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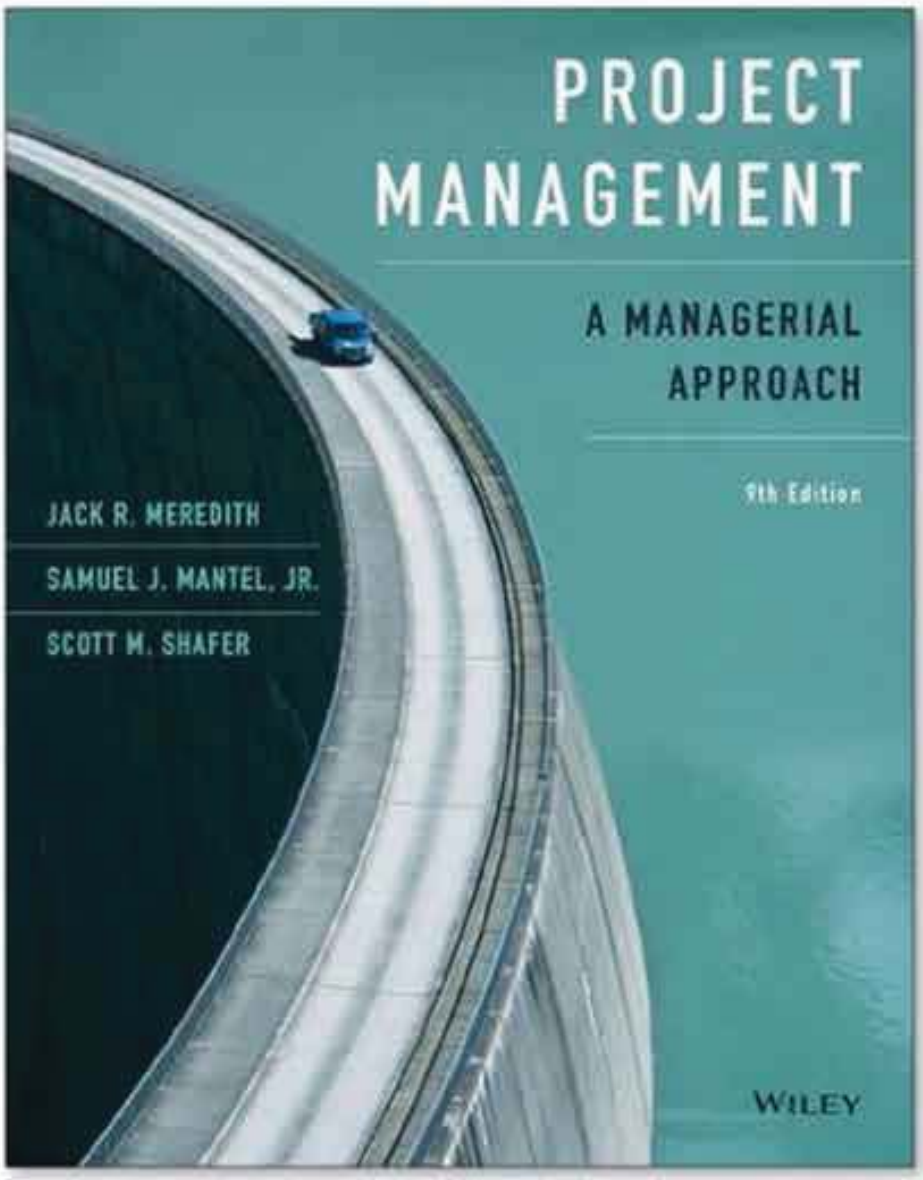

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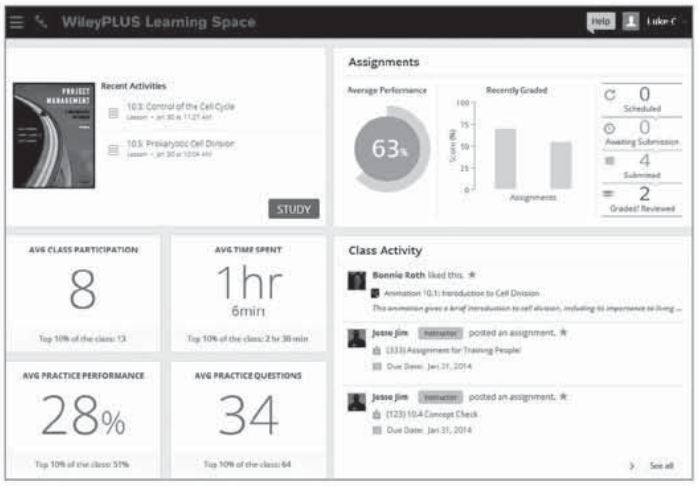

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- Appendix B: Answers to Even-Numbered Problems
- Appendix C: Technological Forecasting
- Appendix D: Creativity and Idea Generation
- Chapter 3 Appendix: Primer on Effective Time Management

Location of Materials for the Project Management Body of Knowledge (PMBOK) Areas

Area 1: Project Integration Management: Sections 6.1, 6.4, 10.1
Area 2: Project Scope Management: Sections 4.3, 4.5, 6.1, 11.3, 11.4
Area 3: Project Time Management: Sections 7.1, 11.2, Chapters 6, 8, 9, 10, 11
Area 4: Project Cost Management: Section 10.3, Chapters 7, 9
Area 5: Project Quality Management: Chapters 6, 12
Area 6: Project Human Resource Management: Sections 4.6, 5.7, 5.8, Chapters 3, 4
Area 7: Project Communications Management: Sections 3.2, 3.4, 4.1, 4.2
Area 8: Project Risk Management: Sections 6.1, 6.5, 7.3, 12.2, Chapters 10, 11
Area 9: Project Procurement Management: Sections 2.6, 6.4
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PROJECT MANAGEMENT

A Managerial Approach

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DEDICATION

To the memory of Sam Mantel, Jr.: Scholar, author, mentor, friend.

J. R. M. and S.M.S

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Preface

APPROACH

The use of projects and project management continues to grow in our society and its organizations. We are able to achieve goals through project organization that could be achieved only with the greatest of difficulty if organized in traditional ways. Though project management has existed since before the days of the great pyramids, its use has virtually exploded since the mid-1990s. Businesses regularly use project management to accomplish unique outcomes with limited resources under critical time constraints. In the service sector of the economy, the use of project management to achieve an organization's goals is even more common. Advertising campaigns, voter registration drives, political campaigns, a family's annual summer vacation, and even management seminars on the subject of project management are organized as projects. A relatively new growth area in the use of project management is the use of projects as a way of accomplishing organizational change. Indeed, there is a rapid increase in the number of firms that use projects as the preferred way of accomplishing almost everything they undertake.

As the field has grown, so has its literature. There are now professional books and booklets covering every imaginable aspect of project management: earned value calculations, team building, cost estimating, purchasing, project management software, scheduling, leadership, and so on. These are valuable for experienced project managers who can profit from advanced knowledge on specific topics. There are also handbooks—collections of articles written mainly by academics and consultants on selected topics of interest to project managers, somewhat akin to a summarized compilation of the books and booklets just noted.

When we wrote the first edition of this textbook in 1983, there weren't any textbooks for those interested in learning project management, only professional books. Now, however, there are a few, each using a different approach to learning the subject. One approach has been to take a behavioral orientation toward the subject, since teamwork is a key characteristic of projects. Another approach is to cover the basics, or tools, of project management in a straightforward and crisp manner. A third approach is to take a functional perspective, usually either engineering or information systems, since so many projects are engineering or IS endeavors. The approach we have used takes a *managerial* perspective. That is, it addresses project management from the perspective of what the project manager will encounter, both chronologically during the "life cycle" of the project as well as practically, in the sense of what the project manager needs to know and why. With this approach we hope that our educated future project managers understand not only the behaviors, tools, and topics of project management but also the context so they can apply, or change, the behaviors and tools for each unique situation they face in their projects.

This managerial perspective, we believe, addresses the basic nature of managing all types of projects—public, business, engineering, information systems, and so on—as well as the specific techniques and insights required to carry out this unique way of getting things done. It also deals with the problems of selecting projects, initiating and planning them, executing and controlling them, and finally evaluating and terminating them. It discusses the demands made on the project manager and the nature of the manager's interaction with the rest of the parent organization. And the book covers the difficult problems associated with conducting a project using people and organizations that represent different cultures and may be separated by considerable distances. Finally, it even covers the issues arising when the decision is made to terminate a project.

The book is primarily intended for use as a college textbook for teaching project management at the advanced undergraduate or master's level. The book is also intended for current and prospective project managers who wish to share our insights and ideas about the field. We have drawn freely on our personal experiences working with project managers and on the experience of friends and colleagues who have spent much of their working lives serving as project managers in what they like to call the "real world." Thus, in contrast to the books described earlier *about* project management, this book teaches students how to *do* project management. As well as being a text that is equally appropriate for classes on the management of service, product, or engineering projects, we have found that information systems (IS) students in our classes find the material particularly helpful for managing their IS projects. Thus, we have included some coverage of material concerning information systems and how IS projects differ from and are similar to regular business projects.

ORGANIZATION AND CONTENT

Given this managerial perspective, we have arranged the book to use the *project life cycle* as the primary organizational guideline. In this ninth edition we have kept the previous organization which demarks more clearly the activities that occur before the launch of the project, setting up those activities that have to do with the *context* (or *initiation*) of the project in the first part of the book, and those that have to do with the *planning* for the project in the second part. Actually *executing* the project to completion constitutes the third part of the book. Each part consists of four chapters, which seems to be a comfortable and easy framework for the reader.

Following an introductory chapter that comments on the role and importance of projects in our society and discusses project management as a potential career for aspiring managers, the book covers the context, events, and issues arising during the management of projects in the order in which they usually occur in the life of a project. *Part I, Project Initiation* concerns the context of the project, which is crucial for the project manager to understand if he or she is to be successful in executing the project. It begins with a description of how projects are selected for implementation, frequently based on their tie to the organization's strategy and goals. Part I also covers the many roles and responsibilities of the project manager, the skills the project manager needs for handling conflict, and the various ways of setting up the project within the organization's reporting structure (including how different ways of organizing projects tend to create different problems for project managers and their teams).

Part II, Project Planning then moves into the planning processes starting with the major tools used in project activity and risk planning. This is followed by project budgeting, project scheduling, and finally, resource allocation among the activities. *Part III, Project Execution* finally gets into the action, beginning with monitoring the activities, largely through information systems, and then controlling them to assure that the results meet expectations. Evaluating and possibly auditing the project at its major milestones or phase-gates is another, though separate, control action that senior management often employs, and last, the project must be terminated.

We have relegated the discussion of two important aspects of projects that usually occur very early in the project life cycle—creativity/idea generation and technological forecasting—to the book's Web site. Although few project managers engage in either of these tasks (typically being appointed to project leadership after these activities have taken place), we believe that a knowledge of these subjects will make the project manager more effective.

In writing this text we assume that all readers have taken an elementary course in management or have had equivalent experience, and are familiar with some basic principles of probability and statistics. (Appendix A on the Web site (http://www.wiley.com/college/meredith) can serve as an initial tutorial on the subject or as a refresher for rusty knowledge.)

Any approach chosen to organize knowledge carries with it an implication of neatness and order that rarely occurs in reality. We are quite aware that projects almost never proceed in an orderly, linear way through the stages and events we describe here. The need to deal with change and uncertainty is a constant task for the project manager. We have tried to reflect this in repeated references to the organizational, interpersonal, economic, and technical glitches that create crises in the life cycle of every project, and thus in the life of every project manager.

Finally, although we use a life-cycle approach to organization, the chapters include material concerning the major areas of the *Project Management Body of Knowledge* (PMBOK®) as defined by the Project Management Institute. (See Bibliography for Chapter 1.) Anyone wishing to prepare for PMI certification (see Chapter 1) in some of these areas may have to go beyond the information covered in this text.

PEDAGOGY

Because this book is primarily a textbook, we have included numerous pedagogical aids to foster this purpose. As in earlier editions, *short summaries* appear at the end of the text of each chapter, followed by *glossaries* defining key terms and concepts introduced in the chapter. End-of-chapter materials also include *review questions* and *problems* revisiting the materials covered in the chapter. The answers (though not the detailed solutions) to the even-numbered problems are on the book's Web site. There are also sets of conceptual *discussion questions* intended to broaden the students' perspectives and to force them to think beyond the chapter materials to its implications. To keep our attitude in perspective, we occasionally offer *Dilbert*® cartoons appropriate to the topic under discussion. Finally, there are questions covering the many Project Management in Practice application examples located throughout the chapters, which have now been moved directly into the PMIP boxes.

As in the past, we include *incidents for discussion*, which are brief "caselettes" oriented primarily toward the specific subjects covered in the chapter, but sometimes materials and concepts covered in earlier chapters. We also offer a *continuing integrative class project* for those users who prefer a running case throughout the chapters that builds on the chapter materials as students progress through the book. And at the very end of each chapter we typically offer a *reading* and/or a *case*, with potential discussion questions at the end of each.

WHAT'S NEW

In this edition, we have made many updates, additions, and changes.

- First, Scott Shafer has joined the team, bringing a wealth of knowledge about simulation, team processes, and PMBOK standards to the book.
- One of the major changes to the supplements has been the replacement and addition (Chapters 3, 4, 5, 7, 8, 9, 10, and 11) of many cases and readings, particularly with shorter, more timely readings.

- Similarly, we have added or replaced quite a few of the Project Management in Practice examples. And, as mentioned, we have moved the PMIP questions from the end of the chapter directly into the boxes so the intent of the example is clear to the student when reading it.
- We have enhanced the Continuing Integrative Class Project exercises at the rear of the chapters.
- We have also put a major effort into aligning the book with the fifth edition (2013) of PMBOK® in multiple ways.
- We have added a new online Appendix for Chapter 3 on Time Management for the project manager.
- We have added a substantial amount in Chapters 1, 3, 4 (a new section), and 6 on the important role of stakeholders in the project. Also in Chapter 4 we have expanded the discussion on dealing with conflict.
- In Chapters 3, 11, and 13 we address some of the ethical as well as practical issues in working with sponsors and clients who need to be informed when the project is not expected to meet its strategic goals, or wish to change the scope of the project.
- In Chapter 3, we discuss in detail the importance of emotional intelligence to the project manager and have also added a discussion on the stages of team development.
- In Chapter 5, we added a considerable amount concerning the results of new research on the Project Management Office.
- We added a subsection in Chapter 6 on the whole-brain approach to project planning through the mind-mapping technique. We also added some material on requirements planning in Chapter 6 using the Requirements Traceability Matrix and what elements are expected in a project plan according to PMBOK.
- In Chapter 6, we also added a lot more on risk management, and then in Chapter 7 illustrated the simulation of both time and costs to better identify all the risks for a project. In Chapter 1, we now include risk management as the second major task of the project manager, in addition to making the usual time, cost, and scope trade-offs.
- Chapter 8 contains a new section on incorporating costs into the simulation analysis and the discussion of Goldratt's *Critical Chain* was expanded in Chapter 9.
- Finally, we added more material in a number of different areas concerning strategic projects, especially for organizational change, real options, project portfolio management, team development, clues for the project manager on dealing with complex projects, leadership skills, dealing with conflict, agile project management, sensitivity analysis for risk determination, the reserve analysis technique, the critical chain, clues to dysfunctions in the project control process, burnup and burndown charts, phase-gate processes, and relevant factors in project failures and successes.

As before, a student version of Crystal Ball®, an Excel® add-in, again comes with the book. This software makes simulation reasonably straightforward and not particularly complicated. The use of simulation as a technique for risk analysis is demonstrated in several ways in different chapters. (Because relatively few students are familiar with simulation software, step-by-step instructions are included in the text.)

Microsoft Project® has become the dominant application software in the field, outselling its closest competitor about 4 to 1. Our coverage of software tends, therefore, to be centered on Microsoft Project® (and on Crystal Ball®), but includes a brief discussion of the many "add-ons" that are now available to supplement Microsoft Project® and its competitors. Because the various

versions of Microsoft Project® are quite similar in the way that they perform most of the basic tasks of project management, we generally do not differentiate between the versions, referring to any and all simply as Microsoft Project (MSP). We have also added some exercises to the end-of-chapter material that can utilize computer software. Similar materials are also available on the Web site.

One option available to educational institutions adopting this Wiley textbook is a free 3-year membership to the MSDN Academic Alliance. The MSDN AA is designed to provide the easiest and most inexpensive way for academic departments to make the latest Microsoft software available in labs, classrooms, and on student PCs.

Microsoft Project 2013 software is available through this Wiley and Microsoft publishing partnership, free of charge with the adoption of any qualified Wiley textbook. Each copy of Microsoft Project is the full version of the software, with no time limitations, and can be used indefinitely for educational purposes. Contact your Wiley sales rep for details. For more information about the MSDN AA program, go to http://msdn.microsoft.com/academic/.

There is, of course, the danger that human nature, operating in its normal discreet mode, will shift the task of learning project management to that of learning project management software. Projects have often failed because the project manager started managing the software instead of the project. Instructors need to be aware of the problem and must caution students not to fall into this trap.

ONLINE SUPPLEMENTS

The *Instructor's Resource Guide* on the Web site www.wiley.com/college/meredith provides additional assistance to the project management instructor. In addition to the answers/solutions to the problems, questions, readings, and cases, this edition includes teaching tips, a computerized test bank, additional cases, and PowerPoint slides. All of these valuable resources are available online (http://www.wiley.com/college/meredith). In addition, the student Web site contains Web quizzes, PowerPoint® slides, Appendix A: Probability and Statistics, Appendix B: Answers to Even-Numbered Problems, Appendix C: Technological Forecasting, Appendix D: Creativity and Idea Generation, Chapter 3 Appendix: Primer on Effective Time Management, and a Microsoft Project Manual.

ACKNOWLEDGMENTS

We owe a debt of gratitude to all those who have helped us with this book. First, we thank the managers and students who helped us solidify our ideas about proper methods for managing projects and proper ways of teaching the subject. Second, we thank the project teams and leaders in all of our project management classes. Third, we thank the adopters and reviewers of the many editions of this book, many who contacted us personally to convey improvements and corrections. Last, we thank the staff at Wiley for their help in the production of this book, and Suzie Chapman and Namit Grover/Thomson Digital in particular.

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Contents

C H A P T E R

1

Projects in Contemporary Organizations

The past several decades have been marked by rapid growth in the use of project management as a means by which organizations achieve their objectives. In the past, most projects were external to the organization—building a new skyscraper, designing a commercial ad campaign, launching a rocket—but the growth in the use of projects lately has primarily been in the area of projects internal to organizations: developing a new product, opening a new branch, implementing a new enterprise software system, improving the services provided to customers, and achieving strategic objectives. As exhilarating as outside projects are, successfully executing internal projects is even more satisfying in that the organization has substantially improved its ability to execute more efficiently, effectively, or quickly, resulting in an agency or business that can even better contribute to society while simultaneously enhancing its own competitive strength. Fundamentally, project management provides an organization with powerful tools that improve its ability to plan, implement, and control its activities as well as the ways in which it utilizes its people and resources.

In this introductory chapter to project management, we begin by defining precisely what a project is. Both the objectives and characteristics of projects are also discussed to help further define them. Next, we address the emergence of project management, the forces that have fostered project management, and recent trends in project management. Following this, we describe the project life cycle. Finally, the chapter concludes with an overview of the structure of the remainder of the text.

1.1 THE DEFINITION OF A "PROJECT"

PMBOK Guide
Glossary

Formally, a project may be defined as "A temporary endeavor undertaken to create a unique product, service, or result" (PMBOK®, Project Management Institute, 2013, p. 417). Consistent with this definition, there is a rich variety of projects to be found in our society. Although some may argue that the construction of the Tower of Babel or the Egyptian pyramids were some of the first "projects," it is probable that cavemen formed a project to gather the raw material for mammoth stew. It is certainly true that the construction of Boulder Dam and Edison's invention of the light bulb were projects by any sensible definition. Modern project management, however, is usually said to have begun with the Manhattan Project. In its early days, project management was used mainly for very large, complex research and development (R & D) projects like the development of the Atlas Intercontinental Ballistic Missile and similar military weapon systems. Massive construction programs were also organized as projects, including the construction of dams, ships, refineries, and freeways.

As the techniques of project management were developed, mostly by the military, the use of project organization began to spread. Private construction firms found that organizing work on the basis of projects or a project–based organization was helpful on smaller projects, such as the building of a warehouse or an apartment complex. Automotive companies used project organization to develop new automobile models. Both General Electric and Pratt & Whitney used project organization to develop new jet aircraft engines for airlines, as well as the Air Force. Project management has even been used to develop new models of shoes and ships. More recently, the use of project management by international organizations, and especially organizations producing services rather than products, has grown rapidly. Advertising campaigns, global mergers, and capital acquisitions are often handled as projects, and the methods have spread to the nonprofit sector. Weddings, scout-o-ramas, fund drives, election campaigns, parties, and recitals have all made use of project management. Most striking has been the widespread adoption of project management techniques for the development of computer software.

To add to our vocabulary, in discussions of project management it is sometimes useful to make a distinction between terms such as *project, program, task*, and *work packages*. The military, the source of most of these terms, generally uses the term *program* to refer to an exceptionally large, long-range objective that is broken down into a set of projects. These projects are divided further into *tasks*, which are, in turn, split into *work packages* that are themselves composed of *work units*. Of course, exceptions to this hierarchical nomenclature abound. For example, the Manhattan Project was a huge "program," but a "task force" was created to investigate the many potential futures of a large steel company. In the broadest sense, a project is a specific, finite task to be accomplished. Whether large- or small-scale or whether long- or short-run is not particularly relevant. What is relevant is that the project be seen as a unit. There are, however, some objectives that all projects share and some attributes that characterize projects.

Three Project Objectives: The "Triple Constraint"

While multimillion-dollar, 5-year projects capture public attention, the overwhelming majority of all projects are comparatively small—though nonetheless important to doer and user alike. They involve outcomes, or deliverables, such as a new floor for a professional basketball arena, a new insurance policy to protect against a specific casualty loss, a new Web site, a new casing for a four-wheel-drive minivan transmission, a new industrial floor cleanser, the installation of a new method for peer review of patient care in a hospital, even the development of new software to help manage projects. The list could be extended almost without limit. These undertakings have much in common with their larger counterparts. Importantly, they have the same general objectives—specified deliverables (also commonly known as *scope*[*]), a specific deadline (time), and budget (cost). We refer to these as "direct" project objectives or goals.

There is a tendency to think of a project solely in terms of its outcome—that is, its scope. But the time at which the outcome is available is itself a part of the outcome, as is the cost entailed in achieving the outcome. The completion of a building on time and on budget is quite a different outcome from the completion of the same physical structure a year late or 20 percent over budget, or both.

PMBOK Guide
Glossary

[*]The term "scope" is typically used when differentiating between what is included and what is excluded in something, but in project management the term has come to mean the specified deliverables. The Project Management Institute's Project Management Body of Knowledge ("PMBOK®") defines Scope as: "The sum of the products, services, and results to be provided as a project." We will refer to the PMBOK guide frequently throughout this book and use the icon seen here in the margin to draw the student's attention to this important reference (see the PMI reference in the chapter bibliography). If particular PMBOK figures, tables, sections, or chapters are relevant to the discussion, we note this under the icon as, for example, 3.2, which means Chapter 3, Section 2.

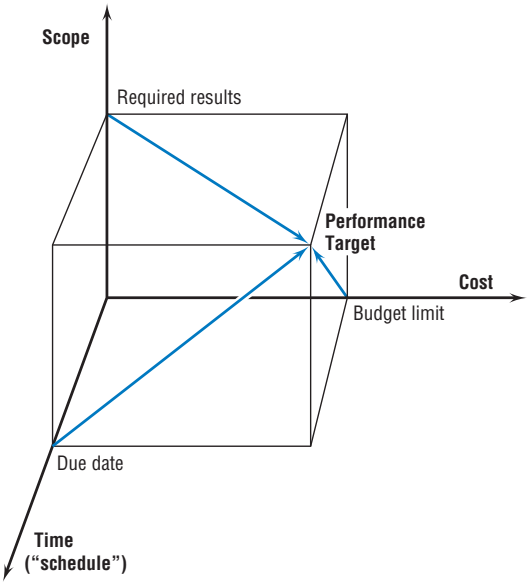


Figure 1-1 Direct project goals—scope, cost, time.

Indeed, even the concept of scope is perhaps more complex than is apparent. In particular, it is important to recognize that the expectations of the client are an inherent part of the project specifications. To consider the client's desires as different from the project specifications is to court conflict between client and project team. All too often projects begin with the client specifying a desired outcome. Then the project team designs and implements the project. Then the client views the result of the team's ideas. In following this approach, differences between the client's expectations and the project team's designs commonly develop as a project proceeds. As a result, meeting the client's desires may not be well reflected by the initially specified scope of the project. The expectations of client and project team therefore need to be continuously realigned and integrated throughout the entire project, but they frequently are not. As a result, we believe in making an effort upfront and throughout the project to ensure the nebulous elements of the client's evolving expectations and desires are identified and aligned with the "specified" scope stated in the project proposal.

The three direct project objectives are shown in Figure 1-1, with the specified project objectives on the axes. This illustration implies that there is some "function" that relates them, one to another—and so there is! Although the functions vary from project to project, and from time to time for a given project, we will refer to these relationships, or trade-offs, throughout this book. The two primary tasks of the project manager (the "PM") are to manage these trade-offs and to anticipate and address risks to the project. In addition to the direct project goals, organizations often have a unique set of ancillary project objectives/goals that are often unarticulated but nevertheless important to the success of the project. Ancillary goals include improving the organization's project management competency and methods, developing individuals' managerial experience through project management, gaining a foothold in a new market, and similar goals. In a more basic sense, those with a stake in the project (the project manager, project team, senior management, the client, and other project stakeholders) have an interest in making the project a success. Shenhar et al. (1997) have concluded that project success has four dimensions: (1) project efficiency, (2) impact on the customer, (3) the business impact on the organization, and (4) opening new opportunities for the future. The first two are clearly part of what we have defined as the project's direct objectives; the latter two are typical of what are frequently unspecified ancillary goals.

One other crucial, but unstated, trade-off that a PM must consider is the health of the project team as well as the rest of the organization. The PM cannot burn out the team in an attempt to

achieve the direct objectives, nor destroy the organization's functional departments in an attempt to meet the project's goals. Another factor in making project trade-offs is the project's *environment,* that is, those things or persons outside the project, and often outside the sponsoring organization, that affect the project or are affected by it. Examples of this environment might be antipollution groups, trade unions, competitive firms, and the like. We will deal with these issues in more detail in Chapter 12.

From the early days of project management, the direct project objectives of time, cost, and scope (as generally agreed to by the client and the organization actually doing the project) have been accepted as the primary determinants of project success or failure. In the past 25 years or so, other direct and ancillary objectives have been suggested. These did not replace the traditional time, cost, and scope, but were added as also relevant. For the most part, however, Chapters 1 through 11 will focus mainly on the traditional direct objectives.

Characteristics of Projects

There are three characteristics that all projects share and a number of other characteristics that are common to projects but not universal. We begin our discussion with the three universal characteristics and then direct our attention to several of the common characteristics.

The first universal characteristic of projects is that every project is unique. Though the desired end results may have been achieved elsewhere, every project has some unique elements. No two construction or R & D projects are precisely alike. Though it is clear that construction projects are usually more routine than R & D projects, some degree of customization is a characteristic of projects. In addition to the presence of risk, as noted earlier, this characteristic means that projects, by their nature, cannot be completely reduced to routine. The PM's importance is emphasized because, as a devotee of *management by exception*, the PM will find there are a great many exceptions to manage by.

The second universal characteristic is that a project is a one-time occurrence with a well-defined and specific set of desired end results. (We discuss poorly defined, or "quasi-" projects a bit later.) These end results are referred to as the "scope," or sometimes required "performance," of the project. The project can be divided into subtasks that must be accomplished in order to achieve the project goals. The project is complex enough that the subtasks require careful coordination and control in terms of timing, precedence, cost, and scope. Often, the project itself must be coordinated with other projects being carried out by the same parent organization.

The third universal characteristic of projects is that they have a finite duration. There is a clear date when the project is launched and a corresponding due date or deadline. Furthermore, like organic entities and their growth curve, projects have life cycles. Often starting with a slow beginning and progressing to a buildup of size, then peaking, beginning a decline, and finally must be terminated by some due date. (Also, like organic entities, they often resist termination.) Some projects end by being phased into the normal, ongoing operations of the parent organization. The life cycle is discussed further in Section 1.3 where an important exception to the usual description of the growth curve is mentioned. There are several different ways in which to view project life cycles. These will be discussed in more detail later.

Interdependencies

While not universally true, projects often interact with other projects being carried out simultaneously by their parent organization. Typically, these interactions take the form of competition for scarce resources between projects, and much of Chapter 9 is devoted to dealing with these issues. While such inter-project interactions are common, projects always interact with the parent organization's standard, ongoing operations. Although the functional departments of an

Project Management in Practice

A Unique Method for Traveler-Tracking at Copenhagen Airport

IT University of Copenhagen, Denmark was working with Copenhagen Airport to improve both the efficiency and effectiveness of the management of their airport through a new approach: traveler-tracking, but without invading people's privacy. The 3-year project focused on a unique, low-cost approach—capturing the Bluetooth signals from passengers' phones with two electronic readers that cost only $30 each. At the time, not everyone had a smartphone that emits signals, of course, but about 7 percent of the passengers do, enough to provide a completely random sample for tracking. To ensure travelers' privacy, a crucial stakeholder in this project, they collected only a portion of each signal and deleted the addresses. They also informed the public about the project on the airport's website and on-site as well. To encourage positive traveler response to the project, they provided alerts to passengers willing to synchronize their Bluetooth to receive information regarding when their plane was boarding and a map to the gate.

Knowing when people were entering and leaving Security allowed the airport to balance the staff at Security so lines didn't build up, thereby shortening the time passengers must wait, while also reducing over- and under-staffing of screeners. In addition, the information allows them to also post wait times at the check-in gates. The data also lets the airport determine which shops and areas are getting the most traffic so they can shift usage of facility space to better serve the travelers and the friends and families accompanying them. And when construction and rerouting changes traffic flows, they can determine the impact on passengers and take action to reduce the inconvenience.

Questions:

1. Are the triple constraints of this project clear? What are they?
2. What was unique about this project? What was the main conflict?
3. Why are the travelers themselves a stakeholder in this project, since most of them won't even know they are being tracked?
4. How widespread do you think this technology will become? What uses will be garnered from it? Do any of them concern you?

Source: S. F. Gale, "Data on the Go," *PM Network*, Vol. 24.

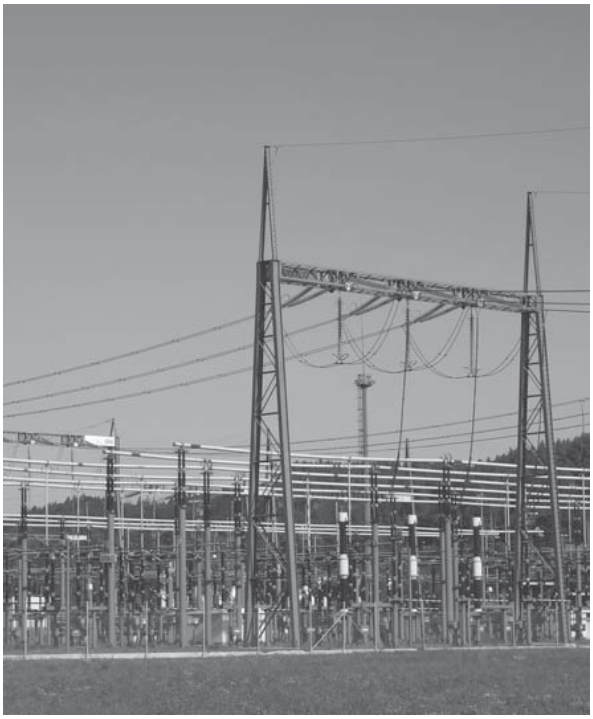
organization (marketing, finance, manufacturing, and the like) interact with one another in regular, patterned ways, the patterns of interaction between projects and these departments tend to be changeable. Marketing may be involved at the beginning and end of a project, but not in the middle. Manufacturing may have major involvement throughout. Finance is often involved at the beginning and accounting (the controller) at the end, as well as at periodic reporting times. The PM must keep all these interactions clear and maintain the appropriate interrelationships with all external groups.

Projects also typically have limited budgets, both for personnel as well as other resources. Often the budget is implied rather than detailed, particularly concerning personnel, but it is strictly limited. The attempt to obtain additional resources (or *any* resources) frequently leads to the next attribute—conflict.

More than most managers, the PM lives in a world characterized by conflict. Projects compete with functional departments for resources and personnel. More serious, with the growing proliferation of projects, is the project-versus-project conflict for resources within multiproject organizations. The members of the project team are in almost constant conflict for the project's resources and for leadership roles in solving project problems. The PM must be expert in conflict resolution, but we will see later that there are helpful types of conflict. The PM must recognize the difference.

Project Management in Practice

The Smart-Grid Revolution Starts in Boulder, Colorado



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Boulder's utility company, Xcel Energy, decided that it was time to create a roadmap for a 3-year, $100 million "smart-grid" electrical system that would span the entire city. There were no standards, benchmarks, or tested procedures for converting a city from a conventional electric-grid system to a fully integrated smart one, though it was known that if customers can monitor the true cost of their energy, they will automatically reduce their usage, by up to 30 percent in some cases. Of course, the smart grid would also allow Xcel to reroute power around bottlenecked lines, detect power outages, identify service risks, cut its use of road crews, read customer meters remotely, reduce outages, and identify false alarms more quickly.

Xcel brought in a mass of partners on the project, such as Accenture consulting for engineering, energy industry consultants, leading technologists, business leaders, IT experts, and of course, Boulder city managers, leaders, and user-citizens. The public and private partners were divided into eight teams, all led by a senior project manager working with a Project Management Office. With all these different stakeholders, with different objectives and interests, it was crucial to have steady, reliable communication to keep everyone up to date and the project on track. Security and privacy were high-priority items on the project, and communication with the community was facilitated through town hall meetings, the local media, tours of project sites, and even a touring trailer allowing citizens to get a hands-on demonstration of the smart-grid technology. With the completion of the project, Xcel is now measuring its many benefits and expects it will take a year to collect and analyze all the data across all the seasons. The project partners have also created an industry consortium to establish industry standards for future, larger smart-grid projects. They now see Boulder as a living laboratory from which they can continue to learn and thereby successfully deploy smart grids across the entire country.

Questions:

1. Are the triple constraints of this project clear? List each of them.
2. Given the range of benefits listed for the new technology, what interdependencies and conflicts do you suspect smart grids will create for utilities?
3. A major portion of this project had to do with carefully managing all the stakeholders. List those mentioned in the article and divide them into the four groups mentioned above. Do any stakeholders fall into more than one of the groups?
4. What conflicts do you suspect might have occurred between all the different stakeholders in this project?
5. Why do you imagine Xcel agreed to invest $100 million in this risky experiment? What might have been their ancillary goals?

Source: S. F. Gale, "A Closer Look," *PM Network*, Vol. 24.

Conventional thinking suggests different stakeholders (e.g., clients, the parent organization, the project team, and the public) define success and failure in different ways. For example, the client wants changes and the parent organization wants profits. Likewise, the individuals working on projects are often responsible to two bosses at the same time: a functional manager and the project manager. Under such conditions conflict can arise when the two bosses have different priorities and objectives.

While the conventional view tends to regard conflict as a rather ubiquitous part of working on projects, more recently others have challenged this view. For example, John Mackey, cofounder and co-CEO of Whole Foods Market, suggests in his recent book *Conscious Capitalism* (2013) that satisfying stakeholder needs is not a zero-sum game where satisfying one stakeholder must come at the expense of another. Rather, Mackey suggests a better approach is to identify opportunities to satisfy all stakeholder needs simultaneously. One way to accomplish this is to identify ways to align the goals of all stakeholders with the purpose of the project. As was mentioned earlier, the primary role of the project manager is to manage the tradeoffs. However, as Mackey warns, if we look for tradeoffs we will always find tradeoffs. On the other hand, if we look for synergies across the stakeholder base, we can often find them too. The clear lesson for project managers is to not be too quick to assume tradeoffs exist among competing project objectives and stakeholder groups.

Nonprojects and Quasi-Projects

If the characteristics listed above define a project, it is appropriate to ask if there are nonprojects. There are. The use of a manufacturing line to produce a flow of standard products is a nonproject. The production of weekly employment reports, the preparation of school lunches, the delivery of mail, the flight of Delta 1288 from Dallas to Dulles, checking your e-mail, all are nonprojects. While one might argue that each of these activities is, to some degree, unique, it is not their uniqueness that characterizes them. They are all *routine*. They are tasks that are performed over and over again. This is not true of projects. Each project is a one-time event. Even the construction of a section of interstate highway is a project. No two miles are alike and constructing them demands constant adaptation to the differences in terrain and substructure of the earth on which the roadbed is to be laid. Projects cannot be managed adequately by the managerial routines used for routine work.

In addition to projects and nonprojects, there are also quasi-projects: "Bill, would you look into this?" "Mia, we need to finish this by Friday's meeting." "Samir, can you find out about this before we meet with the customer?" Most people would consider that they have just been assigned a project, depending on who "we" and "you" is supposed to include. Yet there may be no specific task identified, no specific budget given, and no specific deadline defined. Are they still projects, and if so, can project management methods be used to manage them? Certainly! The scope, schedule, and budget have been implied rather than carefully delineated by the words "this," "meet," and "we" (meaning "you") or "you" (which may mean a group or team). In such cases, it is best to try to quickly nail down the scope, schedule, and budget as precisely as possible, but without antagonizing the manager who assigned the project. You may need to ask for additional help or other resources if the work is needed soon—is it needed soon? How accurate/thorough/detailed does it need to be? And other such questions.

One common quasi-project in the information systems area is where the project includes discovery of the scope or requirements of the task itself (and possibly also the budget and deadline). How can you plan a project when you don't know the scope requirements? In this case, the project is, in fact, determining the scope requirements (and possibly the budget and deadline also). If the entire set of work (including the discovery) has been assigned to you as a project, then the best approach is to set this determination as the first "milestone" in the project, at which point the

resources, budget, deadline, capabilities, personnel, and any other matters will be reviewed to determine if they are sufficient to the new project requirements. Alternatively, the customer may be willing to pay for the project on a "cost-plus" basis, and call a halt to the effort when the benefits no longer justify the cost.

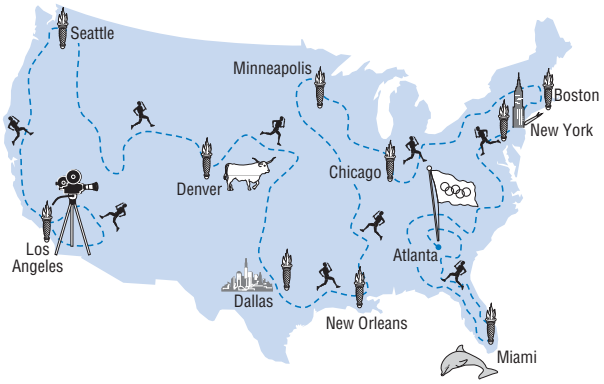
Project Management in Practice

The Olympic Torch Relay Project

Getting the Olympic Flame, known as the Olympic Torch Relay, to the Olympic Games is no simple matter. Generally, the Torch Relay has gotten longer and more complex with every Olympic event. In the 1936 Olympics the torch left from the original site of the Olympics, the Temple of Hera in Olympia, Greece, and traveled through seven countries to reach its final destination at the games in Berlin. For the Beijing 2008 Olympics, the flame traveled 137,000 kilometers (about 85,000 miles)! This increasing length and complexity are driven by the realization of host country citizens that it is a rare opportunity to have the Olympic torch pass through your hometown and the corresponding goal of the Olympic Committee to touch as many lives as possible in a positive way.

As an example, the planning for the 1996 Atlanta Olympic Torch Relay (see figure) took two years, cost over $20 million, and involved an 84 day, 42 state campaign using 10,000 runners to carry the torch for 15,000 miles! Accompanying the runners was a 40-vehicle caravan carrying security officers, media personnel, medical personnel, computers, telecommunications gear, clothing, food, and spare lanterns with extra flames in case the original torch went out. The caravan included: 50 cell phones; 120 radios; 30 cars; 10 motorcycles; and clothing for 10,000 runners, 10,000 volunteers, as well as 2,500 escort runners.

The torch relay is also a major marketing campaign, primarily for the relay's sponsors. Thus, accompanying the Atlanta-bound caravan were trucks hawking Olympic memorabilia: t-shirts, sweatshirts, baseball caps, tickets to the soccer matches, and on and on. In addition to retail commercialism, a number of companies were piggybacking on the torch relay to further their own commercial interests: IBM, Motorola, BellSouth, Texaco, BMW, Lee, Coca-Cola, and so on. The next games will be held in Rio de Janeiro in 2016—we can only wonder how far and how complex the Torch Relay will be then!



Questions:

1. Which of the three universal and three common characteristics of projects are displayed in the regular torch relay?
2. Since this is such a regular project—every 4 years since 1936—would you consider it a nonproject, or a quasi-project? Why, or why not?
3. Is the torch relay another part of the Olympics themselves, perhaps a subproject?

Sources: G. Ruffenach, "Getting the Olympic Flame to Atlanta Won't Be a Simple Cross-Country Run," *The Wall Street Journal*, 1996. http://olympics.india-server.com/torch-relay.html; www.bladesplace.id.au/olympic-games-candidates.html.

1.2 WHY PROJECT MANAGEMENT?

It is popular to ask, "Why can't they run government the way I run my business?" In the case of project management, however, business and other organizations learned from government, not the other way around. A lion's share of the credit for the development of the techniques and practices of project management belongs to the military, which faced a series of major tasks that simply were not achievable by traditional organizations operating in traditional ways. NASA's Apollo space program, and more recently, Boston's "Big Dig" tunnel and freeways project and the development of Boeing's 787 "Dreamliner" are a few of the many instances of the application of these specially developed management approaches to extraordinarily complex projects. Following such examples, nonmilitary government sectors, private industry, public service agencies, and volunteer organizations have all used project management to increase their effectiveness. For example, most firms in the computer software business routinely develop their output as projects or groups of projects.

Project management has emerged because the characteristics of our contemporary society demand the development of new methods of management. Of the many forces involved, three are paramount: (1) the exponential expansion of human knowledge; (2) the growing demand for a broad range of complex, sophisticated, customized goods and services; and (3) the evolution of worldwide competitive markets for the production and consumption of goods and services. All three forces combine to mandate the use of teams to solve problems that used to be solvable by individuals. These three forces combine to increase greatly the complexity of goods and services produced plus the complexity of the processes used to produce them. This, in turn, leads to the need for more sophisticated systems to control both outcomes and processes.

The basic purpose for initiating a project is to accomplish specific goals. The reason for organizing the task as a project is to focus the responsibility and authority for the attainment of the goals on an individual or small group. In spite of the fact that the PM often lacks authority at a level consistent with his or her responsibility, the manager is expected to coordinate and integrate all activities needed to reach the project's goals. In particular, the project form of organization allows the manager to be responsive to: (1) the client and the environment, (2) identify and correct problems at an early date, (3) make timely decisions about trade-offs between conflicting project goals, and (4) ensure that managers of the separate tasks that comprise the project do not optimize the performance of their individual tasks at the expense of the total project—that is, that they do not suboptimize.

Actual experience with project management (such as through the currently popular Six-Sigma projects) indicates that the majority of organizations using it experience better control and better customer relations and apparently an increase in their project's return on investment (Ibbs et al., 1997). A significant proportion of users also report shorter development times, lower costs, higher quality and reliability, and higher profit margins. Other reported advantages include a sharper orientation toward results, better interdepartmental coordination, and higher worker morale.

On the negative side, most organizations report that project management results in greater organizational complexity. Many also report that project organization increases the likelihood that organizational policy will be violated—not a surprising outcome, considering the degree of autonomy required for the PM. A few firms reported higher costs, more management difficulties, and low personnel utilization. As we will see in Chapter 5, the disadvantages of project management stem from exactly the same sources as its advantages. The disadvantages seem to be the price one pays for the advantages. On the whole, the balance weighs in favor of project organization if the work to be done is appropriate for a project.

The tremendous diversity of uses to which project management can be put has had an interesting, and generally unfortunate, side-effect. While we assert that all projects are to some