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SOFTWARE PROJECT MANAGEMENT IN PRACTICE

软件项目管理实践

Pankaj Jalote 著

清华大学出版社

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Preface

The genesis of this book dates back to 1996. For my sabbatical, I joined Infosys as the head of quality, with the charter of improving the processes for project execution. Seeing the problems faced by project managers, I felt that software project management must be the toughest job on the planet. And I thought that delivering high-quality software within budget and on schedule must be an oxymoron.

The situation, I now realize, is not quite that hopeless. By using sound project management processes, project managers in some organizations are successfully executing projects.

Infosys, one such global organization, has successfully executed more than 500 projects last year alone. It has about 10,000 employees spread across 25 cities in more than a dozen countries around the globe, and it has been assessed at the highest maturity level (level 5) of the CMM. Its revenues and profits have grown at about 75% per year for the past five years. The level of customer satisfaction can be judged by the fact that despite the company's huge growth about 85% of its revenue comes from repeat orders from existing customers.

I have used my experience and knowledge of Infosys processes to cull out and describe in this book the key project management practices that have been used to successfully execute project after project. The beauty of these practices is that despite being highly effective, they are not complex; rather, they are grounded in common sense and are supported by simple measurements and analyses.

In describing project management processes at Infosys, the book offers a unique combination of two value propositions. First, it provides the complete set of processes employed for project management in a highly successful organization. The use of these processes is illustrated with real examples and a running case study. Second, because the processes satisfy the requirements of the Capability

Maturity Model (CMM), this book demystifies the way projects are managed in a high-maturity organization, and it provides the benefits that the CMM offers to project management without the need of a detailed understanding of the CMM.

The book is written primarily for project managers and for professionals who plan to become project managers. By using the methods described in this book they can systematically improve the planning and execution of their projects. It can also be very useful for an organization that wants to reach a high maturity level. If project managers start using the methods described here, they will lay the foundations for high maturity in the organization.

Because most chapters begin with an overview before describing the details of the Infosys method, this book can also be used as a text in a software project management course. In a general software engineering course, it can serve as a supplementary text, providing a view of how a software project is managed in a business environment.

Chapter 1 contains a brief introduction to Infosys and the relationship of the CMM and project management. The remainder of the book is divided into two parts. Part I, consisting of Chapters 2 through 9, focuses on project planning and covers topics such as planning infrastructure, process planning, effort and schedule estimation, quality planning, risk management, measurement planning, and configuration management. Part II, consisting of Chapters 10 through 12, focuses on project execution and completion and covers reviews, project monitoring and control, and project closure.

To the extent possible, each chapter has been kept independent and standalone and has been organized as follows. The relevant concepts and background material are given in the first section, followed by a discussion of methods used by Infosys. Next come examples of the use of these methods in real projects and in the case study. Each chapter ends with a summary that lists the key takeaways from the chapter and describes which aspects of CMM are satisfied by the methods discussed in the chapter.

Although this book draws on my earlier book *CMM in Practice* (Addison-Wesley, 2000), it has a different focus and substantially different contents. Whereas *CMM in Practice* considers the entire software process and focuses on implementation of the CMM in an organization, this book focuses exclusively on project management.

Many people helped to make this book a reality. Because the book has its origins in *CMM in Practice*, my thanks to all the people who helped in that project. In addition, I would like to again express my gratitude to Infosys and its directors,

whose cooperation and help made this book possible. My sincere thanks to members of the quality department at Infosys for providing information whenever needed, and to the many people who shared with me their experiences, which find their way into mini-cases throughout the book (although with the names changed). My special thanks to Naresh Agarwal for his help with the main case study, and to Sanjay Joshi for his help in bringing a sharper focus to the chapters. And finally, my thanks to my wife, Shikha, and my daughters, Sumedha and Sunanda, for bearing with me and my odd hours once again.

Any comments about the book, or any inaccuracies that might be present (which are entirely my responsibility), can be sent to me at jalote@iitk.ac.in. For information regarding Infosys, visit www.infy.com or send mail to public-relations@infy.com.

Pankaj Jalote

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Chapter 1

Managing Software Projects

Worldwide, some half a million project managers execute about a million software projects each year, producing software worth $600 billion. Many of these projects fail to fulfill customers' quality expectations or fail to deliver the software within budget and on schedule. One analysis suggests that about one-third of projects have cost and schedule overruns of more than 125%.[1]

Why do so many software projects fail? Although there are many reasons, one of the most important is improper management of the project. For example, the major reasons for runaways (projects that are out of control) are unclear objectives, bad planning, new technology, a lack of a project management methodology, and insufficient staff.[2] At least three of these five reasons clearly relate to project management. The other two—insufficient staff and new technology—can be considered as risks whose management is also a part of project management.

Clearly, by using effective project management techniques a project manager can improve the chances of success. But what are these effective techniques?

Let's consider an analogy. Suppose you want to develop a muscular, toned body. To reach your goal, you start looking at exercise routines described in magazines. One article describes how to develop arm strength, giving a set of 10 exercises to be done—not too many by any standard. But then another article, this one on developing thigh strength, also gives 10 exercises, and the evangelist for flat stomachs also feels that doing 10 exercises is not too much. If you want to develop your body overall by following each of these isolated exercise programs, you would find that you have a set of 50 to 100 exercises to do—a clear impossibility for most people, let alone a busy project manager. To achieve your objective, you need a comprehensive training program that is practical and effective.

Similarly, you'll find an abundance of suggestions for performing the various aspects of project management, including effort estimation, risk management,

project monitoring, configuration management, and so on. Although each proposed technique solves the problem it is designed to solve, it is not clear how to combine these techniques into a practical and workable process. For effective project management, the need of the hour is a practical, manageable "exercise routine" that will deliver the result. In other words, what is needed is a balanced process that covers the management of the entire project from inception to completion. Unfortunately, there is a paucity of published approaches illustrating how to integrate techniques in this way.

This book fills this gap by describing the set of processes used in a world-class organization to effectively and efficiently manage software projects. The company is Infosys, a software development company that has an enviable track record of project execution; in 2000 alone, Infosys project managers used the processes described here to successfully execute about 500 projects for customers. This book discusses all aspects of Infosys project management—planning, execution, and closure. You'll learn how Infosys project managers estimate, plan for managing risks, collect metrics data, set quality goals, use measurements for monitoring a project, and so on. An interesting aspect of these processes, one that will appeal to busy project managers, is that they are neither complex nor cumbersome, and they use simple metrics.

Infosys has been assessed at level 5 (the highest level) of the Capability Maturity Model (CMM). By extracting project management processes from the set of processes at Infosys, this book also illustrates how projects are managed in a high-maturity organization. Through this illustration, I hope to bring the benefits of the CMM to project managers who have not studied it because of lack of time, because they regard it as being for "process folks" or because they have found it difficult to relate the CMM to project management practices.

This chapter introduces the two topics that form the background for the book: the CMM and Infosys. Because the focus of the book is project management and not the CMM, I restrict the discussion to the project management aspects of the CMM. This chapter also provides an overview of the project management process and the main case study; details of these are discussed in the remainder of the book. First, then, let's briefly discuss the role of processes in project management.

1.1 PROCESSES AND PROJECT MANAGEMENT

A software project has two main activity dimensions: engineering and project management. The engineering dimension deals with building the system and focuses on

issues such as how to design, test, code, and so on. The project management dimension deals with properly planning and controlling the engineering activities to meet project goals for cost, schedule, and quality.

If a project is small (say, a team of one or two working for a few weeks), it can be executed somewhat informally. The project plan may be an e-mail specifying the delivery date and perhaps a few intermediate milestones. Requirements might be communicated in a note or even verbally, and intermediate work products, such as design documents, might be scribbles on personal note pads.

These informal techniques, however, do not scale up for larger projects in which many people may work for many months—the situation for most commercial software projects. In such projects, each engineering task must be done carefully by following well-tried methodologies, and the work products must be properly documented so that others can review them. The tasks in the project must be carefully planned and allocated to project personnel and then tracked as the project executes. In other words, to successfully execute larger projects, formality and rigor along these two dimensions must increase.

Formality requires that well-defined processes be used for performing the various tasks so that the outcome becomes more dependent on the capability of the processes. Formality is further enhanced if quantitative approaches are employed in the processes through the use of suitable metrics.

What is a process? Technically, a *process* for a task comprises a sequence of steps that should be followed to execute the task. For an organization, however, the processes it recommends for use by its engineers and project managers are much more than a sequence of steps; they encapsulate what the engineers and project managers have learned about successfully executing projects. Through the processes, the benefits of experience are conferred to everyone, including newcomers in the organization. These processes help managers and engineers emulate past successes and avoid the pitfalls that lead to failures.

For a project, the engineering processes generally specify how to perform engineering activities such as requirement specification, design, testing, and so on. The project management processes, on the other hand, specify how to set milestones, organize personnel, manage risks, monitor progress, and so on. This book focuses on the project management process.

When you consider project management processes, you must ask the question whether project managers will use them. I have often heard process designers complain that project managers don't follow the process and that they resist changes. My experience with project managers at Infosys and other organizations is that they actually want to use processes but only if they're reasonable and will

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