Project Management: A Systems Approach to Planning, Scheduling, and Controlling, Thirteenth Edition

by Harold Kerzner

Chapter 1: Overview

1.0 INTRODUCTION

In the United States, the roots of project management date back to the Department of Defense (DOD) and heavy construction companies during the 1960s. Early use of project management focused on the completion of unique, or sometimes repetitive, projects with a heavy focus on compliance to budgets and schedules. To maintain standardization and control in the way that projects were managed, DOD established policies and procedures for gate reviews and the way that status should be reported.

In the early years, project management was seen as a part-time job rather than as a career path position. In many companies, project management existed in only a small portion of the business, which made it difficult for some projects to get total company support.

Executives began realizing the complexities of resource control and effective project staffing. In addition, the rapid rate of change in both technology and the marketplace had created enormous strains on existing organizational forms. The traditional structure, which was highly bureaucratic, showed that it could not respond rapidly enough to a changing environment. Thus, the traditional structure was replaced by project management, or other temporary management structures, that were highly organic and could respond very rapidly as situations develop inside and outside the company. The organic nature of project management practices today allows project managers to customize the project management tools and processes to adapt to a variety of different environments.

The acceptance of project management was not easy. Many executives were not willing to accept change and were inflexible when it came to adapting to a different environment and flexible organizational structures. The project management approach required a departure from the traditional business organizational form, which was basically vertical and which emphasized a strong superior–subordinate relationship. Many executives had very strong beliefs as to how a company should be run and refused to recognize or admit that project management could benefit their company.

Unfavorable economic conditions forced executives to reconsider the value that project management could bring to a firm. Some of the unfavorable conditions included the recessions of the late 1970s and early 1990s, the housing crisis that began in 2008, the European economy downturn in 2013 and 2014, and the world economic slowdown in 2015. These unfavorable conditions emphasized the need for better control of existing resources, the creation of a portfolio of projects that would maximize the value brought to the firm, and a higher percentage of project successes. It soon became apparent that project management could satisfy all of these needs and that project management is a necessity in both bad and good economic conditions. Today, the concept behind project management is being applied in such diverse industries and organizations as defense, construction, pharmaceuticals, chemicals, banking, hospitals, accounting, advertising, law, state and local governments, and the United Nations.

Almost all of today's executives are convinced that project management can and does work well. Project management is now being applied to all facets of a business rather than just parts of the business. Projects are now being aligned with corporate or strategic objectives. Simply stated, “Why work on a project that is not aligned to strategic objectives with the goal of creating business value?” In some companies – such as IBM, Microsoft, and Hewlett-Packard – project management is recognized as a strategic competency necessary for the survival of the firm. This recognition of the importance of project management today permeates almost all industries and companies of all sizes.

1.1 UNDERSTANDING PROJECT MANAGEMENT

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Chapter 1 Introduction to the *PMBOK® Guide*

- 1.2.1 Projects
- 1.2.1 The Importance of Project Management
- 1.2.4.5 Project Management Process Groups

Standard for Project Management

- 2.3 Functions Associated with Projects

In order to understand project management, one must begin with the definition of a project. A project can be considered to be any series of activities and tasks that:

- Have a specific objective, with a focus on the creation of business value, to be completed within certain specifications
- Have defined start and end dates
- Have funding limits (if applicable)
- Consume human and nonhuman resources (i.e., money, people, equipment)
- Are multifunctional (i.e., cut across several functional lines)

The result or outcome of the project can be unique or repetitive, and must be achieved within a finite period of time. Because companies have very limited resources, care must be taken that the right mix of projects is approved. As such, another outcome of a project is that it provides business value to the company as opposed to being a “pet” project for the personal whims of one person.

Project management is the application of knowledge, skills, and tools necessary to achieve the project's requirements. The knowledge, skills, and tools are usually grouped into activities or processes. PMI®'s *PMBOK® Guide*, 6th edition, identified five process groups. Some of the activities within these groups included:

1. Project initiation
    - Selection of the best project given resource limits
    - Recognizing the benefits of the project
    - Preparation of the documents to sanction the project
    - Assigning of the project manager
2. Project planning
    - Definition of the work requirements
    - Definition of the quality and quantity of work
    - Definition of the resources needed
    - Scheduling the activities
    - Evaluation of the various risks
3. Project execution
    - Negotiating for the project team members
    - Directing and managing the work
    - Working with the team members to help them improve
4. Project monitoring and control
    - Tracking progress
    - Comparing actual outcome to predicted outcome
    - Analyzing variances and impacts
    - Making adjustments when necessary

5. Project closure
    - Verifying that all of the work has been accomplished
    - Contractual closure of the contract
    - Financial closure of the charge numbers
    - Administrative closure of the paperwork

Many companies viewed the five process groups as life-cycle phases and created a singular methodology that all projects were required to follow. Each process group had documentation requirements and performance measurements, and reporting was aligned to the process groups. This one-size-fits-all approach limited the flexibility that project teams needed to customize project management to the requirements of each project. In the 7th edition of the *PMBOK® Guide,* it is recommended that project teams be given the freedom to select their own approach for each project as well as the models, methods, and artifacts best suited for this project.

The 6th edition of the *PMBOK® Guide* focused on process groups and areas of knowledge, with an emphasis on the inputs, tools and outputs needed. In the 7th edition, the emphasis is on eight performance domain areas that are deemed critical for repetitive project success:

1. Stakeholders
2. Team
3. Development Approach and Life Cycle
4. Planning
5. Project Work
6. Delivery
7. Measurement
8. Uncertainty

Although each of the eight domains appears as independent, the domains overlap and interact with each other. The information within the domains can be customized for each project. The processes, tools, and techniques discussed in the 6th edition of the *PMBOK® Guide* direct the behavior that project managers should consider for the performance domains to be successfully implemented.

Successful project management, as seen from a corporate perspective, can be defined as achieving a continuous stream of project objectives within time, within cost, at the desired performance/technology level, while utilizing the assigned resources effectively and efficiently, and by providing customers and/or stakeholders with the benefits and value they expected. Because each project is inherently different and each customer can have different requirements, the activities included within the performance domains may change from project to project. The *PMBOK® Guide* identifies industry-accepted activity regarded as best practices for each performance domain and these best practices can be structured to create several project management delivery systems that can be applied and customized to a variety of projects.

The potential benefits from effective project management are:

- Clear identification of functional responsibilities to ensure that all activities are accounted for, regardless of personnel turnover
- Minimizing the need for continuous reporting
- Identification of time limits for scheduling
- Identification of a methodology for trade-off analysis
- Measurement of accomplishment against plans

- Early identification of problems so that corrective action may follow
- Improved estimating capability for future planning
- Knowing when objectives cannot be met or will be exceeded

Unfortunately, the benefits cannot be achieved without overcoming obstacles such as project complexity, customer's special requirements and scope changes, organizational restructuring, project risks, changes in technology, and forward planning and pricing.

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- 3.4 Project Management Competence

Standard for Project Management

- 3.2 Create a Collaborative Project Management Environment

Project management is designed to make better use of existing resources by getting work to flow horizontally as well as vertically within the company. This approach does not really destroy the vertical, bureaucratic flow of work but simply requires that line organizations talk to one another horizontally so that horizontal and vertical workflow will be accomplished more smoothly throughout the organization and in a concurrent manner. The vertical flow of work is still the responsibility of the line managers. The horizontal flow of work is the responsibility of the project managers, and their primary effort is to communicate and coordinate activities horizontally between the line organizations.

Figure 1–1 shows how many companies are structured. There are always “class or prestige” gaps between various levels of management. There are also functional gaps between working units of the organization. If we superimpose the management gaps on top of the functional gaps, we find that companies are made up of small operational islands that refuse to communicate with one another for fear that giving up information may strengthen their opponents. The project manager's responsibility is to get these islands to communicate cross-functionally toward common goals and objectives.

The project manager may require a difference set of skills when working with each of the islands. The *PMBOK® Guide* identifies a talent triangle composed of technical project management, leadership, and strategic and business management skills. In today's environment, strategic and business management skills are getting more attention because project managers are seen as managing part of a business rather than merely a project and, as such, are expected to make both project and business decisions.

The following is an overview definition of project management:

> Project management is the planning, organizing, directing, and controlling of company resources for a relatively short-term objective that has been established to complete specific goals and objectives. Furthermore, project management utilizes the systems approach to management by having functional personnel (the vertical hierarchy) assigned to a specific project (the horizontal hierarchy).

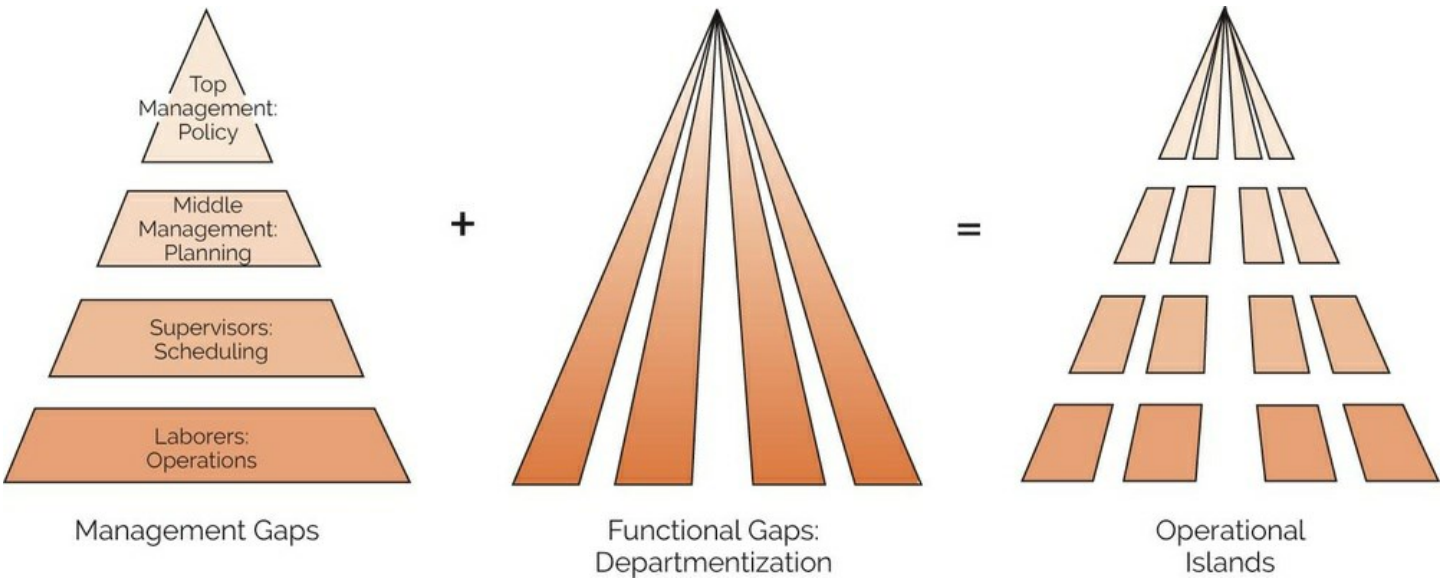

Figure 1–1: Organizational gaps.

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- 2.4 Organizational Systems

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- 3.5 Recognize, Evaluate and Respond to Systems Interactions

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- 2.6.2 Deliverables

The preceding definition requires further comment. Classical management is usually considered to have five functions or principles:

1. Planning
2. Organizing
3. Staffing
4. Controlling
5. Directing

You will notice that, in the definition, the staffing function has been omitted. This was intentional because the project manager does not staff the project. Staffing is a line responsibility. The project manager has the right to request specific resources, but the final decision of what resources will be committed rests with the line managers.

We should also comment on what is meant by a “relatively” short-term project. Not all industries have the same definition for a short-term project. In engineering, the project might be for 6 months or 2 years; in construction, 3–5 years; in nuclear components, 10 years; and in insurance, 2 weeks. Long-term projects, which consume resources full-time, are usually set up as a separate division (if large enough) or simply as a line organization.

Figure 1–2 is a pictorial representation of traditional project management the way it was understood in the past. The objective of the figure is to show that project management is designed to manage or control company resources on a given activity, within time, within cost, and within performance and other constraints. Time, cost, and performance were considered in the past as the only constraints on the project. If the project is to be accomplished for an outside customer, then the project had a fourth constraint: good customer relations. Customers can be internal or external to the parent organization. The reader should

immediately realize that it is possible to manage a project within time, cost, and performance and then also alienate the customer to such a degree that no further business will be forthcoming. Executives often select project managers based on who the customer is and what kind of customer relations will be necessary.

Figure 1–2: Overview of project management.

Projects exist to produce deliverables that create business value. The person ultimately assigned as the project manager may very well be assigned based on the size, nature, and scope of the deliverables. Deliverables are outputs, or the end result of either the completion of the project or the end of a life-cycle phase of the project. Deliverables are measurable, tangible outputs. Some outputs may have undergone several readjustments or may simply be suboptimal. With advances in measurement techniques, deliverables can also be intangible outcomes such as better governance or a more cooperative corporate culture. Deliverables can take such form as:

- *Hardware deliverables*. These are hardware items, such as a table, a prototype, or a piece of equipment.
- *Software deliverables*. These items are similar to hardware deliverables but are usually paper products, such as reports, studies, handouts, or documentation. Some companies do not differentiate between hardware and software deliverables.
- *Interim deliverables*. These items can be either hardware or software deliverables and progressively evolve as the project proceeds. An example might be a series of interim reports leading up to the final report.

From a project manager's perspective, the project may appear to be over once the deliverables are created and accepted by the business owner. However, the business benefits and business value of the deliverables may not be known until months or years later if the deliverables are products that are sold to consumers. Even though we focus on deliverables, it is the value that comes from the deliverables that is critical.

1.2 DEFINING PROJECT SUCCESS

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- 1.2.6.4 Project Success Measures

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- 2.6.2 Deliverables

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- 2.1 Creating Value

In the previous section, we defined project success as the completion of an activity within the constraints of time, cost, and performance. There are more than three constraints on projects, but for simplicity's sake, only these three constraints will be discussed. This was the definition used for the past 30 to 40 years or so. More recently, the definition of project success has been modified to include completion:

- Within the allocated time period
- Within the budgeted cost
- At the proper performance or specification level
- Within other competing constraints
- With acceptance by the customer/user
- With the desired business benefits and value
- With minimum or mutually agreed upon scope changes
- Without disturbing the main workflow of the organization
- Without changing the corporate culture

The last three elements require further explanation. Very few projects are completed within the original scope of the project. Scope changes are inevitable and have the potential to destroy not only the morale on a project, but the entire project. Scope changes *must* be held to a minimum and those that are required *must* be approved by both the project manager and the customer/user.

Project managers must be willing to manage (and make concessions/trade-offs, if necessary) such that the company's main workflow is not altered. Most project managers view themselves as self-employed entrepreneurs after project go-ahead and would like to divorce their project from the operations of the parent organization. This is not always possible. The project manager must be willing to manage within the guidelines, policies, procedures, rules, and directives of the parent organization.

All corporations have corporate cultures, and even though each project may be inherently different, the project manager should not expect his assigned personnel to deviate from cultural norms. Cultures may be based on established corporate values and beliefs. If the company has a standard of openness and honesty when dealing with customers, then this cultural value should remain in place for all projects, regardless of who the customer/user is or how strong the project manager's desire for success is.

Excellence in project management is defined as a continuous stream of successfully managed projects. Any project can be driven to success through formal authority and strong executive meddling. But for a continuous stream of successful projects to

occur, there must exist a strong corporate commitment to project management, and this commitment *must be visible*.

1.3 TRADE-OFFS AND COMPETING CONSTRAINTS

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- 2.3.4.2 Project
- 2.5.2 Balancing Competing Constraints

Although many projects are completed successfully, at least in the eyes of the stakeholders, the final criteria from which success is measured may be different from the initial criteria because of trade-offs. Trade-offs are situations where one aspect of a project may be sacrificed to gain an advantage with another aspect. As an example, additional time and money may be needed to make further improvements in the quality of the project's deliverables.

The first triangle shown in Figure 1–2 is referred to as the triple constraints on a project, namely time, cost, and performance, where performance can be scope, quality, or technology. These are considered to be the primary constraints and are often considered to be the criteria for a project against which success is measured.

Today, we realize that there can be multiple constraints on a project and, rather than use the terminology of the triple constraints, we focus our attention on competing constraints. Sometimes the constraints are referred to as primary and secondary constraints. There may be secondary factors such as risk, safety, customer relations, image, and reputation that may cause us to deviate from our original success criteria of time, cost, and performance. These changes can occur any time during the life of a project and can then cause trade-offs in the triple constraints, thus requiring that changes be made to the success criteria. In an ideal situation, we would perform trade-offs on any or all of the competing constraints such that acceptable success criteria would still be met.

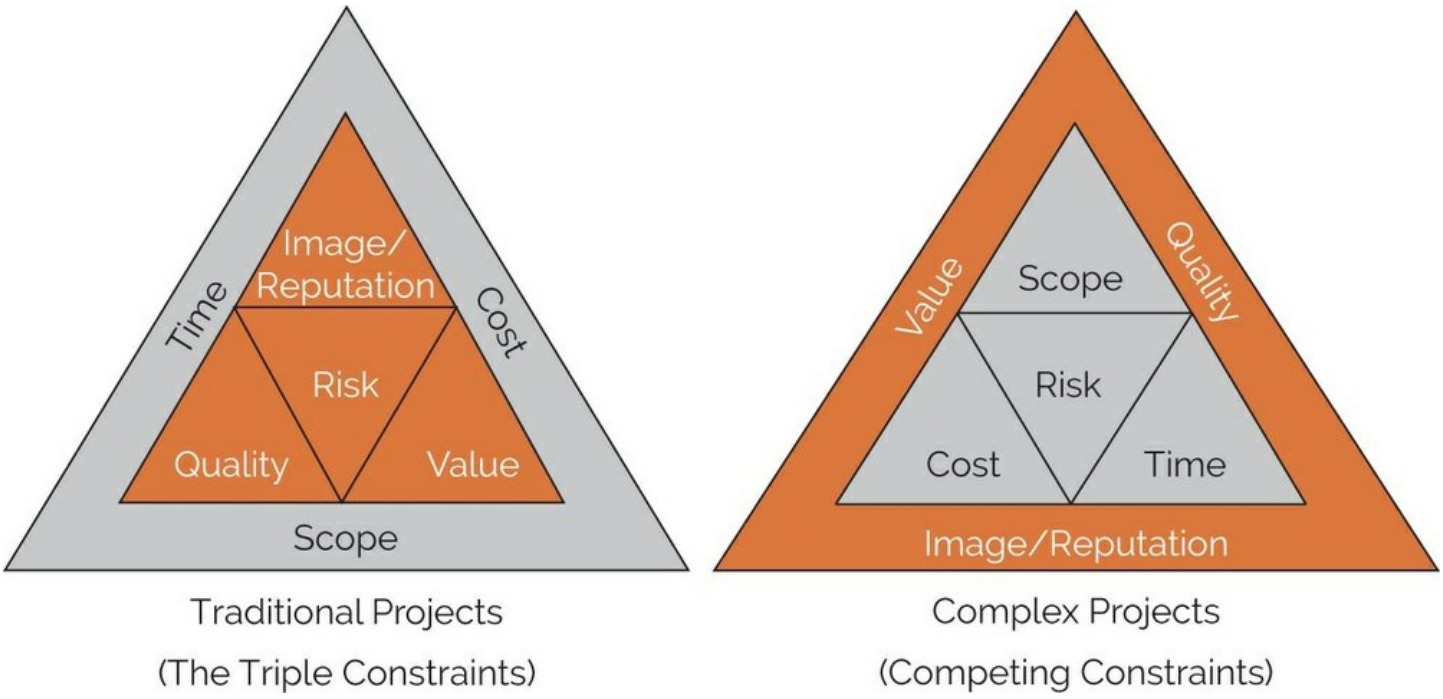

Figure 1–3: Competing constraints.

As an example, let's assume that a project was initiated using the success criteria of the triple constraints as shown in Figure 1–3. For simplicity's sake, a triangle was used for the competing constraints in Figure 1–3. However, there can be significantly more than three competing constraints in which some geometric shape other than a triangle might work best. Partway through the project, the environment changes, a new senior management team is brought in with their own agenda, or a corporate crisis occurs such that the credibility of the corporation is at stake. In such a case, the competing constraints shown on the right in Figure 1–3 can be more important than the original triple constraints.

Secondary factors are also considered to be constraints and may be more important than the primary constraints. For example, years ago, in Disneyland and Disney World, the project managers designing and building the attractions at the theme parks

had six constraints: time, cost, scope, safety, aesthetic value, and quality.

At Disney, the last three constraints of safety, aesthetic value, and quality were considered locked-in constraints that could not be altered during trade-offs. All trade-offs were made on time, cost, and scope. Some constraints simply cannot change while others may have flexibility.

Not all constraints are equal in importance. For example, in the initiation phase of a project, scope may be the critical factor and all trade-offs are made on time and cost. During the execution phase of the project, time and cost may become more important and then trade-offs will be made on scope. A more detailed discussion of trade-offs can be found in Chapter 16.

When managing a project according to the triple constraints of time, cost, and scope, we perform a juggling act and often find a way to meet all three constraints, each of which usually carries an equal degree of importance. When the number of constraints increases to five or six constraints, it may be difficult, if not impossible, to meet all of the constraints, and a prioritization of constraints may be necessary.

The prioritization of constraints can change over the life of the project based on the needs of the project manager, the client, and the stakeholders. Changing the priorities of the constraints can lead to scope changes and play havoc with the requirements and baselines. There must be a valid reason for changing the prioritization of the constraints after project go-ahead.

1.4 THE ENTRY-LEVEL PROJECT MANAGER

Too often, people desire a project management position without fully understanding what the job entails. Some people believe that they will be given a vast amount of authority, they will make any and all decisions on the project, they will have control of a small empire of workers whom they personally hired, and they will interface with executives within and outside of their firm.

In reality, project management may be a lot different than some believe. Most project managers have very little real authority. The real authority may rest with the project sponsor, governance personnel, and functional management. Some people argue that project management is actually leadership without authority.

Project managers may not have any say in staffing the project and may not even be able to fire poorly performing workers. Project staff is most commonly provided by the functional managers and only the functional managers can remove the workers. Project managers may have no input into the wage and salary program for the employees assigned to the project. Employees assigned to the project may be working on several other projects at the same time and the project manager may not be able to get these employees to satisfy his/her project's requirements in a timely manner. Project managers may not be allowed to communicate with personnel external to the company. This may be done by the internal project sponsor.

Today's project managers are expected to have at least a cursory understanding of the company's business model as well as the company's business processes that support project management. Project managers are now expected to make both project- and business-related decisions when necessary.

Some people believe that project managers make any and all decisions on a project. This is certainly not true. In today's high-technology environments, project managers cannot be experts in all areas. Their expertise may not be in any of the knowledge areas of the project. This is quite common when a project manager is asked to manage a technology-based project, as discussed in Section 1.5. They must therefore rely on the governance committee and team members for support in project decision-making.

The project manager may have no say or input on the imposed constraints or boundary conditions for the project. These factors may have been made by the client or the sales force during competitive bidding activities and the project manager is told that he/she must live with these conditions. It is not uncommon for the sales force to agree to unrealistic budgets and schedules just to win a contract and then tell the project manager, “This is all the time and money we could get from the client. Live with it.”

Finally, new project managers cannot take for granted that they fully understand the role of the participants. Because each project will be different, the roles of the players and the accompanying interface can change. This is discussed in Sections 1.7–1.11.

The characteristics of a project can change from company to company. It is important for the newly appointed or entry-level project managers to have a good understanding of what the job entails before accepting the position.

1.5 THE TALENT TRIANGLE

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- 3.4 Project Management Competencies

Each project is inherently different, thus possibly mandating a different set of competencies. PMI has introduced the Talent Triangle that represents the high-level skill set that global organizations consider important for project management practitioners. The Talent Triangle includes:

- Technical Project Management
- Leadership
- Strategic and Business Management

The components of the three skill areas can change between project, program, and portfolio management activities. Technical project management and leadership have been discussed briefly in this chapter and will be discussed in more depth throughout the book.

Strategic and business management is relatively new for many project managers. In some companies, the responsibility for strategic and business decisions rests solely with the project sponsor. In these situations, the project manager's primary role is to produce a deliverable and most often a technical deliverable. How the deliverable will be used and whether it provided value to the firm is determined by the project sponsor.

In today's world, project managers must be strategic and business oriented. Project managers today are managing more than just a project. They view themselves as managing part of a business rather than just a project and as such are expected to make project, technical, and business decisions. The tools that the project manager uses, specifically the project management methodologies, are embedded with business processes rather than merely pure project management processes.

The words *business value* could become the most important words in the project manager's vocabulary. The outcome of a project is no longer just a deliverable; rather, it is now focusing more on the creation of sustainable business value. Project success is now the creation of sustainable business value rather than merely meeting certain imposed constraints. All through this chapter we focused on the importance of value, and this trend is expected to increase.

1.6 TECHNOLOGY-BASED PROJECTS

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- 3.4.2 Technical Project Management Skills

Technology-based projects are often considered the most difficult projects to manage, especially for entry-level project managers. There is a high degree of complexity, innovation is required, the risks are most often greater than with traditional projects, and the solution requires experimentation, iterative approaches, and creativity. According to Hans Thamhain,[1]

> In our highly connected world, most project managers must deal with technology. They must function in a business environment that uses technology for competitive advantage, and their projects are heavily steeped in technology. Virtually every segment of industry and government tries to leverage technology to improve effectiveness, value, and speed. Traditional linear work processes and top-down controls are no longer sufficient, but are gradually being replaced by alternative organizational designs and new, more agile management techniques and business processes, such as concurrent engineering, design-build, stage-gate and user-centered design. These techniques offer more sophisticated capabilities for cross-functional integration, resource mobility, effectiveness, and market responsiveness, but they also require more sophisticated skills to effectively deal with a broad spectrum of contemporary challenges, both technically and socially, including higher levels of conflict, change, risks, uncertainty, and a shifting attention from functional efficiency to process integration effectiveness, emphasizing organizational interfaces, human factors, and the overall business process. Taken together, technology-intensive projects can be characterized as follows:

- Value creation by applying technology
- Strong need for innovation and creativity

- High task complexities, risk, and uncertainties
- Resource constraints and tight end-date-driven schedules despite tough performance requirements
- Highly educated and skilled personnel, broad skill spectrum
- Specific technical job knowledge and competency
- Need for sophisticated people skills, ability to work across different organizational cultures and values, and to deal with organizational conflict, power and politics
- Complex project organizations and cross-functional linkages
- Complex business processes and stakeholder communities
- Technology used as a tool for managing projects
- Replacement of labor with technology
- Advanced infrastructure
- High front-end expenditures early in the project life cycle
- Low short-term profitability in spite of large capital investment
- Fast-changing markets, technology, and regulations
- Intense global competition, open markets, and low barriers to entry
- Short product life cycles affect time to market
- Need for quick market response
- Complex decision-making processes
- Many alliances, joint ventures, and partnerships

[1]. Hans J. Thamhain, *Managing Technology-Based Projects* (Hoboken, NJ: John Wiley & Sons, 2014), p. 5.

1.7 THE PROJECT MANAGER–LINE MANAGER INTERFACE

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- 3.4 Project Management Competencies

Standard for Project Management

- 3.5 Recognize, Evaluate and Respond to Systems Interactions

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We have stated that the project manager must control company resources within time, cost, and performance. Most companies have six resources:

1. Money
2. Employees
3. Equipment
4. Facilities
5. Materials

6. Information/technology

Actually, the project manager does *not* control any of these resources directly, except perhaps money (i.e., the project budget).[2] Resources are controlled by the line managers, functional managers, or, as they are often called, resources managers. Project managers must, therefore, negotiate with line managers for all project resources. When we say that project managers control project resources, we really mean that they control those resources (which are temporarily loaned to them) *through line managers*.

Today, we have a new breed of project manager. Years ago, virtually all project managers were engineers with advanced degrees. These people had a command of technology rather than merely an understanding of technology. If the line manager believed that the project manager did in fact possess a command of technology, then the line manager would allow the assigned functional employees to take direction from the project manager. The result was that project managers were expected to manage people.

Most project managers today have an understanding of technology rather than a command of technology – with the exception of innovation projects, where the project manager may be the technical expert. As a result, the accountability for the success of the project is now viewed as shared accountability between the project manager and all affected line managers. With shared accountability, the line managers must now have a good understanding of project management, which is why more line managers are becoming PMP® credential holders. Project managers are now expected to focus more so on managing the project's deliverables rather than providing technical direction to the project team. Management of the assigned resources is more often than not a line function, but this can change based on the project.

Another important fact is that project managers are treated as though they are managing part of a business rather than simply a project, and as such are expected to make sound business decisions as well as project decisions. Project managers must understand business principles. In the future, project managers may be expected to become externally certified by PMI® and internally certified by their company on the organization's business processes.

In recent years, the rapid acceleration of technology has forced the project manager to become more business oriented.

It should become obvious at this point that successful project management is strongly dependent on:

- A good daily working relationship between the project manager and those line managers who directly assign resources to projects
- The ability of functional employees to report vertically to line managers at the same time that they report horizontally to one or more project managers
- The ability of the project manager to provide effective team leadership according to the *PMBOK® Guide*'s performance domains

These first two items become critical. In the first item, functional employees who are assigned to a project manager may still take technical direction from their line managers. Second, employees who report to multiple managers will always favor the manager who controls their purse strings. Thus, most project managers appear always to be at the mercy of the line managers.

If we take a close look at project management, the project manager actually works for the line managers, not vice versa. Many executives do not realize this. They have a tendency to put a halo around the head of the project manager and give him a bonus at project completion when, in fact, the credit should be shared with the line managers, who are continually pressured to make better use of their resources while meeting the project's constraints. The project manager is simply the agent through whom this is accomplished. So why do some companies glorify the project management position?

When the project management–line management relationship begins to deteriorate, the project almost always suffers. Executives must promote a good working relationship between line and project management. One of the most common ways of destroying this relationship is by asking, “Who contributes to profits – the line or project manager?” Project managers feel that they control all project profits because they control the budget. The line managers, on the other hand, argue that they must staff with appropriately budgeted-for personnel, supply the resources at the desired time, and supervise performance. Actually, both the vertical and horizontal lines contribute to profits. These types of conflicts can destroy the entire project management system.

Effective project management requires an understanding of quantitative tools and techniques, organizational structures, and organizational behavior.

Most people understand the quantitative tools for planning, scheduling, and controlling work. It is imperative that project

managers understand totally the operations of each line organization. In addition, project managers must understand their own job description, especially where their authority begins and ends.

Organizational behavior is important because the functional employees at the interface position find themselves reporting to more than one boss – a line manager and one project manager for each project they are assigned to. Executives must provide proper training so functional employees can report effectively to multiple managers.

[2]. Here we are assuming that the line manager and project manager are not the same individual. However, the terms *line manager* and *functional manager* are used interchangeably throughout the text.

1.8 DEFINING THE PROJECT MANAGER'S ROLE

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- 2.4.3 Organizational Governance Frameworks
- Chapter 3 Role of the Project Management
- Chapter 4 Project Integration Management

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- 2.4 The Project Environment
- 2.4.1 Internal Environment
- The project manager is responsible for coordinating and integrating activities across multiple, functional lines. The integration activities performed by the project manager include:
  - Integrating the activities necessary to develop a project plan
  - Integrating the activities necessary to execute the plan
  - Integrating the activities necessary to make changes to the plan

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- Chapter 4 Integration Management

These integrative responsibilities are shown in Figure 1–4 where the project manager must convert the inputs (i.e., resources) into outputs of products, services, and ultimately business value and profits. In order to do this, the project manager needs strong communicative and interpersonal skills, must become familiar with the operations of each line organization, and must have knowledge of the technology being used.

An executive with a computer manufacturer stated that his company was looking externally for project managers. When asked if he expected candidates to have a command of computer technology, the executive remarked, “You give me an individual who has good communicative skills and interpersonal skills, and I'll give that individual a job. I can teach people the technology and give them technical experts to assist them in decision-making. But I cannot teach somebody how to work with people.”

The project manager's job is not an easy one. Project managers may have increasing responsibility, but very little authority. This lack of authority can force them to “negotiate” with upper-level management as well as functional management for control of company resources. They may often be treated as outsiders by the formal organization.

In the project environment, everything seems to revolve about the project manager.

Although the project organization is a specialized, task-oriented entity, it cannot exist apart from the traditional structure of the organization. The project manager, therefore, must walk the fence between the two organizations. The term *interface management* is often used for this role, which can be described as managing relationships:

- Within the project team

- Between the project team and the functional organizations
- Between the project team and senior management
- Between the project team and the customer's organization, whether an internal or external organization
- Between the team and active stakeholders

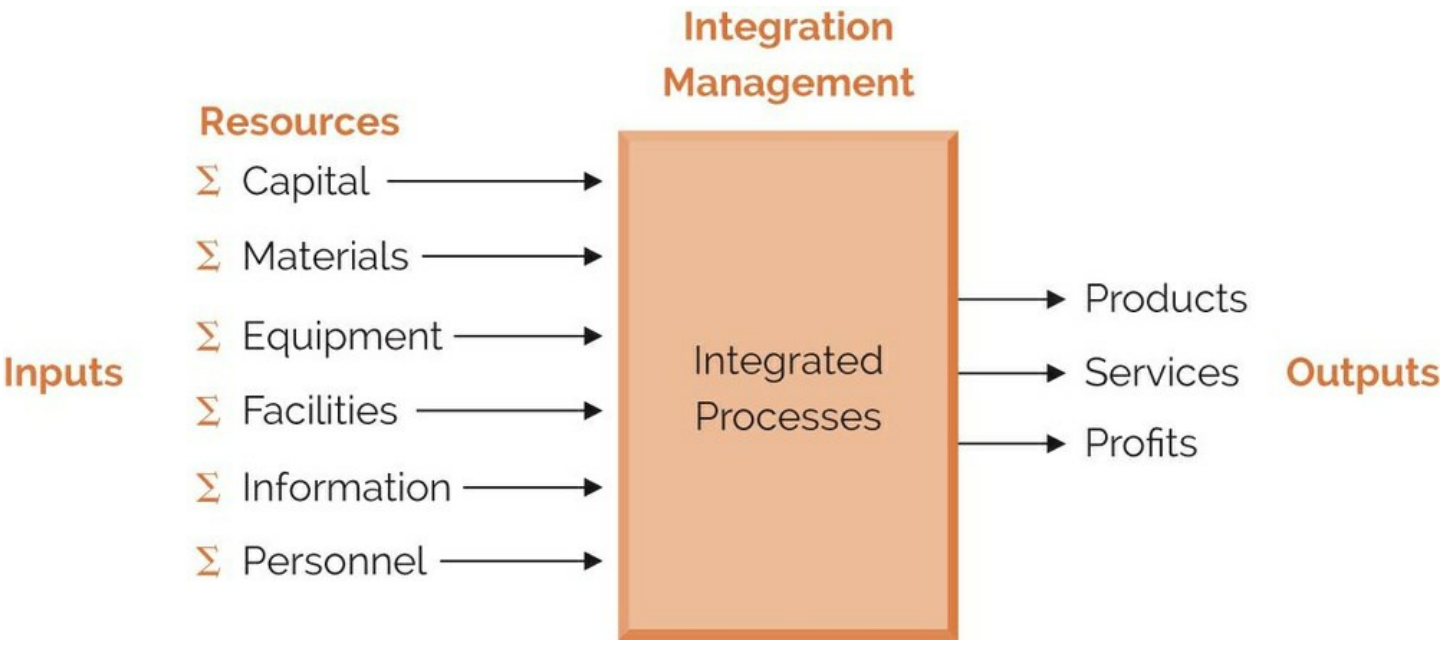

Figure 1–4: Integration management.

The project manager is actually a general manager and gets to know the total operation of the company. In fact, project managers get to know more about the total operation of a company than most executives. That is why project management is often used as a training ground to prepare future general managers who will be capable of filling top management positions.

1.9 DEFINING THE FUNCTIONAL MANAGER'S ROLE

***PMBOK® Guide*, 6th Edition**

- Chapter 9 Project Resources Management
- 9.3 Acquire Resources

Assuming that the project and functional managers are not the same person, we can identify a specific role for the functional manager. There are three elements to this role:

1. The functional manager has the responsibility to define *how* the task will be done and *where* the task will be done (i.e., the technical criteria).
2. The functional manager has the responsibility to provide sufficient resources to accomplish the objective within the project's constraints (i.e., *who* will get the job done).
3. The functional manager has or may share the responsibility for the deliverable.

In other words, once the project manager identifies the requirements for the project (i.e., what work has to be done and the constraints), it becomes the line manager's responsibility to identify the technical criteria. Except perhaps in R&D efforts, the line manager should be the recognized technical expert. If the line manager believes that certain technical portions of the project manager's requirements are unsound, then the line manager has the right, by virtue of his/her expertise, to take exception and plead his/her case to a higher authority.

In Section 1.1 we stated that all resources (including personnel) are controlled by the line manager. The project manager has

the right to request specific staff, but the final appointments rest with line managers. It helps if project managers understand the line manager's problems:

- Unlimited work requests (especially during competitive bidding)
- Predetermined deadlines
- All requests having a high priority
- Limited number of resources
- Limited availability of resources
- Unscheduled changes in the project plan
- Unpredicted lack of progress
- Unplanned absence of resources
- Unplanned breakdown of resources
- Unplanned loss of resources
- Unplanned turnover of personnel

Only in a very few industries will the line manager be able to identify to the project manager in advance exactly what resources will be available when the project is scheduled to begin, especially if the project is based on assumptions that can change. It is not important for the project manager to have the best available resources if average resources can perform the activities. Functional managers should not commit to certain people's availability. Rather, the functional manager should commit to achieving his/her portion of the deliverables within time, cost, and performance even if he/she has to use average or below-average personnel. If the project manager is unhappy with the assigned functional resources, then the project manager should closely track that portion of the project. Only if and when the project manager is convinced by the evidence that the assigned resources are unacceptable should the line manager be approached with a demand for better resources.

The fact that a project manager is assigned does not relieve the line manager of his functional responsibility to perform. If a functional manager assigns resources such that the constraints are not met, then *both* the project and functional managers will be blamed. Some companies are even considering evaluating line managers for merit increases and promotion based on how often they have lived up to their commitments to the project managers.

Therefore, it is extremely valuable to everyone concerned to have all project commitments *made visible to all*.

Project management is designed to have shared authority and responsibility between the project and line managers. Project managers plan, monitor, and control the project, whereas functional managers perform the work. Table 1–1 shows this shared responsibility. The one exception to Table 1–1 occurs when the project and line managers are the same person. This situation, which happens more often than not, creates a conflict of interest. If line managers must assign resources to six projects, one of which is under the line manager's direct control, they might save the best resources for their own project. In this case, a project–line manager's project will be a success at the expense of all of the other projects.

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- 2.4.4 Organizational Structure Types

Standard for Project Management

- 3.2 Create a Collaborative Project Team Environment

Table 1–1: DUAL RESPONSIBILITY

Topic	**Responsibility**	
	Project Manager	**Line Manager**
Rewards	Give recommendation: Informal	Provide rewards: Formal
Direction	Milestone (summary)	Detailed

Table 1–1: DUAL RESPONSIBILITY

Topic	Responsibility	
	Project Manager	Line Manager
Evaluation	Summary	Detailed
Measurement	Summary	Detailed
Control	Summary	Detailed

Table 1–2: REPORTING RELATIONSHIPS

Type of Project Manager	Type of Matrix Structure *	Project Manager (PM)/Line Manager (LM)/Employee Relationship			
		PM Negotiates For	Employees Take Technical Direction From	PM Receives Functional Progress From	Employee Performance Evaluations Made By
Lightweight	Weak	Deliverables	LMs	Primarily LMs	LMs only with no input from PM
Heavyweight	Strong	People who report informally to PM but formally to LMs	PM and LMs	Assigned employees who report to LMs	LMs with input from PM
Tiger teams	Very strong	People who report entirely to PM full-time for duration of project	PM only	Assigned employees who now report directly to PM	PM only
* The types of organizational structures are discussed in Chapter 3.					

The exact relationship between project and line managers is of paramount importance in project management where multiple-boss reporting prevails. Table 1–2 shows that the relationship between project and line managers is not always in balance and thus, of course, has a bearing on who exerts more influence over the assigned functional employees.

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- 2.4.4 Organizational Structure Types

1.10 DEFINING THE FUNCTIONAL EMPLOYEE'S ROLE

***PMBOK® Guide*, 7th Edition**

- 2.2 Team Performance Domain

Once the line managers commit to the deliverables, it is the responsibility of the assigned functional employees to achieve the functional deliverables.

In most organizations, the assigned employees report on a “solid” line to their functional manager, even though they may be working on several projects simultaneously. The employees are usually a “dotted” line to the project but solid to their function. This places the employees in the often awkward position of reporting to multiple individuals. This situation is further complicated when the project manager has more technical knowledge than the line manager. This occurs during R&D projects.

The functional employee is expected to accomplish the following activities when assigned to projects:

- Accept responsibility for accomplishing the assigned deliverables within the project's constraints.
- Complete the work at the earliest possible time.
- Periodically inform both the project and line manager of the project's status.
- Bring problems to the surface quickly for resolution.
- Share information with the rest of the project team.

The concept of multiple boss reporting often places the project team members in a position of having to decide where their loyalties should be directed. This creates a challenge for the project manager. As stated by Roeder,[3]

- In some cases, the team members may protect each other at the expense of the larger mission. It is important to build

team relationships. The team will be more effective when members bond together and develop a sense that they do not want to let down the group. When this leads to behaviors, however, that shield the team from reality or that keep the facts from being reported to the project manager, it is an indication that the team is dysfunctional. Since the team was put in place to achieve the mission, this is a scenario likely to lead to a failed project. The project manager should take actions to maintain the team's bonds while simultaneously reminding the team that there is a larger goal that must be achieved.

As will be discussed in Chapter 5, team members often favor the organization that performs their functional performance reviews, which usually rests with the functional managers rather than project managers. However, functional managers may ask the project managers for input even though the functional managers make the final decision on performance reviews.

[3]. Tres Roeder, *Managing Project Stakeholders,* (Hoboken, NJ: John Wiley, 2013), p. 67.

1.11 DEFINING THE EXECUTIVE'S ROLE

***PMBOK® Guide*, 6th Edition**

- 2.4.2 Organizational Governance Frameworks

Standard for Project Management

- 2.2 Organizational Governance Systems

In a project environment there are new and ever-changing expectations of and for the executives, as well as a new interfacing role.[4] Executives are expected to interface a project as follows:

- In project planning and objective setting
- In conflict resolution
- In priority setting
- As project sponsor[5]

Executives are expected to interface with projects very closely at project initiation and planning, but to remain at a distance during execution unless needed for priority setting and conflict resolution. One reason why executives “meddle” during project execution is that they are not getting accurate information from the project manager about project status. If project managers provide executives with meaningful status reports, then the so-called meddling may be reduced or even eliminated.

[4]. The expectations are discussed in Section 9.3.

[5]. The role of the project sponsor is discussed in Section 10.1.

1.12 WORKING WITH EXECUTIVES

Standard for Project Management

- 2.2 Organizational Governance Systems

Success in project management is like a three-legged stool. The first leg is the project manager, the second leg is the line manager, and the third leg is senior management. If any of the three legs fail, the stool will topple.

The critical node in project management is the project manager–line manager interface. At this interface, the project and line managers must view each other as equals and be willing to share authority, responsibility, and accountability. In excellently managed companies, project managers do not negotiate for resources but simply ask for the line manager's commitment to executing his portion of the work within time, cost, and performance. Therefore, it should not matter who the line manager assigns as long as the line manager lives up to his commitments.

Since the project and line managers are “equals,” senior management involvement is necessary to provide advice and guidance to the project manager, as well as to provide encouragement to the line managers to keep their promises. When

executives act in this capacity, they assume the role of project sponsors, as shown in Figure 1–5,[6] which also shows that sponsorship need not always be at the executive levels. The exact person appointed as the project sponsor is based on the dollar value of the project, the priority of the project, and who the customer is.

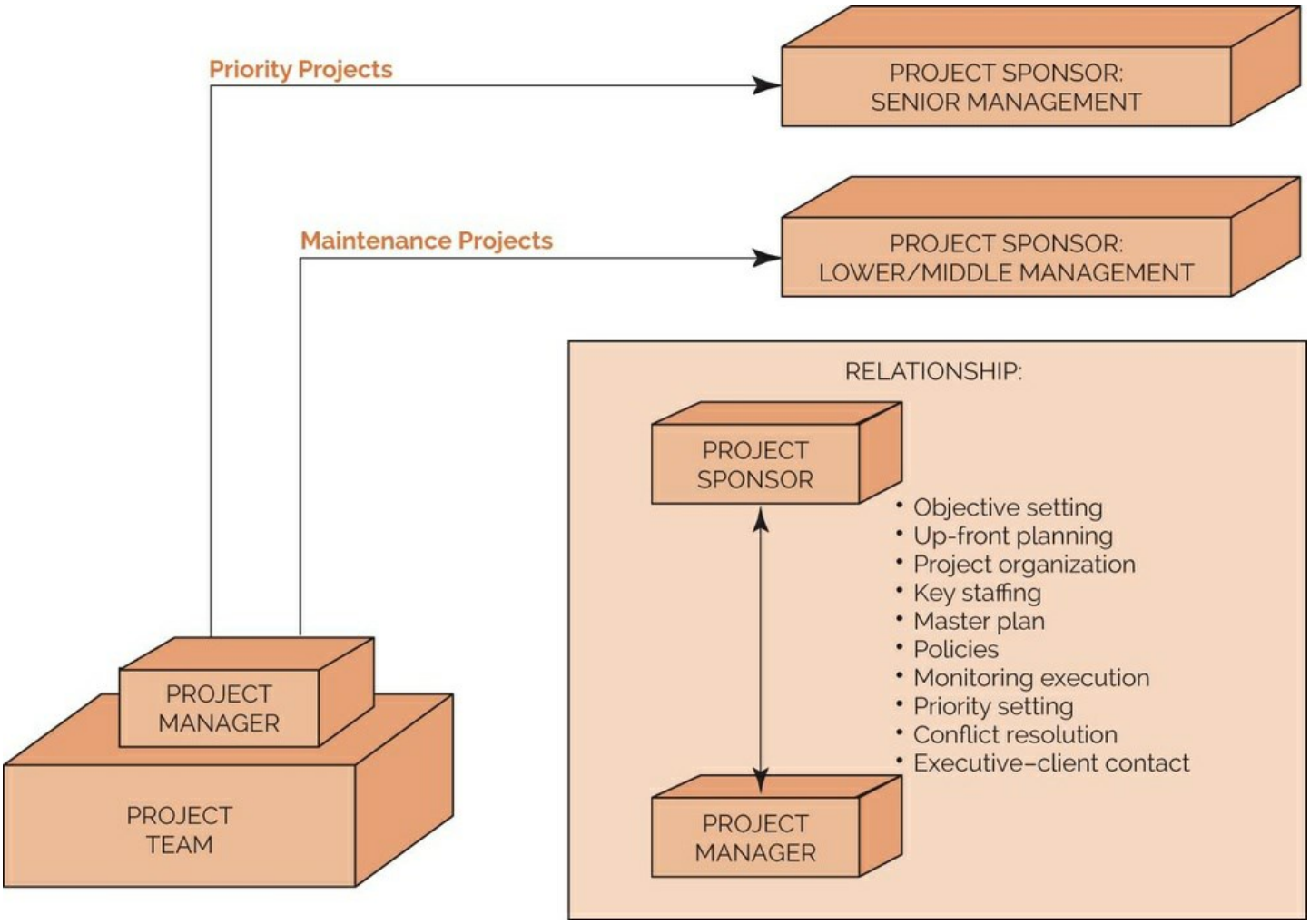

Figure 1–5: The project sponsor interface.

The ultimate objective of the project sponsor is to provide behind-the-scenes assistance to project personnel for projects both "internal" to the company, as well as "external," as shown in Figure 1–5. Projects can still be successful without this commitment and support, as long as all work flows smoothly. But in time of crisis, having a "big brother" available as a possible sounding board will surely help.

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- 2.4.2 Organizational Governance Frameworks

When an executive is required to act as a project sponsor, then the executive has the responsibility to make effective and timely project decisions. To accomplish this, the executive needs timely, accurate, and complete data for such decisions. Keeping management informed serves this purpose, while the all-too-common practice of *stonewalling* prevents an executive from making effective project decisions.

It is not necessary for project sponsorship to remain exclusively at the executive levels. As companies mature in their understanding and implementation of project management, project sponsorship may be pushed down to middle-level management. Committee sponsorship is also possible.

[6]. Section 10.1 describes the role of the project sponsor in more depth.

1.13 COMMITTEE SPONSORSHIP/GOVERNANCE

Standard for Project Management

- 2.2 Organizational Governance Systems

All projects have the potential of getting into trouble but, in general, project management can work well as long as the project's requirements do not impose severe pressure on the project manager and a project sponsor exists as an ally to assist the project manager when trouble does appear.

Project problems requiring executive-level support may not be able to be resolved, at least easily and in a timely manner, by a single project sponsor. These problems can be resolved using effective project governance which may include members of the board of directors. Project governance is actually a framework by which decisions are made. Governance relates to decisions that define expectations, accountability, responsibility, the granting of power, evaluating legal implications, or verifying performance. Governance relates to consistent management, cohesive policies, and processes and decision-making rights for a given area of responsibility. Governance enables efficient and effective decision-making to take place.

Every project can have different governance even if each project uses the same enterprise project management methodology. The governance function can operate as a separate process or as part of project management leadership. Governance is designed not to replace project decision-making but to prevent undesirable decisions from being made.

Historically, governance was provided by a single project sponsor. Today, governance is a committee and can include representatives from each stakeholder's organization. Table 1–3 shows various governance approaches based on the type of project team. The membership of the committee can change from project to project and industry to industry. The membership may also vary based on the number of stakeholders and whether the project is for an internal or external client. On long-term projects, membership can change throughout the project.

Table 1–3: TYPES OF PROJECT GOVERNANCE

Structure	Description	Governance
Dispersed locally	Team members can be full- or part-time. They are still attached administratively to their functional area.	Usually a single person is acting as the sponsor but may be an internal committee based on the project's complexity.
Dispersed geographically	This is a virtual team. The project manager may never see some of the team members. Team members can be full- or part-time.	Usually governance by committee and can include stakeholder membership.
Colocated	All of the team members are physically located in close proximity to the project manager. The project manager does not have any responsibility for wage and salary administration.	Usually a single person acting as the sponsor.
Projectized	This is similar to a colocated team, but the project manager generally functions as a line manager and may have wage and salary responsibilities.	May be governance by committee based on the size of the project and the number of strategic partners.

Governance on projects and programs sometimes fails because people confuse project governance with corporate governance. The result is that members of the committee are not sure what their role should be. Some of the major differences include:

- *Alignment*. Corporate governance focuses on how well the portfolio of projects is aligned to and satisfies overall business objectives. Project governance focuses on ways to keep a project on track.
- *Direction*. Corporate governance provides strategic direction with a focus on how project success will satisfy corporate objectives. Project governance is more operation direction with decisions based on the predefined parameters on project scope, time, cost, and functionality.
- *Dashboards*. Corporate governance dashboards are based on financial, marketing, and sales metrics. Project governance dashboards have operations metrics on time, cost, scope, quality, action items, risks, and deliverables.
- *Membership*. Corporate governance committees are composed of the senior-most levels of management. Project government membership may include some membership from middle management.

Another reason why failure may occur is when members of the project or program governance group do not understand project or program management. This can lead to micromanagement by the governance committee. There is always the question of what decisions must be made by the governance committee and what decisions the project manager can make. In general, the project manager should have the authority for decisions related to actions necessary to maintain the baselines. Governance

committees must have the authority to approve scope changes above a certain dollar value and to make decisions necessary to align the project to corporate objectives and strategy.

Corporate governance is more than just assisting project managers with the daily decisions needed to produce successful outcomes. It can also include dealing with ethical issues, corporate social responsibility, stakeholder management, and shareholder pressure.

We assume that governance personnel, especially those at the senior levels of management, will always make decisions in the best interest of the company. This is not always the case, especially when governance personnel have hidden agendas that focus on their own best interest. Executives hire into companies with compensation contracts that are usually aligned to the company stock price. If yearly bonuses are aligned to the year-end stock price, governance personnel might pressure the project team to compress the time-to-market for a product that may not be ready for launch and to expose the company to product liability lawsuits. Short-term thinking then dominates long-term expected business value and benefits.

Sometimes, governance personnel must make decisions that provide some degree of protection that the financiers expect to receive for the capital they are providing. This may include members of the board of directors that are shareholders as well as representation from pension and mutual funds that possess a significant amount of equity in the company. Pension and mutual funds with large equity positions often have seats on the board of directors and assist in governance, monitoring performance and decision-making on selected projects.

Appeasing everyone, including investors and shareholders, is not easy during project selection and execution. Some people might prefer short-term profits resulting from low-risk projects that can be completed quickly rather than long-term and larger profits accompanied by higher risks that are associated with the best project that may take years to come to fruition.

1.14 THE PROJECT MANAGER AS THE PLANNING AGENT

***PMBOK® Guide*, 6th Edition**

- Chapter 9 Project Resource Management

The major responsibility of the project manager is planning. If project planning is performed correctly, then it is conceivable that the project manager will work himself out of a job because the project can run itself. This rarely happens, however. Few projects are ever completed without some conflict or trade-offs for the project manager to resolve.

In most cases, the project manager provides overall or summary definitions of the work to be accomplished, but the line managers (the true experts) do the detailed planning. Although project managers cannot control or assign line resources, they must make sure that the resources are adequate and scheduled to satisfy the needs of the project, not vice versa. As the architect of the project plan, the project manager must provide:

- Complete task definitions
- Resource requirement definitions (possibly skill levels)
- Major timetable milestones
- Definition of end-item quality and reliability requirements
- The basis for performance measurement
- Definition of project success

These factors, if properly established, result in:

- Assurance that functional units will understand their total responsibilities toward achieving project needs
- Assurance that problems resulting from scheduling and allocation of critical resources are known beforehand
- Early identification of problems that may jeopardize successful project completion so that effective corrective action and replanning can be taken to prevent or resolve the problems

Project managers are responsible for project administration and, therefore, must have the right to establish their own policies, procedures, rules, guidelines, and directives – provided these policies, guidelines, and so on conform to overall company

policy. Companies with mature project management structures usually have rather loose company guidelines, so project managers have some degree of flexibility in how to control their projects.

Establishing project administrative requirements is part of project planning. Executives must either work with the project managers at project initiation or act as resources later. Improper project administrative planning can create a situation that requires:

- A continuous revision and/or establishment of company and/or project policies, procedures, and directives
- A continuous shifting in organizational responsibility and possible unnecessary restructuring
- A need for staff to acquire new knowledge and skills

If these situations occur simultaneously on several projects, there can be confusion throughout the organization.

1.15 PROJECT CHAMPIONS

Corporations encourage employees to think up new ideas that, if approved by the corporation, will generate monetary and nonmonetary rewards for the idea generator. One such reward is naming the individual the *project champion*. Unfortunately, the project champion often becomes the project manager, and, although the idea was technically sound, the project fails.

Table 1–4 provides a comparison between project managers and project champions. It shows that the project champions may become so attached to the technical side of the project that they become derelict in their administrative responsibilities. Perhaps the project champion might function best as a project engineer rather than the project manager.

This comparison does not mean that technically oriented project managers-champions will fail. Rather, it implies that the selection of the “proper” project manager should be based on *all* facets of the project.

Table 1–4: PROJECT MANAGER VERSUS PROJECT CHAMPIONS

Project Managers	**Project Champions**
• Prefer to work in groups	• Prefer working individually
• Committed to their managerial and technical responsibilities	• Committed to technology
• Committed to the corporation	• Committed to the profession
• Seek to achieve the objective	• Seek to exceed the objective
• Are willing to take risks	• Are unwilling to take risks; try to test everything
• Seek what is possible	• Seek perfection
• Think in terms of short time spans	• Think in terms of long time spans
• Manage people	• Manage things
• Are committed to and pursue material values	• Are committed to and pursue intellectual values

1.16 PROJECT-DRIVEN VERSUS NON–PROJECT-DRIVEN ORGANIZATIONS

***PMBOK® Guide*, 6th Edition**

- 2.4.1 Organizational Systems Overview

On the micro level, virtually all organizations are either marketing-, engineering-, or manufacturing-driven. But on the macro level, organizations are either project- or non–project-driven. The *PMBOK® Guide* uses the terms *project-based* and *non–project-based,* whereas in this text the terms *project-driven* and *non–project-driven* or *operational-driven* are used. In a project-driven organization, such as construction or aerospace, all work is characterized through projects, with each project as a separate cost center having its own profit-and-loss statement. The total profit to the corporation is simply the summation of the profits on all projects. In a project-driven organization, everything centers on the projects.

In the non–project-driven organization, such as low-technology manufacturing, profit and loss are measured on vertical or functional lines. In this type of organization, projects exist merely to support the product lines or functional lines. Priority resources are assigned to the revenue-producing functional line activities rather than the projects. Project management in a non–project-driven organization is generally more difficult for these reasons:

- Projects may be few and far between.
- Not all projects have the same project management requirements, and therefore they cannot be managed identically. This difficulty results from poor understanding of project management and a reluctance of companies to invest in proper training.
- Executives do not have sufficient time to manage projects themselves, yet refuse to delegate authority.
- Projects tend to be delayed because approvals most often follow the vertical chain of command. As a result, project work stays too long in functional departments.
- Because project staffing is on a “local” basis, only a portion of the organization understands project management and sees the system in action.
- There is heavy dependence on subcontractors and outside agencies for project management expertise.

Non–project-driven organizations may also have a steady stream of projects, all of which are usually designed to enhance manufacturing operations. Some projects may be customer-requested, such as:

- The introduction of statistical dimensioning concepts to improve process control
- The introduction of process changes to enhance the final product
- The introduction of process change concepts to enhance product reliability

If these changes are not identified as specific projects, the result can be:

- Poorly defined responsibility areas within the organization
- Poor communications, both internal and external to the organization
- Slow implementation
- A lack of a cost-tracking system for implementation
- Poorly defined performance criteria

Figure 1–6 shows the tip-of-the-iceberg syndrome, which can occur in all types of organizations but is most common in non–project-driven organizations. On the surface, all we see is a lack of authority for the project manager. But beneath the surface we see the causes; there is excessive meddling due to lack of understanding of project management, which, in turn, resulted from an inability to recognize the need for proper training.

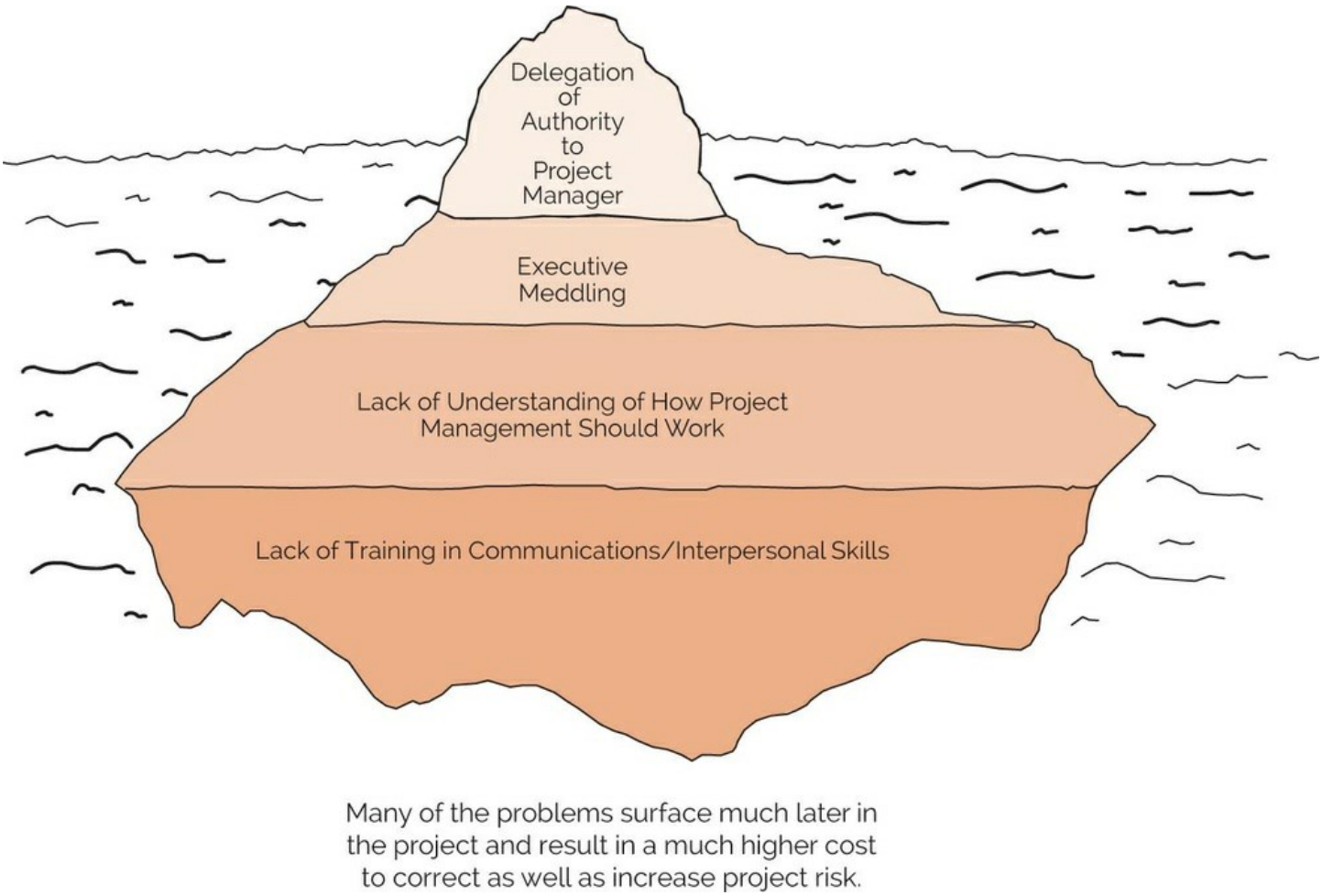

Figure 1–6: The tip-of-the-iceberg syndrome for matrix implementation.

1.17 MARKETING IN THE PROJECT-DRIVEN ORGANIZATION

***PMBOK® Guide*, 6th Edition**

- 1.2.3.6 Organizational Project Management (OPM) and Strategies

Getting new projects is the lifeblood of any project-oriented business. The practices of the project-oriented company are, however, substantially different from traditional product businesses and require highly specialized and disciplined team efforts among marketing, technical, and operating personnel, plus significant customer involvement. Projects are different from products in many respects, especially marketing. Marketing projects requires the ability to identify, pursue, and capture one-of-a-kind business opportunities, and is characterized by:

- *A systematic effort*. A systematic approach is usually required to develop a new program lead into an actual contract. The project acquisition effort is often highly integrated with ongoing programs and involves key personnel from both the potential customer and the performing organization.
- *Custom design*. While traditional businesses provide standard products and services for a variety of applications and customers, projects are custom-designed items to fit specific requirements of a single-customer community.
- *Project life cycle*. Project-oriented businesses have a well-defined beginning and end and are not self-perpetuating. Business must be generated on a project-by-project basis rather than by creating demand for a standard product or service.
- *Marketing phase*. Long lead times often exist between the product definition, start-up, and completion phases of a project.
- *Risks*. There are risks, especially in the research, design, and production of programs. The program manager not only has to integrate the multidisciplinary tasks and project elements within budget and schedule constraints, but also has to

manage inventions and technology while working with a variety of technically oriented prima donnas.

- *The technical capability to perform*. Technical ability is critical to the successful pursuit and acquisition of a new project.

In spite of the risks and problems, profits on projects are usually very low in comparison with commercial business practices. One may wonder why companies pursue project businesses. Clearly, there are many reasons why projects are good business:

- Although immediate profits (as a percentage of sales) are usually small, the return on capital investment is often very attractive. Progress payment practices keep inventories and receivables to a minimum and enable companies to undertake projects many times larger in value than the assets of the total company.
- Once a contract has been secured and is being managed properly, the project may be of relatively low financial risk to the company. The company has little additional selling expenditure and has a predictable market over the life cycle of the project.
- Project business must be viewed from a broader perspective than motivation for immediate profits. Projects provide an opportunity to develop the company's technical capabilities and build an experience base for future business growth.
- Winning one large project often provides attractive growth potential, such as (1) growth with the project via additions and changes; (2) follow-on work; (3) spare parts, maintenance, and training; and (4) being able to compete effectively in the next project phase, such as nurturing a study program into a development contract and finally a production contract.

Customers come in various forms and sizes. For small and medium businesses particularly, it is a challenge to compete for contracts from large industrial or governmental organizations. Although the contract to a firm may be relatively small, it is often subcontracted via a larger organization. Selling to such a diversified heterogeneous customer is a marketing challenge that requires a highly sophisticated and disciplined approach.

The first step in a new business development effort is to define the market to be pursued. The market segment for a new program opportunity is normally in an area of relevant past experience, technical capability, and customer involvement. Good marketers in the program business have to think as product line managers. They have to understand all dimensions of the business and be able to define and pursue market objectives that are consistent with the capabilities of their organizations.

Program businesses operate in an opportunity-driven market. It is a common mistake, however, to believe that these markets are unpredictable and unmanageable. Market planning and strategizing is important. New project opportunities develop over periods of time, sometimes years for larger projects. These developments must be properly tracked and cultivated to form the bases for management actions such as (1) bid decisions, (2) resource commitment, (3) technical readiness, and (4) effective customer liaison.

1.18 CLASSIFICATION OF PROJECTS

The principles of project management can be applied to any type of project and to any industry. However, the relative degree of importance of these principles can vary from project to project and industry to industry. Table 1–5 shows a brief comparison of certain industries/projects.

For those industries that are project-driven, such as aerospace and large construction, the high dollar value of the projects mandates a much more rigorous project management approach. For non–project-driven industries, projects may be managed more informally than formally, especially if no immediate profit is involved. Informal project management is similar to formal project management but paperwork requirements are kept at a minimum.

Table 1–5: CLASSIFICATION OF PROJECTS/CHARACTERISTICS

	Type of Project/Industry					
	In-house R&D	**Small Construction**	**Large Construction**	**Aerospace/Defense**	**MIS**	**Engineering**
Need for interpersonal skills	Low	Low	High	High	High	Low
Importance of organizational structure	Low	Low	Low	Low	High	Low
Time management difficulties	Low	Low	High	High	High	Low
Number of meetings	Excessive	Low	Excessive	Excessive	High	Medium
Project manager's supervisor	Middle management	Top management	Top management	Top management	Middle management	Middle management
Project sponsor present	Yes	No	Yes	Yes	No	No
Conflict intensity	Low	Low	High	High	High	Low

Table 1–5: CLASSIFICATION OF PROJECTS/CHARACTERISTICS

	Type of Project/Industry					
	In-house R&D	**Small Construction**	**Large Construction**	**Aerospace/Defense**	**MIS**	**Engineering**
Cost control level	Low	Low	High	High	Low	Low
Level of planning/scheduling	Milestones only	Milestones only	Detailed plan	Detailed plan	Milestones only	Milestones only

1.19 LOCATION OF THE PROJECT MANAGER

The success of project management could easily depend on the location of the project manager within the organization. Two questions must be answered:

1. What salary should the project manager earn?
2. To whom should the project manager report?

Figure 1–7 shows a typical organizational hierarchy. Ideally, project managers should be at the same pay grade as the individuals with whom they must negotiate on a daily basis. A project manager earning substantially more or less money than the line manager will usually create conflict. The ultimate reporting location of the project manager (and perhaps his salary) is heavily dependent on whether the organization is project- or non–project-driven, and whether the project manager is responsible for profit or loss.

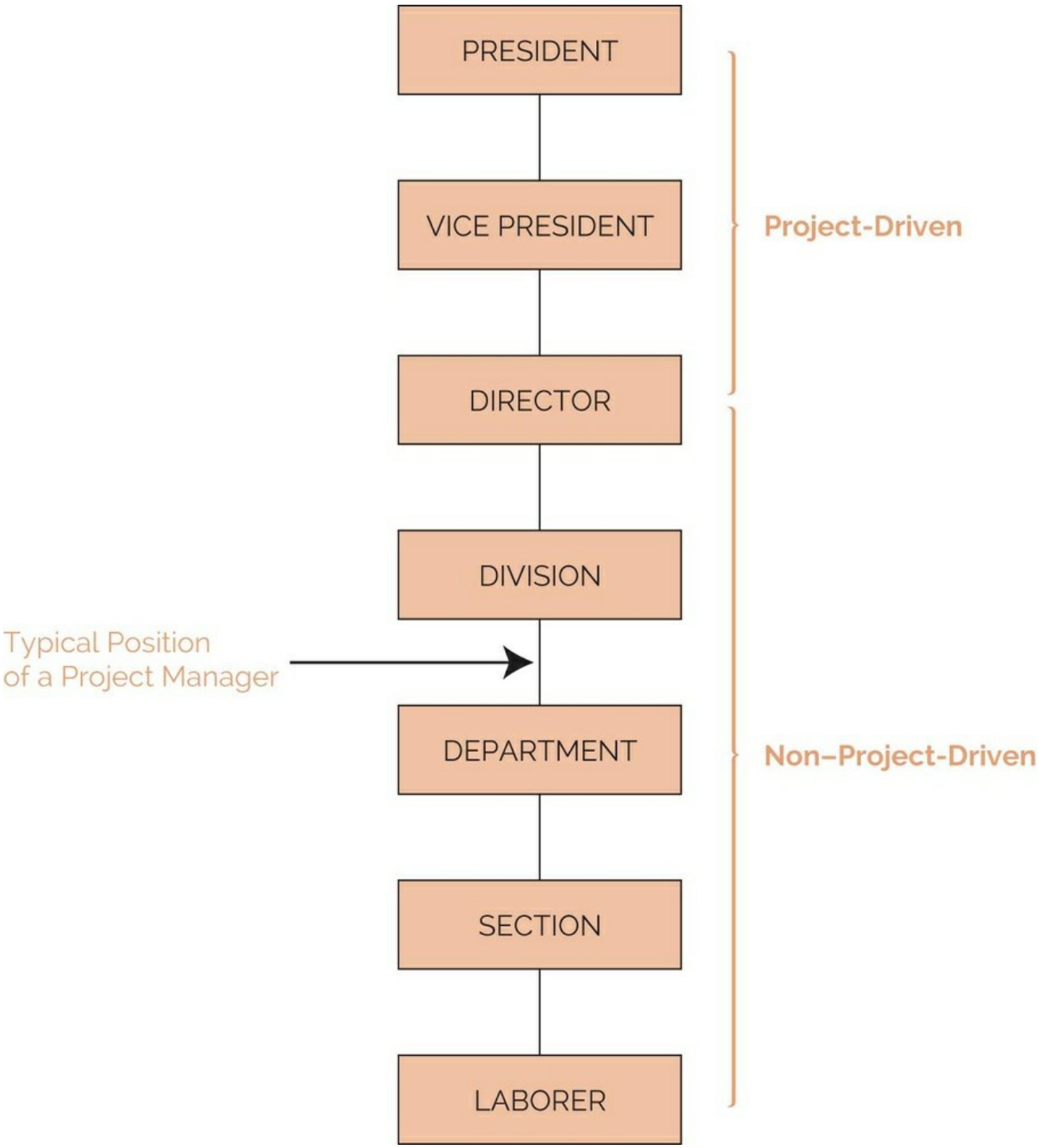

Figure 1–7: Organizational hierarchy.

Project managers can end up reporting both high and low in an organization during the life cycle of the project. During the planning phase of the project, the project manager may report high, whereas during implementation, the project manager may report low. Likewise, the positioning of the project manager might depend on the risk of the project, the size of the project, or the customer.

Finally, it should be noted that even if the report is low, the project manager should still have the right to interface with top executives during project planning, although there may be two or more reporting levels between the project manager and executives. At the opposite end of the spectrum, the project manager should have the right to go directly into the depths of the organization instead of having to follow the chain of command downward, especially during planning.

1.20 DIFFERING VIEWS OF PROJECT MANAGEMENT

Many companies, especially those with project-driven organizations, have differing views of project management. Some people

view project management as an excellent means of achieving objectives, while others view it as a threat. In project-driven organizations, there are three career paths that lead to executive management:

1. Through project management
2. Through project engineering
3. Through line management

A project engineer often performs project management coordination and integration activities for primarily engineering activities and may be restricted to just engineering work. In addition, manufacturing engineers might handle only that portion of the project that is in manufacturing.

In project-driven organizations, the fast-track position is in project management, whereas in a non–project-driven organization, it would be line management. Even though line managers support the project management approach, they resent project managers because of their promotions and top-level visibility. In one construction company, a department manager was told that he had no chance for promotion above his present department manager position unless he went into project management or project engineering, where he could get to know the operation of the whole company. A second construction company requires that individuals aspiring to become a department manager first spend a “tour of duty” as an assistant project manager or project engineer.

Executives may dislike project managers because more authority and control must be delegated. However, once executives realize that it is a sound business practice, they often see their importance.

1.21 PUBLIC-SECTOR PROJECT MANAGEMENT

Standard for Project Management

- 2.1 Stakeholder Performance Domain
- 2.1.1 Stakeholder Engagement

For several decades, public-sector projects were managed by contractors whose primary objective was a profit motive. Many times, contractors would make trade-offs and accompanying decisions just to support the profit motive. At the end of the project, the contractor would provide the public-sector agency with a deliverable, but the contractor would walk away with the project management best practices and lessons learned.

Today, public-sector agencies are requesting the contractor to share with them all project management intellectual property accumulated during the course of the project. Also, more agencies are becoming experienced in project management to the point where the projects are managed with internal personnel rather than contractors.

As more and more government agencies adopt the project management approach, we discover that public-sector projects can be more complex than private-sector projects and more difficult to manage. David Wirick provides insight on public management challenges.[7]

THE CHALLENGES OF PUBLIC-SECTOR PROJECT MANAGEMENT

Private-sector project managers like to assume that their work is more demanding than projects in the public sector. They assume that their projects are more complex, subject to tougher management oversight, and mandated to move at faster speeds. Although private-sector projects can be tough, in many cases, it is easier to accomplish results in the private sector than in the public sector.

Public-sector projects can be more difficult than many private-sector projects because they:

- Operate in an environment of often-conflicting goals and outcome
- Involve many layers of stakeholders with varied interests
- Must placate political interests and operate under media scrutiny
- Are allowed little tolerance for failure

- Operate in organizations that often have a difficult time identifying outcome measures and missions
- Are required to be performed under constraints imposed by administrative rules and often-cumbersome policies and processes that can delay projects and consume project resources
- Require the cooperation and performance of agencies outside of the project team for purchasing, hiring, and other functions
- Must make do with existing staff resources more often than private-sector projects because of civil-service protections and hiring systems
- Are performed in organizations that may not be comfortable or used to directed action and project success
- Are performed in an environment that may include political adversaries

If these challenges were not tough enough, because of their ability to push the burden of paying for projects to future generations, public-sector projects have a reach deep into the future. That introduces the challenges of serving the needs of stakeholders who are not yet “at the table” and whose interests might be difficult to identify. Some also cite the relative lack of project management maturity in public organizations as a challenge of public-sector projects.

In addition to these complications, public projects are often more complex than those in the private sector. For some projects, the outcome can be defined at the beginning of the project. Construction projects are one example. For other projects, the desired outcome can only be defined as the project progresses. Examples of those are organizational change projects and complex information technology projects. Although the first type of project can be difficult and require detailed planning and implementation, the second type, those whose outcomes are determined over the course of the project, are regarded as more challenging. They require more interaction with stakeholders and more openness to factors outside of the control of the project team.

Because of the multiple stakeholders involved in public-sector projects, the types of projects the public sector engages in, and the difficulty of identifying measurable outcomes in the public sector, more public-sector projects are likely to be of the latter variety and more difficult. As a result of the distinguishing characteristics of public-sector organizations, public-sector projects require the management not only of the project team but of an entire community. Little is accomplished in the public sector by lone individuals or even by teams working in isolation. Instead, public-sector projects engage broad groups of stakeholders who not only have a stake in the project but also have a voice and an opportunity to influence outcomes. In public-sector projects, even though the project manager may be ultimately accountable, governance of the project and credit for successes must be shared.

The good news for public-sector project managers is that the community of stakeholders, which may seem to be a burden, can also be an opportunity and a source of resources and support. Many of those stakeholders stand ready to provide help to the project manager as he or she attempts to navigate the constraints affecting the project. Others can be enlisted to support the project, and their authority can make the difference between project success and failure.

THE COMING STORM

In addition to the existing challenges of public-sector projects listed previously, some factors will place soon more stress on public-sector organizations and demand even more emphasis on solid project management. Some of the emerging challenges for public-sector organizations will include:

- Modest or stagnant economic growth
- Globalization and the loss of the industrial revenue base and, increasingly, the service-sector revenue base
- A decline in real wages and pressures for tax reform
- Private-sector practices that pass the corporate safety net back to individuals, who may then look to government for such essential security mechanisms as health coverage
- Difficulty in passing on the need for government revenue to taxpayers and a general loss of confidence in government
- Structural limitations on revenue generation, such as Proposition 13 and property tax indexing
- The redirection of scarce public revenues to homeland security and defense without the imposition of war taxes
- The erosion of public-sector income as entitlement programs drain revenues in response to an aging population

- An age imbalance, with fewer workers in the workforce to support an expanding number of retirees and children
- Longer life expectancy, which further burdens entitlement and health programs
- Increasing costs of health care well beyond the level of inflation
- Long-delayed investments in our national infrastructure, including roads, bridges and water systems

In combination, these factors constitute a looming storm that will require us to question our assumptions about government operations and services. Doing far more with much less will require new thinking about how government performs its work. It will require more innovation than the development of new services. It will take radical rethinking of what government does and how it goes about getting it done.

WHY DO PUBLIC-SECTOR PROJECTS FAIL?

Public-sector projects can fail for a set of reasons related to the unique character of public-sector projects. In that regard, they:

- Run afoul of political processes
- Lack the necessary resources because of requirements to use existing staff rather than to contract for the right expertise
- Are constrained by civil-service rules that limit assignment of activities to project staff
- Lose budget authorization
- Lose support at the change of administration due to electoral cycles
- Are overwhelmed by administrative rules and required processes for purchasing and hiring
- Fail to satisfy oversight agencies
- Adopt overly conservative approaches due to the contentious nature of the project environment
- Are victimized by suboptimal vendors who have been selected by purchasing processes that are overly focused on costs or that can be influenced by factors that are not relevant to performance
- Are compromised by the bias of public-sector managers and staff toward compliance over performance
- Fail to identify project goals given the wide array of project stakeholders in the public sector and the challenges of identifying public-sector goals and metrics for success

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[7]. D. W. Wirick, *Public-Sector Project Management* (Hoboken, NJ: John Wiley & Sons, 2009), pp. 8–10, 18–19.

1.22 INTERNATIONAL PROJECT MANAGEMENT

As the world marketplace begins to accept project management and recognizes the need for experienced project managers, more opportunities have become available for people aspiring to become project managers. The need is there and growing. According to Thomas Grisham[8]:

> International business and project management practice have converged in the last 10 years. Organizations are tending toward hiring multitalented people who are self-motivated, intelligent, and willing to take responsibility. Some of the reasons are:

- The need for leaner and flatter organizations to reduce cost
- The need for leadership skills throughout the organizational food chain from top to bottom – lead one day, follow the next, and be comfortable personally in either role
- The need for knowledge workers throughout the organization
- Globalization and the need to improve quality while reducing cost
- Kaizen to keep quality high while reducing cost

- Diversity

  Years ago, companies had three pay grades for project managers; junior project managers, project managers, and senior project managers. Today, we are adding in a fourth pay grade, namely global project managers. Unfortunately, there may be additional skills needed to be a global project manager. Some of the additional skills include managing virtual teams, understanding global cultural differences, working in an environment where politics can dictate many of the decisions, and working under committee governance rather than a single sponsor.

[8]. T. W. Grisham, *International Project Management* (Hoboken, NJ: Wiley, 2010), p. 3.

1.23 CONCURRENT ENGINEERING: A PROJECT MANAGEMENT APPROACH

In the past decade, organizations have become more aware of the fact that America's most formidable weapon is its manufacturing ability, and yet more and more work seems to be departing for Southeast Asia and the Far East. If America and other countries are to remain competitive, then survival may depend on the manufacturing of a quality product and a rapid introduction into the marketplace. Today, companies are under tremendous pressure to rapidly introduce new products because product life cycles are becoming shorter. As a result, organizations no longer have the luxury of performing work in series.

Concurrent or simultaneous engineering is an attempt to accomplish work in parallel rather than in series. This requires that marketing, R&D, engineering, and production are all actively involved in the early project phases and making plans even before the product design has been finalized. This concept of current engineering will accelerate product development, but it does come with serious and potentially costly risks, the largest one being the cost of rework.

Almost everyone agrees that the best way to reduce or minimize risks is for the organization to plan better. Since project management is one of the best methodologies to foster better planning, it is little wonder that more organizations are accepting project management as a way of life.

1.24 ADDED VALUE

Standard for Project Management

- 2.1 Creating Value

People often wonder what project managers do with their time once the project plan is created. While it is true that they monitor and control the work being performed, they also look for ways to add value to the project. Added value can be defined as incremental improvements to the deliverable of a project such that performance is improved or a significant business advantage is obtained, and the client is willing to pay for this difference. Looking for added-value opportunities that benefit the client is a good approach whereas looking for “fictitious” added-value opportunities just to increase the cost of the project is bad.

In certain projects, such as in new product development in the pharmaceutical industry, project managers must be aware of opportunities. According to Trevor Brown and Stephen Allport:[9]

> The critical issues facing companies which understand the importance of building customer value into new products is how to incorporate this into the development process and invest appropriately to fully understand the opportunity. In practice, project teams have more opportunity than is generally realized to add, enhance, or diminish value in each of the four perspectives … corporate, prescriber, payer and patient. The tools at the project teams’ disposal to enhance customer value include challenging and improving established processes, adopting a value-directed approach to the management of development projects, and taking advantage of tried and tested methodologies for understanding product value.

Project managers generally do not take enough time in evaluating opportunities. In such a case, either the scope change is disapproved or the scope change is allowed and suddenly the project is at risk when additional information is discovered. Opportunities must be fully understood.

* Case study also appears at end of chapter.
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Related Case Studies (from Kerzner/Project *Management Case Studies*, 6th ed.)	*PMBOK® Guide*, 6th ed., Reference Section for the PMP® Certification Exam	*PMBOK® Guide*, 7th ed., Reference Section for the PMP® Certification Exam
• Kombs Engineering • Williams Machine Tool Company* • Macon, Inc. • Jackson Industries • Olympics (A)	• Integration Management • Scope Management • Project Resource Management	• Overview • People in the Project • Interactions among the Players • Definitions • Deliverables • Working with Stakeholders • Team Performance
* Case study also appears at end of chapter.		
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[9]. T. J. Brown and S. Allport, "Developing Products with Added Value," in P. Harpum (ed.), *Portfolio, Program, and Project Management in the Pharmaceutical and Biotechnology Industries* (Hoboken, NJ: John Wiley & Sons, 2010), p. 218.

1.25 STUDYING TIPS FOR THE PMI® PROJECT MANAGEMENT CERTIFICATION EXAM

This section is applicable as a review of the principles or to support an understanding of the knowledge areas and domain groups in the *PMBOK® Guide*. This chapter addresses some material from the *PMBOK® Guide* knowledge areas:

- Integration Management
- Scope Management
- Project Resource Management

Understanding the following principles is beneficial if the reader is using this textbook together with the *PMBOK® Guide* to study for the PMP® Certification Exam:

- Definition of a project
- Definition of the competing constraints
- Definition of successful execution of a project
- Benefits of using project management
- Responsibility of the project manager in dealing with stakeholders and how stakeholders can affect the outcome of the project
- Responsibility of the project manager in meeting deliverables
- The fact that the project manager is ultimately accountable for the success of the project
- Responsibilities of the line manager during project management staffing and execution
- Role of the executive sponsor and champion
- Difference between a project-driven and non–project-driven organization

Be sure to review the appropriate sections of the *PMBOK® Guides* and the glossary of terms at the end of the *PMBOK® Guides*.

Some multiple-choice questions are provided in this section as a review of the material. There are other sources for practice

review questions that are specific for the PMP® Exam, namely:

- *Project Management IQ*® from the International Institute for Learning (iil.com)
- *PMP® Exam Practice Test and Study Guide,* by J. LeRoy Ward, PMP, editor
- *PMP® Exam Prep,* by Rita Mulcahy
- *Q & As for the PMBOK® Guide,* Project Management Institute

The more practice questions reviewed, the better prepared the reader will be for the PMP® Certification Exam.

In Appendix C, there are a series of mini case studies called Dorale Products that review some of the concepts. The mini cases can be used as either an introduction to the chapter or as a review of the chapter material. These mini case studies were placed in Appendix C because they can be used for several chapters in the text. For this chapter, the following are applicable:

- Dorale Products (A) [Integration and Scope Management]
- Dorale Products (B) [Integration and Scope Management]

Answers to the Dorale Products mini cases appear in Appendix D. The following multiple-choice questions will be helpful in reviewing the above principles:

1. The traditional competing constraints on a project are: ?

A. Time, cost, and profitability

B. Resources required, sponsorship involvement, and funding

C. Time, cost, and quality and/or scope

D. Calendar dates, facilities available, and funding

2. Which of the following is not part of the definition of a project? ?

A. Repetitive activities

B. Constraints

C. Consumption of resources

D. A well-defined objective

3. Which of the following is usually not part of the criteria for project success? ?

A. Customer satisfaction

B. Customer acceptance

C. Meeting at least 75 percent of specification requirements

D. Meeting the triple-constraint requirements

4. Which of the following is generally not a benefit achieved from using project management? ?

A. Flexibility in the project's end date

B. Improved risk management

C. Improved estimating

D. Tracking of projects

5. The person responsible for assigning the resources to a project is most often: ?

A. The project manager

B. The human resources department

C. The line manager

D. The executive sponsor

6. Conflicts between the project and line managers are most often resolved by: ?

A. The assistant project manager for conflicts

B. The project sponsor

C. The executive steering committee

D. The human resources department

7. Your company does only projects. If the projects performed by your company are for customers external to your company and a profit criterion exists on the project, then your organization is most likely: ?

A. Project-driven

B. Non–project-driven

C. A hybrid

D. All of the above are possible based on the size of the profit margin.

Answers

1. C
2. A
3. C
4. A
5. C
6. B
7. A

PROBLEMS

- **1–1** Because of the individuality of people, there always exist differing views of what management is all about. Below are lists of possible perspectives and a selected group of organizational members. For each individual, select the possible ways that this individual might view project management:

Individuals

- Upper-level manager
- Project manager
- Functional manager
- Project team member
- Scientist and consultant

Perspectives

a. A threat to established authority

b. A source for future general managers

c. A cause of unwanted change in ongoing procedures

d. A means to an end

e. A significant market for their services

f. A place to build an empire

g. A necessary evil to traditional management

h. An opportunity for growth and advancement

i. A better way to motivate people toward an objective

j. A source of frustration in authority

k. A way of introducing controlled changes

l. An area of research

m. A vehicle for introducing creativity

n. A means of coordinating functional units

o. A means of deep satisfaction

p. A way of life

1–2 Will project management work in all companies? If not, identify those companies in which project management may not be applicable and defend your answers.

1–3 What attributes should a project manager have? Can an individual be trained to become a project manager? If a company were changing over to a project management structure, would it be better to promote and train from within or hire from the outside?

1–4 What types of projects might be more appropriate for functional management rather than project management, and vice versa?

1–5 Do you think that there would be a shift in the relative degree of importance of the following terms in a project management environment as opposed to a traditional management environment?

a. Time management

b. Communications

c. Motivation

1–6 Is project management designed to transfer power from the line managers to the project manager?

1–7 Explain how career paths and career growth can differ between project-driven and non–project-driven organizations. In each organization, is the career path fastest in project management, project engineering, or line management?

CASE STUDY

WILLIAMS MACHINE TOOL COMPANY

For 85 years, the Williams Machine Tool Company had provided quality products to its clients, becoming the third largest US-based machine tool company by 1990. The company was highly profitable and had an extremely low employee turnover rate. Pay and benefits were excellent.

Between 1980 and 1990, the company's profits soared to record levels. The company's success was due to one product line of standard manufacturing machine tools. Williams spent most of its time and effort looking for ways to improve its bread-and-butter product line rather than to develop new products. The product line was so successful that companies were willing to modify their production lines around these machine tools rather than asking Williams for major modifications to the machine tools.

By 1990, Williams Company was extremely complacent, expecting this phenomenal success with one product line to continue for 20 to 25 more years. The recession of the early 1990s forced management to realign their thinking. Cutbacks in production had decreased the demand for the standard machine tools. More and more customers were asking for either major modifications to the standard machine tools or a completely new product design.

The marketplace was changing and senior management recognized that a new strategic focus was necessary. However, lower-level management and the workforce, especially engineering, were strongly resisting a change. The employees, many of them with over 20 years of employment at Williams Company, refused to recognize the need for this change in the belief that the

glory days of yore would return at the end of the recession.

By 1995, the recession had been over for at least two years yet Williams Company had no new product lines. Revenue was down, sales for the standard product (with and without modifications) were decreasing, and the employees were still resisting change. Layoffs were imminent.

In 1996, the company was sold to Crock Engineering. Crock had an experienced machine tool division of its own and understood the machine tool business. Williams Company was allowed to operate as a separate entity from 1995 to 1996. By 1996, red ink had appeared on the Williams Company balance sheet. Crock replaced all of the Williams senior managers with its own personnel. Crock then announced to all employees that Williams would become a specialty machine tool manufacturer and that the “good old days” would never return. Customer demand for specialty products had increased threefold in just the last twelve months alone. Crock made it clear that employees who would not support this new direction would be replaced.

The new senior management at Williams Company recognized that 85 years of traditional management had come to an end for a company now committed to specialty products. The company culture was about to change, spearheaded by project management, concurrent engineering, and total quality management.

Senior management's commitment to product management was apparent by the time and money spent in educating the employees. Unfortunately, the seasoned 20-year-plus veterans still would not support the new culture. Recognizing the problems, management provided continuous and visible support for project management in addition to hiring a project management consultant to work with the people. The consultant worked with Williams from 1996 to 2001.

From 1996 to 2001, the Williams Division of Crock Engineering experienced losses in 24 consecutive quarters. The quarter ending March 31, 2002, was the first profitable quarter in over six years. Much of the credit was given to the performance and maturity of the project management system. In May 2002, the Williams Division was sold. More than 80 percent of the employees lost their jobs when the company was relocated over 1,500 miles away.

QUESTIONS

1. Why was it so difficult to change the culture of the company?
2. What could have been done differently to accelerate the change?

NOTES

- PMBOK is a registered mark of the Project Management Institute, Inc.

1. Hans J. Thamhain, *Managing Technology-Based Projects* (Hoboken, NJ: John Wiley & Sons, 2014), p. 5.
2. Here we are assuming that the line manager and project manager are not the same individual. However, the terms *line manager* and *functional manager* are used interchangeably throughout the text.

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3. Tres Roeder, *Managing Project Stakeholders,* (Hoboken, NJ: John Wiley, 2013), p. 67.
4. The expectations are discussed in Section 9.3.
5. The role of the project sponsor is discussed in Section 10.1.
6. Section 10.1 describes the role of the project sponsor in more depth.
7. D. W. Wirick, *Public-Sector Project Management* (Hoboken, NJ: John Wiley & Sons, 2009), pp. 8–10, 18–19.
8. T. W. Grisham, *International Project Management* (Hoboken, NJ: Wiley, 2010), p. 3.
9. T. J. Brown and S. Allport, “Developing Products with Added Value,” in P. Harpum (ed.), *Portfolio, Program, and Project Management in the Pharmaceutical and Biotechnology Industries* (Hoboken, NJ: John Wiley & Sons, 2010), p. 218.