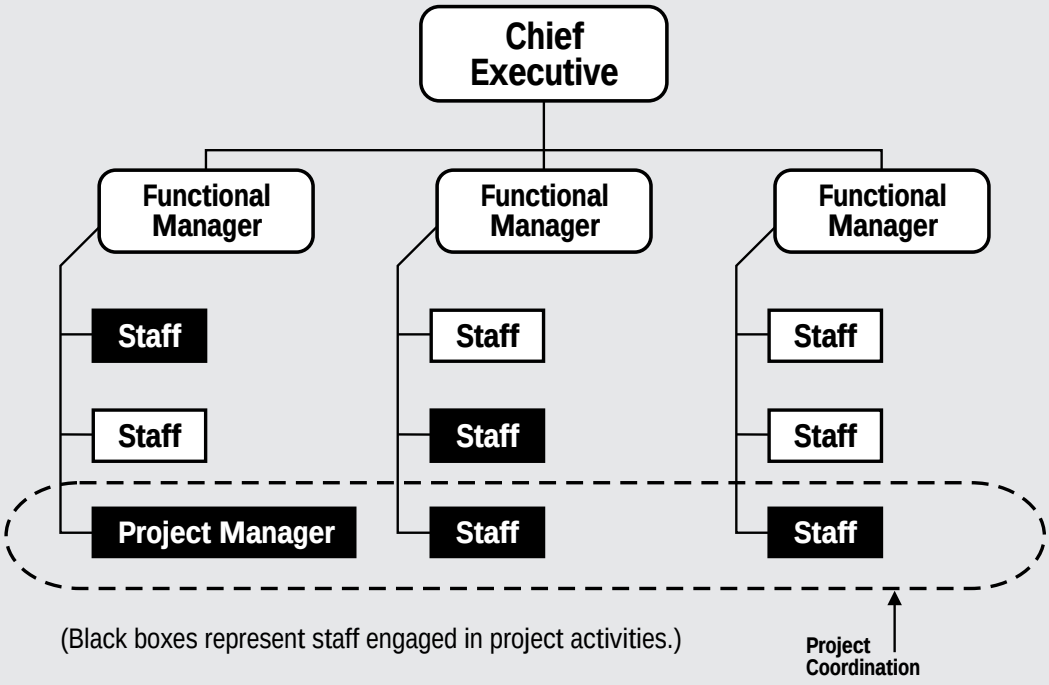


Figure 2–11. Strong Matrix Organization

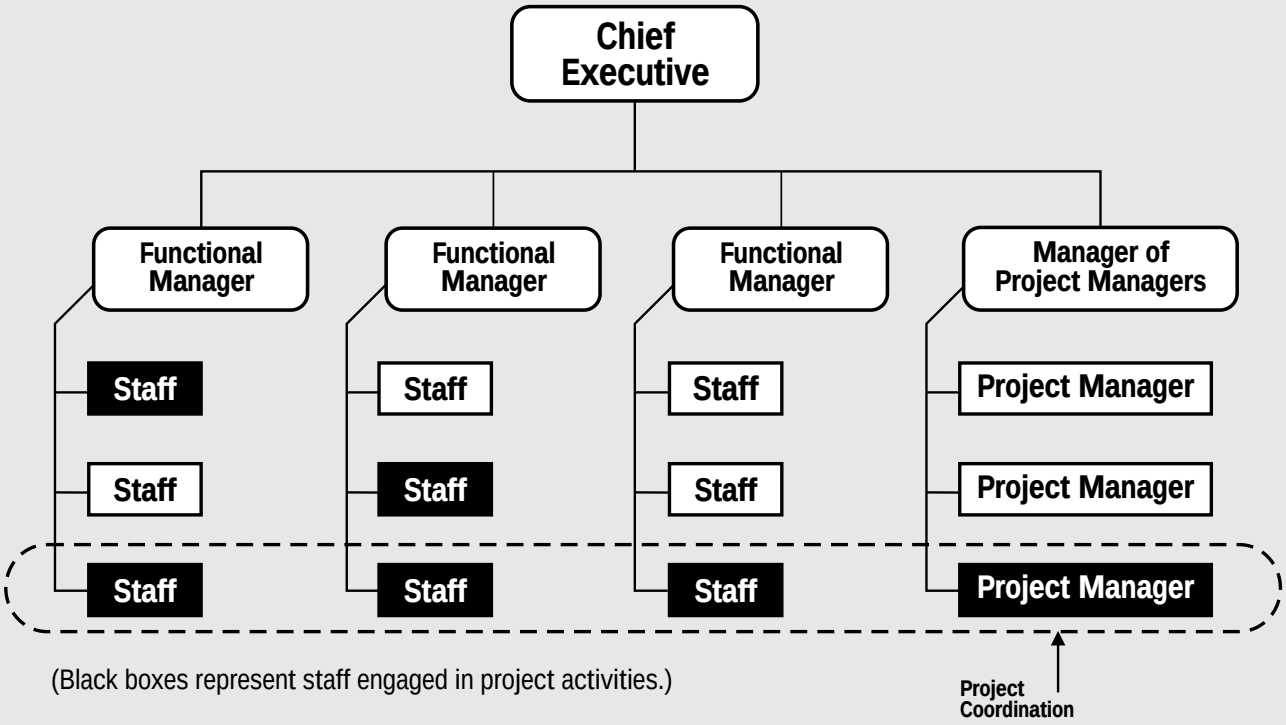
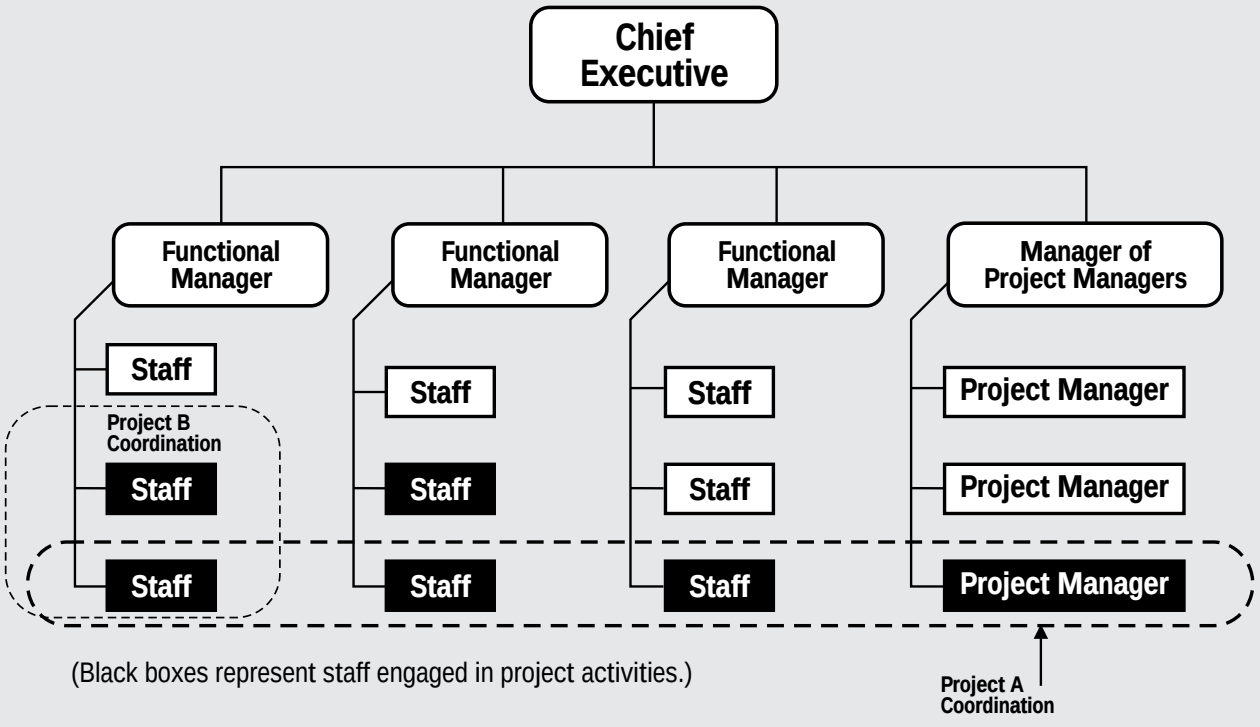


Figure 2–12. Composite Organization



2.4.1 Leading

Kotter [4] distinguishes between *leading* and *managing* while emphasizing the need for both: one without the other is likely to produce poor results. He says that managing is primarily concerned with "consistently producing key results expected by stakeholders," while leading involves:

- Establishing direction—developing both a vision of the future and strategies for producing the changes needed to achieve that vision.
- Aligning people—communicating the vision by words and deeds to all those whose cooperation may be needed to achieve the vision.
- Motivating and inspiring—helping people energize themselves to overcome political, bureaucratic, and resource barriers to change.

On a project, particularly a larger project, the project manager is generally expected to be the project's leader as well. Leadership is not, however, limited to the project manager: it may be demonstrated by many different individuals at many different times during the project. Leadership must be demonstrated at all levels of the project (project leadership, technical leadership, team leadership).

2.4.2 Communicating

Communicating involves the exchange of information. The sender is responsible for making the information clear, unambiguous, and complete so that the receiver can receive it correctly. The receiver is responsible for making sure that the information is received in its entirety and understood correctly. Communicating has many dimensions:

- Written and oral, listening and speaking.
- Internal (within the project) and external (to the customer, the media, the public, etc.).
- Formal (reports, briefings, etc.) and informal (memos, ad hoc conversations, etc.).
- Vertical (up and down the organization) and horizontal (with peers).

The general management skill of communicating is related to, but not the same as, Project Communications Management (described in Chapter 10). Communicating is the broader subject and involves a substantial body of knowledge that is not unique to the project context, for example:

- Sender-receiver models—feedback loops, barriers to communications, etc.
- Choice of media—when to communicate in writing, when to communicate orally, when to write an informal memo, when to write a formal report, etc.
- Writing style—active vs. passive voice, sentence structure, word choice, etc.
- Presentation techniques—body language, design of visual aids, etc.
- Meeting management techniques—preparing an agenda, dealing with conflict, etc.

Project Communications Management is the application of these broad concepts to the specific needs of a project; for example, deciding how, when, in what form, and to whom to report project performance.

2.4.3 Negotiating

Negotiating involves conferring with others in order to come to terms or reach an agreement. Agreements may be negotiated directly or with assistance; mediation and arbitration are two types of assisted negotiation.

Negotiations occur around many issues, at many times, and at many levels of the project. During the course of a typical project, project staff are likely to negotiate for any or all of the following:

- Scope, cost, and schedule objectives.
- Changes to scope, cost, or schedule.
- Contract terms and conditions.
- Assignments.
- Resources.

2.4.4 Problem Solving

Problem solving involves a combination of problem definition and decision making. It is concerned with problems that have already occurred (as opposed to risk management that addresses potential problems).

Problem definition requires distinguishing between causes and symptoms. Problems may be internal (a key employee is reassigned to another project) or external (a permit required to begin work is delayed). Problems may be technical (differences of opinion about the best way to design a product), managerial (a functional group is not producing according to plan), or interpersonal (personality or style clashes).

Decision making includes analyzing the problem to identify viable solutions, and then making a choice from among them. Decisions can be made or obtained (from the customer, from the team, or from a functional manager). Once made, decisions must be implemented. Decisions also have a time element to them—the "right" decision may not be the "best" decision if it is made too early or too late.

2.4.5 Influencing the Organization

Influencing the organization involves the ability to "get things done." It requires an understanding of both the formal and informal structures of all the organizations involved—the performing organization, the customer, contractors, and numerous others as appropriate. Influencing the organization also requires an understanding of the mechanics of power and politics.

Both power and politics are used here in their positive senses. Pfeffer [5] defines power as "the potential ability to influence behavior, to change the course of events, to overcome resistance, and to get people to do things that they would not otherwise do." In similar fashion, Eccles [6] says that "politics is about getting collective action from a group of people who may have quite different interests. It is about being willing to use conflict and disorder creatively. The negative sense, of course, derives from the fact that attempts to reconcile these interests result in power struggles and organizational games that can sometimes take on a thoroughly unproductive life of their own."

2.5 SOCIOECONOMIC INFLUENCES

Like general management, *socioeconomic influences* include a wide range of topics and issues. The project management team must understand that current conditions and trends in this area may have a major effect on their project: a small change here can translate, usually with a time lag, into cataclysmic upheavals in the project itself. Of the many potential socioeconomic influences, several major categories that frequently affect projects are described briefly below.

2.5.1 Standards and Regulations

The International Organization for Standardization (ISO) differentiates between standards and regulations as follows [7]:

- A *standard* is a "document approved by a recognized body, that provides, for common and repeated use, rules, guidelines, or characteristics for products, processes or services with which compliance is not mandatory." There are numerous standards in use covering everything from thermal stability of hydraulic fluids to the size of computer diskettes.
- A *regulation* is a "document which lays down product, process or service characteristics, including the applicable administrative provisions, with which compliance is mandatory." Building codes are an example of regulations.

Care must be used in discussing standards and regulations since there is a vast gray area between the two, for example:

- Standards often begin as guidelines that describe a preferred approach, and later, with widespread adoption, become *de facto* regulations (e.g., the use of the Critical Path Method for scheduling major construction projects).
- Compliance may be mandated at different levels (e.g., by a government agency, by the management of the performing organization, or by the project management team).

For many projects, standards and regulations (by whatever definition) are well known and project plans can reflect their effects. In other cases, the influence is unknown or uncertain and must be considered under Project Risk Management.

2.5.2 Internationalization

As more and more organizations engage in work which spans national boundaries, more and more projects span national boundaries as well. In addition to the traditional concerns of scope, cost, time, and quality, the project management team must also consider the effect of time zone differences, national and regional holidays, travel requirements for face-to-face meetings, the logistics of teleconferencing, and often volatile political differences.

2.5.3 Cultural Influences

Culture is the "totality of socially transmitted behavior patterns, arts, beliefs, institutions, and all other products of human work and thought" [8]. Every project must operate within a context of one or more cultural norms. This area of influence includes political, economic, demographic, educational, ethical, ethnic, religious, and other areas of practice, belief, and attitudes that affect the way people and organizations interact.

NOTES