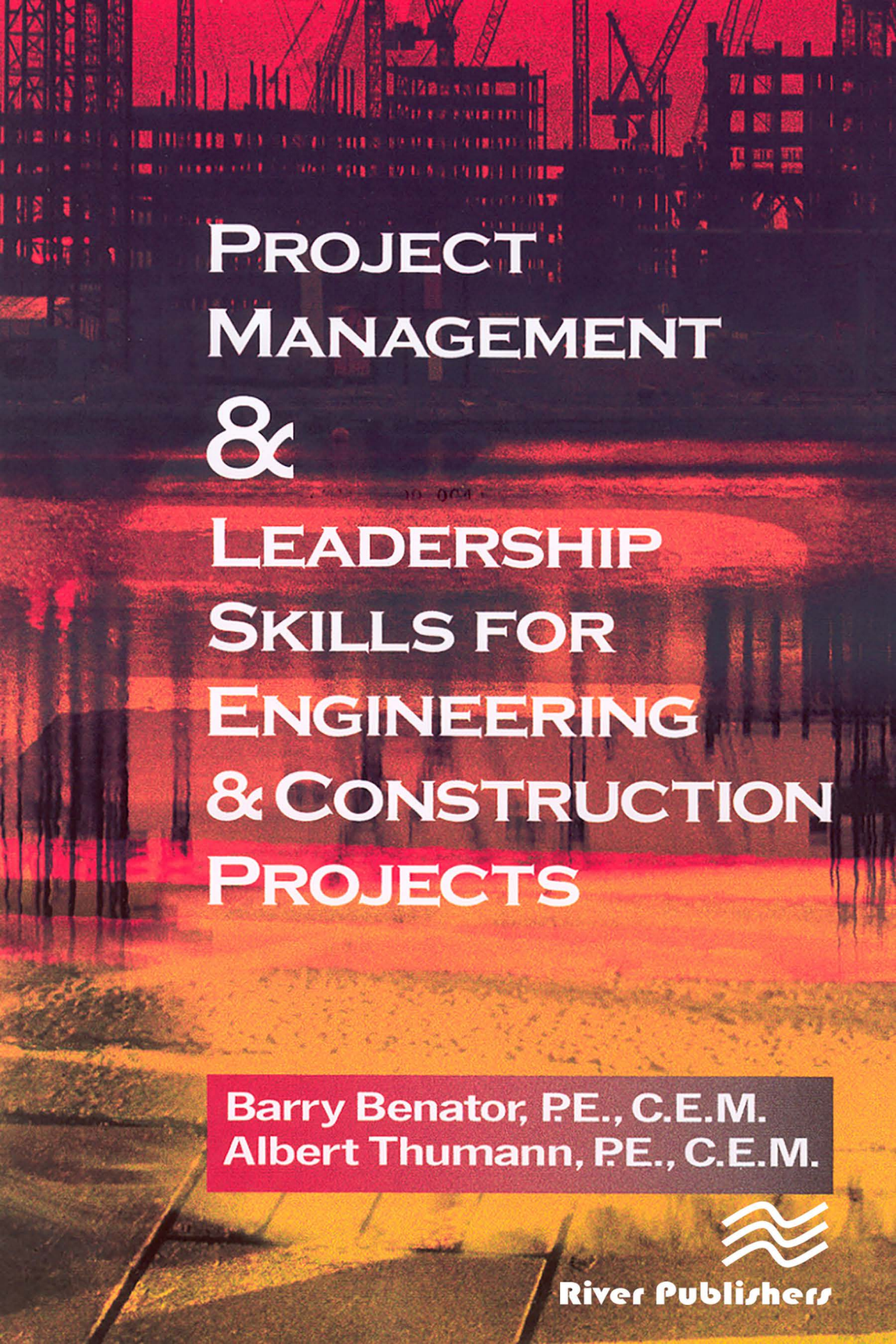




PROJECT MANAGEMENT & LEADERSHIP SKILLS FOR ENGINEERING & CONSTRUCTION PROJECTS

Barry Benator, P.E., C.E.M.
Albert Thumann, P.E., C.E.M.



River Publishers

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Contents

Preface	vi
Acknowledgment	ix
Chapter 1 Overview of Project Management	1
Chapter 2 Staffing the Project Team	13
Chapter 3 Fundamentals of Scheduling	29
Chapter 4 Computer Tools for Project Management	37
Chapter 5 Technical, Schedule, Financial Management.....	53
Chapter 6 Cost Estimating.....	73
Chapter 7 Leadership Fundamentals	101
Chapter 8 Effective Communications	141
Chapter 9 Economic Decision Making	149
Chapter 10 Contract Planning Essentials.....	185
Chapter 11 Commissioning Construction Projects	199
Chapter 12 Case Study: Microbial Abatement of a Moldy Hotel.....	215
Bibliography and References	225
Index	227



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Preface

A project can be defined as a large or important item of work, involving considerable expense, personnel, and equipment. It is typically a one-time endeavor, with a specific result or end-state envisioned. Examples of projects in the engineering and construction fields could include the upgrade of a building's heating, ventilating, and air-conditioning system, the design and construction of a new building, relocation of a manufacturing plant, or a comprehensive energy audit.

A project is distinguished from ongoing business activities by several characteristics:

Uniqueness. A project is typically a specific mission (design and build a new building or plant, upgrade a computer installation) as contrasted with ongoing business functions such as accounting, human resources, purchasing or manufacturing which are performed on a day-in, day-out basis, ideally with increasing productivity.

Duration. A project tends to be of finite duration with a defined start date and a planned completion date. Day-to-day business functions such as human resources, information technology support, accounting, word processing are typically in place before a project starts and will continue after the project is concluded.

People. People assigned to a project may come from any part of an organization or from outside the organization, and depending on the scope and budget of the project, may include engineering, construction, financial, scheduling, cost estimating and other professionals who can make the project a success. When the project is completed, these professionals will likely move on to other projects or back into line functions within the organization.

A project also shares several characteristics with ongoing business activities:

Budget. A project, like most line functions, has a budget.

Whatever the project is, the project manager will be responsible for managing his or her project to an on-time, technically sound result within the project budget.

People. A project is much more than engineering calculations or construction schedules. It involves people—nothing happens on a project without good people making it happen. The project manager will be involved in some or all of these people functions of project management—selecting, training, coordinating, leading, coaching, rewarding, disciplining, and supporting. A project manager deals with people all the time. If you are not willing to at least try to fulfill this responsibility, you should return his book now and get your money back. If you enjoy working with people or are willing to try, this book will help you succeed.

Relationships. Related to the people aspect of project management is the project manager's responsibility to manage relationships associated with the project. Internally, these include the people in your company who are members of your project team, your boss, your peers and supporting departments within your own company. Externally, they include your customer's people associated with the project, as well as any subcontractors and vendors who may be associated with the project.

Is Project Management for you? Is this book for you?

Do you take to the challenge of bringing together multiple and diverse resources to complete an engineering or construction project on-time, within-budget and to the customer's satisfaction? Are you are a successful engineer or construction manager seeking overall project responsibility? Do you enjoy working with people and helping them succeed through teamwork? Do you seek the professional opportunities and financial rewards of leading projects to successful conclusions?

If you answered yes to one or more of these questions, then this book is for you. It will give you, in straightforward and practical terms, information and guidance that will help you succeed in the real-world of engineering and construction project management. Let's get started!

Al Thumann, P.E. CEM
Barry Benator, P.E., CEM

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Chapter 1

Overview of Project Management

Barry Benator

If one word could describe the essence of project management it is *responsibility*. The project manager (PM) is responsible for all that happens on a project. This doesn't mean the project manager should or could do everything associated with the project; it does mean the PM owns ultimate responsibility for the project, regardless of who is on the project team and regardless of the obstacles encountered along the way to successful completion. In other words, the buck stops with the project manager. If that sounds like an awesome responsibility, then you have grasped the concept of what it means to be a project manager. For many people, it's an **exciting challenge**. Because, in addition to the large responsibilities of project management, there are numerous **rewards** for successful project managers. This book will help you meet those responsibilities and attain the rewards of becoming a successful project manager.

REWARDS OF PROJECT MANAGEMENT

There are a number of rewards associated with being a successful project manager. Listed below are a just few of them.

- The satisfaction of pulling together a diverse group of people from different organizations and creating a high performing project team that accomplishes the project's mission.
- The reward of helping these people perform their responsibilities and achieving success for themselves and the project.
- The reward of increased profits and enhanced cash flow to your company
- The reward of a satisfied and appreciative customer.
- The reward of repeat business from that customer.
- The reward of new business from other customers based on positive recommendations from your satisfied customer.
- The reward of enhanced career opportunities for you and your project team.

Good project managers are one of the few job functions which continue to be in demand by companies in almost every business sector. Good project managers have a bright future ahead of them. This book will help you achieve that brighter future.

THE PROJECT MANAGER'S RESPONSIBILITY

The technical knowledge and skills required to be a successful engineering or construction project manager are wide-ranging, but the good news is you don't need to be an expert in all of them. In fact, you don't need to be an expert in any of them; you do, however, need to have engineering or construction experience. However, as important as this technical experience is, even more important is the *will and commitment* to take on the overall responsibility for your projects. The fact that you are reading this book is a strong signal of your commitment to learn and practice good

leadership and management skills, which will help you fulfill your project management responsibilities and succeed as project manager.

A typical engineering or construction project will have many of the following disciplines associated with it:

- Electrical
- Mechanical
- Process
- Structural
- Architectural
- Civil
- Cost estimating
- Financial/accounting
- Purchasing
- Legal/contractual
- Insurance/risk management
- Purchasing
- Drafting/Computer Aided Design

The project manager's responsibility is to manage the financial, technical and schedule requirements of the project in such a manner as to bring the project in on-time, within budget and with a technical quality that meets or exceeds the contractual performance specifications.

SKILLS OF A SUCCESSFUL PROJECT MANAGER

While experience in engineering and construction is important, the critical skills you need to be a successful project manager (PM) are not technical. They are leadership and management skills—skills that will help you lead and manage the project in such a manner that the project's objectives are achieved.

While there are a number of definitions for leadership and management, we will use the following for the purpose of discussing project management in this book:

***Leadership**—the process of influencing individuals or groups to accomplish an organizational goal or mission*

Management—the process of *planning, organizing, directing and controlling a project or activity*

Often the exercise of leadership and management overlap, but the general meaning and intent is typically clear, so there is no need to become overly academic about these terms. As a general statement, *leadership* implies a people-based set of activities such as communicating, coaching, setting a personal example, providing recognition and feedback, supporting, etc. while *managing* tends to imply a more systematic set of activities such as planning, organizing, directing and controlling.

PLANNING THE PROJECT

Perhaps the best way for us to obtain an overview of the project management process is to look in detail about how to plan a project. Then in subsequent chapters, we will delve into specifics about each of the skills and activities associated with turning a project plan into a successful project.

In the author's experience of managing more than 300 projects and teaching more than 200 workshops on project management and leadership, one of the activities project managers tend to like the least and avoid the most is *planning*. Reasons vary but they seem to fall in the realm of "planning is not fun." Engineering project managers and construction managers tend to enjoy *doing* things—designing, coordinating, negotiating, installing, solving problems, etc. Planning, on the other hand, requires a more contemplative, long-term view of the project, and may encompass planning for activities that are "over the horizon" in terms of when they will occur. It requires *more thinking than doing* and often receives insufficient attention because it's not hands-on or immediate in its urgency. Yet, ***good planning is a cornerstone*** of a good project. Careful planning, along with good execution, almost always leads to a successful project. Poor planning, on the other hand, even with good ex-

ecution, may lead to a successful project, but often one that is fraught with crises, stress and loss of opportunities because the PM and his or her team were bailing out the project instead of looking ahead for other opportunities.

So, what are the ingredients of a successful project plan? Details vary from project to project, but the following elements are part of virtually every good project plan.

Deliverables

What are the deliverables and when are they due? A deliverable is anything specified in the contract that the engineer, construction firm, vendor or supplier has agreed to deliver to the customer. Examples of deliverables include specifications, drawings, cost estimates, project schedule, equipment, buildings, systems, training, etc. In the planning phase of a project, it is important to identify these deliverables, when they are due, and who has prime responsibility for each deliverable (the PM has the overall responsibility for each deliverable). Oftentimes a table that extracts from the contract all the specific deliverables is a good vehicle for getting everyone on the same page as to what is to be delivered and when. See Figure 1-1 for an example of such a deliverable table.

Resources

You will need a variety of resources to lead and manage successful projects. You will need:

- **People**—from your firm, your contractors, your consultants, your vendors and your customers.
- **Technology**—computers (for scheduling, budgets, word processing, calculations, drafting, project tracking, progress reports, e-mail, etc.), communications equipment (phones, pagers, faxes, etc.), Personal Digital Assistants (PDAs), etc.
- **Budget**—a clear picture of financial resources available to complete the project.

Figure 1-1. List of Deliverables (Example)

<i>Deliverable</i>	<i>Prime Responsibility</i>	<i>Date Due to PM/Customer</i>
List of Deliverables	Project Manager	
Project Schedule	Project Manager	
Bore Samples Report	ABC Soils Firm	
10% Drawings	Cognizant Engineers / Architects	
30% Drawings	Cognizant Engineers / Architects	
60% Drawings	Cognizant Engineers / Architects	
60% Specifications	Cognizant Engineers / Architects	
60% Cost Estimate	ABC Cost Estimating Firm	
90% Drawings	Cognizant Engineers / Architects	
90% Specifications	Cognizant Engineers / Architects	
90% Cost estimate	ABC Cost Estimating Firm	

- **Equipment**—earth movers, cranes, electrical, mechanical, etc.
- **Internal Accounting Support**—accounting reports, invoicing, payments to contractors and consultants, etc.

Resource Conflicts

Your plan should anticipate potential resource conflicts, and to the best extent possible, indicate how these conflicts will be managed. Typical resource conflicts include those listed below. Subsequent chapters will discuss these issues in detail.

- **People**—good people are always in demand, and it is extremely rare that your ideal project team will just be waiting around for you to tap them on the shoulder and give them the privilege of working on your project. They may be working on other projects, on a company task force, on vacation, or not even hired yet. Coming up with a plan to handle these people resource conflicts that meets your needs and the needs of your company will be crucial to the success of the project.
- **Technology**—with the steady dropping of prices for technology (computers, printers, phones, etc.) technology conflicts are becoming rarer. However, in a cash flow-tight environment, this can be a challenge for a project manager. Alternatives can include rental, borrowing from other projects or borrowing from a pool of technology equipment in your firm, etc.
- **Equipment**—equipment conflicts can range from earth moving equipment to portable offices to portable potties.

Seasonal Impacts

Seasonal impacts to your project need to be reflected in your project plan. The seasons can affect your project in a number of ways.

- **People**—In Winter, people catch colds and the flu, and they miss work. In the Summer, they take vacations. In either case they are not available to work on the project. Sometimes they are snowed in at home or out of town. Similarly, in some locales, hurricanes can be anticipated to halt or slow down productivity on a project. The prudent project manager will plan for an appropriate number of vacation days, sick days, snow days, hurricane days, etc. and factor that into his or her project schedule. It is not difficult to approximate the number of non-work days that will take place due to these factors and it should be done.
- **Site**—Weather can affect the ability to perform work at the construction site. Again, this can be anticipated and estimates made for so many non-work days due to site conditions.

Budgets

Whether you work for a for-profit, nonprofit or government organization, there will be a budget for your project. You will be responsible for preparing the budget if you are the PM at the initiation of the project, and for managing to the budget if you are the PM during the project's execution. The level of complexity of the budget should be commensurate with the overall complexity of the project.

- **Scoping**—To prepare a good, realistic budget, it is important to break down or scope-out the work effort into phases, tasks or whatever you prefer to call specific units of work. This is performed by analyzing the project's statement of work (also called scope of work) and identifying the costs and revenues associated with each phase of the project.
- **Budget Tools**—Use a financial management tool to prepare your budget. This can be a specialized computer program specifically made for project financial budgets and analysis or a customized spreadsheet that you can use to develop your

budget. The power and complexity of the program you use should be commensurate with the scope and dollars and risk of the project.

Schedule

A project always has a planned end date. To help ensure that the end date coincides with the actual completion of the project, a detailed schedule must be prepared. This schedule must list key phases, tasks, and milestones. It should also list who is responsible for performing these tasks or meeting the milestones and show dependency relationships among tasks.

Scheduling Tools

Your schedule should be computer based. As with the budget tools, you can select a dedicated project management program such as Microsoft® Project, SureTrak Project Manager®, Primavera Project Planner® or another appropriate project management program. You can also choose to develop a spreadsheet-based schedule management tool. The actual choice should be based on the complexity of the project and the capabilities of the scheduling program. One caution: use of a computer-based scheduling program should not be a “wag the dog” situation where so much time is spent updating and tweaking the scheduling program that it takes valuable time away from other important project management activities.

Agreement

Once you have completed the project planning steps discussed in this chapter, it is crucial that you have the various project team members “sign off” on their commitments to signify agreement with what they are going to do and when they are going to have it done. This can be in the form of a contract, a signed program plan, a set of minutes with a signature sheet or some other vehicle that establishes a firm commitment by the project team members that they will honor their commitments to the project plan.

But Plans Change, Don't They?

Sure they do. And your project plan with all its elements at various times will need to be revised to reflect real-world conditions and “changes on the ground.” This, however, does not mean a schedule should be revised just because of a problem or hitch on the project. Good project managers solve and work around the great majority of problems without changing a due date, an end budget or quality standards.

On the other hand, a change in project scope or a natural disaster could change deliverables, dates, dollars, etc. which could justify a revised project plan.

The Design of This Book

The design of this book is straightforward. In each of the chapters that follow, we provide specific, practical, real-world information that will help you learn and use effective project management and leadership skills. These chapters will expand on the topics discussed in this overview chapter. As you read each chapter, contemplate how you will use the information contained within it to help you be a better project manager/leader. If you are managing a project now, you will pick up valuable tools to help you right now. If you are slated to be a PM on an upcoming project, this book will help you when you pick up that project.

What happens after you complete this book is up to you. You are in charge of your own management and leadership behaviors. This book will help you succeed. Your colleagues will help you succeed. And your own experience in applying the principles contained in this book will help you succeed as a project manager. We wish you the very best in your project management career.



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Chapter 2

Staffing the Project Team

Barry Benator

There are a number of important factors that contribute to a successful project, but if one had to single out the most important factor, it would be *people*. Good people always find a way to make things happen—to overcome the many challenges inherent in any engineering or construction project. The project manager’s ability to influence who is assigned to his or her project can have a significant impact on the success of the project. And over many projects, that influence can range from very little (e.g., he or she inherits the project team members and must forge a successful team with the people given to him/her), to being told he or she can pick the best people for the job at hand.

Typically, however, the actual amount of influence the project manager has in selecting his or her project team falls somewhere between these two extremes. As a result, the project manager must employ a number of different strategies to obtain the best people for his or her project, consistent with the overall objectives of the organization. In lining up people for the project team, the project manager must be flexible, persuasive and assertive. Determining which of these characteristics to call upon at any particular time in the staffing process requires a nice sense of judgment that you will develop as you employ the principles identified in this chapter.

The successful PM will invest the time necessary to assemble the best project team that the constraints of the project and the organization will allow.

WHOM TO SELECT

The Right Type of Expertise

The people whom you select for your project team will depend on the nature of the project. Since you are reading this book, you are now either a project manager or construction manager or someone who aspires to become an engineering or construction project manager. Whichever category you fall into, you will want to select the right engineering disciplines, construction trades, and support staff that will best help you lead and manage a successful project.

Typical engineering and construction projects include some or all of the following engineering disciplines, construction trades and support staff:

- Electrical
- Mechanical
- Process
- Civil
- Structural
- Plumbing
- Energy Engineering
- Architecture
- Financial/accounting
- Purchasing
- Legal/contractual
- Insurance/risk management
- Cost estimating
- Purchasing
- Drafting/Computer Aided Design

Each project, with its own unique requirements, will determine how many and which types of these or other skills will be required to perform a successful project.

The Right Type of People

After you have determined what type of expertise is required for your project, you will want to find good people who possess the right kind of expertise needed on the project. This is where it is critically important that you do as much homework as possible on potential project team members.

Assuming you have some say in who will be assigned to your project (and you almost always will have some input as to