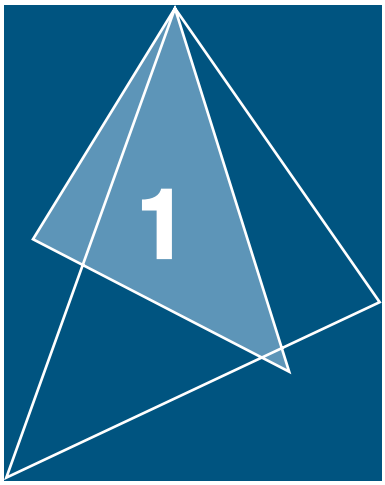

Overview

Related Case Studies (from Kerzner/*Project Management Case Studies,* 3rd Edition)	Related Workbook Exercises (from Kerzner/*Project Management Workbook and PMP®/CAPM® Exam Study Guide,* 10th Edition)	PMBOK® Guide, 4th Edition, Reference Section for the PMP® Certification Exam
• Kombs Engineering • Williams Machine Tool Company* • Hyten Corporation • Macon, Inc. • Continental Computer Corporation • Jackson Industries	• Multiple Choice Exam	• Integration Management • Scope Management • Human Resource Management

1.0 INTRODUCTION

Executives will be facing increasingly complex challenges during the next decade. These challenges will be the result of high escalation factors for salaries and raw materials, increased union demands, pressure from stockholders, and the possibility of long-term high inflation accompanied by a mild recession and a lack of borrowing power with financial institutions. These environmental conditions have existed before, but not to the degree that they do today.

*Case Study also appears at end of chapter.

In the past, executives have attempted to ease the impact of these environmental conditions by embarking on massive cost-reduction programs. The usual results of these programs have been early retirement, layoffs, and a reduction in manpower through attrition. As jobs become vacant, executives pressure line managers to accomplish the same amount of work with fewer resources, either by improving efficiency or by upgrading performance requirements to a higher position on the learning curve. Because people costs are more inflationary than the cost of equipment or facilities, executives are funding more and more capital equipment projects in an attempt to increase or improve productivity without increasing labor.

Unfortunately, executives are somewhat limited in how far they can go to reduce manpower without running a high risk to corporate profitability. Capital equipment projects are not always the answer. Thus, executives have been forced to look elsewhere for the solutions to their problems.

Almost all of today's executives are in agreement that the solution to the majority of corporate problems involves obtaining better control and use of existing corporate resources, looking internally rather than externally for the solution. As part of the attempt to achieve an internal solution, executives are taking a hard look at the ways corporate activities are managed. Project management is one of the techniques under consideration.

The project management approach is relatively modern. It is characterized by methods of restructuring management and adapting special management techniques, with the purpose of obtaining better control and use of existing resources. Forty years ago project management was confined to U.S. Department of Defense contractors and construction companies. 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.

The rapid rate of change in both technology and the marketplace has created enormous strains on existing organizational forms. The traditional structure is highly bureaucratic, and experience has shown that it cannot respond rapidly enough to a changing environment. Thus, the traditional structure must be replaced by project management, or other temporary management structures that are highly organic and can respond very rapidly as situations develop inside and outside the company.

Project management has long been discussed by corporate executives and academics as one of several workable possibilities for organizational forms of the future that could integrate complex efforts and reduce bureaucracy. The acceptance of project management has not been easy, however. Many executives are not willing to accept change and are inflexible when it comes to adapting to a different environment. The project management approach requires a departure from the traditional business organizational form, which is basically vertical and which emphasizes a strong superior–subordinate relationship.

1.1 UNDERSTANDING PROJECT MANAGEMENT

PMBOK® Guide, 4th Edition
1.2 What Is a Project?
1.3 What Is Project Management?

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 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)

Project management, on the other hand, involves five process groups as identified in the PMBOK® Guide, namely:

- 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
- 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
- Project execution
  - Negotiating for the project team members
  - Directing and managing the work
  - Working with the team members to help them improve
- Project monitoring and control
  - Tracking progress
  - Comparing actual outcome to predicted outcome
  - Analyzing variances and impacts
  - Making adjustments
- 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 papework

Successful project management can then be defined as having achieved the project objectives:

- Within time
- Within cost
- At the desired performance/technology level
- While utilizing the assigned resources effectively and efficiently
- Accepted by the customer

The potential benefits from project management are:

- 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
- Forward planning and pricing

Project management can mean different things to different people. Quite often, people misunderstand the concept because they have ongoing projects within their company and feel that they are using project management to control these activities. In such a case, the following might be considered an appropriate definition:

> Project management is the art of creating the illusion that any outcome is the result of a series of predetermined, deliberate acts when, in fact, it was dumb luck.

Although this might be the way that some companies are running their projects, this is not project management. 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 work will be accomplished more smoothly throughout the organization. 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.

PMBOK® Guide, 4th Edition
1.6 Project Management Skills

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 following would be 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).

PMBOK® Guide, 4th Edition
2.4.2 Organizational Structures

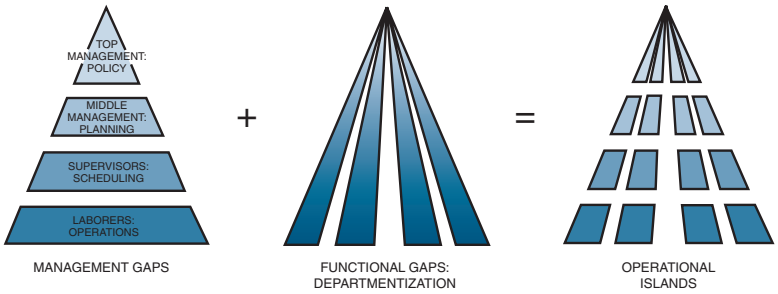

FIGURE 1–1. Why are systems necessary?

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

- Planning
- Organizing
- Staffing
- Controlling
- Directing

You will notice that, in the above 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 six months or two years; in construction, three to five years; in nuclear components, ten years; and in insurance, two 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 project management. 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. Time, cost, and performance are the constraints on the project. If the project is to be accomplished for an outside customer, then the project has a fourth constraint: good customer relations. The reader should immediately realize that it is possible to manage a project internally within time, cost, and performance and then 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.

Projects exist to produce deliverables. The person ultimately assigned as the project manager may very well be assigned based upon 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 and can take such form as:

- **Hardware Deliverables:** These are hardware items, such as a table, a prototype, or a piece of equipment.

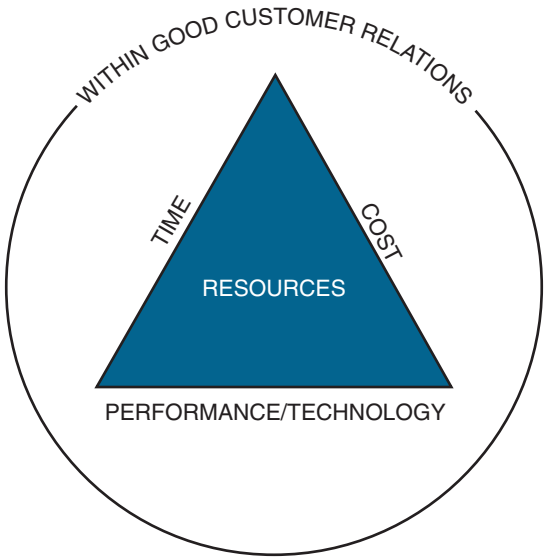

FIGURE 1–2. Overview of project management.

- **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.

Another factor influencing the selection of the project manager would be the stakeholders. Stakeholders are individuals or organizations that can be favorably or unfavorably impacted by the project. As such, project managers must interface with these stakeholders, and many of the stakeholders can exert their influence or pressure over the direction of the project.

Some stakeholders are referred to as "active" or "key" stakeholders that can possess decision-making authority during the execution of the project. Each stakeholder can have his or her own set of objectives, and this could place the project manager in a position of having to balance a variety of stakeholder interests without creating a conflict-of-interest situation for the project manager.

Each company has its own categorization system for identifying stakeholders. A typical system might be:

- Organizational stakeholders
  - Executive officers
  - Line managers
  - Employees
  - Unions

- Product/market stakeholders
  - Customers
  - Suppliers
  - Local committees
  - Governments (local, state, and federal)
  - General public
- Capital market stakeholders
  - Shareholders
  - Creditors
  - Banks

1.2 DEFINING PROJECT SUCCESS

In the previous section, we defined project success as the completion of an activity within the constraints of time, cost, and performance. This was the definition used for the past twenty years or so. Today, 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
- With acceptance by the customer/user
- With minimum or mutually agreed upon scope changes
- Without disturbing the main work flow 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 work flow 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. If the company has a cultural 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.

As a final note, it should be understood that simply because a project is a success does not mean that the company as a whole is successful in its project management endeavors. 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 in order 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 THE PROJECT MANAGER–LINE MANAGER INTERFACE

PMBOK® Guide, 4th Edition
1.6 Project Management Skills

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

- Money
- Manpower
- Equipment
- Facilities
- Materials
- Information/technology

Actually, the project manager does *not* control any of these resources directly, except perhaps money (i.e., the project budget).[1] 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. 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 now becoming PMP®S. 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.

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.

1. 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.

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

> The new breed of business leaders must deal effectively with a broad spectrum of contemporary challenges that focus on time-to-market pressures, accelerating technologies, innovation, resource limitations, technical complexities, social and ethical issues, operational dynamics, cost, risks, and technology itself as summarized below:
>
> - High task complexities, risks and uncertainties
> - Fast-changing markets, technology, regulations
> - Intense competition, open global markets
> - Resource constraint, tough performance requirements
> - Tight, end-date-driven schedules
> - Total project life-cycle considerations
> - Complex organizations and cross-functional linkages
> - Joint ventures, alliances and partnerships, need for dealing with different organizational cultures and values
> - Complex business processes and stakeholder communities
> - Need for continuous improvements, upgrades and enhancements
> - Need for sophisticated people skills, ability to deal with organizational conflict, power, and politics
> - Increasing impact of IT and e-business[2]

Dr. Thamhain further believes that there are paradigm shifts in technology-oriented business environments that will affect the business leaders of the future, including project managers. According to Dr. Thamhain, we are shifting from…

- … mostly linear work processes to highly dynamic, organic and integrated management systems
- …efficiency toward effectiveness
- …executing projects to enterprise-wide project management
- …managing information to fully utilizing information technology
- …managerial control to self-direction and accountability
- …managing technology as part of a functional speciality ot management of technology as a distinct skill set and professional
- …status[3]

Another example of the need for the project manager to become more actively involved in business aspects has been identified by Gary Heerkens. Heerkens provides several revelations of why business knowledge has become important, a few of which are[4]:

- It really doesn't matter how well you execute a project, if you're working on the wrong project!

2. H. J. Thamhain, *Management of Technology*, (Hoboken, NJ: Wiley, 2005), pp. 3–4.
3. See note 2; Thamhain; p. 28.
4. G. Heerkens, *The Business-Savvy Project Manager* (New York: McGraw-Hill, 2006), pp. 4–8.

- There are times when spending more money on a project could be smart business—even if you exceed the original budget!
- There are times when spending more money on a project could be smart business—even if the project is delivered after the original deadline!
- Forcing the project team to agree to an unrealistic deadline may not be very smart, from a business standpoint.
- A portfolio of projects that all generate a positive cash flow may not represent an organization's best opportunity for investment.

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

These two items become critical. In the first item, functional employees who are assigned to a project manager 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.

Classical management has often been defined as a process in which the manager does not necessarily perform things for himself, but accomplishes objectives through others in a group situation. This basic definition also applies to the project manager. In addition, a project manager must help himself. There is nobody else to help him.

If we take a close look at project management, we will see that 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 termination, when, in fact, the credit should go to the line managers, who are continually pressured to make better use of their resources. The project manager is simply the agent through whom this is accomplished. So why do some companies glorify the project management position?

To illustrate the role of the project manager, consider the time, cost, and performance constraints shown in Figure 1–2. Many functional managers, if left alone, would recognize only the performance constraint: "Just give me another $50,000 and two more months, and I'll give you the ideal technology."

The project manager, as part of these communicating, coordinating, and integrating responsibilities, reminds the line managers that there are also time and cost constraints on the project. This is the starting point for better resource control.

Project managers depend on line managers. When the project manager gets in trouble, the only place he can go is to the line manager because additional resources are almost always required to alleviate the problems. When a line manager gets in trouble, he usually goes first to the project manager and requests either additional funding or some type of authorization for scope changes.

To illustrate this working relationship between the project and line managers, consider the following situation:

Project Manager (addressing the line manager): "I have a serious problem. I'm looking at a $150,000 cost overrun on my project and I need your help. I'd like you to do the same amount of work that you are currently scheduled for but in 3,000 fewer man-hours. Since your organization is burdened at $60/hour, this would more than compensate for the cost overrun."

Line Manager: "Even if I could, why should I? You know that good line managers can always make work expand to meet budget. I'll look over my manpower curves and let you know tomorrow."

The following day . . .

Line Manager: "I've looked over my manpower curves and I have enough work to keep my people employed. I'll give you back the 3,000 hours you need, but remember, *you owe me one!"*

Several months later . . .

Line Manager: "I've just seen the planning for your new project that's supposed to start two months from now. You'll need two people from my department. There are two employees that I'd like to use on your project. Unfortunately, these two people are available now. If I don't pick these people up on your charge number right now, some other project might pick them up in the interim period, and they won't be available when your project starts."

Project Manager: "What you're saying is that you want me to let you sandbag against one of my charge numbers, knowing that I really don't need them."

Line Manager: "That's right. I'll try to find other jobs (and charge numbers) for them to work on temporarily so that your project won't be completely burdened. Remember, you owe me one."

Project Manager: "O.K. I know that I owe you one, so I'll do this for you. Does this make us even?"

Line Manager: "Not at all! But you're going in the right direction."

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.

The previous examples should indicate that project management is more behavioral than quantitative. Effective project management requires an understanding of:

- Quantitative tools and techniques
- Organizational structures
- 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. During an in-house seminar on engineering project management, the author asked one of the project engineers to provide a description of his job as a project engineer. During the discussion that followed, several proj-ect managers and line managers said that there was a great deal of overlap between their job descriptions and that of the project engineer.

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.

1.4 DEFINING THE PROJECT MANAGER'S ROLE

PMBOK® Guide, 4th Edition
2.3 Stakeholders
2.3.8 Functional Managers
2.3.6 Project Managers
Chapter 4 Project Integration Management

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

These integrative responsibilities are shown in Figure 1–3 where the project manager must convert the inputs (i.e., resources) into outputs of products, services, and ultimately 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

PMBOK® Guide, 4th Edition
Chapter 4 Integration Management

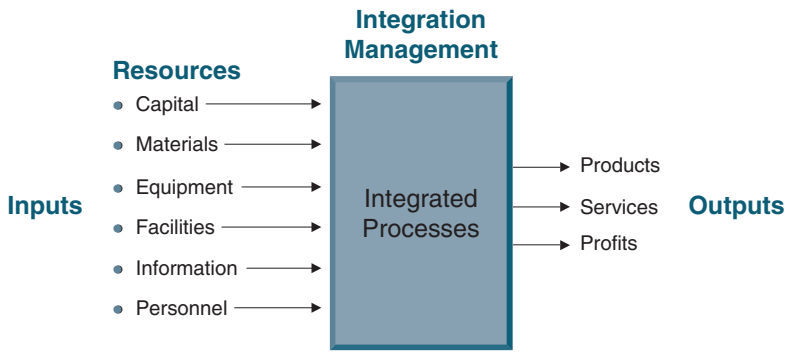

FIGURE 1–3. Integration management.

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

To be effective as a project manager, an individual must have management as well as technical skills. Because engineers often consider their careers limited in the functional disciplines, they look toward project management and project engineering as career path opportunities. But becoming a manager entails learning about psychology, human behavior, organizational behavior, interpersonal relations, and communications. MBA programs have come to the rescue of individuals desiring the background to be effective project managers.

In the past, executives motivated and retained qualified personnel primarily with financial incentives. Today other ways are being used, such as a change in title or the promise of more challenging work. Perhaps the lowest turnover rates of any professions in the world are in project management and project engineering. In a project environment, the

project managers and project engineers get to see their project through from "birth to death." Being able to see the fruits of one's efforts is highly rewarding. A senior project manager in a construction company commented on why he never accepted a vice presidency that had been offered to him: "I can take my children and grandchildren into ten countries in the world and show them facilities that I have built as the project manager. What do I show my kids as an executive? The size of my office? My bank account? A stockholder's report?"

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.

1.5 DEFINING THE FUNCTIONAL MANAGER'S ROLE

PMBOK® Guide, 4th Edition
Chapter 9 Human Resources Management
9.1.2 HR Planning: Tools and Techniques

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:

- 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).
- 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).
- The functional manager has 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 expertise, to take exception and plead his 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. It is not important for the project manager to have the best available resources. Functional managers should not commit to certain people's availability. Rather, the functional manager should commit to achieving his portion of the objective within time, cost, and performance even if he 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 he confront the line manager and demand 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. One company is 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.*

Some companies carry the concept of commitments to extremes. An aircraft components manufacturer has a Commitment Department headed by a second-level manager. The function of the Commitment Department is to track how well the line managers keep their promises to the project managers. The department manager reports directly to the vice president of the division. In this company, line managers are extremely careful and cautious in making commitments, but do everything possible to meet deliverables. This same company has gone so far as to tell both project and line personnel that they run the risk of being discharged from the company for burying a problem rather than bringing the problem to the surface *immediately*.

In one automotive company, the tension between the project and line managers became so combative that it was having a serious impact on the performance and constraints of the project. The project managers argued that the line managers were not fulfilling their promises whereas the line managers were arguing that the project managers' requirements were poorly defined. To alleviate the problem, a new form was created which served as a contractual agreement between the project and the line managers who had to commit to the deliverables. This resulted in "shared accountability" for the project's deliverables.

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.

PMBOK® Guide, 4th Edition
2.4.2 Organizational Structure
Figure 2–7

TABLE 1–1. DUAL RESPONSIBILITY

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

If a line manager has to assign resources to six projects, one of which is under his direct control, he might save the best resources for his project. In this case, his project will be a success at the expense of all of the other projects.

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.

PMBOK® Guide, 4th Edition
2.4.2 Organizational Structure
Figure 2–7

TABLE 1–2. REPORTING RELATIONSHIPS

		Project Manager (PM)/Line Manager (LM)/Employee Relationship			
Type of Project Manager	**Type of Matrix Structure***	**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.

1.6 DEFINING THE FUNCTIONAL EMPLOYEE'S ROLE

Once the line managers commit to the deliverables, it is the responsibility of the assigned functional employees to achieve the functional deliverables. For years the functional employees were called subordinates. Although this term still exists in textbooks, industry prefers to regard the assigned employees as "associates" rather than subordinates. The reason for this is that in project management the associates can be a higher pay grade than the project manager. The associates can even be a higher pay grade than their functional manager.

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

1.7 DEFINING THE EXECUTIVE'S ROLE

In a project environment there are new expectations of and for the executives, as well as a new interfacing role.[5] Executives are expected to interface a project as follows:

- In project planning and objective-setting
- In conflict resolution
- In priority-setting
- As project sponsor[6]

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 as to project status. If project managers provide executives with meaningful status reports, then the so-called meddling may be reduced or even eliminated.

5. The expectations are discussed in Section 9.3.
6. The role of the project sponsor is discussed in Section 10.1.

PMBOK® Guide, 4th Edition
2.3.2 Sponsor

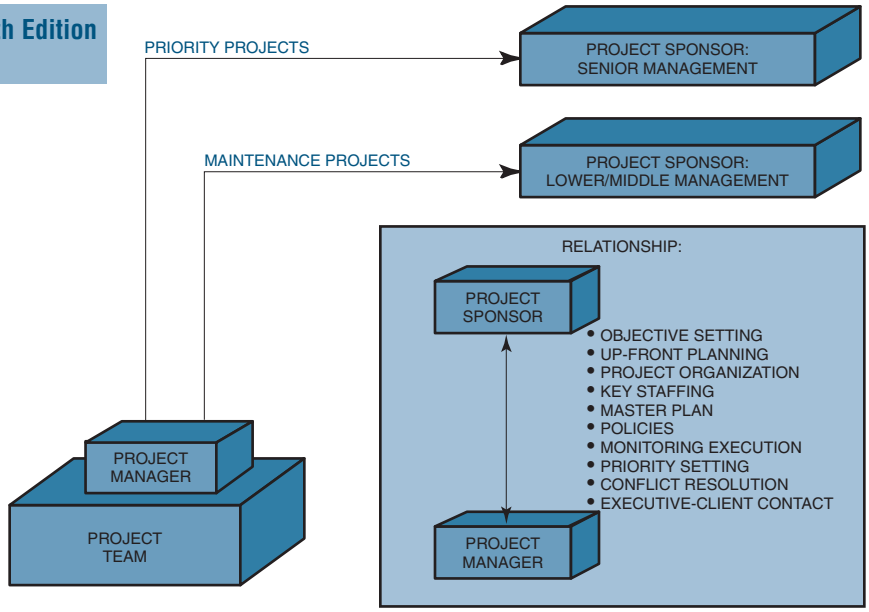

FIGURE 1–4. The project sponsor interface.

1.8 WORKING WITH EXECUTIVES

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, then even delicate balancing may not prevent the stool from toppling.

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, in excellent companies, 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 1–4,[7] 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.

7. Section 10.1 describes the role of the project sponsor in more depth.

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 1–4. 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.

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.

1.9 THE PROJECT MANAGER AS THE PLANNING AGENT

PMBOK® Guide, 4th Edition
Chapter 9 Project Human Resources 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

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. However, project managers cannot make any promises to a functional employee concerning:

- Promotion
- Grade
- Salary
- Bonus
- Overtime
- Responsibility
- Future work assignments

These seven items can be administered by line managers only, but the project manager can have indirect involvement by telling the line manager how well an employee is doing (and putting it in writing), requesting overtime because the project budget will permit it, and offering individuals the opportunity to perform work above their current pay grade. However, such work above pay grade can cause severe managerial headaches if not coordinated with the line manager, because the individual will expect immediate rewards if he performs well.

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.

1.10 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 1–3. PROJECT MANAGERS 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

Table 1–3 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.

1.11 THE DOWNSIDE OF PROJECT MANAGEMENT

Project management is often recognized only as a high-salaried, highly challenging position whereby the project manager receives excellent training in general management.

For projects that are done for external sources, the project manager is first viewed as starting out with a pot of gold and then as having to manage the project so that sufficient profits will be made for the stockholders. If the project manager performs well, the project will be successful. But the personal cost may be high for the project manager.

There are severe risks that are not always evident. Some project management positions may require a sixty-hour workweek and extensive time away from home. When a project manager begins to fall in love more with the job than with his family, the result is usually lack of friends, a poor home life, and possibly divorce. During the birth of the missile and space programs, companies estimated that the divorce rate among project managers and project engineers was probably twice the national average. Accepting a project management assignment is not always compatible with raising a young family. Characteristics of the workaholic project manager include:

- Every Friday he thinks that there are only two more working days until Monday.
- At 5:00 P.M. he considers the working day only half over.
- He has no time to rest or relax.
- He always takes work home from the office.
- He takes work with him on vacations.

1.12 PROJECT-DRIVEN VERSUS NON–PROJECT-DRIVEN ORGANIZATIONS

PMBOK® Guide, 4th Edition
2.4.2 Organizational Systems
2.2 Project-Based and Non–Project-Based

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 proj-ect 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 around 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

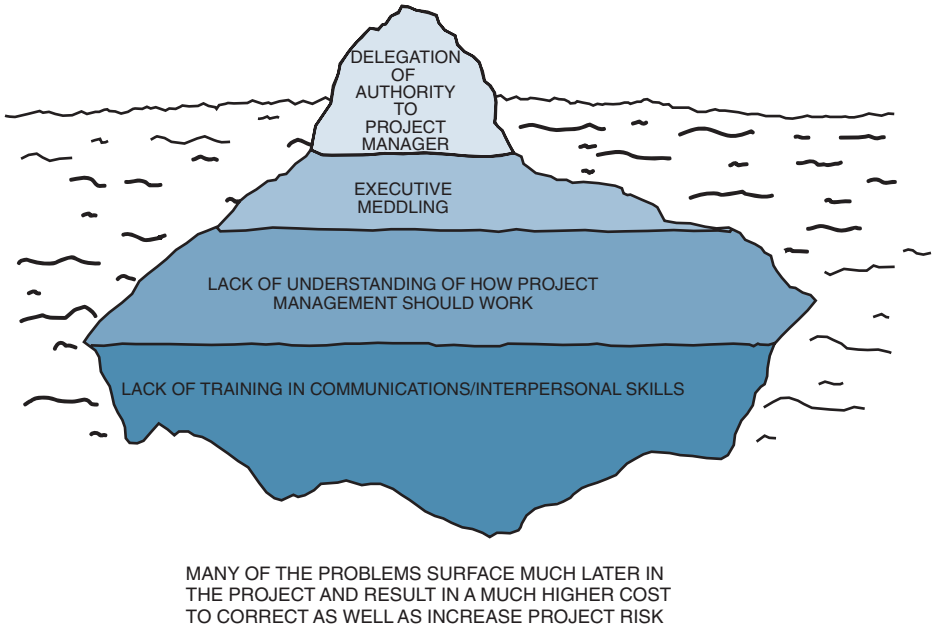

FIGURE 1–5. The tip-of-the-iceberg syndrome for matrix implementation.

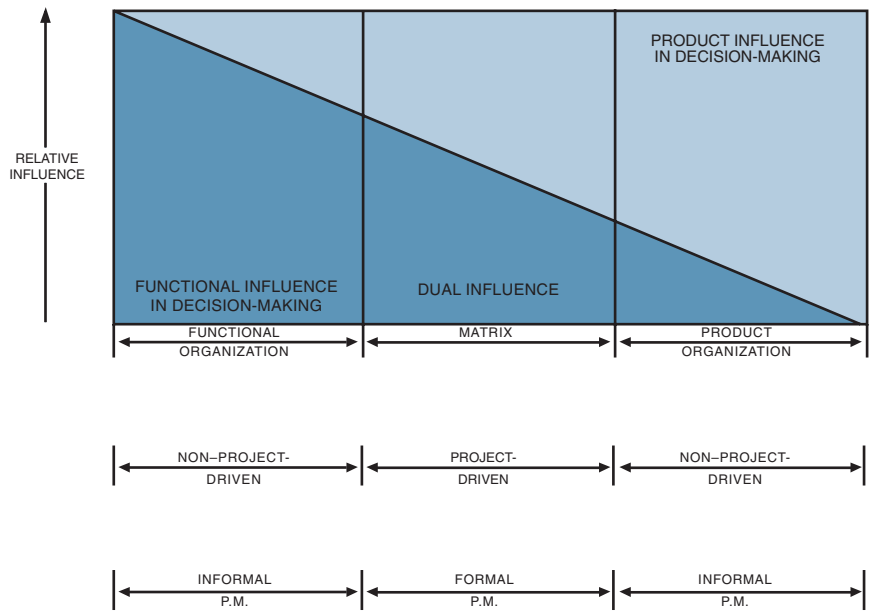

FIGURE 1–6. Decision-making influence.

- Slow implementation
- A lack of a cost-tracking system for implementation
- Poorly defined performance criteria

Figure 1–5 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.

In the previous sections we stated that project management could be handled on either a formal or an informal basis. As can be seen from Figure 1–6, informal project management most often appears in non–project-driven organizations. It is doubtful that informal project management would work in a project-driven organization where the project manager has profit-and-loss responsibility.

1.13 MARKETING IN THE PROJECT-DRIVEN ORGANIZATION

PMBOK® Guide, 4th Edition
1.4.3 Projects and Strategic Planning

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 commerical 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. This strategy of winning new business is supported by systematic, disciplined approaches, which are illustrated in Figure 1–7.

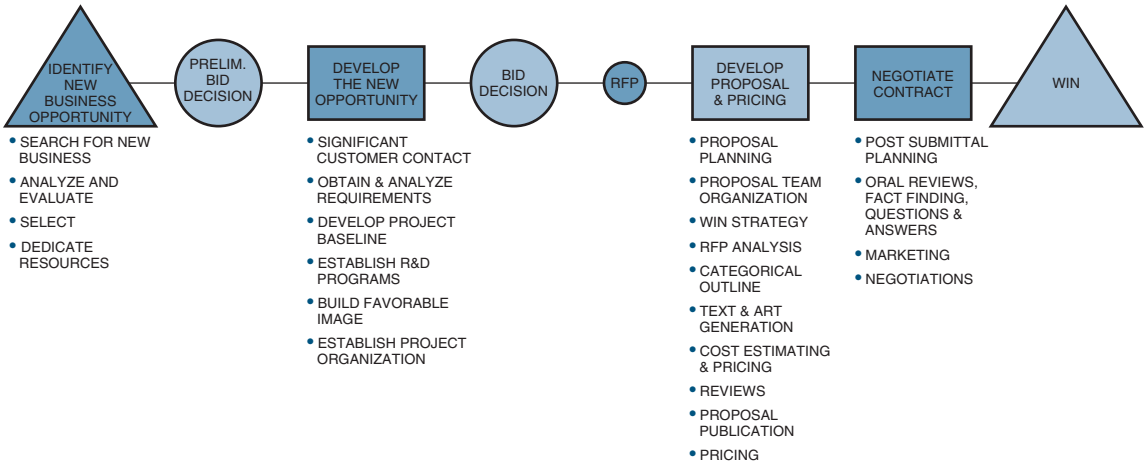

FIGURE 1–7. The phases of winning new contracts in project-oriented businesses.

1.14 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 1–4 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 1–4. 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
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

1.15 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:

- What salary should the project manager earn?
- To whom should the project manager report?

Figure 1–8 shows a typical organizational hierarchy (the numbers represent pay grades). Ideally, the project manager should be at the same pay grade as the individuals with whom he must negotiate on a daily basis. Using this criterion, and assuming that the project manager interfaces at the department manager level, the project manager should earn a salary between grades 20 and 25. 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

PMBOK® Guide, 4th Edition
2.4 Organizational Influences

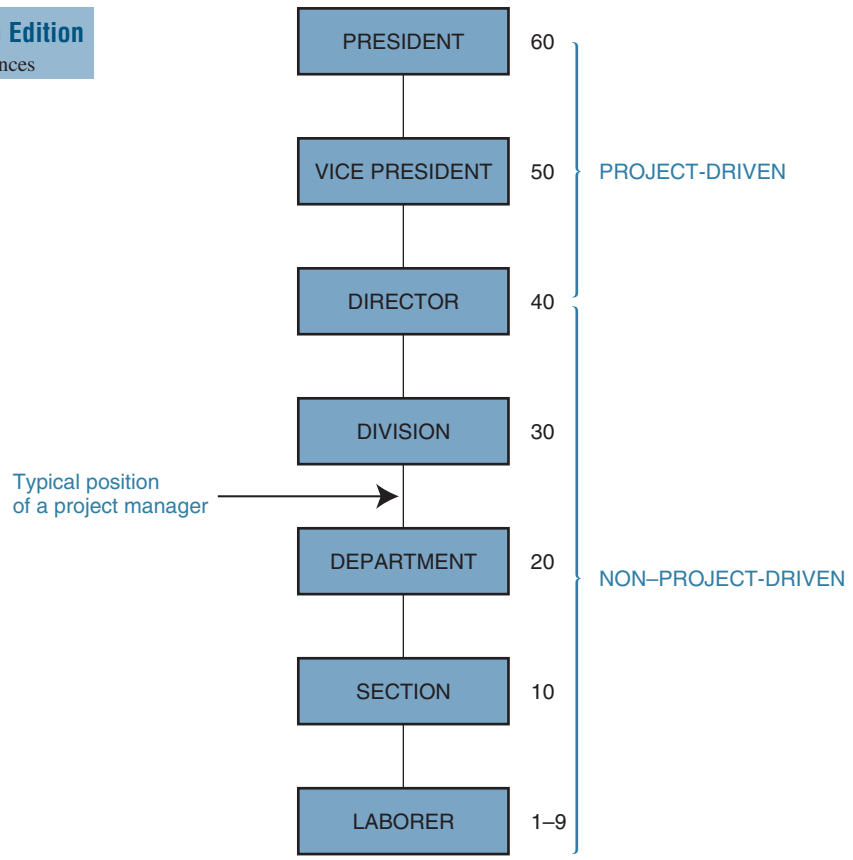

FIGURE 1–8. Organizational hierarchy.

organization is project- or non–project-driven, and whether the project manager is responsible for profit or loss.

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, he may report low. Likewise, the positioning of the project manager may be dependent on the risk of the project, the size of the project, or the customer.

Finally, it should be noted that even if the project manager reports low, he 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. As an example, see Figure 1–9. The project manager had two weeks to plan and price out a small project. Most of the work was to be accomplished within one section. The project manager was told that all requests for work, even estimating, had to follow the chain of command from the executive down through the section supervisor. By the time the request was received by the section supervisor, twelve of the fourteen days were gone, and only an order-of-magnitude estimate was possible. The lesson to be learned here is:

The chain of command should be used for approving projects, not planning them.

Forcing the project manager to use the chain of command (in either direction) for project planning can result in a great deal of unproductive time and idle time cost.

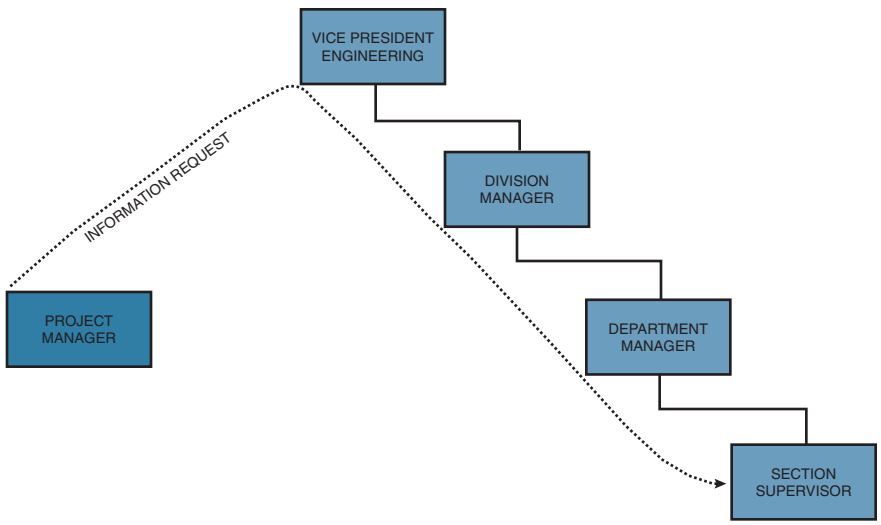

FIGURE 1–9. The organizational hierarchy: for planning and/or approval?

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

- Through project management
- Through project engineering
- Through line management

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 the project manager because of his 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, it becomes important, as shown in the following letter[8]:

> In order to sense and react quickly and to insure rapid decision-making, lines of communication should be the shortest possible between all levels of the organization. People with the most knowledge must be available at the source of the problem, and they must have decision-making authority and responsibility. Meaningful data must be available on a timely basis and the organization must be structured to produce this environment.
>
> In the aerospace industry, it is a serious weakness to be tied to fixed organization charts, plans, and procedures. With regard to organization, we successfully married the project concept of management with a central function concept. What we came up with is an organization within an organization—one to ramrod the day-to-day problems; the other to provide support for existing projects and to anticipate the requirements for future projects.
>
> The project system is essential in getting complicated jobs done well and on time, but it solves only part of the management problem. When you have your nose to the project grindstone, you are often not in a position to see much beyond that project. This is where the central functional organization comes in. My experience has been that you need this central organization to give you depth, flexibility, and perspective. Together, the two parts permit you to see both the woods and the trees.
>
> Initiative is essential at all levels of the organization. We try to press the level of decision to the lowest possible rung of the managerial ladder. This type of decision-making provides motivation and permits recognition for the individual and the group at all levels. It stimulates action and breeds dedication.

8. Letter from J. Donald Rath, Vice President of Martin-Marietta Corporation, Denver Division, to J. E. Webb, of NASA, October 18, 1963.

With this kind of encouragement, the organization can become a live thing—sensitive to problems and able to move in on them with much more speed and understanding than would be normally expected in a large operation. In this way, we can regroup or reorganize easily as situations dictate and can quickly focus on a "crisis." In this industry a company must always be able to reorient itself to meet new objectives. In a more staid, old-line organization, frequent reorientation usually accompanied by a corresponding shift of people's activities, could be most upsetting. However, in the aerospace industry, we must be prepared for change. The entire picture is one of change.

1.17 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.

1.18 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
- Human Resources 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 triple constraint
- 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® Guide and the glossary of terms at the end of the PMBOK® Guide.

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 reviews some of the concepts. The minicases 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 minicases appear in Appendix D.

The following multiple-choice questions will be helpful in reviewing the above principles:

1. The triple 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 upon the size of the profit margin.

ANSWERS

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

PROBLEMS

1–1 In the project environment, cause-and-effect relationships are almost always readily apparent. Good project management will examine the effect in order to better understand the cause and possibly prevent it from occurring again. Below are causes and effects. For each one of the effects, select the possible cause or causes that may have existed to create this situation:

Effects

1. Late completion of activities
2. Cost overruns
3. Substandard performance
4. High turnover in project staff
5. High turnover in functional staff
6. Two functional departments performing the same activities on one project

Causes

a. Top management not recognizing this activity as a project
b. Too many projects going on at one time
c. Impossible schedule commitments
d. No functional input into the planning phase
e. No one person responsible for the total project
f. Poor control of design changes
g. Poor control of customer changes
h. Poor understanding of the project manager's job
i. Wrong person assigned as project manager
j. No integrated planning and control
k. Company resources are overcommitted
l. Unrealistic planning and scheduling
m. No project cost accounting ability
n. Conflicting project priorities
o. Poorly organized project office

(This problem has been adapted from Russell D. Archibald, *Managing High-Technology Programs and Projects,* New York: John Wiley, 1976, p. 10.)

1–2 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

1. Upper-level manager
2. Project manager
3. Functional manager
4. Project team member
5. 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

1–3 Consider an organization that is composed of upper-level managers, middle- and lower-level managers, and laborers. Which of the groups should have first insight that an organizational restructuring toward project management may be necessary?

1–4 How would you defend the statement that a project manager must help himself?

1–5 Will project management work in all companies? If not, identify those companies in which project management may not be applicable and defend your answers.

1–6 In a project organization, do you think that there might be a conflict in opinions over whether the project managers or functional managers contribute to profits?

1–7 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?

1–8 Do you think that functional managers would make good project managers?

1–9 What types of projects might be more appropriate for functional management rather than project management, and vice versa?

1–10 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

1–11 Classical management has often been defined as a process in which the manager does not necessarily perform things for himself, but accomplishes objectives through others in a group situation. Does this definition also apply to project management?

1–12 Which of the following are basic characteristics of project management?

a. Customer problem
b. Responsibility identification
c. Systems approach to decision-making
d. Adaptation to a changing environment

e. Multidisciplinary activity in a finite time duration
f. Horizontal and vertical organizational relationships

1–13 Project managers are usually dedicated and committed to the project. Who should be "looking over the shoulder" of the project manager to make sure that the work and requests are also in the best interest of the company? Does your answer depend on the priority of the project?

1–14 Is project management designed to transfer power from the line managers to the project manager?

1–15 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?

1–16 Explain how the following statement can have a bearing on who is ultimately selected as part of the project team:
"There comes a time in the life cycle of all projects when one must shoot the design engineers and begin production."

1–17 How do you handle a situation where the project manager has become a generalist, but still thinks that he is an expert?

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 U.S.-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 work force, 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% of the employees lost their jobs when the company was relocated over 1,500 miles away.