

Project Management Theory and Practice

Third Edition

Gary L. Richardson
Brad M. Jackson



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Preface

The roots of this effort go back many years in our collective attempts to install standard project development methodologies into large organizations. Also, through all those years we have been involved with projects of one kind or another. Around 2003, the roots of this effort began when one of the authors joined the University of Houston to teach project management thinking that it would be an easy subject given previous experience. However, it soon became obvious that this subject was not well documented in a student readable or model-type format. As a result, students struggled to get an understandable broad real flavor of the topic. Most of the textbooks on the market were either too sterilely academic, too narrow of an industry view, or too much real world “silver bullet” quick fix advice types. Based on that assessment, the vision of correcting that shortcoming began to take shape. After four years of thrashing around with the topic, the first edition of this text resulted. Over the next 10 years, two more iterations of this effort were produced, this being the third edition. The project model term for this type of evolution is “progressive elaboration.” In plain language, that really means it can be done better and that is what this latest version has as its goal.

One major content target is to stay faithful to the Project Management Institute (PMI) Project Management Body of Knowledge (PMBOK®) Guide, which is considered to be the de facto standard for project management description. Beyond that, the goal is to make the verbiage readable and understandable. You as the reader will have to decide how well this effort matched these goals.

The academic program at the University of Houston is heavily based on the Project Management Institute’s (PMI) model and curriculum guidelines. That bias formed the foundation for the text, but not the complete final table of contents. As packaged here, the core chapters not only stay reasonably close to the PMI model, but also attempt to show how this model fits a real-world project. In this regard, the material in the text is viewed as a companion to the technical model guide and should be of help to someone studying for various project management certifications.

There are several project-related sub-model frameworks sponsored by PMI today and many of these are covered in dedicated chapters of the text. Specifically, the following six major sub-model topics are discussed in some detail:

- Work Breakdown Structures (WBS)
- Earned Value Management (EVM)
- Enterprise project management (PMO)
- Portfolio management (PPM)
- Professional responsibility and ethics
- Agile life cycle

In addition, there are multiple chapters related to various other associated contemporary topics that are currently emerging in the industry.

Deciding how to define the final table of contents was more difficult than first envisioned. The introduction background section (Chapters 1–9) contains material outside of the model structure, but necessary to level set the reader background. Much of the middle text portions are drawn heavily from the 10 standard model knowledge areas (i.e., Chapters 10–25). Finally, other supplementary sections were added in Chapters 26–38 to make the overall package more complete. Specifically, discussions of advanced planning models and the project external environmental sections are all external to the core model detail.

Even though interest in the topic of project management is growing and maturing, this subject area is still in a relative neophyte maturity stage. In support of this writing effort, many industry experts have willingly shared their work and thoughts in their areas of expertise to help explain specific items. This input has been incorporated with credit and hopefully the resulting material shown does not distort the originator's intent. Based on the logic outlined above we believe the resulting package represents a legitimate overview of the project management environment today, but also recognizes that there is more left to evolve.

Some chapters of the text clearly push beyond the basic model view and some extrapolate beyond current practice. Please accept these few ventures as an attempt to broaden the current perspectives and offer a potential future pathway for the overall topic. These jumps in faith were carefully taken and directionally seem appropriate. At least they should stimulate thinking beyond the pragmatic view. Any professional working in this field needs to both understand the current model views and also be prepared to evolve those over time. In all the topics covered here one must note that time and technology have the potential to change the way a particular item may be properly handled.

The writing style used is not meant to be overly formal in the hope that it would create a more willing reader. Reading a dull project management text can be much like going to the dentist for a root canal. The authors originally proposed the new title to be *50 Shades of Project Management* in the hopes that the reader population would be more eager to pursue the material, but some in the publishing world felt that to be too excessive.

One way to gain a better perspective about project management is to observe the outside world—for example, road and building construction, IT projects, bad customer processes, and generally poor project execution in an organization. Realize that the basic role of a project is to change the current state and do that effectively. That process is not as easy as one might believe. Bon voyage.

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cordin8

Acknowledgements

No effort of this scope and complexity could have been accomplished by one person in any reasonable time frame. This text is no exception to that rule. During the early incubation period (circa 2002), several colleagues provided stimulus for this effort. The first influence came from Walter Viali who is a 30-year professional associate who convinced us that the PMBOK® Guide and PMI were the right thought leaders to provide the foundation structure for the university academic program. That has proven to be a successful core strategic decision for the university program, as well as for this text. Rudy Hirschheim, Blake Ives, and Dennis Adams were instrumental in helping start the academic side of this venture. Later, Michael Gibson provided the final push and support to allow time to complete the first edition draft material. Ron Smith (PMP and CSPM) provided several of his published worksheets and helped customize these for use as end of chapter examples. And thanks to Teri Butler who taught me about chip theory and a lot of other soft skill things.

Industry gurus Watts Humphrey, Walt Lipke, Tom Mocal, Max Wideman, Frank Patrick, Lawrence Leach, and Don James contributed ideas, reviews, or material in their respective areas of expertise. Other sources such as PMI, The Standish Group, QPR, QSM, and the Software Engineering Institute shared their Intellectual Property.

Jerry Evans, Dan Cassler, and Ron Hopkins, my University of Houston office mates, continually provided an environment of friendly warmth and fun that may well be the most important support of all. Last but not least, Bob Fitzsimmons continued our 60-year friendship with frequent moral support and he became the volunteer chief graphics artist along the way.

Over the past several years, we have been blessed with having captive project management graduate students digging through this material and helping to make it more readable. The resulting text material is a compendium of intellectual thoughts and ideas from all the sources mentioned above, plus my own experiences. I have tried to credit the sources that were used and if any were missed it was unintentional.

Finally, my wife Shawn's tolerance through what seemed like endless nights and weekends in the Man Cave study upstairs must be recognized. Without her support this effort could not have been finished.

Gary L. Richardson

At the beginning of my career, I had the opportunity to explore emerging technologies, specifically, the application of collaborative technologies, in Texaco's Technology Planning, Assessment, and Research group headed by Gary L. Richardson. He also served on my Master's degree thesis committee. His philosophy of getting out of the way and letting the teams drive the work was empowering and produced innovative results. It was truly an honor when Gary asked me to work on the 3rd edition of his already successful project management textbook.

Over the years, my interests have formed around the intersection of organizations, teams, processes, and technology. At Texaco, Ed McDonald provided sponsorship for my research initiatives centered around technology-enabled, team-based organizations. Through those projects, I had the opportunity to work with great thought leaders on collaborative work systems, including Gerry DeSanctis, Scott Poole, Gary Dickson, Bob Johansen, Lynda Applegate, and Jay Nunamaker.

After leaving Texaco, I embarked on an initiative to develop a software platform, *cordin8*, with my business partner and collaborator, Andy Kalish, to deliver on a vision of an “organizational operating system.” At the heart of this system are project teams. The framework that provides the structure for these teams is based on the PMBOK® Guide. Through engagements and prototype reviews, I’ve had the opportunity to work with so many knowledgeable practitioners all of whom helped form the development of the feature set in *cordin8*, including Rod Sipe, Chris Bragg, Tom Mochal, Mohamed Sherif, Ken Fitzgerald, Ben Lanius, and Walter Viali.

As an organizational technologist, I view project management as the language to manage the knowledge work component of an organization (e.g., research, engineering, development, marketing). While the technology platform has a heavy computational role in project management, I believe a much more valuable role resides in its communication capacity. For communications to be effective and efficient, there must be an agreed upon framework that everyone understands. That is why I believe anyone interested in management needs a foundation in project management.

Lastly, my utmost appreciation to my wife Alexis for her incredible support throughout all these years. She is truly a remarkable woman.

Brad M. Jackson

Authors

Gary L. Richardson is currently the PMI Houston Endowed Professor of Project Management at the University of Houston, College of Technology graduate level project management program. This program serves both the internal and external community and is focused on teaching the theory and practice of project management. Gary comes from a broad professional background including industry, consulting, government, and academia.

After graduating from college with a basketball scholarship, he served as an officer in the U.S. Air Force, leaving after four years of service with the rank of Captain. He followed this as a manufacturing engineer at Texas Instruments in the Government Products Division. Later non-academic experience involved various consulting-oriented jobs in Washington DC for the Defense Communications Agency, Department of Labor, and the U.S. Air Force (Pentagon). A large segment of his later professional career was spent in Houston, Texas with Texaco, Star Enterprise (Texaco/Aramco joint venture), and Service Corporation International in various senior IT and CIO level management positions. Interspersed through these industry stints he was a tenured professor at Texas A&M and the University of South Florida, along with adjunct professor stints at two other universities prior to arriving at the University of Houston in 2003. Through these various job experiences, he has held professional credentials as PhD, PMP, Professional Engineer, and Earned Value Management. He has previously published seven computer and management-related textbooks and numerous technical articles.

Gary earned his BS in Mechanical Engineering from the Louisiana Tech, an AFIT post-graduate program in Meteorology at the University of Texas, a MS in Engineering Management from the University of Alaska, and a PhD in Business Administration from the University of North Texas. He currently teaches various project management courses at the University of Houston, plus PMP and project management external education courses.

His broad experience in over 100 significant-sized projects of various types through his career has provided a wealth of background in this area as he observed project outcomes and various management techniques that have occurred over this time.

Brad M. Jackson is co-founder and CEO of cordin8, who are the developers of a software platform that facilitates enterprise-wide team work in key management processes, including: strategy execution, cyber risk management, PMO, program management teams, account management teams, quality improvement teams, and leadership teams. In this endeavor, he has worked with over 100 organizations across multiple sectors and geographical locations to improve their organizational performance.

He began his career as a systems analyst at Texaco, which included a stint in the Technology, Planning and Research group of the corporate IT department. He was later appointed as Assistant

to the CIO supporting the coordination of global IT management and standards. He has served as an adjust professor and as a research affiliate with a non-profit technology forecasting organization. Mr. Jackson holds a BS from the University of Arkansas and an MS from the University of Houston, both in computer science.

CONCEPTUAL OVERVIEW OF THE PROJECT ENVIRONMENT

I

This initial section is designed to level set the reader with various basic concepts from the project management field. Upon completion of this section, the following concepts should be understood:

1. Definition of a project and its general characteristics
2. Basic history of project management
3. An understanding of the typical challenges facing project managers
4. Benefits of the project management process
5. An introductory overview of the Project Management Institute's project model
6. Some of the contemporary trends that are changing the view of project management
7. Basic project scope, time, and budget mechanics
8. Key project vocabulary that is needed to understand the more detailed sections that follow later in the text
9. A statistical overview of project success factors



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Chapter 1

Introduction

The term *project* occupies the central theme of this text and it is a frequently used descriptor; however, there are many different perspectives regarding what the term means. A collection of key words from various sources and individuals will typically include the following terms in their definitions:

1. Team
2. Plan
3. Resources
4. Extend capability
5. Temporary
6. Chaos
7. Unique
8. Create
9. State transition

From these diverse views it would be difficult to construct a universal definition that neatly included all the terms, but collectively they do say a lot about a project's composition. The Project Management Institute (PMI) defines a project as:

A temporary endeavor undertaken to create a unique product, service, or result.

(PMI, 2017, p.715)

One key thesis of this text is that all projects fit the same conceptual model with only degrees of variation across the elements. That view has now become reasonably accepted as users begin to understand the concept of variability. Some projects have very high risk and others less so. Same is true for high versus low use of third-party vendors, etc. The common key in all these is that a team of skilled workers is collected to produce a defined outcome, hopefully within a planned schedule and budget. The management model outlined here fits this description and there is no intent to focus on IT, construction, manufacturing, or any other area of endeavor. It is important to understand that the model is universal. It fits lawsuits and medical research. Similarly, thinking the

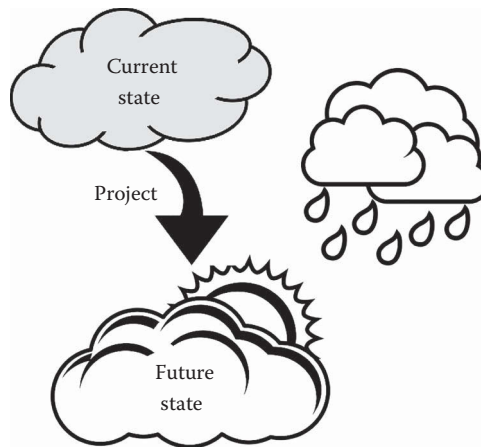


Figure 1.1 Project state transition process.

same way, one's personal life is a project and all of these same variables are at play in that context as well. So, let your mind stay open and test the concept. In the modern organization, the project model is used to accomplish many of their planning goals, that is, moving the organization from state A to state B (state transition). For these endeavors, resources are allocated to the target, and through a series of work activities the project team attempts to produce the defined goal. Typical goals for this type of activity involve the creation of a new product, service, process, or any other activity that requires a fixed-time resource focus.

Figure 1.1 is a visual metaphor to illustrate what a project is attempting to accomplish. The two fuzzy clouds depict an organization moving from a current state to a future state. The arrow represents the project team driving this movement. From an abstract point of view, the role of a project is to create that movement, whether that represents an organizational process, new product development, or some other desired deliverable.

Projects should be envisioned as formal undertakings, guided by explicit management charters and focused on enterprise goals. Practically speaking, this is not always the case, but given the nature of this text we need to reject projects that are not focused on improving the goal status for the organization and those that do not have the explicit support of management. Any other initiatives are not examples of a project, but rather contribute to “ad hoc chaos.”

1.1 Project Management

The management of a project consists of many interrelated management pieces and parts. PMI defines this term as follows:

The application of knowledge, skills, tools, and techniques to project activities to meet the project requirements.

(PMI, 2017, p. 716)

One of the first management issues is to define the scope, schedule, budget, and resources required to produce the required output. These parameters are fundamental to all projects.

Closely related to this set is the concept of quality, which relates to both the project target and the work processes used to achieve that target. Collectively, these items represent some of the more visible components involved in project management. Supporting this activity group is another collection of items related more to “how” the goal will be accomplished. This second grouping of management focus activities involves more aspects of human resources, plus issues related to procurement, communications, and risk. During the course of the project, all of these topic areas interact with each other and therein lays the management complexity related to this topic.

1.2 Role of the Project Manager

Essentially, the role of a project manager (PM) is to “make it happen.” This does not mean that he is the best engineer, programmer, or business process technician. It does mean that he has the necessary skills to acquire, develop, and manage a team of individuals who are capable of producing the desired product. Every project has unique characteristics and therefore the roles required change accordingly. The current state of understanding for this role has defined the basic knowledge areas (KAs) involved in this activity, but the operational techniques for creating productive project teams is still a fragile art form.

Many project success and failure studies have documented the basic factors leading to these conclusions. As projects have become more complex there is growing recognition that a skilled PM is the glue that brings these elements together. This involves the more mechanical management elements, but probably more important is the use of softer management skills for team motivation, conflict resolution, user communications, and general negotiation. We must not forget that project management involves humans and will never be reduced to a mechanical exercise. Nevertheless, the mechanical aspects are an important part of the overall management process in identifying what actions are required to influence changes. For example, to know that a project schedule is overrunning requires a complex set of decision processes, but does not in itself do anything about resolving the issues. Conceptualize the mechanical side of the management role as a meter—if your car’s gas gauge is near empty this will stimulate the driver to seek out a gas station. Similarly, if the project schedule is not going according to the plan, the mechanical management processes help identify where and why. Recognize that other management action is also influenced by the status meter readings.

1.3 PM Skills

We are tempted to say that the ideal PM skills are the ability to “leap tall buildings with a single bound, faster than a speeding bullet, and more powerful than a locomotive,” but that statement might be a little excessive (that comes from an old memory somewhere). However, it is accurate to say that this individual needs to understand how to deal with the various KAs involved, with additional high skills in both personal and organizational areas. Project dynamics create an amazing array of daily issues to resolve. If one cannot organize this activity into some workable process the project will stagnate. Through all this, it is the PM’s goal to achieve the plan. Industry project failure statistics indicate that this is more difficult than is understood by most.

At the highest level, the PM needs to bring structure and organization to his project team. One senior PM once described this problem as “putting a lot of mush in a small bucket.” A significant

aspect of this is formalizing the roles and relationships of the various players in regard to their functions in the life cycle.

A second PM-level skill view is that he needs to be recognized as a leader of the effort. This does not mean that he is out front shouting “follow me,” but he has to ensure that the team continues to move toward the required target. During early project phases, the target is not well defined, so the leadership role at that point is to bring the proper players together and help resolve various conflicts that typically emerge.

The third critical skill involves dealing with the various human resources related to the project. The most noticeable group will be the project team who ultimately will be the “builders.” They collectively have the skills to execute the plan, but there are many human relationship issues that can get in the way of that effort. Project team members must be managed and nurtured through the life cycle. To properly do this, the PM needs to be an operational psychologist who understands individual and group needs. Project teams are a cauldron of human emotions. Kept at the right temperature they can produce amazing results; however, when allowed to boil the conflict can destroy the process. Finally, during this process, an additional role of the PM is to improve the skills of the team members and ensure that they are properly relocated at the end of the project.

In addition to the internal project team, there will be other human interactions with external groups such as users, management, and various organization entities. Each of these has a different perspective regarding the project and all their views must be dealt with. In each these cases, the PM is never given enough formal power to edict solutions even if he knew what the solution was. These human relationships require a more open communication and a more motivational style with the approach being to build partnerships. Each of the human interface groups holds a piece of the project success and the PM must extract that piece from each. This aggregation of project participants is called *stakeholders*. The formal PMI definition for this group is “An Individual, group, or organization that may affect, be affected by, or perceive itself to be affected by a decision, activity, or outcome of a project, process, or portfolio” (PMI 2017, p.723).

1.3.1 Success Management

The first step in success management is to understand the factors that lead to that conclusion. The basic management model outlined in this text offers a reasonably clear set of processes to achieve that goal. However, the organizational environment in which a project exists may contain factors that still make success unlikely. In some cases, a PM is assigned Project Titanic (i.e., a good ship may still sink because of other external circumstances). When this happens, it is important to realize that evidence now indicates decisions made by the crew of the Titanic actually caused it to sink faster than it would have if left on the iceberg. Of course, the best decision was to stay away from the iceberg in the first place. Therefore, in both situations a catastrophe could have been mitigated with the right management decisions. Here we see that a bad management decision can make a complex situation disastrous. The same conclusion is valid for the project environment. A good PM certainly has if they can find the right pathway through the project icebergs.

So, success management requires a series of strategies and related decisions. First, understand where success (or failure) comes from and mitigate as many of the problem factors as possible. Second, through the course of the project, the PM role is to influence the right set of actions to correct deviations that threaten to become a major problem. Third, when a threat surfaces take quick action using all the management skills at hand. Finally, if the boat is in fact sinking, you also have the role of communicating status and recommendations to all participants regarding how to

handle the situation. Management will have been informed of status and forecasts along the way. In all of these modes, the PM must be both a leader and an *honest broker of information*.

One might ask “If we follow all these prescriptions, will every project be successful?” Probably not! There are too many uncontrollable variables to expect that, but proper use of the tools and techniques described here should significantly improve the outcome. If we continue to look at what went wrong with the last project and try to ensure that the previous item does not recur, the next project should progress better. Experience from the Japanese quality programs has taught the world how continuous improvement actions over a long period can take a country from a crude tool maker to the Toyota/Lexus manufacturer in slightly over 60 years. Likewise, we must realize that project management is not a short-term band-aid event; it is a process. Organizations must strategically focus on it and individuals must study it in order to achieve the desired results.

1.4 Text Content and Organization

This text looks at the project experience from the view of a PM. Material covered in the text has been selected from a personal database of “things I wished that I had known more about” at one point or another along the way. Also, in recent years the PMI has documented a great deal of professional project experience into the published archives on this topic and their documentation suite is respected internationally. Over the past several years, the authors have been heavily involved in teaching this topic after many years in industry attempting to master it. Those two diverse experiences lead to the amalgamation found here. The text content is a mixture of the PMI model view and comparable views of various practitioners. Attempts to translate this material to university and industry groups have supported the belief that a proper realistic source document with a reasonable dose of theory, vocabulary, and practice would help someone desiring to understand the breadth of this topic. This was the initial goal that started this effort.

The text material makes a reasonable attempt to stay consistent with the *Project Management Body of Knowledge* (PMBOK® Guide) which is considered to be the defining model document from the PMI (2017). In addition to this treatise on the topic, PMI publishes other supporting project related standards such as OPM3, Work Breakdown Structure (WBS), Professional Ethics, and others (each of these will be discussed later).

The resulting collection of material contained here is a compilation of project management models, concepts, vocabulary, and trends. Through all these elements, the goal is to make each item fit into the big picture and more importantly keep the discussion on an understandable level. If the reader wades through this material to the end, we will even share the secret PM handshake (this is probably the only joke in the text so it needs to be tagged).

Another stimulus for this effort has been the emergence of a formal educational curriculum accreditation process for PMs. This initiative is titled by PMI as the Global Accreditation Curriculum (GAC) (PMI 2001) and it offers more specific guidance regarding the role of a PM. Prior to this, individuals seeking project management certification studied various reference sources and then pursued a formal certification exam hoping that they had been exposed to the right material. In an attempt to ensure that the material covered in the text fit the PMI accreditation structure that document was used to cross-reference section material content. Learning objectives for each section map to this formal curriculum. This is intended to give the text legitimacy in regard to that section’s topic menu.

1.4.1 Text Structure

The text material is partitioned into eight major sections that are essentially envisioned as “peeling the onion” away to open up increasingly complex levels of the total picture. Each major section represents a designed layer and each successive one opens up a new more complex layer related to the overall topic. In the first nine chapters there is no assumption made as to the reader’s background. These chapters represent the foundation material. Recognize that this material has been previously tested on university and outside consulting groups over several years. The one important disclaimer regards whether the material can be viewed as a tutorial for the PMI certification exams. The answer to that question is clearly no! This text covers the same material found in the PMI standard sources, but is not meant to prep a person for one of the certification exams. However, it does give the reader a background that will make that preparation much easier and helps in the conceptual understanding of project management and the PMI model.

The summary below outlines the goal of each major section:

Part I. Conceptual overview. This section consists of nine chapters that collectively lay the foundation for the rest of the text. Basic vocabulary and concepts are covered here.

Part II. Foundation processes. This section describes the core deliverable activities of project management—scope, schedule, cost, and quality. This set of processes represents only a starting point for the PM, but there is sufficient theoretical material to justify its focus. This topic area is isolated from other more complex concepts related to the execution and control delivery mechanics.

Part III. Soft skills processes. Increasingly over time there has been realization that project success is driven by a complex interaction of human resources more than simple mechanics. For that reason, this collection of soft skills occupies a focus section describing human resources, communications, stakeholders, and team management.

Part IV. Support processes. In addition to the core management activities, the PM must also understand the role of other support KAs. This section finishes the discussion of KAs with procurement, risk, and integration. Each of these topics represents critical management decision area for the PM and they collectively must be dealt with along with the other items from Sections II and III to produce a viable project plan. Upon completion of this section, the reader has been introduced to the full set of knowledge processes recognized in the basic model.

Part V. Advanced scheduling models. This section is designed to highlight the idea that the model can have alternative ways to view the life cycle. The terms adaptive, simulation, and critical chain are used to illustrate sample methods for this more advanced view.

Part VI. Project execution, monitoring, and control. At this point, the text material has covered processes to produce a viable project plan that has been approved by appropriate management. The effort now moves into execution and the management challenge here is to produce the planned output as defined and approved. Unfortunately, the management process becomes muddier at this stage. There is more human conflict emerging, as well as more change dynamics and what some describe as raw chaos. If these dynamics did not exist, the management role in execution would simply be “task checker.” A better metaphor for this stage is to compare it to an airplane pilot in rough weather with various mechanical and environmental problems to deal with. Most of the material described here is still model driven, but an attempt is made to give the model more of a reality flavor.

There are many control-oriented aspects in the project life cycle. Various related techniques are separated here for discussion. Each of these represents an important control knowledge component that the PM needs to understand.

Part VII. Project Environmental Support. One metaphor for this section is that the project is a seed in the organizational flower pot. What this translates to is recognition that various organizational process and culture impact the project from external sources. One of the key culture factors that occur both internal and external to the project team is professional responsibility or ethics. One only needs to read the daily news to see why this topic is worthy of inclusion. PMI has issued a code of conduct for the PM and the tenets of this code must be understood. In addition, some text scenario examples are used to show that it is not only a real topic, but one that is often hard to decide how to deal with.

Appendices. Three additional background topics are included in the text package:

- A. Financial analysis mechanics
- B. Project templates—reusable tools
- C. Document repository—project data base.

In each of these supplementary sections, the material shown is considered as valuable technical background for an item the working PM should understand and use as part of his tool kit.

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