

CHAPTER 2

Project Life Cycle and Organization

Projects and project management are carried out in an environment broader than that of the project itself. The project management team must understand this broader context so it can select the life cycle phases, processes, and tools and techniques that appropriately fit the project. This chapter describes some key aspects of the project management context. The topics included here are:

2.1 The Project Life Cycle

2.2 Project Stakeholders

2.3 Organizational Influences

2.1 The Project Life Cycle

Project managers or the organization can divide projects into phases to provide better management control with appropriate links to the ongoing operations of the performing organization. Collectively, these phases are known as the project life cycle. Many organizations identify a specific set of life cycles for use on all of their projects.

2.1.1 Characteristics of the Project Life Cycle

The project life cycle defines the phases that connect the beginning of a project to its end. For example, when an organization identifies an opportunity to which it would like to respond, it will often authorize a feasibility study to decide whether it should undertake the project. The project life cycle definition can help the project manager clarify whether to treat the feasibility study as the first project phase or as a separate, stand-alone project. Where the outcome of such a preliminary effort is not clearly identifiable, it is best to treat such efforts as a separate project. The phases of a project life cycle are not the same as the Project Management Process Groups described in detail in Chapter 3.

The transition from one phase to another within a project's life cycle generally involves, and is usually defined by, some form of technical transfer or handoff. Deliverables from one phase are usually reviewed for completeness and accuracy and approved before work starts on the next phase. However, it is uncommon for a phase to begin prior to the approval of the previous phase. Overlapping phases, normally done in sequence, is an example of the application of the schedule compression technique called fast tracking.

There is no single best way to define an ideal project life cycle. Some organizations have established policies that standardize all projects with a single life cycle, while others allow the project management team to choose the most appropriate life cycle for the team's project. Further, industry common practices will often lead to the use of a preferred life cycle within that industry.

Project life cycles generally define:

- What technical work to do in each phase (for example, in which phase should the architect's work be performed?)
- When the deliverables are to be generated in each phase and how each deliverable is reviewed, verified, and validated
- Who is involved in each phase (for example, concurrent engineering requires that the implementers be involved with requirements and design)
- How to control and approve each phase.

Project life cycle descriptions can be very general or very detailed. Highly detailed descriptions of life cycles can include forms, charts, and checklists to provide structure and control.

Most project life cycles share a number of common characteristics:

- Phases are generally sequential and are usually defined by some form of technical information transfer or technical component handoff.
- Cost and staffing levels are low at the start, peak during the intermediate phases, and drop rapidly as the project draws to a conclusion. Figure 2-1 illustrates this pattern.

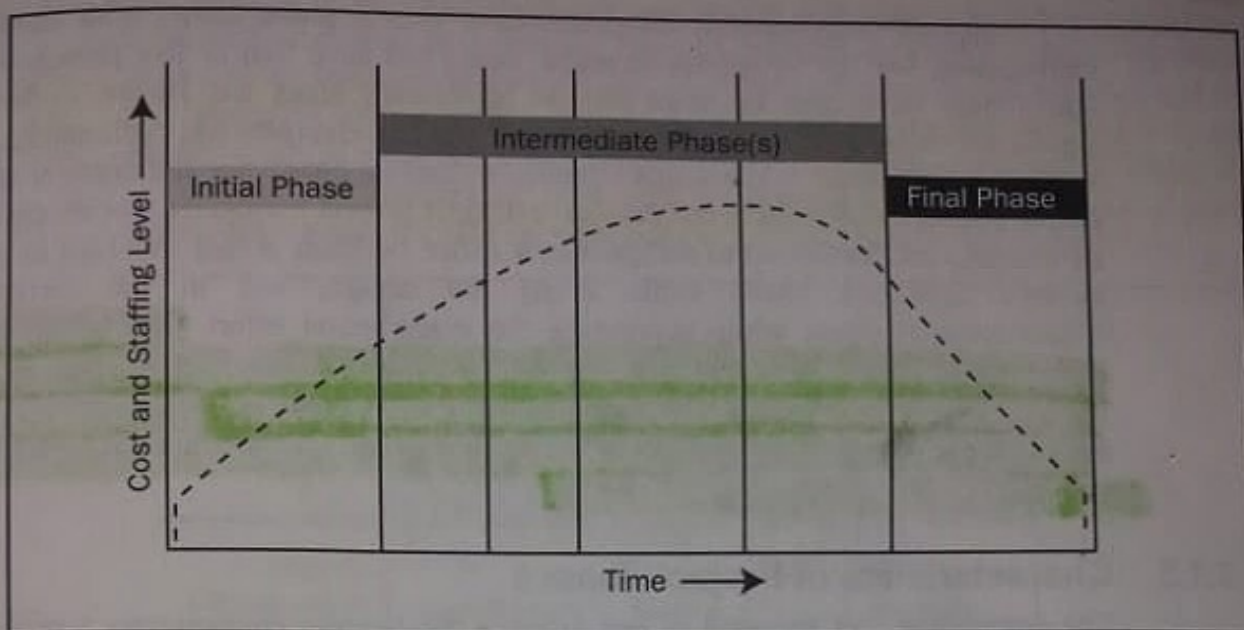


Figure 2-1. Typical Project Cost and Staffing Level Across the Project Life Cycle

- The level of uncertainty is highest and, hence, risk of failing to achieve the objectives is greatest at the start of the project. The certainty of completion generally gets progressively better as the project continues.
- The ability of the stakeholders to influence the final characteristics of the project's product and the final cost of the project is highest at the start, and gets progressively lower as the project continues. Figure 2-2 illustrates this. A major contributor to this phenomenon is that the cost of changes and correcting errors generally increases as the project continues.

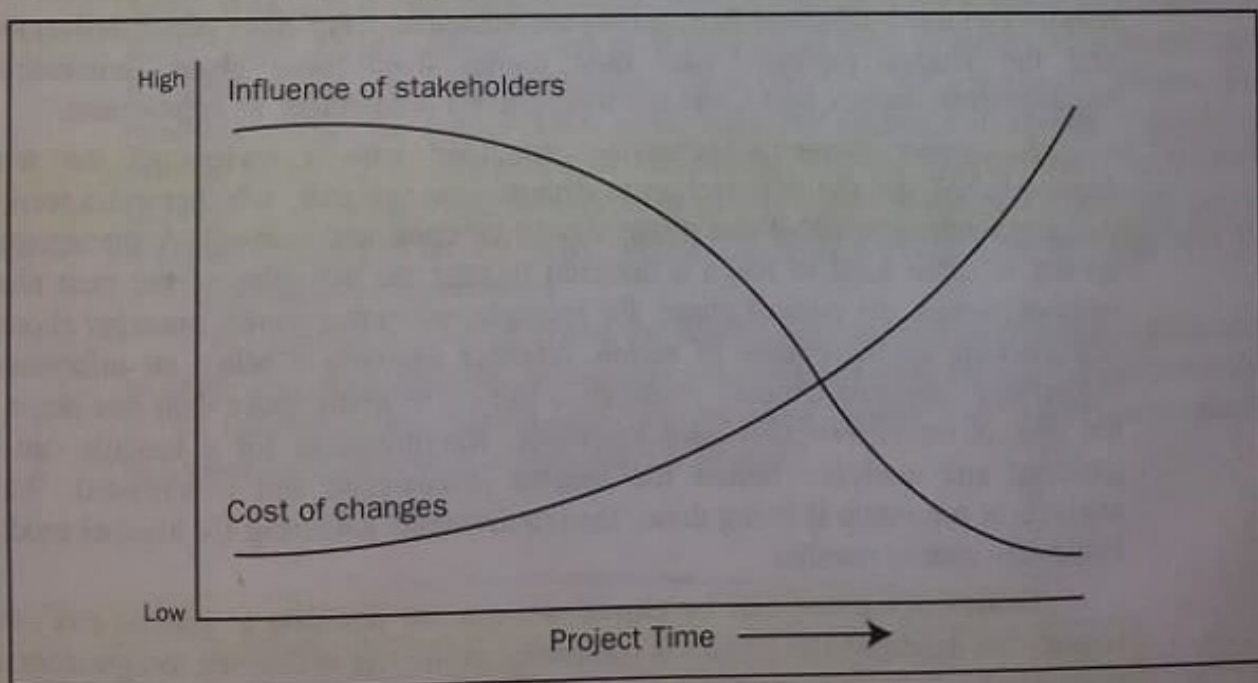


Figure 2-2. Stakeholders' Influence Over Time

Although many project life cycles have similar phase names with similar deliverables, few life cycles are identical. Some can have four or five phases, while others may have nine or more. Single application areas are known to have significant variations. One organization's software development life cycle can have a single design phase, while another can have separate phases for architectural and detailed design. Subprojects can 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 while doing the design, and in the owner's implementation phase while 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 can even treat designing the facility and supporting the construction as separate projects, each with its own set of phases.

2.1.2 Characteristics of Project Phases

The completion and approval of one or more deliverables characterizes a project phase. A deliverable is a measurable, verifiable work product such as a specification, feasibility study report, detailed design document, or working prototype. Some deliverables can correspond to the project management process, whereas others are the end products or components of the end products for which the project was conceived. The deliverables, and hence the phases, are part of a generally sequential process designed to ensure proper control of the project and to attain the desired product or service, which is the objective of the project.

In any specific project, for reasons of size, complexity, level of risk, and cash flow constraints, phases can be further subdivided into subphases. Each subphase is aligned with one or more specific deliverables for monitoring and control. The majority of these subphase deliverables are related to the primary phase deliverables and the phases typically take their names from these phase deliverables: requirements, design, build, test, startup, turnover, and others, as appropriate.

A project phase is generally concluded with a review of the work accomplished and the deliverables to determine acceptance, whether extra work is still required, or whether the phase should be considered closed. A management review is often held to reach a decision to start the activities of the next phase without closing the current phase, for example, when the project manager chooses fast tracking as the course of action. Another example is when an information technology company chooses an iterative life cycle where more than one phase of the project might progress simultaneously. Requirements for a module can be gathered and analyzed before the module is designed and constructed. While analysis of a module is being done, the requirements gathering for another module could also start in parallel.

Similarly, a phase can be closed without the decision to initiate any other phases. For example, the project is completed or the risk is deemed too great for the project to be allowed to continue.

2.1.3

Formal phase completion does not include authorizing the subsequent phase
 For effective control, each phase is formally initiated to produce a phase-dependent output of the Initiating Process Group, specifying what is allowed and expected for that phase, as shown in Figure 2-3. A phase-end review can be held with the explicit goals of obtaining authorization to close the current phase and to initiate the subsequent one. Sometimes both authorizations can be gained at one review. Phase-end reviews are also called phase exits, phase gates, or kill points.

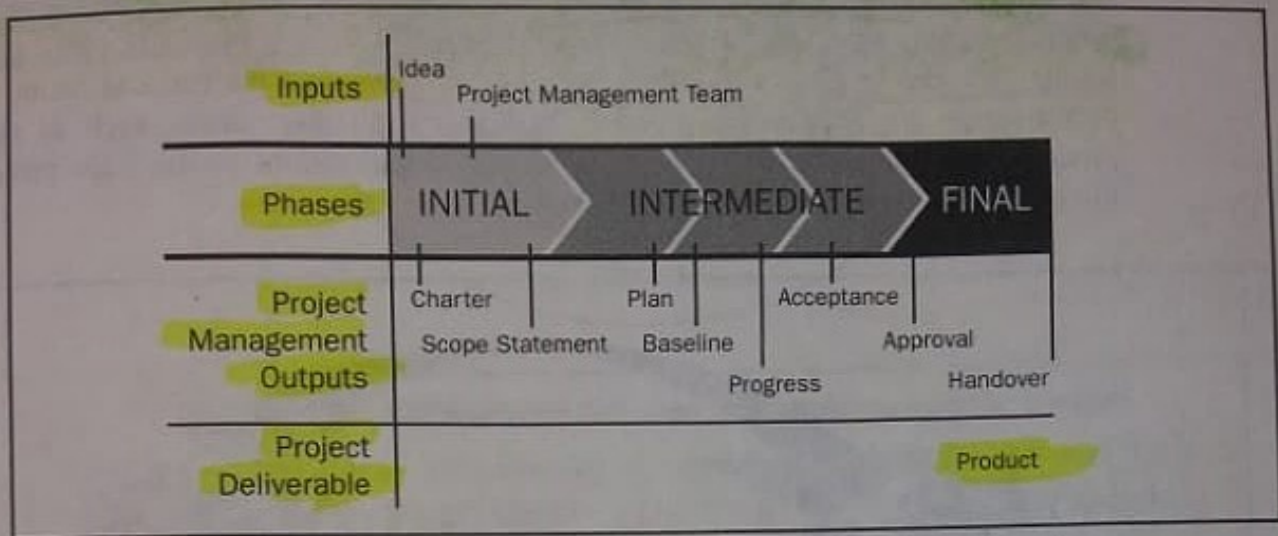


Figure 2-3. Typical Sequence of Phases in a Project Life Cycle

2.1.3 Project Life Cycle and Product Life Cycle Relationships

Many projects are linked to the ongoing work of the performing organization. Some organizations formally approve projects only after completion of a feasibility study, a preliminary plan, or some other equivalent form of analysis; in these cases, the preliminary planning or analysis takes the form of a separate project. For example, additional phases could come from developing and testing a prototype prior to initiating the project for the development of the final product. Some types of projects, especially internal service or new product development projects, can be initiated informally for a limited amount of time to secure formal approval for additional phases or activities.

The driving forces that create the stimuli for a project are typically referred to as problems, opportunities, or business requirements. The effect of these pressures is that management generally must prioritize this request with respect to the needs and resource demands of other potential projects.

The project life cycle definition will also identify which transitional actions at the end of the project are included or not included, in order to link the project to the ongoing operations of the performing organization. Examples would be when a new product is released to manufacturing, or a new software program is turned over to marketing. 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 only one aspect of the product life cycle. Figure 2-4 illustrates the product life cycle starting with the business plan, through idea, to product, ongoing operations and product divestment. The project life cycle goes through a series of phases to create the product. Additional projects can include a performance upgrade to the product. In some application areas, such as new product development or software development, organizations consider the project life cycle as part of the product life cycle.

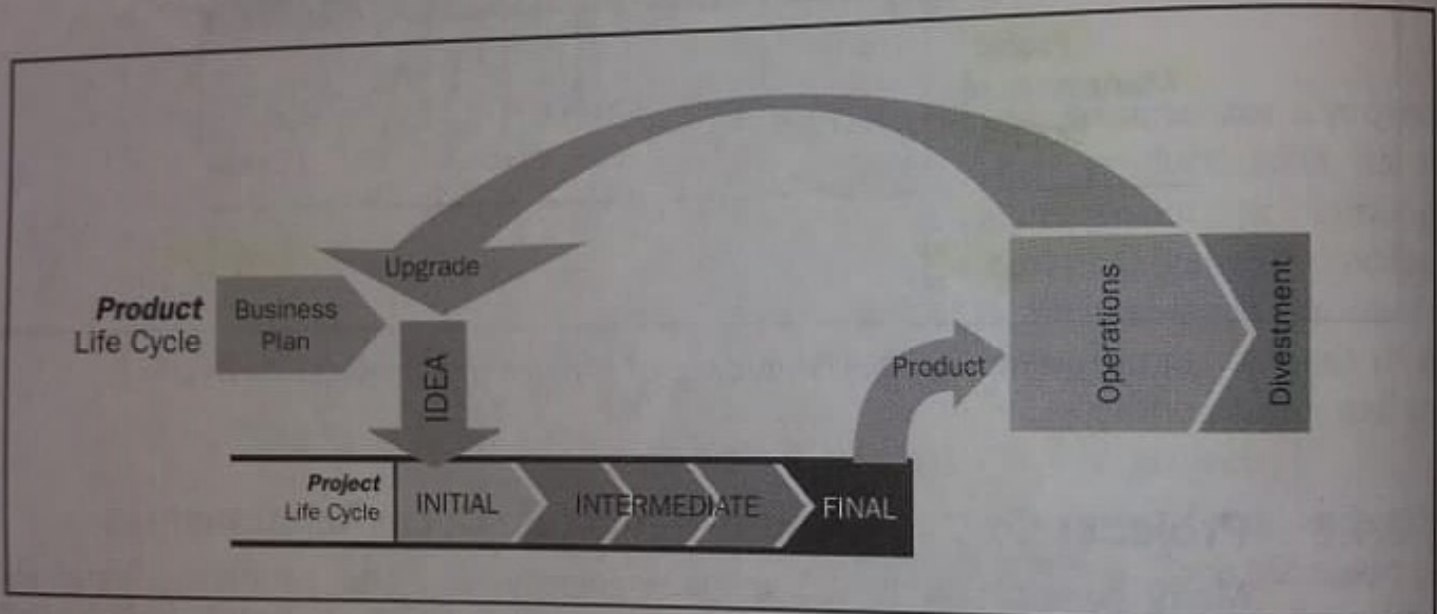
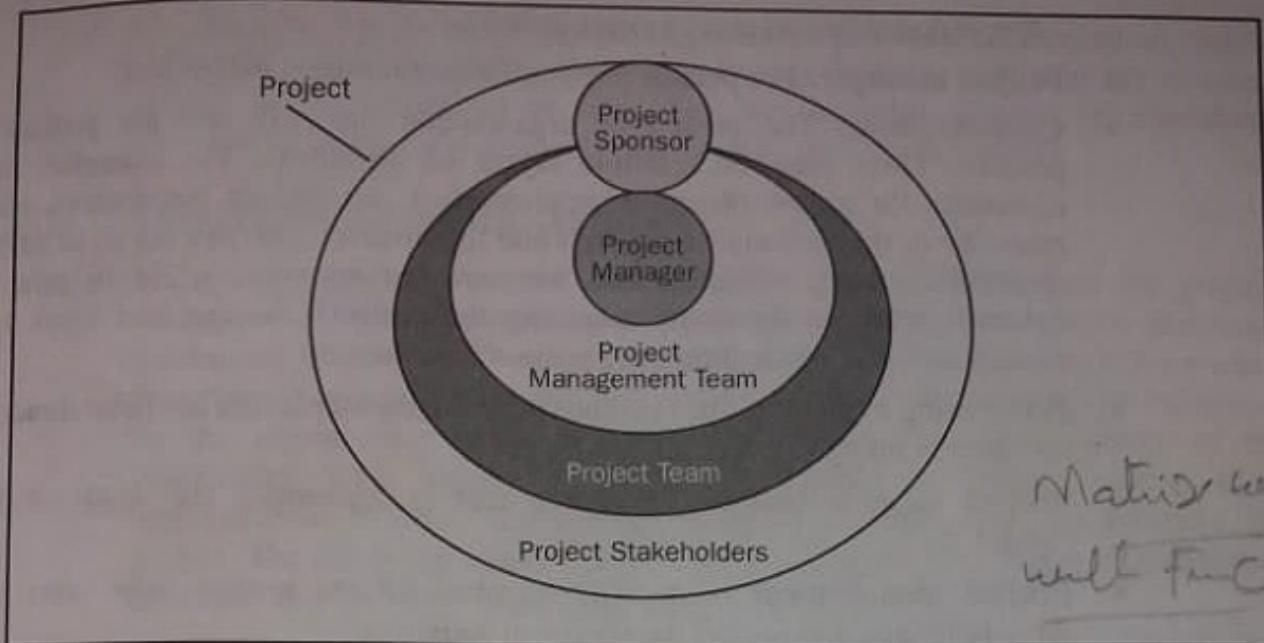


Figure 2-4. Relationship Between the Product and the Project Life Cycles

2.2 Project Stakeholders

Project stakeholders are individuals and organizations that are actively involved in the project, or whose interests may be affected as a result of project execution or project completion. They may also exert influence over the project's objectives and outcomes. The project management team must identify the stakeholders, determine their requirements and expectations, and, to the extent possible, manage their influence in relation to the requirements to ensure a successful project. Figure 2-5 illustrates the relationship between stakeholders and the project team.



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Figure 2-5. The Relationship Between Stakeholders and the Project

Stakeholders have varying levels of responsibility and authority when participating on a project and these can change over the course of the project's life cycle. Their responsibility and authority range from occasional contributions in surveys and focus groups to full project sponsorship, which includes providing financial and political support. Stakeholders who ignore this responsibility can have a damaging impact on the project objectives. Likewise, project managers who ignore stakeholders can expect a damaging impact on project outcomes.

Sometimes, stakeholder identification can be difficult. For example, some would argue that an assembly-line worker whose future employment depends on the outcome of a new product-design project is a stakeholder. Failure to identify a key stakeholder can cause major problems for a project. For example, late recognition that the legal department was a significant stakeholder in a year 2000 rollover (Y2K) software upgrade project caused many additional documentation tasks to be added to the project's requirements.

Stakeholders may have a positive or negative influence on a project. Positive stakeholders are those who would normally benefit from a successful outcome from the project, while negative stakeholders are those who see negative outcomes from the project's success. For example, business leaders from a community that will benefit from an industrial expansion project may be positive stakeholders because they see economic benefit to the community from the project's success. Conversely, environmental groups could be negative stakeholders if they view the project as doing harm to the environment. In the case of positive stakeholders, their interests are best served by helping the project succeed, for example, helping the project obtain the needed permits to proceed. The negative stakeholders' interest would be better served by impeding the project's progress by demanding more extensive environmental reviews. Negative stakeholders are often overlooked by the project team at the risk of failing to bring their projects to a successful end.

Key stakeholders on every project include:

- **Project manager.** The person responsible for managing the project.
- **Customer/user.** The person or organization that will use the project product. There may be multiple layers of customers. For example, customers for a new pharmaceutical product can include the doctors who prescribe it, the patients who take it and the insurers who pay for it. In some application areas, customer and user are synonymous, while in other customer refers to the entity acquiring the project's product and users are those who will directly utilize the project's product.
- **Performing organization.** The enterprise whose employees are most directly involved in doing the work of the project.
- **Project team members.** The group that is performing the work of the project.
- **Project management team.** The members of the project team who are directly involved in project management activities.
- **Sponsor.** The person or group that provides the financial resources, in cash or in kind, for the project.
- **Influencers.** People or groups that are not directly related to the acquisition or use of the project's product, but due to an individual's position in the customer organization or performing organization, can influence, positively or negatively, the course of the project.
- **PMO.** If it exists in the performing organization, the PMO can be a stakeholder if it has direct or indirect responsibility for the outcome of the project.

In addition to these key stakeholders, there are many different names and categories of project stakeholders, including internal and external, owners and investors, sellers 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 can overlap, such as when an engineering firm provides financing for a plant that it is designing.

Project managers must manage stakeholder expectations, which can be difficult because stakeholders often have very different or conflicting objectives. 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.

2.3

2.3.1

2.3.2

- 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.

2.3 Organizational Influences

Projects are typically part of an organization that is larger than the project. Examples of organizations include corporations, government agencies, healthcare institutions, international bodies, professional associations, and others. Even when the project is external (joint ventures, partnering), the project will still be influenced by the organization or organizations that initiated it. The maturity of the organization with respect to its project management system, culture, style, organizational structure and project management office can also influence the project. 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 under contract – architectural firms, engineering firms, consultants, construction contractors, and government contractors.
- Organizations that have adopted management by projects (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 often may lack 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 support them. The project management team should be aware of how its organization's structure and systems affect the project.

2.3.2 Organizational Cultures and Styles

Most organizations have developed unique and describable cultures. These cultures are reflected in numerous factors, including, but not limited to:

- Shared values, norms, beliefs, and expectations
- Policies and procedures
- View of authority relationships
- Work ethic and work hours.

Organizational cultures often have a direct influence on the project example:

- A team proposing an unusual or high-risk approach is more likely to get 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 available resources in a spectrum from functional to projectized, with a variety of structures in between. Figure 2-6 shows key project-related characteristics of major types of organizational structures.

Project Characteristics	Organization Structure	Matrix			Projectized
		Functional	Weak Matrix	Balanced Matrix	
Project Manager's Authority	Little or None	Limited	Low to Moderate	Moderate to High	High to Almost Total
Resource Availability	Little or None	Limited	Low to Moderate	Moderate to High	High to Almost Total
Who controls 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

Figure 2-6. Organizational Structure Influences on Projects

The classic functional organization, shown in Figure 2-7, 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. Engineering may be further subdivided into functional organizations that serve the business of the larger organization, such as mechanical and electrical. Functional organizations still have projects, but the scope of the project is usually limited to the boundaries of the function. The engineering department in a functional organization will do its project work independent of the manufacturing or marketing departments. When new product development is undertaken in a purely functional organization, the design phase, often called a design process, includes only engineering department staff. Then, when questions about manufacturing arise, they are passed up the organizational 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 functional manager.

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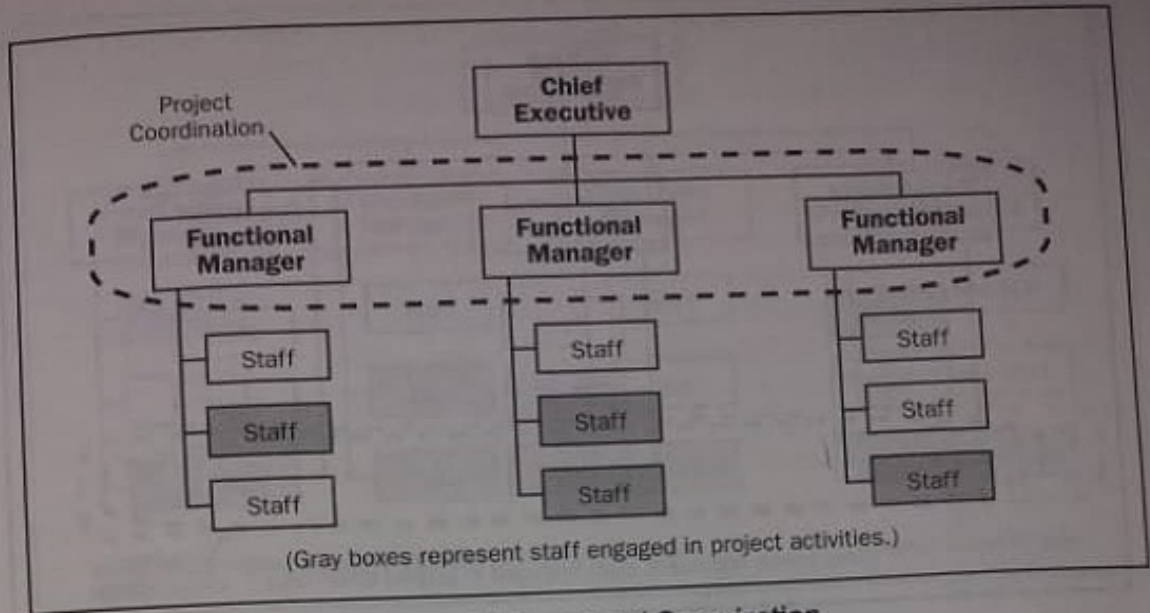


Figure 2-7. Functional Organization

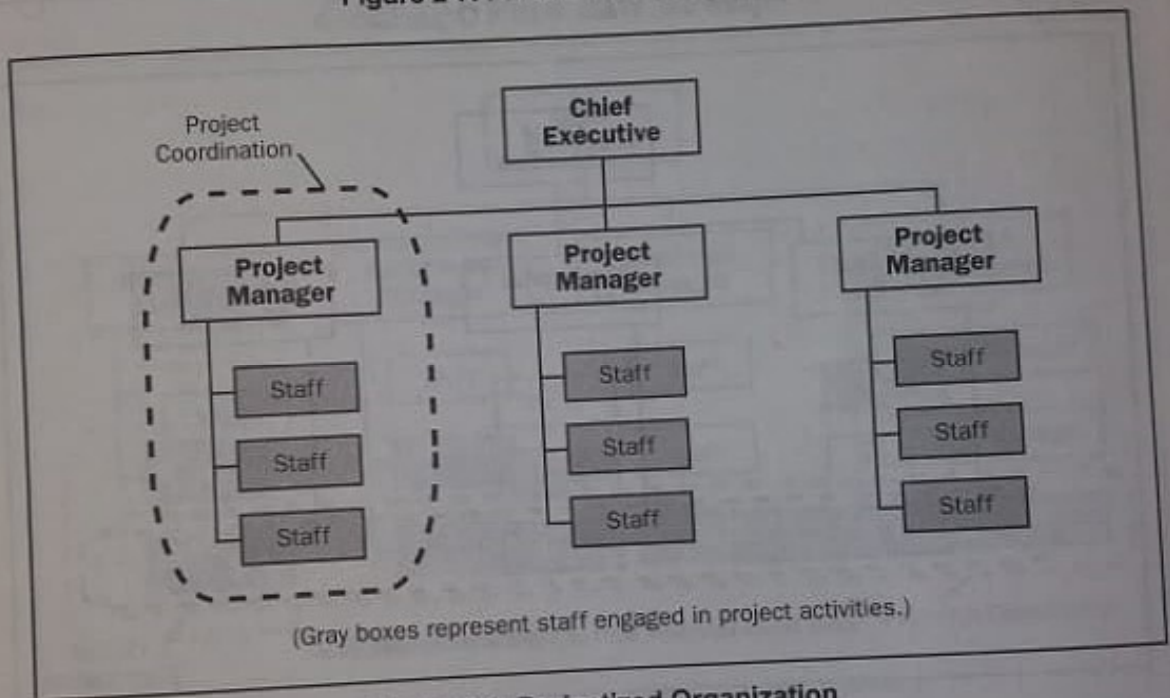


Figure 2-8. Projectized Organization

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.

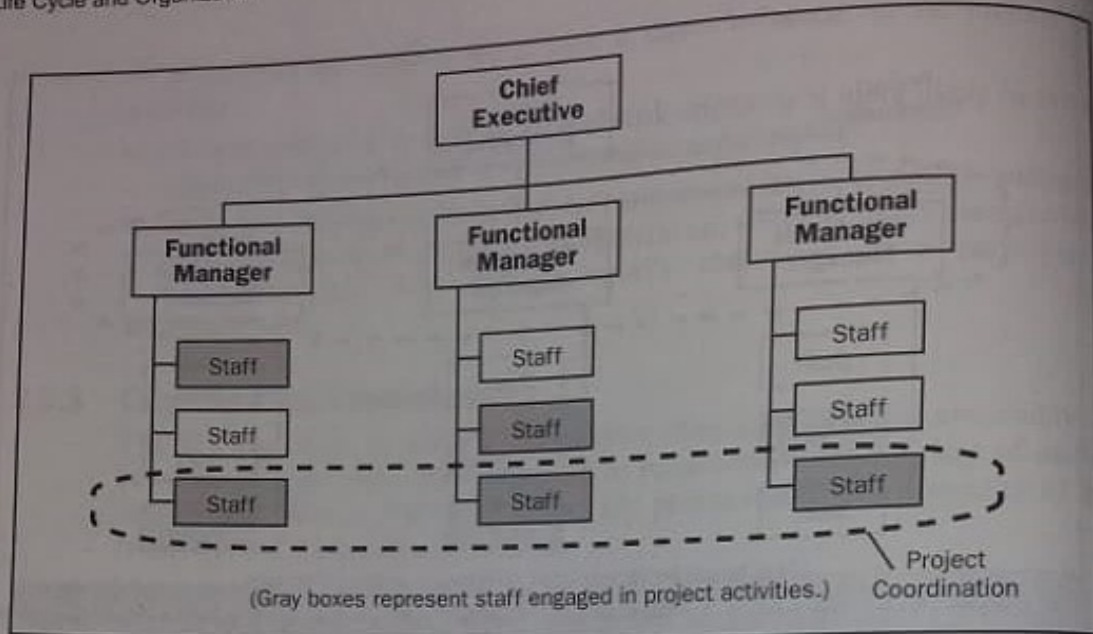


Figure 2-9. Weak Matrix Organization

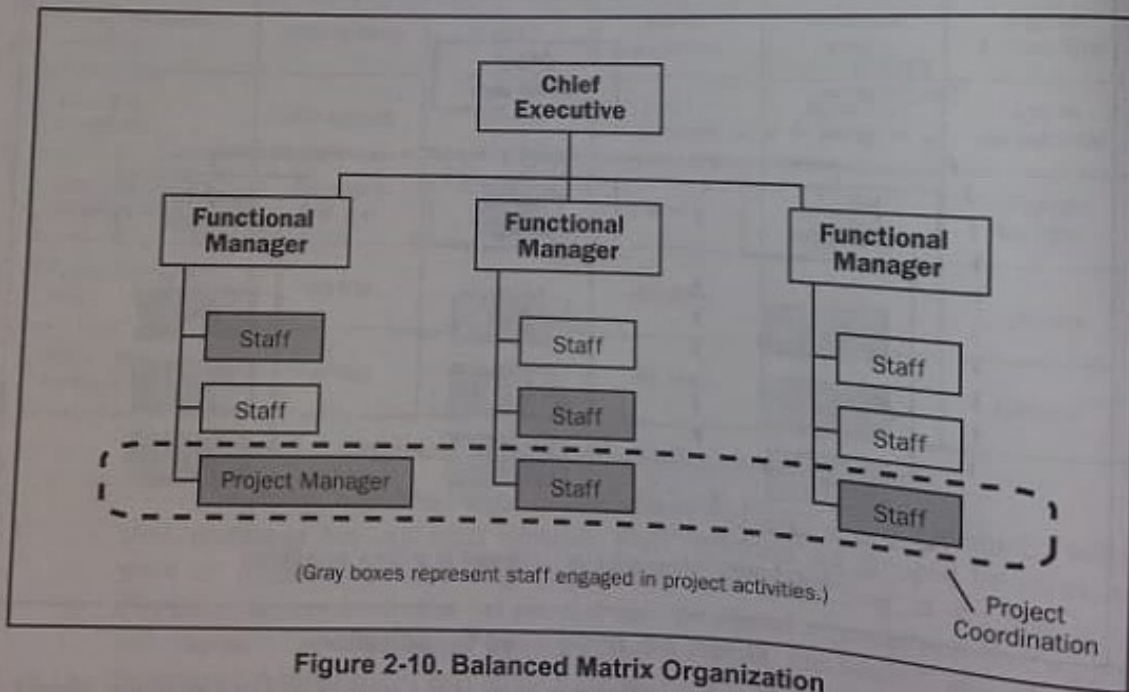


Figure 2-10. Balanced Matrix Organization

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 expeditor than that of a manager. In similar fashion, strong matrices have many of the characteristics of the projectized organization, and can 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 (Figure 2-6).

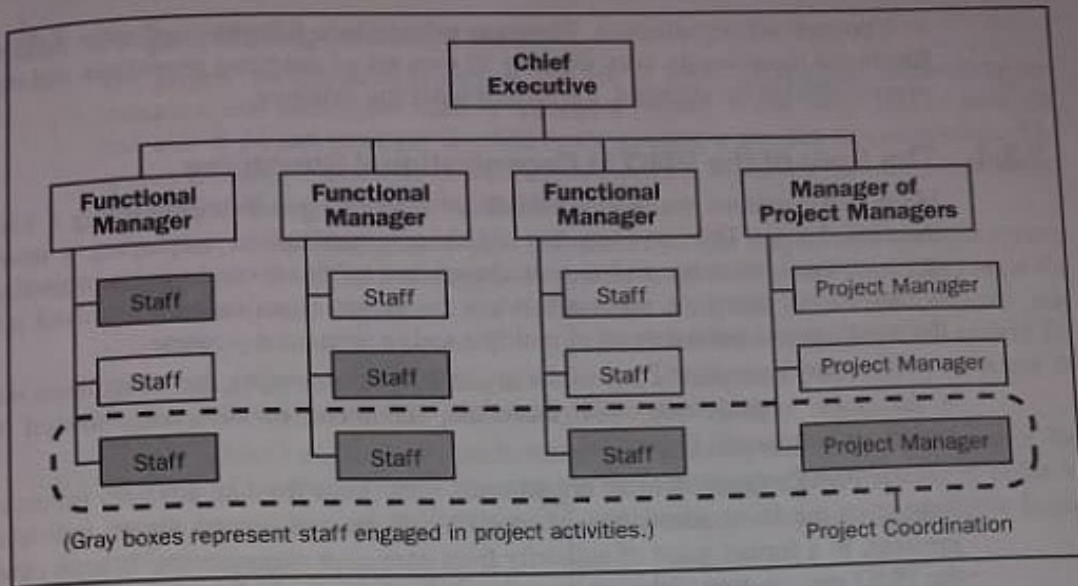


Figure 2-11. Strong Matrix Organization

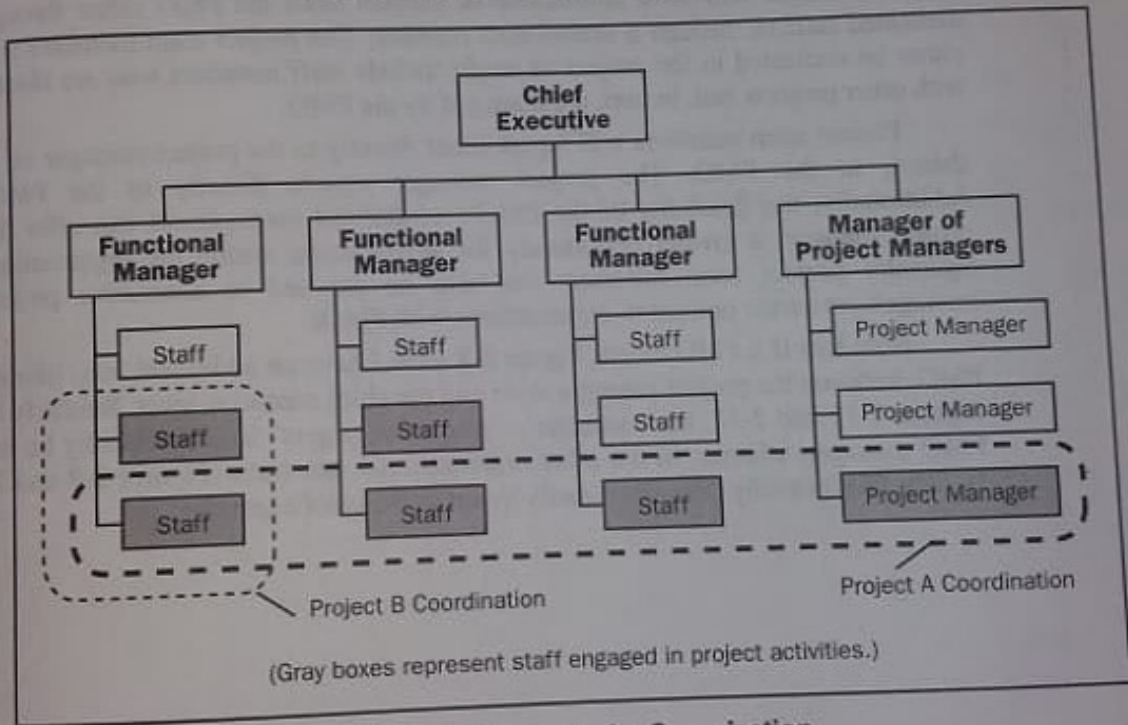


Figure 2-12. Composite Organization

Most modern organizations involve all these structures at various levels, as shown in Figure 2-12 (Composite Organization). 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 operate outside the standard, formalized reporting structure.

2.3.4 The Role of the PMO in Organizational Structures

Many organizations realize the benefit of developing and implementing a PMO (Section 1.6.4). This is often true of those organizations employing a matrix organizational structure, and almost always true of those employing a projectized organizational structure, especially when the parent organization is involved with the simultaneous management of multiple and/or sequential projects.

A PMO can exist in any of the organizational structures, including those with a functional organization, with increasing likelihood of occurrence toward the rightmost columns in Figure 2-6.

A PMO's function in an organization may range from an advisory influence, limited to the recommendation of specific policies and procedures on individual projects, to a formal grant of authority from executive management. In such cases, the PMO may, in turn, delegate its authority to the individual project manager. The project manager will have administrative support from the PMO either through dedicated staff or through a shared staff member. The project team members will either be dedicated to the project or might include staff members who are shared with other projects and, in turn, are managed by the PMO.

Project team members will report either directly to the project manager or, if shared, to the PMO. The project manager reports directly to the PMO. Additionally, the flexibility of the PMO's centralized management can offer the project manager a greater opportunity for advancement within the organization. Specialty project team members can also be exposed to alternative project management career options in organizations with PMOs.

Note that if a PMO exists, Figure 2-8 would have an additional box, labeled PMO, between the project manager layer and the chief executive layer. Similarly in Figures 2-11 and 2-12, the "manager of project managers" would normally be the PMO manager, whereas in the other organizational structures (Figures 2-9 and 2-10), the PMO usually does not directly report to the chief executive.