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A Framework for Strategizing and Defining Project Objectives and Deliverables

DIETMAR W. SOKOWSKI

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Dietmar W. Sokowski

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To my family and my friends

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Contents

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My thanks also go to the editors at Pearson Education for the guidance and service they provided. For the readers of this book, I have the request to please view the book with a critical mind and send me (hopefully many) comments. As my motto states, "as long as I breathe, I learn."

I want to thank all my friends, my sister Jutta, my brother-in-law Conrad, as well as my former colleague and friend Harald for being friends. I especially thank my American brother and sister by choice of heart, Sten and Robin, for showing that lifelong friendship is possible.

Most of all, I want to thank my wife, Irmgard, for her unwavering support and for always being at my side.

—Dietmar W. Sokowski

About the Author

Dietmar W. Sokowski is the Founder and Chief Consultant of QTunnel Business Consulting, a consultancy focused on critical thinking and a leading provider of services related to enterprise analysis, enterprise architecture, IT strategy, organizational development, project management, and project management training. He has more than 30 years of experience in diverse business fields, including banking, corporate IT, law enforcement, manufacturing, national security, and small businesses.

Dietmar earned his MBA at Northcentral University, his BSc in mathematics at Auburn University, a two-year certificate in adult professional education at the University Koblenz-Landau (Germany), and a Controller's Diploma at the Controller Akademie Gauting/Munich (Germany).

Preface: The Organization and Content of This Book

This book is organized into four sections.

Section I, "The Initiating of Projects," sets the stage. Chapter 1, "Fundamentals," introduces the holistic viewpoint of integration and scope management, the related PMBOK® Knowledge Areas and Process Groups, the IPO concept, and some fundamental terms and concepts, including the Pyramid of Business Maxims. Chapter 2, "The Project Charter," defines and describes the single point of reference (SPOR) Project Charter, the document that formally authorizes a project.

Section II, "The Planning, Defining, Scoping, and Structuring of Projects," focuses on the core elements of a project. Chapter 3, "Project Management Plans and Documents," defines and describes the project management plan, subsidiary plans, and other project documents. Chapter 4, "Project Requirements," focuses on the project requirements, how they are solicited, formalized, documented with the stakeholders, and accepted by the stakeholders. Chapter 5, "The Scoping of Projects," focuses on detailing scope elements within the bounds defined in the SPOR Project Charter. Chapter 6, "The Project Work Breakdown Structure (WBS)," focuses on the work breakdown structure, the unambiguous documentation of *what* is within the defined and accepted project scope—that is, *what* must be delivered by the successful project.

Section III, "The Managing and Leading of the Execution of Projects," focuses on directing, managing, monitoring, and controlling the actual project work, the inevitable changes, and controlling and validating the project scope. Chapter 7, "The Directing and Managing of the Work Performed in Projects," is dedicated to the directing and managing of the work performed in projects, while Chapter 8, "The Monitoring and Controlling of the Work Performed in Projects," concentrates on the monitoring and controlling of the work performed in projects. Chapter 9, "The Integrating and Controlling of the Changes Occurring in Projects," addresses the integrating and controlling of changes occurring in projects, and Chapter 10, "The

Controlling and Validating of the Scope of Projects," focuses on the controlling and validating of the project scope.

Section IV, "The Closing of Projects," addresses two highly important, but often neglected elements in the life of a project, the project closure acceptance documentation (PCAD) and on lessons learned. These elements are covered in Chapter 11, "The Closing of a Project or a Phase."

Key Themes That Characterize This Book

Over time, a plethora of books on project management became available. Some books emphasize particular techniques or software tools, often, without deliberate intention, creating the hope in the reader to find the silver bullet. Other books elaborate on the history of project management, or the latest trend in academic project management research.

One book that stands out and has become a de facto standard in project management is the Project Management Institute's (PMI) *A Guide to the Project Management Body of Knowledge (PMBOK® Guide).* At first contact with the *PMBOK® Guide,* the perceived dichotomy of Knowledge Areas and Process Groups has created some degree of misunderstanding and confusion among practitioners and particularly students. Without additional help, the exceptional usefulness of the *PMBOK® Guide* becomes evident only after extensive, and sometimes testing, experience with the *PMBOK® Guide* in managing projects.

Mastering Project Management Integration and Scope aims to provide such help. It introduces the holistic viewpoint of project management, which to a large extent parallels the *PMBOK® Guide,* but differs in that it avoids the interface issue of the Integration Knowledge Area with the Scope Knowledge Area by providing a new definition of the project scope management activity.

What This Book Is Not

Mastering Project Management Integration and Scope is not a book on the history and growth of project management methodologies or techniques. It is also not a book that elaborates on the importance of

project management in general or for an organization, nor is it a book that teaches in detail various techniques useful for the management of projects.

The book emphasizes a critical-thinking approach to integration and scope management to develop a conceptual understanding of the principles of project management with the intent of widening the domain of people who truly understand what constitutes project management.

Assumption

The readers are assumed to have a fundamental understanding of the different forms of organizational structure that can exist in commercial companies and in government agencies. The detailed knowledge conveyed in courses or textbooks on Organizational Behavior and Managerial Accounting is not required to get the maximum benefit out of *Mastering Project Management Integration and Scope*, but some familiarity with the topics from these courses or books will be helpful. Within the life span of a project, a project manager will be confronted with issues of cost, risk, human behavior, planning, change in midstream, and similar aspects of business life. The aim of this book is to prepare the project manager to successfully handle such challenges—not by being exposed to numerical examples, but by becoming aware of the underlying principles and factors of influence.

This Book's Audience

This book has been written for an audience that encompasses the entire spectrum of people exposed to and working with project management: the people who teach project management, the people who want to learn about project management, and the people who practice project management.

Instructors

The topic-oriented organization of the book enables instructors to use this book as the sole textbook or in conjunction with the *PMBOK® Guide* or even another textbook.

Student Community

Students will benefit from the topic-oriented organization of the book as this classification makes it easier to grasp the meaning, purpose, and influence of each topic on the management of projects—just like the object-oriented paradigm greatly improved the development, quality, and maintainability of software programs.

Practitioners

For practitioners, the topic-oriented organization of the book makes it a practical and easy-to-use reference book in their daily work whenever they want to be reminded of the fundamental principles.

All Readers

Whatever the audience, I hope that the book will provide sound insight into the subject of integration and scope management and that the book succeeds in illuminating the *PMBOK® Guide*'s comprehensive coverage of project management knowledge areas and the processes involved in managing projects.

Finally, I hope that the book will inspire the readers to join me in stating "everything in life is a project and I love making projects successful."

This Book's Two Distinctive Features

(1) The chapters are consistently organized into three pedagogical blocks: the alpha [α]-block, which takes the reader from his or her current point of understanding to the second block, the main topic of the chapter, and the omega [ω]-block, which relates the main topic to actual project reality and allows the readers to confirm and reinforce the knowledge and understanding gained from the chapter. Thus, each chapter presents a closed learning block, from beginning to end, of one main topic.

(2) The use of the seven magnificent relative pronouns, referred to as the 7-Ws ever since Joachim Georg Daries's (1714–1791) Latin terms had been translated into German. (In English, there are six corresponding *W*s and one *H*).

A subsequent feature of the book that provides for ease of reading for the student and the practitioner and helps the instructor in delivering a comprehensible course is the consistency in structure throughout all chapters. The repetitive nature of the structure helps to reinforce concepts, deepen understanding, and strengthen retention.

Chapter 1 contains a glossary of new terms at the beginning of the chapter. In addition to being listed in the glossary of new terms at the beginning of Chapter 1, **key terms** are highlighted in bold at first occurrence in the text of Chapter 1. Where considered helpful and practical, a "case in point" is provided at the end of some chapters.

As is customary, the Bibliography gives credit to the sources of original thought, description, or illustration and might serve as suggestions for further reading.

Study Techniques

Notwithstanding individual differences in human nature, the keys to successful learning are concentration, persistence, and stamina. Multitasking doesn't work at a quality level in the human brain and, as we are sometimes painfully reminded, not even well in computers.

One successful approach to studying is to first reflect on what the chapter (section) is about; then, after each paragraph, stop and explain to yourself what the paragraph "told" you. Some people use index cards to write down that message; others, like myself, use mind mapping to extract key ideas, important terms, and the like. The key question to ask yourself is always the "What" question. What was the main concept, statement, or logic of this paragraph or this chapter? Finally, explain or teach to a (virtual) listener or to yourself the essence of the chapter.

Section I

The Initiating of Projects

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1

Fundamentals

α Learning Objectives

Note: To support the learning process and to reinforce the retention of the chapter's content, the learning objectives are not necessarily listed in the sequence of the chapter content.

After having read and comprehended the contents of this chapter, you should be able to:

- Sketch a visual representation of the *PMBOK® Guide* integration and scope areas in the holistic scope management concept.
- List and explain the principal factors that influence the managing of a project.
- List and describe the fundamental elements that make up project management and break down these elements into their constituent parts.
- Explain what a project is.
- Explain the relationships, the differences, and the similarities between the terms *activities, tasks, subtasks, steps,* and *processes.*
- Explain the principal concept behind project management.
- Explain the distinction between the *PMBOK® Guide* concept and the holistic concept of project management.
- Describe the principal difference between scope management according to the *PMBOK® Guide* and scope management according to the holistic viewpoint.
- Describe the fundamental concept of the *PMBOK® Guide.*

- Describe the concept of project management from a holistic viewpoint.
- Describe how and where the *PMBOK® Guide* concept and the holistic concept of project management are similar.
- List the PMBOK® elements.
- List the levels (bottom up) of the Pyramid of Business Maxims.
- Identify and describe the "all-present" business factors that influence project management in every organization.
- Explain the meaning and the importance of each level in the Pyramid of Business Maxims.
- Explain the IPO concept, its possible origin, its recent historical origin, and its usefulness when applied.
- Describe where the concept of Knowledge Area or activity area could possibly come from.
- Describe and explain the essence of the meaning of the terms *organization* and *project.*
- Describe and explain the essence of the meaning of the terms *leadership* and *project management.*
- Define *goals* and *objectives* and explain the difference between the two terms.

The Four Sections of This Book

Section I covers the initiating of a project with Chapter 1, "Fundamentals," and Chapter 2, "The Project Charter."

Section II covers the planning, defining, scoping, and structuring of projects. These topics are described in four chapters: Chapter 3, "Project Management Plans and Documents," Chapter 4, "Project Requirements," Chapter 5, "The Scoping of Projects," and Chapter 6, "The Project Work Breakdown Structure (WBS)."

Section III covers the managing and leading of projects. The four chapters of this section are Chapter 7, "The Directing and Managing of the Work Performed in Projects," Chapter 8, "The Monitoring and Controlling of the Work Performed in Projects," Chapter 9, "The Integrating and Controlling of the Changes Occurring in Projects,"

and Chapter 10, "The Controlling and Validating of the Scope of Projects."

Finally, Section IV covers the closing of a project with Chapter 11, "The Closing of a Project or a Phase." With the exception of Chapter 1, there is a label on each of the chapter titles in Figure 1-5 indicating the Process Group in the *PMBOK® Guide* that corresponds to the chapter content. The chapter on fundamentals cannot, by its very nature, be related to a Process Group in the *PMBOK® Guide*. Knowing about and truly understanding the concepts that are the fundamental building blocks of a project as described in the fundamentals chapter is essential for the holistic view of project management. Project initiation in the *PMBOK® Guide*–Fifth Edition starts directly with the development of the Project Charter.

α Glossary

Activity Area	The identification (by name) of WHAT is to be managed. An activity area contains one or more separately executable activity tasks (or steps).
Activity Based Costing (ABC)	"A procedure that measures the costs of objects, such as products, services, and customers" (International Group of Controlling).
Activity Task	A component (or step) of an activity area that transforms a given input into a desired output. It specifies the HOW. Tasks may contain subtasks.
Baselining	The act of "freezing" the content of a document to the status at that time.
Core Values	Core values are the fundamental principles and convictions that form the foundation of an organization. For a detailed description, see the section "The Pyramid of Business Maxims."
Dynamic System	Any change in one element of the system affects all interrelated elements and the behavior of the system at any one point in time influences its behavior at a future point in time.
Goals	A measurable target to be reached. For a detailed description, see "Pyramid of Business Maxims."
HIPO	HIPO stands for Hierarchical Input-Process-Output, a structured system analysis design aid and documentation technique developed by IBM in the 1970s.

Holistic	A viewpoint that focuses on the whole of a "something" rather than individual elements.
Integration	The connecting of individual elements into a coherent whole. *PMBOK® Guide* specific: The performing of activities that produce output for use over the entire project or that span across several PMBOK® Knowledge Areas.
IPO	IPO stands for Input-Process-Output. See also HIPO.
Knowledge Area	*PMBOK® Guide* specific: The collection of processes to be performed for the project management activity identified by the name of the area.
Mission	An organization's strategic purpose, its reason for being. For a detailed description, see "Pyramid of Business Maxims."
Objectives	A measurable target to be reached. For a detailed description, see "Pyramid of Business Maxims."
Object-Orientation	A way of organizing knowledge conceptually.
Organization	A contractual agreement between two or more persons to achieve a stated result.
Owner	The owner of a project is the person who provides the funds for the project or the person appointed as the owner by the provider of the funds.
PMBOK®	A collection of knowledge about project management published by the Project Management Institute (PMI).
Process	"A systematic series of activities directed towards causing an end result such that one or more inputs will be acted upon to create one or more outputs" (PMBOK®).
Process Group	In the context of the *PMBOK® Guide*: The collective term for a set of processes used for a common purpose.
Project	Any endeavor that serves a specific purpose, objective, or goal under the constraint of time, resources, quality objectives, and defined scope. It has a definite start and a definite end point.
Project Charter	The document that formally authorizes a project.
Project Life	The duration of a project.
Project Management	A set of activities performed to move from a given state to a defined target state. Specifically: the planning, organizing, coordinating, controlling, and leading of activities and resources.
Project Manager	A person selected to manage and lead a project.
Resources	People, financial means, material means, knowledge bases, time.

Scope	The totality of the area of coverage of a project. Scope demarcates the complete and unambiguous domain of a project.
Scope Creep	The undocumented stepwise expansion of the original baseline of the scope of a project, product, or service without agreed-upon changes to the original constraints.
Stakeholder	A person, a group of persons, or an organizational unit affected by or influenced by a project or exerting an influence on a project. The term also includes all members of the project team.
Strategy	The description of the methods of how to achieve an organization's goals. For a detailed description, see "Pyramid of Business Maxims."
View	What you see when you look from a viewpoint.
Viewpoint	The mental position or perspective from where one is looking to obtain a view of some item or items.
Vision	An organization's view of itself. For a detailed description, see "Pyramid of Business Maxims."
Work Area	Another name for activity area.
Work Breakdown Structure (WBS)	A deliverable-oriented grouping of project elements.

Overview

Integration and scope management of a project encompasses the activities of initiating, planning, defining, scoping, managing, leading, and closing. Organizations are complex living structures, and work within an organization is consequently difficult to perform. Efforts to be efficient in the execution of organizational work lead to the concept of projects and project management.

The word *project* can be seen as a collective term for the work performed in turning a given input into an output that had been determined to be of a certain value to the organization. Building on that concept, the word *project management* can be considered a summarizing term for the effort to manage the work performed in executing the project. The concept of Process Groups and Knowledge Areas, the foundation on which the Project Management Institute (PMI) has based the *PMBOK® Guide*–Fifth Edition, can be considered as

a natural consequence of human thinking and of man's experience gained over time.

Factors that determine an organization's modus operandi and influence its projects, its project management, and the people involved in the (project) work are the vision, the mission, the objectives, and the strategy of the organization. Factors that play a significant role in the successful planning, execution, and completion of a project are a project manager's leadership qualities, communication skill, and the ability to "see and live" an organization's values. Given these qualifications, a project manager must have a solid understanding of a number of fundamental terms and concepts to successfully function within the actual working-structure of an organization. These topics are addressed in the subsections of this chapter.

Project management consists of a number (or set) of activities. An activity, also referred to as **activity area**, in turn consists of a number (or set) of **activity tasks** (or steps). If beneficial, tasks may be divided into subtasks. An activity task starts when it takes a given input (or inputs) and consumes time and resources by transforming the input into a specified output. The task ends with the delivery of the output (or outputs). Since an activity consists of a set of tasks, it consequently also has a start and end point and consumes time and resources. The resource consumed by an activity is the algebraic sum of the resources consumed by its tasks. The time consumed is differentiated into elapsed time and total time. The total time consumed by the activity is the algebraic sum of the time consumed by all its tasks. The elapsed time is the difference between the start time of the first executed task and the end time of the last completed task. These cost figures are used in the cost-benefit analysis of a project using **activity-based costing (ABC)** or some other method of evaluation.

Integration and **scope** management of a **project** encompasses the activity tasks (or steps) of initiating, planning, defining, scoping, managing, leading, and closing. In this context, integration is understood to mean the connecting of individual elements into a coherent whole, and scope is understood as the totality of the area of coverage of a project. **Organizations** are complex living structures and as such act and behave as **dynamic systems** both in the mathematics/physics sense and in the psychological sense. As a consequence, work within an organization is difficult to perform. Human efforts to be efficient

in the execution of organizational work have led to the concept of projects and project management.

The word *project* can be seen as a collective term for the work performed in moving from a current state (as-is state) to a future state (to-be state) by turning a given input into an output that had been determined to be of a certain value to the organization. More formally, a project can be defined as any endeavor that serves a specific purpose, objective, or goal under the constraint of time, **resources**, quality **objectives**, and defined scope. A project has a definite start and a definite end point. Building on that concept, the word *project management* can be considered a summarizing term for the effort to manage the work performed in executing a project. More specifically, project management can be defined as the planning, organizing, coordinating, controlling, and leading of activities and resources to start and complete a defined project.

The Project Management Institute (PMI) has based its "Project Management Body of Knowledge" collection, the ***PMBOK® Guide***–Fifth Edition, on the concept of **Process Groups** and **Knowledge Areas**. A Knowledge Area in the *PMBOK® Guide* is a term for the collection of related processes to perform a certain type of work. Three examples (out of nine) are the Risk Management, Time Management, or Scope Management Knowledge Areas. In addition, there is a tenth Knowledge Area called Integration for cross-functional processes. Although the concept of Knowledge Areas and Process Groups is in actuality straightforward, the *PMBOK® Guide* has gained a reputation of being difficult to understand. Maybe the use of an integration area has something to do with this. For information on the PMBOK® concept and a visual representation of the concept, see the section "The PMBOK® View of Project Integration and Scope Management" in this chapter.

Project management can also be viewed from a holistic **viewpoint.** The viewpoint concept taken is similar to the PMBOK® concept, yet distinct in a subtle way. The viewpoint of the integration and scope aspects of projects and of project management is a **holistic** one based on the recognition that the key to the management of a project, from the point of initiation to the point of closure, is to manage the (defined) *scope* of the project. Under the holistic viewpoint, the activity tasks (or steps) to manage the scope of a project include, by

the definition of holistic, any and all integrative project management activities steps. Although that inclusion has determined the structure of this book, the use of the widely known term *Integration and Scope* for this book was chosen to facilitate a direct and easy cross-reference to the PMBOK® Knowledge Areas.

Based on the holistic viewpoint, *Mastering Project Management Integration and Scope* is structured into four conceptual sections. The Initiating of Projects (covered in Section I), The Planning, Defining, Scoping, and Structuring of Projects (covered in Section II), The Managing and Leading of the Execution of Projects (covered in Section III), and The Closing of Projects (covered in Section IV). A visual representation of this holistic structure is shown in Figure 1-1.

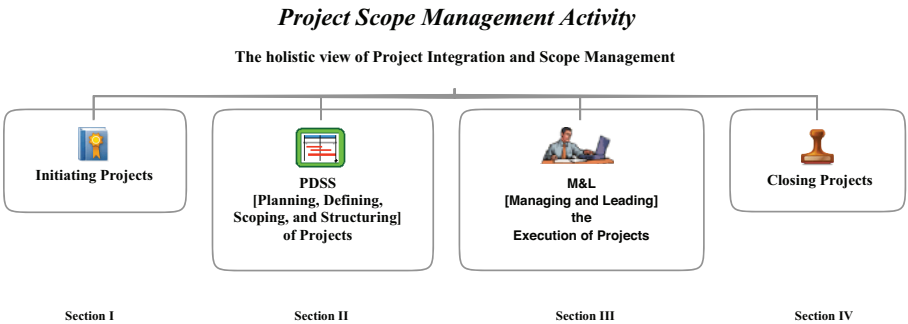

Figure 1-1 The holistic structure of integration and scope management

Many sources of project management address the initiation of a project by talking about terms like project brief, **Project Charter,** project kick-off meeting, project launch meeting, or some similar expression. While the activities behind the terms, respectively, the activities implied by these terms, are absolutely necessary, they are not sufficient in my opinion. Just like the participants in the study of mathematics (also known as students) cannot understand (and much less prove) a mathematical theorem without knowledge of the fundamental axioms and the definitions of the terms involved in the theorem, the participants in a project (also known as stakeholders) cannot, in all likelihood, understand each other or comprehend the meaning and necessity of the various elements and activities in a project. To have a chance in doing so, they first must acquire a common

understanding of project and project management fundamentals. This is the reason for Chapter 1, "Fundamentals," being the first chapter in the section on the initiation of projects (refer to Figure 1-5 later in the chapter).

There are tangible and intangible factors that influence an organization's modus operandi and also influence its projects, its project management, and the people involved in the (project) work. Tangible factors are the organizational structure, supporting hardware and software systems (including technical infrastructure), the organization's data pool, hardware tools, software tools, documentation, and financial and human resources. Intangible factors are the **vision**, the **mission**, the **goals**, the objectives, the **strategy,** and the **core values** of the organization. Some authors of project management literature also consider the owned (or earned) knowledge and the life and work experience of employees as an intangible factor or asset. But such a consideration quickly becomes academic with the consideration of the question if and to what extent employees are willing to bring in these assets. Unlike with college football games, "all in" is not a given in the workplace.

Additional factors that play a significant role in the successful planning, execution, and completion of a project are a project manager's leadership qualities, communication skill, work performance capability, and the ability to "see and live" the organization's values. Like any **stakeholder**, a **project manager** must have a solid understanding of a number of fundamental terms and concepts to successfully function within the actual working-structure of an organization. These topics are addressed in the following sections of this chapter.

The Holistic Viewpoint of Project Integration and Scope Management

Under the holistic viewpoint, the activity to manage the scope of a project includes, by the definition of *holistic,* any and all *integrative* project management steps. The scope of a project, once defined and agreed upon by all stakeholders, completely and exhaustively defines the domain of a project. Project management activities necessary from the viewpoint of communication, cost, human resources,

procurement, quality, risk, stakeholders, and time are distinct elements of the domain of the project. This holistic **view** thus obtained avoids the need for the construct of a Knowledge Area for integration. The other nine Knowledge Areas in the *PMBOK® Guide* correspond to the aforementioned eight project management activity viewpoints in the holistic view. The integrative view seen from the holistic viewpoint of project management activities is shown in Figure 1-2.

As the title *Mastering Project Management Integration and Scope* indicates, this book addresses only the project management processes described in the PMBOK® Knowledge Area Integration and in the Knowledge Area Scope. The project management activities represented by the vertical columns in Figure 1-2, and also listed in the corresponding PMBOK® Knowledge Areas, are subject to separate volumes in the FT Press Project Management Series.

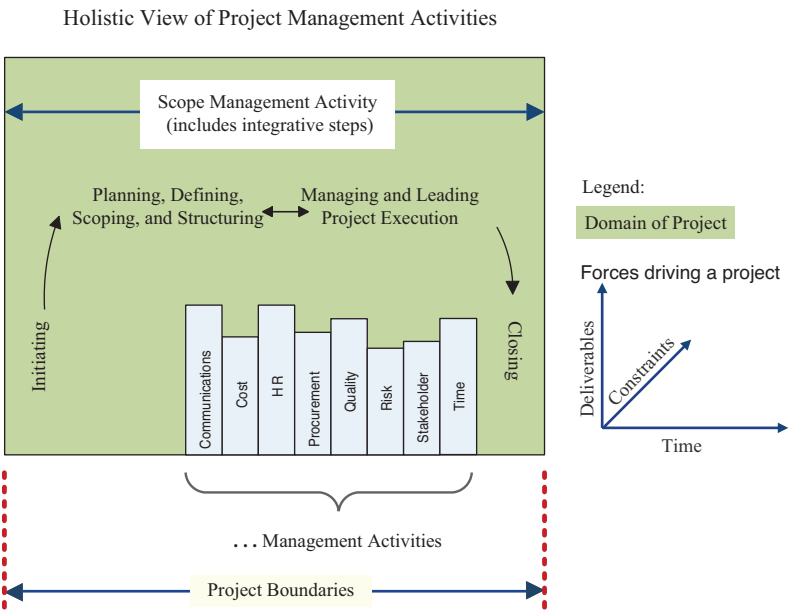

Figure 1-2 The view seen from a holistic viewpoint of project management activities

The darkened rectangle in Figure 1-2 represents the totality of the scope of a project. The scope identifies the project boundaries and defines the domain of the project. The activities represented by

the eight rectangles are contained within the totality of the project scope and, thus, subject to the integrative activity tasks (or steps) listed in the scope area. The activity tasks (or steps) within the scope area, including the integrative steps involving aspects of the other eight management activities, collectively constitute the Project Scope Management Activity.

From this point on, we will either just use the term *steps* instead of activity tasks (or steps) if the context is clear or, alternatively, we will use the term *processes* for the steps *within* an activity, whichever is the better semantic fit in the sentence.

Scope management activity starts with the project initiation steps followed by the steps to define the various project plans and identify the necessary or desired project documentation. The next set of scope management steps are the processes to solicit and define the requirements demanded (by the stakeholders) from the project and the processes to hammer out the scope itself in the necessary, sufficient, and unambiguous detail to identify the deliverables. These deliverables are then even more detailed to a level of granularity suitable for the practical use in the project **work breakdown structure** (WBS). Another set of scope management steps involves managing and leading the work performed during the execution of the project. Managing and leading includes the monitoring and controlling of the work performed, the integrating and controlling of the changes that occur (almost inevitably) during project execution, and the controlling and continuous validating of the scope of the project. All of these steps are definitely not on a linear time axis, but rather they occasionally, and sometimes frequently, loop back. This iterative characteristic of scope management is indicated by the double arrow in Figure 1-2.

It might even happen in some rare cases that there arises a need to go back to initiation during some other scope management steps, that is, a need to change the Project Charter might have become unavoidable. In such a case, it is advisable to be very, very careful. If the change or changes are small, it might be justifiable to make these changes to the charter. However, there is a limit that must not be surpassed. If that limit is reached, it is by far better to make a clean cut, close the current project (maybe as "discontinued"), and initiate a new project. Such a clean cut saves the organization from endless squabbles, constantly rising costs, and continuously extended

deadlines. Unfortunately, there is no singular, clearly identifiable general limit that could be used as a decision criterion. Instead, each limit must be determined on a case-by-case basis within an organization.

The activities of closing the project and assessing the outcome (versus the **baselined** charter and the initial project plans) should not loop back. If one comes to the closing point for the project and a perceived need to loop back is brought forth by someone in the organization, something seriously was amiss in the management and leadership of the project. The project should be closed and an independent, thorough investigation into the management of that project should be started.

The Concept Behind the Holistic Structure

The *PMBOK® Guide*–Fifth Edition makes a distinction between the processes that it classifies as belonging to the Integration Knowledge Area (refer to Figure 1-6 in this chapter) and the processes that it classifies as belonging to the Scope Knowledge Area (refer to Figure 1-7 in this chapter).

Considering this PMBOK® distinction between Integration and Scope Knowledge Areas and reflecting on what constitutes the scope of any endeavor (from a practical point of view, any endeavor can be considered a project), we can see, as described earlier, that scope and integrative activities cover the same area, the darkened area in Figure 1-2. The bounds of a project determine or limit the scope, and the amount of effort and resources required to perform (or execute and manage) a project determine the size of the project. Of course, the amount of effort and the required resources are a function of the demanded deliverables. If we view the eight project management activities, other than integration and scope, as (alphabetically) shown in Figure 1-2, we can see that the "size" of these activities corresponds to the area represented by the rectangles between the bounds of the scope. For the purpose of illustration, the size of each rectangle has arbitrarily been chosen. In a real project, the rectangles will have completely different sizes depending on the amount of effort required.

(As an amusing aside, doesn't the image of these rectangles together with the word *integration* trigger fond memories of the derivation of the Riemann sum representation of the definite integral?)

Since, as illustrated by Figure 1-2, scope and integration management activities are both performed within the (common) scope area, we might just simply speak of scope management rather than integration and scope management. However, to facilitate easy cross-reference to the *PMBOK® Guide*–Fifth Edition, the compound term integration and scope management will continue to be used in this book interchangeably and along with the holistic term scope management activity.

With the understanding that the holistic term Project Scope Management Activity includes the integrative steps addressed in the PMBOK® Project Integration Management Knowledge Area, we could classify the "art and science" of project management as consisting of nine sets of activities without the need of introducing Knowledge Areas to complement Process Groups. The nine sets are the holistic scope management activity plus the eight management activities listed in alphabetical order in Figure 1-2. Each of the nine sets contains a number of unique elements, the specific steps, or processes, that make up the particular activity. For example, the activity set "Project Cost Management" has four elements, namely {Plan Cost Management, Estimate Costs, Determine Budget, and Control Costs}. For this example, the *PMBOK® Guide*–Fifth Edition makes use of one Knowledge Area and two Process Groups to address these four elements. The first three elements are in the PMBOK® Planning Process Group for the Knowledge Area Project Cost Management, while the fourth element is in the Monitoring and Controlling Process Group for the same Knowledge Area. Maybe this interlacing of the Knowledge Area concept with the Process Group concept has added to the "difficult to understand" reputation of the PMBOK® *Guide*.

The conceptual integration of the PMBOK® Knowledge Areas Integration and Scope with their respective Process Groups into the holistic scope management activity is visually represented in Figure 1-3. The combining of the two PMBOK Knowledge Areas into the singular Scope management activity has led to the simplification shown in Figure 1-4.

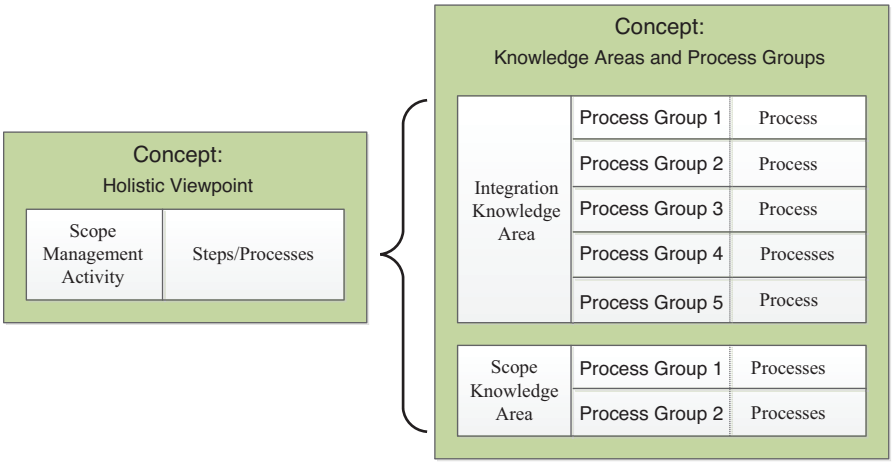

Figure 1-3 The holistic activity set scope management as the result of the unification of two Knowledge Areas and their respective Process Groups

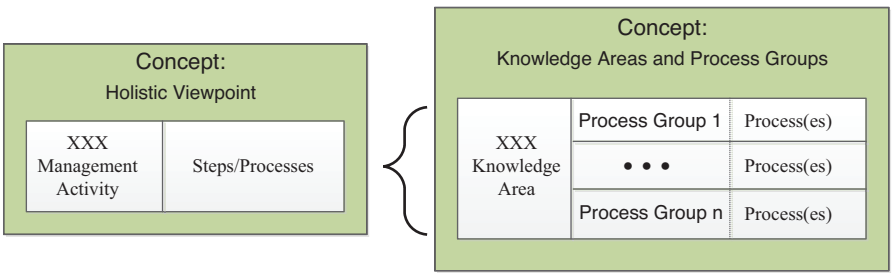

Figure 1-4 The simplification resulting from the application of the holistic viewpoint to Knowledge Areas

As mentioned before, the other eight Knowledge Areas with their respective Process Groups are not the subject of this book. However, for the sake of completeness, Figure 1-8 has been included later in this chapter to illustrate the application of the holistic viewpoint to these Knowledge Areas. It is important to realize that with the holistic viewpoint, neither has a heretofore unknown management activity been created nor has a process been deleted. The elimination of a more or less semantic interface—the Process Groups—has "simply" simplified the way one can look at and practice project management. It is hoped that this simplification will help newcomers and practitioners alike to provide increasingly positive contributions to the management of projects and ensure their successful completion.

The holistic structure and the further breakdown of each section of the book into chapters covering a specific topic of the activity set Project Scope Management is depicted in Figure 1-5. The text in each rounded rectangle in the diagram represents the name of the chapter in this book and also, except for the chapter Fundamentals, indicates the related project management processes as identified in the *PMBOK® Guide*–Fifth Edition. For ease of cross-reference, the labels added at the bottom of the rectangles identify the respective project management Knowledge Area and the Process Group in the *PMBOK® Guide.* The icons have been added as a visual aid.

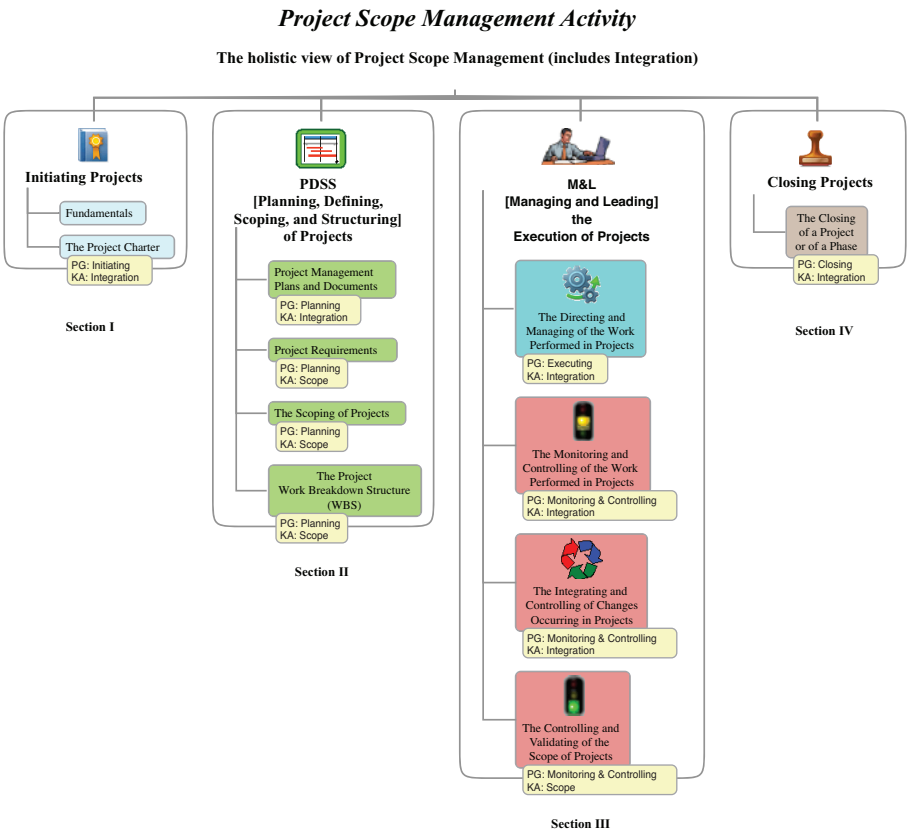

Figure 1-5 The structure of the Project Scope Management Activity

The PMBOK® View of Project Integration and Scope Management

As pointed out earlier in this chapter, the *PMBOK® Guide*–Fifth Edition makes a distinction between the processes that it classifies as belonging to the Integration Knowledge Area (Figure 1-6) and the activities or processes that it classifies as belonging to the Scope Knowledge Area (Figure 1-7).

All ten Knowledge Areas that entail the complete Knowledge Area concept as presented in the *PMBOK® Guide*–Fifth Edition are shown in Figure 1-8.

The PMBOK® Project Integration Knowledge Area

Figure 1-6 shows the Process Groups that constitute the project management Knowledge Area necessary to ensure that the project management processes are integrated according to the *PMBOK® Guide*–Fifth Edition. The rectangles name the specific processes involved in project management Integration Knowledge Area. The work done in these six processes is correspondingly performed in the steps, or processes, of the holistic Project Scope Management activity described earlier.

The Section I, Section II, Section III, and Section IV captions refer to the section in this book where the various processes are described as part of the holistic project scope management activity.

The label at the bottom of a rectangle identifies the Process Group in the *PMBOK® Guide* and also the Knowledge Area, which, in this figure, is Integration in every case. As can be seen in the figure, the Knowledge Area Project Integration Management uses one process from each of the four Process Groups Initiating, Planning, Executing, and Closing and two processes from the Monitoring and Controlling Process Group.

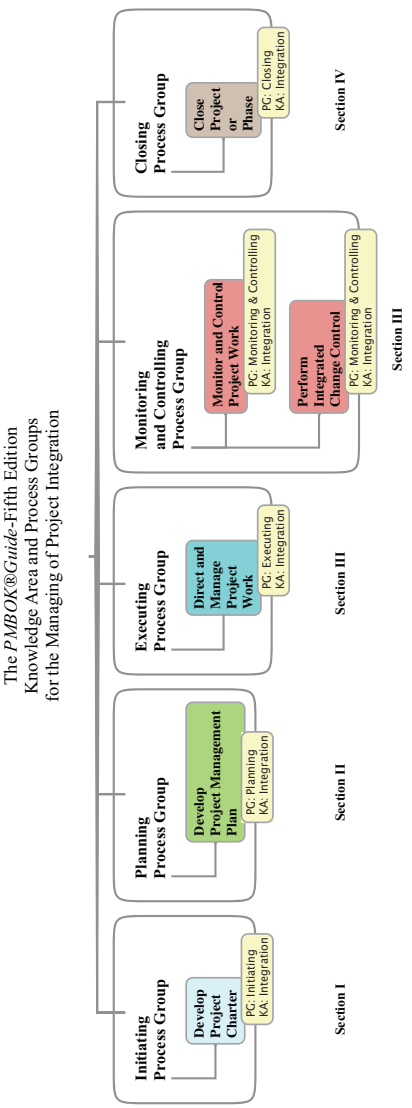

Figure 1-6 The *PMBOK® Guide*–Fifth Edition Integration Knowledge Area

The PMBOK® Project Scope Management Knowledge Area

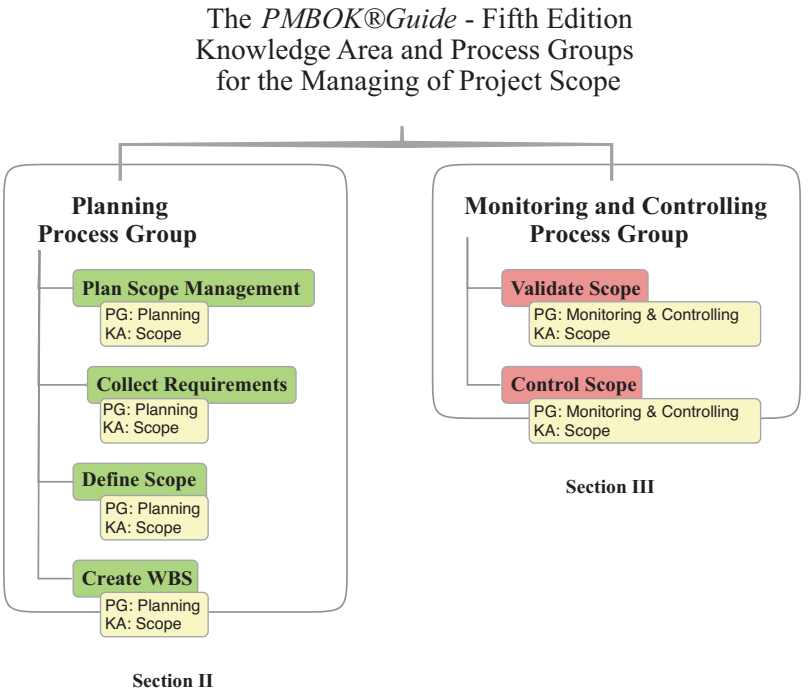

Figure 1-7 Process groups in the Project Scope Management Knowledge Area as described in the *PMBOK® Guide*–Fifth Edition

Figure 1-7 shows the Process Groups that constitute the project management Knowledge Area necessary to ensure that the project scope is managed according to the *PMBOK® Guide*–Fifth Edition. The rectangles name the specific processes involved in the project management Scope Knowledge Area. The Section II and Section III captions refer to the section in this book where the various processes are described as part of the holistic project scope management activity.

The label at the bottom of a rectangle identifies the Process Group in the *PMBOK® Guide* and also the PMBOK® Knowledge Area, which, in this figure, is of course Scope in every case. As can be seen from the figure, the major effort is spent on planning. Planning

involves four processes compared with the two processes in the Monitoring and Controlling Process Group. In general, the more processes from one Process Group are involved, the more resources have to be spent for this Process Group.

However, it is conceivable, and it has happened, that one single activity from one Process Group requires more resources (and attention) than all the activities in another Process Group together. For example, in a small to medium-sized project, it might take more time to create a scope management plan and to collect the requirements since the stakeholders feel strongly that they know exactly what they want. Defining the scope and creating a work breakdown structure (WBS) might subsequently be accomplished in a relatively shorter time.

The fun and the expenditure of unplanned additional amounts of resources begin when the project is being executed. All of a sudden, the requirements are starting to morph little by little and validating and controlling scope becomes an almost daily struggle for the project manager or the team member(s) assigned to these two tasks. If the project manager is lucky, the stakeholders recognize that their requirements, initially believed to be firm and well defined, were in reality only approximate conceptions. With fair and objective stakeholders such as these, the project manager should still be able to complete the project in time, with an accepted increase in costs, and with the expected quality, or, if it becomes apparent that this is not possible, a mutual agreement on an extension will most likely be possible.

If, however, the stakeholders insist that the specifications they provided were and still are correct and precise, the project manager's leadership qualification and communication skills will be challenged.

The PMBOK® Scope Management Knowledge Area shown above illustrates that a Knowledge Area does not necessarily involve all five PMBOK® Process Groups. As a matter of fact, most Knowledge Areas, namely five, involve only two Process Groups, two Knowledge Areas involve three Process Groups, and another two areas involve four Process Groups. The only PMBOK® project Knowledge Area that involves all five PMBOK® Process Groups is that of Integration. In the *PMBOK® Guide*–Fifth Edition, this Knowledge Area is referred to as the Project Integration Management Knowledge Area and is distinct from the Project Scope Management Knowledge Area.

This distinction is, as has been described earlier, in contrast to the holistic viewpoint of project management activities where the Scope Management Activity includes, by virtue of being holistic, the integrative subtasks and steps (or PMBOK® processes) that are a fundamental part of project management.

The Ten PMBOK® Project Management Knowledge Areas

As indicated by the title of this book and as also mentioned previously, this book only addresses management activity dealing with the integration and scope aspects of project management. The holistic viewpoint taken in this book leads to one holistic Project Scope Management Activity, which includes all integrative steps (or processes) necessary for the management of a project. In addition, there are eight other project management activities (see Figure 1-2). This set of nine project management activities provides the subtasks and steps (or processes) to manage a project.

As likewise mentioned previously, differing from the holistic viewpoint, the *PMBOK® Guide*–Fifth Edition describes ten Knowledge Areas and various processes (47 in all) to manage a project. Eight of the PMBOK® Knowledge Areas correspond to the set of eight holistic project management activities, while the Integration Knowledge Area and the Scope Knowledge Area *together* correspond to the *one* holistic scope management activity "area."

For ease of reference and comparison, Figure 1-8 shows the ten PMBOK® Knowledge Areas, and for each Knowledge Area the number of processes used in that area and from how many Process Groups these processes are selected.

Processes in PMBOK® Knowledge Areas: What Used ⟷ Where

From mathematics, we know that matrices or tables are powerful constructs for providing clarity. If we construct a table of Knowledge Areas versus Process Groups, we can make interesting observations, which can promote our understanding of the connection between the *PMBOK® Guide*'s Knowledge Areas and Process Groups.

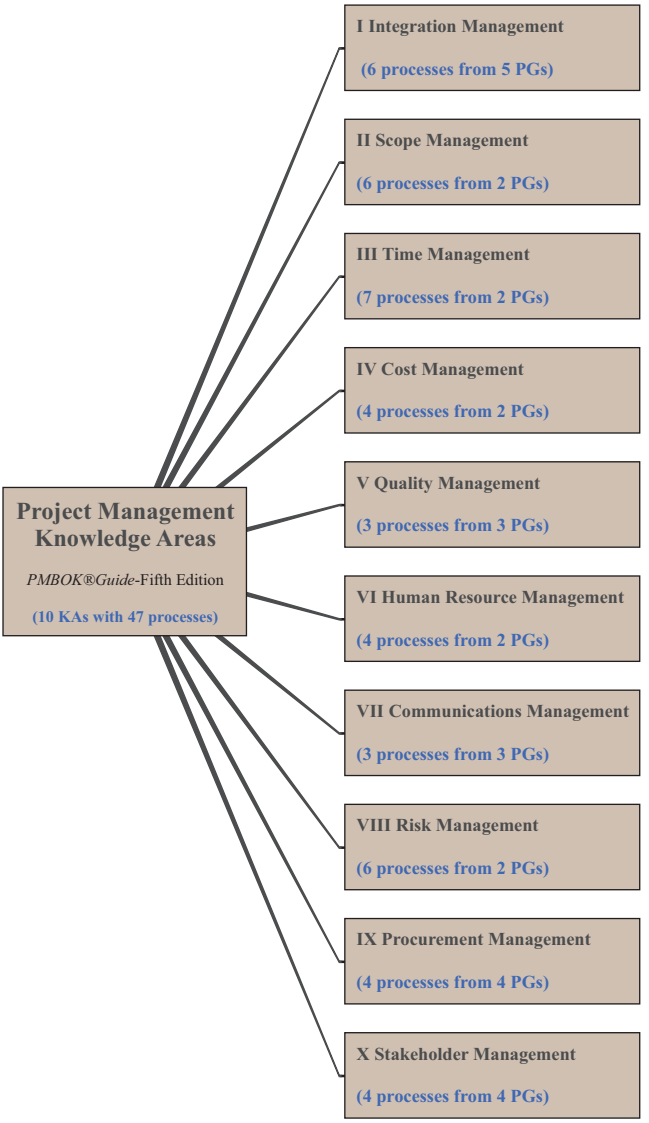

Figure 1-8 The Ten *PMBOK® Guide*–Fifth Edition Knowledge Areas

Figure 1-9 shows *What* number of processes from each Process Group is used *Where* in the Knowledge Areas, that is in which Knowledge Area. The table serves as a visual aid in answering the questions *what—where* and *where—what*. If the situation "where the work is to be done" is relevant, for example in the Risk Management area, the table immediately shows that the answer to the question "what number and type of activities or processes" are needed to do the work. The answer in this example is five planning processes and one monitoring and controlling process. The inverse question is answered analogously.

Aside from deepening one's understanding of the relationship between Knowledge Areas and Process Groups, which is one of the issues that first-time readers have with the *PMBOK® Guide*, there is some practical use and benefit from looking at the matrix. In large organizations with a number of projects, the *what—where* and *where—what* view could help simplify resource planning.

The rightmost column of the table in Figure 1-9 contains the percentage of the total number of processes required to do the work in each of the knowledge (or work) areas. The bottom row of the table contains the percentage of the total number of processes that is contained in each Process Group.

Knowledge Areas Use of Processes from Process Groups

K- Area \ Process Gr.	Initiating	Planning	Executing	Monitoring & Control.	Closing	Total	%
Integration Management	1	1	1	2	1	6	12.8
Scope Management		4		2		6	12.8
Time Management		6		1		7	14.9
Cost Management		3		1		4	8.5
Quality Management		1	1	1		3	6.4
HR Management		1	3			4	8.5
Communication Management		1	1	1		3	6.4
Risk Management		5		1		6	12.8
Procurement Management		1	1	1	1	4	8.5
Stakeholder Management	1	1	1	1		4	8.5
Total	2	24	8	11	2	47	100.0
%	4.3	51.1	17.0	23.4	4.3	100.0	

Figure 1-9 WHAT processes used WHERE in Knowledge Areas in the *PMBOK® Guide*

The IPO Concept and How Project Management Might Have Started

IPO stands for Input-Process-Output. The fundamental IPO structure is illustrated in Figure 1-10. The term *process* stands for the steps performed to transform a given input into a desired output. The term has established itself in the systems and business worlds and is used in this book to maintain consistency with the historical usage. Without this bow to history, a more general and flexible expression would be the term *transformation* and IPO would be called ITO, that is, Input-Transformation-Output.

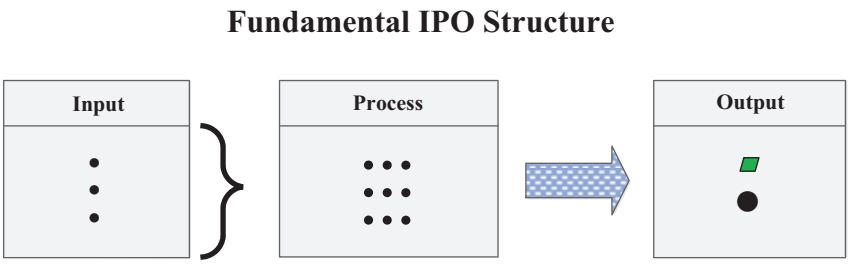

Figure 1-10 The fundamental Input-Process-Output structure

The concept behind this structure is based on simple, common-sense thinking. Whenever we are in a certain as-is situation, let us call it the original state, and we want to move to a new, desired situation, let us call this the target state, common sense and life experience tell us that some kind of effort, or work activity, has to be expended to make this move possible. The effort or work activity consists of taking the input and transforming ("processing") it into the output.

Likewise, based on common sense, and from life experience, we understand that we have to provide some input to the effort that executes the move from the original state to the target state. We also know that such a move has a beginning, or start point in time, and, subsequently, also an end point in time. Furthermore, since that moving is "going on," or in other words, is "alive" for the period of the elapsed time between the start point and the end point, we can call this period the life of the move. The entirety of this understanding is visually represented in Figure 1-11.

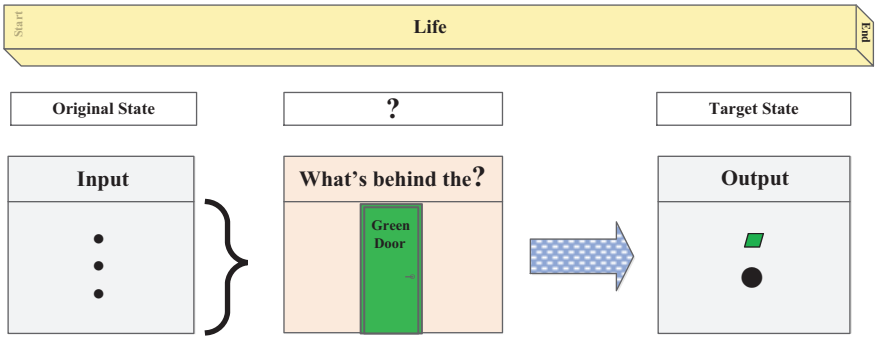

Figure 1-11 Basic concept to move from a current state to a new state

While the distinction between input and output is easily comprehended, the all-important question is, what's behind the green door? Obviously, some sort of activity or possibly even several activities have taken place since a new state was reached at the end of the life of the move. Or, to express this in a more general statement, the activities behind the green door have *processed* (transformed) the information and, if appropriate, the data and/or products provided by or provided in the original state, to deliver an output, which constitutes the desired target state. We can now state the following observation about what happens behind the green door: A set of activities takes the given input and, through executing one or more activity tasks, subtasks, or steps over a period of time, *delivers* an output.

The desire or need to move from a current as-is state to a new state that is considered to be of higher value arises in organizations periodically. As a matter of fact, it arises more frequently the longer an organization is in operation and, also more frequently, the bigger the organization. This desire can be triggered by various sources such as an *internal idea,* a *business need,* or a *contract* with an external agent. In this context, the term *business need* is to be understood to include government laws, regulations, and the forces of a competitive market.

Throughout history, possibly since as early as the Cro-Magnon days, judging by the cave drawings, man has displayed an inborn tendency to be effective in the work to satisfy a need, that is to "do the right thing," and, at the same time, to be efficient in that effort, that is

to "do the thing right." Conscious, through the lessons learned from earlier work efforts, of the need to have to repeat a number of steps or processes as described above, it stands to reason that people have taken note of the steps performed during the various activities, that they looked at similarities, and that they sorted similar steps into collections of steps of a related nature. Since relational databases and cloud storage had not yet been discovered, these collections probably are best visualized as bins (could this be considered the origin of Kanban bins?) made of some natural biologically grown material into which our ancestors placed their descriptions of the steps, probably in the form of drawings on animal skin, alphabet-like symbols on clay tablets, parchment scrolls, or paper, once it was available, depending on how far back into history we want to travel.

It does not take much imagination to recognize that people very quickly discovered the need to uniquely identify these bins if they wanted to be efficient and also if they wanted to train others to be able to perform the steps of the various activities. The use of numbers or descriptive names for that identification seems natural. As the number of bins increased, people must have found that it makes sense to collect bins with similar content and place them into still larger bins indicating a natural relationship between the smaller bins. Of course, the larger bins also needed to be given a descriptive identification. Again, it stands to reason that a descriptive identification was chosen to indicate that the content of each bin was viewed to share some common characteristic. This commonality indicated the area of work or activity where the content of each large bin would be useful or appropriate.

Now, with the knowledge of which large bin was best suited for a certain activity or kind of work, people could easily pull the small bins with the necessary activity tasks (or steps) or processes out of the large bin and perform the work to deliver the required or desired output. Thus, conceivably, were born the concept or viewpoint of **work areas** or activity areas with their associated work steps or processes. In due time, our ancestors (there are always people who love to cross-analyze everything) surely noticed that there also was some additional commonality among the work steps or processes located in the small bins when viewed across all the work or activity areas (the large bins).

In other words, they discovered that there are related steps or processes performed in the various activity areas that can be grouped together using a cross-activity viewpoint. Of course, our ancestors found a descriptive name for each of these new cross-activity groups. And thus, we could imagine, was conceived the concept of Process Groups.

Continuing our time travel through the history of project management thought, we might find that, to ensure completion and success of the work performed, a person was chosen by the ancestral board for work efficiency to oversee (*manage*) the execution of the work activities. The duration of the work activities eventually became known as a project, the selected overseer became known as the project manager, and the duration of the work activity as the **project life**.

Fast-forward to modern times. The *PMBOK® Guide*–Fifth Edition refers to the work activity areas (the large bins of history) as *Knowledge Areas* and identifies five cross-Knowledge Area (cross-work activity) *groups of processes.* The work steps or processes in these five Process Groups are the answer to the earlier question, what is behind the green door. The five Process Groups, together with visual representations of input and output examples, are revealed in Figure 1-12.

The *PMBOK® Guide*–Fifth Edition also identifies ten Knowledge Areas, which cover the spectrum of the areas of work that arise during the life of a project. The ten Knowledge Areas are shown in Figure 1-8. Whenever work is to be done in any one of the ten Knowledge Areas, the Process Groups in the *PMBOK® Guide* identify which steps or processes are to be selected for the work. The selection of the Process Group and thus of the work steps or processes is determined by the particular purpose of the work identified by the Knowledge Area. For example, if the chosen area of work is the management of costs and, let us say, one person was given the task to estimate costs and a second person was given the task to control costs, then the first person would find the appropriate process steps in the Planning Process Group, while the second person would find the process steps for controlling the costs in the Monitoring & Controlling Process Group.

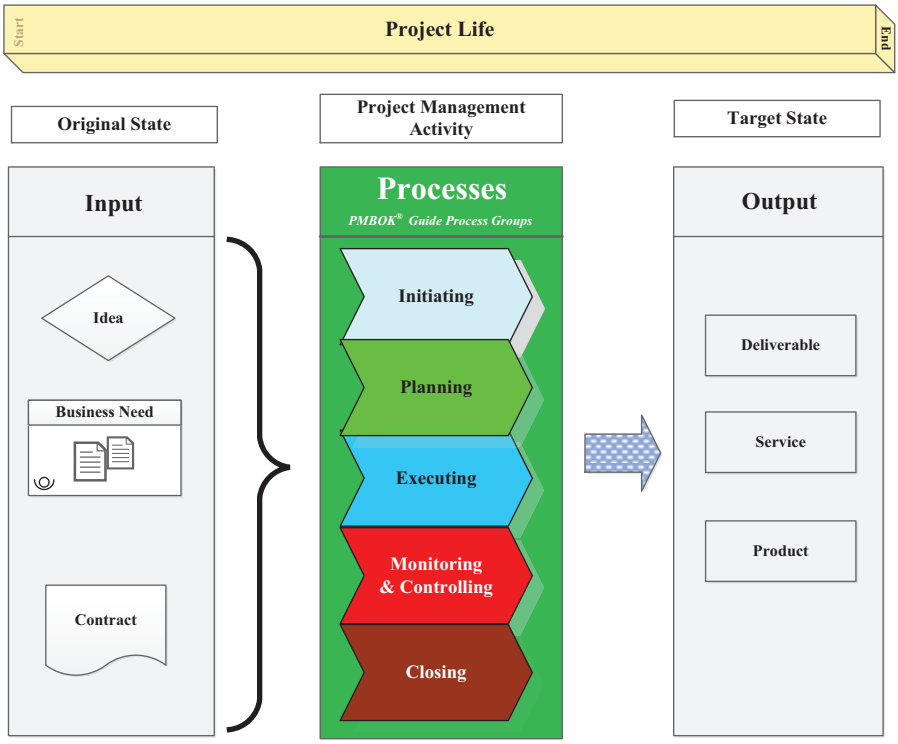

Figure 1-12 The *PMBOK® Guide*–Fifth Edition Process Groups in the Input-Process-Output concept

In the *PMBOK® Guide*–Fifth Edition, there are 47 steps or processes (the small bins) unevenly distributed among the five Process Groups (the cross-activity grouping of processes). In the view of the Project Management Institute (PMI), the 47 processes represent the current best practices as generally accepted by project management practitioners. The ten PMBOK® Knowledge Areas are listed in Figure 1-8. For each Knowledge Area, there is also listed the number of processes specific to that Knowledge Area and from how many different Process Groups these processes have been selected.

For each process, the *PMBOK Guide* lists the inputs, the tools and techniques that can be used, and the output. The structure of input—tools and techniques—output, supported by a brief overview, is maintained in the *PMBOK Guide* for every process in each Knowledge Area. This provides project managers and project team members with an easy-to-use reference to what is needed for working with or

on a process, what tools or techniques to use, and what the deliverable from the process should be. The latter point is especially helpful for those stakeholders who are only occasionally involved in the project.

Figure 1-13 provides a visual representation of the concept used in the *PMBOK® Guide*–Fifth Edition to represent a project management process. The 'XXX' stands for any of the six processes identified in the *PMBOK® Guide* as necessary and sufficient for the management of scope and any of the six processes needed for the management of project integration, for example for the process *Develop Project Charter.* The icons have been added as a visual aid. Similarly, the labels at the bottom of the rounded rectangle have been added to identify the respective project management Knowledge Area and the Process Group in the *PMBOK® Guide.*

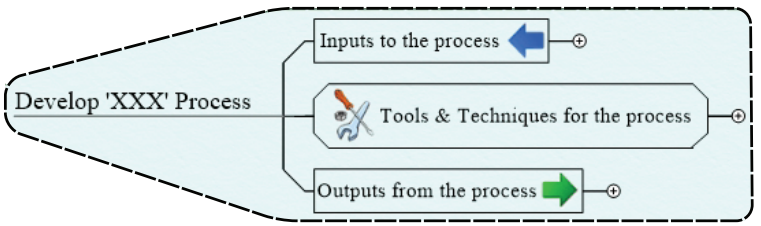

Figure 1-13 The concept used in the *PMBOK® Guide*–Fifth Edition to represent any project management (PMBOK®) process

The Similarity and Difference Between the PMBOK® and the Holistic View

Does the holistic viewpoint of the activities involved in project management differ from the PMBOK® view of Knowledge Areas and Process Groups? The PMBOK® view shows ten classification areas where you can find the knowledge about the processes that will enable you to manage a project. In addition, that view also tells you that there exist five classification groups for these processes independent of where they are used. It certainly doesn't hurt to have these Process Groups, but do you really need this group classification to manage a project? Isn't it just necessary and also sufficient to know that I need these *x* processes to manage a certain work area of a

project? For example, if I know which six processes (according to the PMBOK®) are necessary to manage the risk in a project, isn't that also sufficient (assuming I know how to manage and lead a project team)? Will it help me to manage project risk better if I know that one of the six necessary processes belongs to the "family" of processes with the name Monitoring and Controlling and that the other five necessary processes belong to a family named Planning? For comparison, if I know which skills I need my project team members to possess, do I need to know what family the team members belong to (not considering Human Resources administration aspects)? However, there is one situation where knowledge of this classification into Process Groups is not only helpful but also absolutely necessary and that is when you sit for a PMBOK®-based project management certification examination.

The holistic viewpoint of the activities involved in project management presents a view of nine work activity areas with a specific number of activity tasks or steps for each area necessary and sufficient to manage a project. One positive characteristic of the holistic viewpoint is its aim to make the understanding and practice of project management activities as simple as possible without sacrificing depth and quality. A cross-classification of activity tasks corresponding to the cross-Process Group classification of processes is recognized as not necessary. Instead, the project management understanding is furthered by being aware of the *nature* of the activity tasks (or steps). Some activity tasks (or steps) are, by nature, geared to the initiating, respectively closing of a project; other steps are creative in nature (planning, defining, scoping, and structuring, or PDSS); while still others are natural managing and leading (M&L) activity tasks (or steps). The nature of the activity tasks (or steps) is visually shown in Figure 1-14.

The arrow looping back from the M&L nature of activity tasks to the PDSS nature of activity tasks indicates that there possibly will be feedback information gained during the M&L activity tasks that is of sufficient influence to warrant some change to the results previously obtained from the PDSS activity tasks. Of course, the result of the initiating task influences the PDSS tasks. Likewise, the M&L tasks determine if and when the closing activity task can be started.

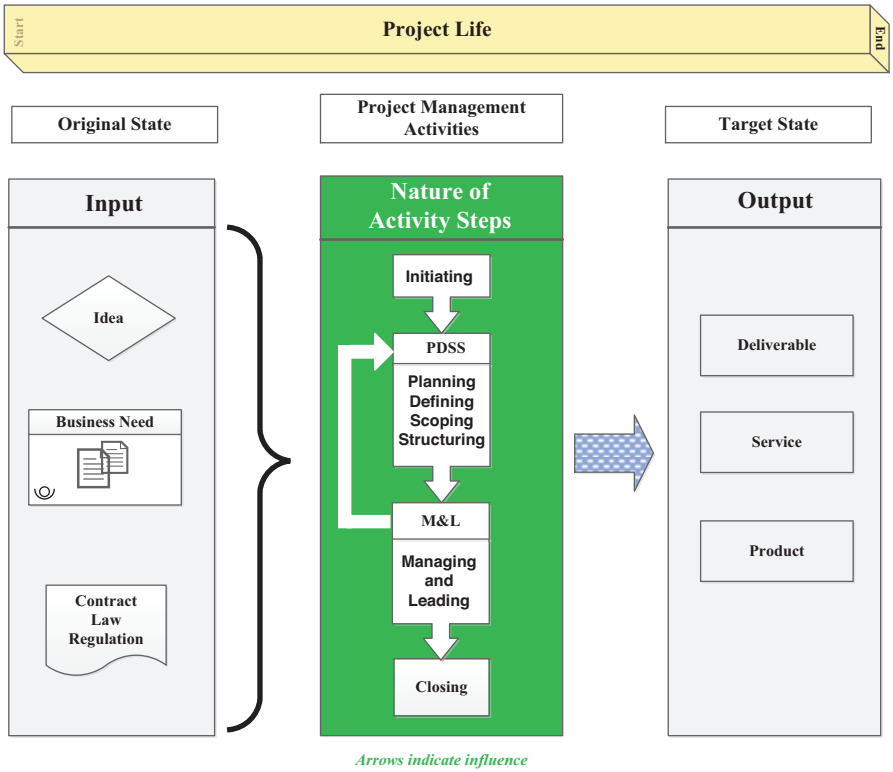

Figure 1-14 Input-Activity-Output in the holistic project management viewpoint

Since both the PMBOK® view and the holistic viewpoint represent the currently understood best practices, they must be very similar; the difference is largely didactic and to some extent semantic only, but it does affect the ease of understanding project management and the efficiency of performing the art and science of project management. And, since the *PMBOK® Guide* is practically the world standard in project management knowledge, it stands to reason that the terminology used is the same in both views. Furthermore, since the *PMBOK® Guide* has been the go-to documentation for project management, any new text on project management necessarily builds on it or is derived from its content.

The Input-Process-Output concept, visually represented in previous and in subsequent pages, of viewing the steps of project

management activities as taking a given input—the original or current state—managing its transformation, and delivering the desired output—the target state—is based on IBM's time-proven **HIPO** structured system analysis design aid and documentation technique from the 1970s. HIPO stands for Hierarchical Input-Process-Output. The generic term IPO is still used in this book to acknowledge the historical heritage and to give the deserved credit to the originator even though the term *activity task* is preferable to the historical term *process* in the context of project management.

The reason for this preference has to do with the trend in the recognition and use of project management, enterprise architecture, and business process modeling in today's business world. The importance of (good) project management and of (well-designed) enterprise architecture is being recognized more and more, both nationally and internationally. At the same time, companies (and consultancies) increasingly look at business processes in their quest for more effectiveness, efficiency, and growth in business volume and profit. This means that the term *process* begins to be applied more and more in the context of big-picture business processes rather than in the connection with the narrower viewpoint of a singular project. Of course, if all parties involved have a common understanding of the terms used, then there would probably be little or no room for misunderstandings. But, has anybody ever encountered a real-world situation where everybody involved in a project had the same understanding? Probably not, unless the Project Charter had been developed as described in Chapter 2.

During the 1970s and early 1980s, when structured system development and information engineering constituted the new frontier of the information age, the use of the HIPO technique was *de rigueur*. The functional structure of a system—WHAT the system was to do (to deliver in today's parlance)—was visually represented in a hierarchical chart, which at first glance looked like an organization chart, but actually was a breakdown structure of the scope of the system. It specified to the developers what their modules were expected to deliver as output. We will meet such a structure again in Chapter 6.

The HIPO Input-Process-Output components consisted of a series of numbered diagrams, starting at high, descriptive levels, which were subsequently broken down through stepwise refinement to a level of

granularity that enabled the developer to produce the appropriate code. If consistency was maintained, the HIPO technique produced the system design, the programmed modules that implemented the system, and a concurrent documentation. There were few graphic programs available in those days, so most of the design and documentation work had to be done by hand. IBM provided a HIPO template (IBM–Form GX20–1971) that at least ensured consistent drawings. In addition, IBM also provided a user guide for HIPO design, which is listed in the bibliography.

Some Fundamental Terms and Concepts

There are some fundamental terms and concepts relating to project integration and scope that a project manager needs not only to know, but also to fully understand. To be successful in today's rapidly changing organizational environments, the project manager must have an understanding of these terms and must be able to use these terms properly within a given context. Furthermore, experience shows that in the world of projects and project management, incomplete understanding and sometimes misconceptions of these terms are not uncommon. This holds true for members of a project team and other stakeholders alike. In project environments where this is the case, the project manager is confronted with the challenge to provide a convincing explanation of these terms and concepts.

Explanations can sometimes be quite a delicate task, given the propensity of the human species for self-deception and denial. The handling of such issues demands high leadership capabilities on the part of the project manager, especially if stakeholders are involved who belong to top management.

Leadership

Leadership can be described as the function of motivating and inspiring people to achieve their optimal performance within an organization and to guide the activities performed by the members of the organization to comply with the vision, support the mission, reach the goals, meet the objectives, and follow the strategy of the organization while at the same time adhering to the core values of the

organization. Robbins and Judge (2007) describe leading as "A function that includes motivating employees, directing others, selecting the most effective communication channels, and resolving conflicts" (p. 5).

The aspect of leadership in project management has only recently garnered some attention. In the past, the list of qualification requirements for a project manager has emphasized, and even now as we are in the second decade of the 21st century, the list still emphasizes skills in popular software tools over leadership qualification.

Organization

An *organization* is the synthesis of people, knowledge, and regulations—which include laws—and, as such, an organization is subject to the forces that affect all living things. That is, an organization is a *dynamic system.*

A characteristic of dynamic systems such as an organization is the complexity of the processes involved in performing the system-relevant activities and the large number of interactions between the processes and also between the activities.

To illustrate the complexity, if, for example, five processes are simultaneously involved in an activity, each interacting with every one of the other processes, there is a total of 26 possible interactions. For ten such interacting processes, the total number of possible simultaneous interactions grows to 1,013.

Over time, the people in organizations realized that an organized and well-structured approach is necessary to cope with this complexity when undertaking new tasks. This realization eventually led to a formalized approach in the 1950s called project management. (See also **Project Management** in the Glossary.)

Robbins and Judge (2007) define organization as "A consciously coordinated social unit, composed of two or more people, that functions on a relatively continuous basis to achieve a common goal or set of goals" (p. 5). Organizations usually are structured according to functions, or according to their products or a combination of the two. The latter organizational form is called matrix structure. Typical functional departments are accounting, engineering, marketing,

and so on. Sometimes one even sees an organization that is organized according to projects. This is called a projectized organization. There is still another form of organization called composite organization. Here, there is one function made up of project managers who draw on staff from other functions or departments as the need arises. This is where a project manager can expect quite a challenge when it comes to resource allocation and availability.

In the context of project management, we can simplify the above definition of an organization to an alliance of two or more people designed to function on a continuous basis to achieve a common set of goals. This concept of an organization includes the functional structure, the nominal reporting structure, the actual influence or power structure, the formal and the informal communication structure, the process assets, the culture, the vision, the mission, the goals, the strategy, and additional factors usually part of the Enterprise Environmental Factors. This is the form of organization, be it official or merely factual, that a project manager has to deal with most. And that is one of the reasons why a project manager must also possess leadership skills, and not only skills in tools and techniques.

Project

What is a project? A *project* is any endeavor that serves a specific purpose, objective, or goal under the constraint of time, resources, quality objectives, and defined scope. The Project Management Institute (PMI) defines a project as "A temporary endeavor undertaken to create a unique product, service, or result. The temporary nature of projects indicates that a project has a definite beginning and end" (Project Management Institute, 2013).

A project is closed when it has reached the end of its purpose, that is, when it has provided the deliverables specified in the Project Charter and further detailed in the work breakdown structure (WBS). Another way to consider the end to have been reached is when the project's objectives have been accomplished from the top stakeholder's point of view or when a willful decision was made to terminate the project. Such a termination decision can be based on the recognition that the project's objectives will not or cannot be reached or when the **owner** of the project does not wish to continue with the project any

longer. The owner of a project is the person who provides the funds for the project or the person appointed as the pro forma owner by the provider of the funds.

Project Management

A formalized approach to project management was developed in the 1950s. (See also **Organization** in the Glossary.) Since the mid-twentieth century, many variations on the theme of project management have appeared, some of which created considerable buzz while others relatively quickly and quietly faded from the public limelight. Some examples of the more persistent variations, in alphabetical order, are Agile Project Management, Critical Chain Project Management, Extreme Project Management, or Lean Project Management.

While these modern variations of project management are impressive, the popular initial silver-bullet expectation with most of these variations was, for the most part, a result of the powerful software tools available, and, in part, also due to the wishful thinking inherent in human nature. While giving full credit to all the modern enhancements and capabilities, the core of project management still rests nonetheless on the creative thinking and work of Jules Henri Fayol (1841–1925) and Henry Laurence Gantt (1861–1919).

Large and complex undertakings in the United States in the late 1950s and early 1960s, both military and civilian, broadened and refined the understanding of the existing project management concepts. The success of these projects and especially the convincing success of the space program in the 1960s attracted worldwide attention and generated global acceptance of project management as a "not-can-do-without" management discipline.

So what is project management? The definition and delimitation of the term *project management* is more difficult than the definition of the term *project.* The Project Management Institute (PMI) defines project management as "… the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements" (Project Management Institute, 2013). PMI then states that the appropriate application and integration of the 47 project management processes described in the *PMBOK® Guide*–Fifth Edition

accomplishes project management. (See Figure 1-9 for the organizing of the 47 processes according to classification criteria.)

While that statement does correctly specify the functional aspects of the management of project activities, it does not, at least not explicitly, reference the aspect of **leadership**. Projects that are managed solely or predominantly according to functional aspects of management are more likely to overshoot their budgets or timelines, and possibly experience undocumented **scope creep,** than projects that are under the guidance of leadership. The former method of project management is sometimes referred to, usually in good humor, as "management by scheduling."

Scope creep can be described as the undocumented stepwise expansion of the original baseline of the scope of a project, product, or service without agreed-upon changes to the original constraints. Scope creep has been found to be a major contributor to the failure of projects, respectively to the exceeding of cost and schedule and to the missing quality objectives or standards. Scope creep is addressed in more detail in Chapters 2 and 10.

The Deutsches Institut für Normung (DIN) defines project management as "The entirety of leadership functions, organization, techniques, and tools for the execution of a project" (DIN 69901, 2009-1). While still fairly general, this definition does reference the leadership function of a project manager.

A preferred definition of project management is the following: Project management is a set of management activities performed in and on an organization, under the leadership of a designated person, to move from a given current state to a defined target state. This definition implies, by virtue of "moving from a given state," a definite beginning (a movement always has a start) and a definite end, by virtue of when the target state has been reached. It explicitly includes leadership activity as well as management activity. An activity is understood to involve one or more activity tasks (or steps). Generally accepted project management activities are scope (which includes, by the definition of scope, integrative activities), communication, cost, human resources (HR), procurement, quality, risk, stakeholder, and time management activities.

The Pyramid of Business Maxims

A project manager needs to know and understand an organization's vision, mission, goals, objectives, and strategy, as well as the core values of the organization. Being aware of these terms and understanding what they mean to stakeholders will help the project manager when communicating with the various stakeholders.

An important point to be aware of is the (sad) fact that even in upper management there is no clear consensus of what these terms mean or even what they are for their organization. A poignant illustration of this lack of common understanding are the vivid senior management round table discussions that ensue when the CEO of a company has decided that these terms should be defined and published.

Another point for a project manager to be aware of is the fact that the understanding and acceptance of these terms diverges as one goes down the chain of command, notwithstanding even the prominent display of the written definitions. A lower-level line manager or stakeholder might, unofficially of course, but nonetheless real, follow his or her own set of goals. A project manager frequently has to walk a very fine line to ensure success of the project (and thus personal success also).

Figure 1-15, the Values-to-Vision Pyramid, is a visual representation of the relative relationships of vision, mission, goals, objectives, strategy, and core values in an organization. The definition of the vision, mission, goals, objectives, and strategy of an organization requires intensive soul searching, detailed market analysis, and critical thinking. These activities are therefore considered to constitute the planning domain. The creation of the structure of an organization, the supporting systems, the data, the tools, the documentation, and the resources constitute the implementation domain. The foundation on which both domains are built and on the continuing adherence to which the organization's long-term success depends are its core values. The transition from the planning domain to the implementation domain occurs when an organization takes steps to implement its strategy. In Figure 1-15, this is indicated by the bar representing each domain reaching approximately halfway into the Strategy area of the pyramid. A description (in top-down order) of each of the pyramid areas is next.

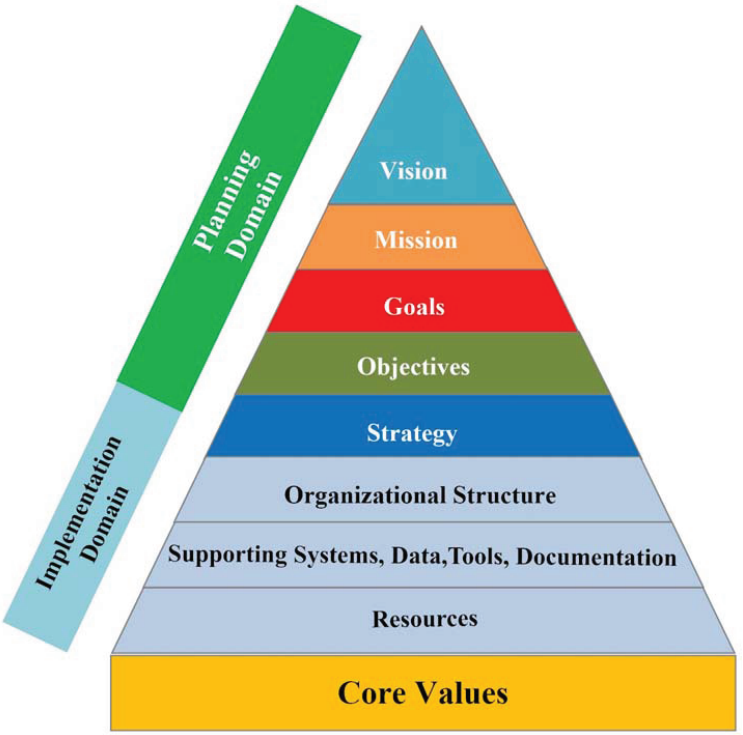

Figure 1-15 Values-to-Vision Pyramid

Vision

A vision statement describes to the public and to its own employees the organization's view of itself, the organization's aspirations, and how it wants to be perceived now and in the future. It does not specify any specific ends to be achieved. Vision statements can range from carefully designed and thoughtfully phrased business philosophy to a simple statement designed to provide guidance and motivation to the people in the organization. The vision is founded on and reflects the organization's core values and is the moral and ethical basis for all future decisions.

For an organization's vision statement to not just be an esoteric statement printed on glossy paper, but rather a livable guide for decisions about current or future activities, it must be understood by everyone within the organization. Many organizations include in their

vision statement a highly motivating catchphrase that emotionally portrays the organization's vision and is easily remembered by both the people inside and outside the organization.

Given the understanding of the organization's vision, the mission statement then provides the decision-making criteria if and how a proposed project supports and contributes to the realization of the organization's vision.

Mission

A mission statement explains an organization's strategic purpose, its reason for being. It describes what actions an organization performs to achieve its vision. It outlines the "Sinn," the psychological purpose, toward which the organization's resources and actions are dedicated; it indicates what is the organization's focus and why. The mission statement conveys to the employees and to the public "who we are, what we do, why we do what we do, where or for whom we do what we do." Mission statements do not describe how the organization performs these actions. In other words, mission statements do not address the organization's processes. Ideally, a mission statement is timeless.

Painstakingly crafted mission statements present the way toward the realization of the organization's vision. Furthermore, well-thought-out mission statements include, or should include, statements about factors considered to be critical for the fulfillment of the organization's mission. These factors are commonly referred to as the critical success factors (CSFs).

Just like the vision, the mission is founded on and guided by the organization's core values.

Goals

The goals of a project (or an organization) project [foreshadow] the desired end state or capability the organization expects to be in or possess after the completion of the project (or after a specified period of time). Goals are the broad units of achievement required to successfully fulfill the project's (or the organization's) mission.

When defining the goals of a project, they must reflect the business or organizational need, the identification of which had led to the creation of the project. In other words, goals are the outcome one wants to achieve. As such, goals must be believable and attainable. Relative to objectives, goals are set to be long term.

As is the case with the mission, if the project team or management sees some issues or has concerns regarding the attainment of the project goals, then these issues or concerns should be identified as critical success factors (CSFs) for the project.

Objectives

The *objectives* of a project (or of an organization) are specific and measurable items within the domain of the project (or the business area of the organization). The items are deliverables or a state of being, and activities, which may consist of one or more actions, that support and enable the reaching of the project goal (or the organization's goals). Objectives are measurable, time-framed step(s) required to reach a goal. Relative to goals, objectives are set to be short term.

Over time, an easy-to-remember and indeed useful catchphrase about objectives has crystallized in practical project work and can be found in most, if not all, books on project management. The phrase is "Objectives must be SMART," where each letter in SMART is the first letter of an adjective that describes a property that objectives must possess if they are to be good and useful objectives. These adjectives are shown in Figure 1-16.

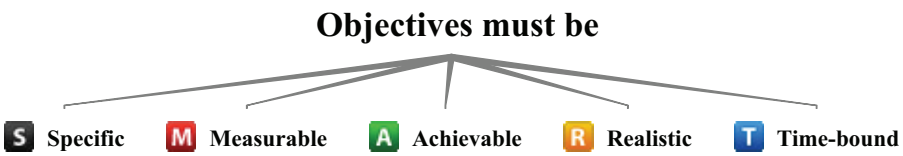

Figure 1-16 SMART objectives

Some schools of thought prefer to replace the adjective Realistic with the adjective Relevant to indicate alignment with an organization's vision, mission, and goals. But one might argue that relevance

is implied a priori. Additional adjectives often used with and expected to be fulfilled by objectives are as follows:

- Appropriate
- Acceptable
- Feasible
- Flexible
- Motivating
- Understandable

Objectives should always start with an action verb, followed by the intended result and the target date, as indicated by this formula:

"... objective is **to** [action verb] [result] [target date]."

Once defined, they should be presented to all stakeholders to be tested for clarity and for confirmation that they are indeed SMART.

Strategy

Strategy is the description of the methods of how to achieve an organization's (or a project's) goals. Strategy is usually long-range. An organization's strategy can influence the number and nature of its projects. For example, the business strategy determines where and how the organization will conduct its business, what capabilities it will need, what kind of information systems it will need, and so on. These factors in turn have a significant influence on the creation and the management of projects.

An organization can also have a specific strategy for the management of projects. For example, the strategy could be to always use external sources to implement and manage projects or to always use in-house resources or to use a combination of external and in-house resources.

Project managers in charge of small to medium-sized projects usually are not directly involved with an organization's strategy, but they should be nonetheless aware of it and ensure that the project stays in line with the overall strategy during the course of execution of the project.

Core Values

Core values are the fundamental principles and convictions that form the ethical foundation of an organization. They are the maxim according to which an organization acts. Ideally, such a maxim would be in the spirit of Immanuel Kant's *categorical imperative* "I act only and always according to that maxim whereby I can at the same time will that it should become a universal law."

Core values are the principle, belief, or doctrine held in common by the members of an organization, the tenets of the organization. Core values are timeless principles that guide the actions of the individuals within the organization. They have intrinsic values to the members and need no prior justification. In principle, they are, or rather should be independent of the way an organization operates and conducts its business. However, there have been occasions where the core values of an organization have changed with a change in top management or ownership.

Some organizations add a code of conduct to the description of their core values. Such a code of conduct describes the model behavior that visibly reflects the core values.

Two Enterprise Elements That Influence Project Management

The *PMBOK® Guide*–Fifth Edition identifies two enterprise elements that influence the planning and managing of projects, Enterprise Environmental Factors and Organizational Process Assets. Both elements are frequently used as input to the processes in the PMBOK® Knowledge Areas.

Organizational Process Assets is used as input in every process of the Project Integration Management Knowledge Area and Enterprise Environmental Factors is used in all but one process of that area. Organizational Process Assets is used in four processes and Enterprise Environmental Factors is used in two processes of the Project Scope Management Knowledge Area.

In all ten Knowledge Areas, Organizational Process Assets is used over 45 times and Enterprise Environmental Factors over 20 times.

This frequent use underlines the importance of these two elements and warrants their inclusion in the chapter on fundamentals of and for project management. The two elements are shown in Figures 1-17 and 1-18.

Enterprise Environmental Factors

Enterprise Environmental Factors include, but are not limited to, the contents shown (in alphabetical order) in Figure 1-17.

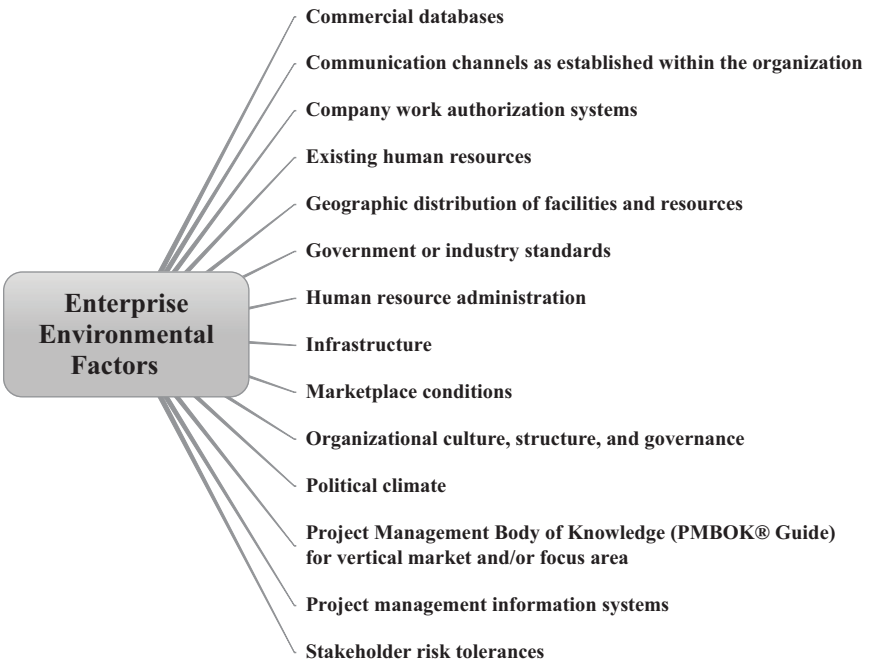

Figure 1-17 Enterprise Environmental Factors listed in the *PMBOK® Guide*–Fifth Edition

Organizational Process Assets

Organizational Process Assets include, but are not limited to, the contents shown (in alphabetical order) in Figure 1-18. The labels below the items refer to the PMBOK® Process Groups in which the items are used.

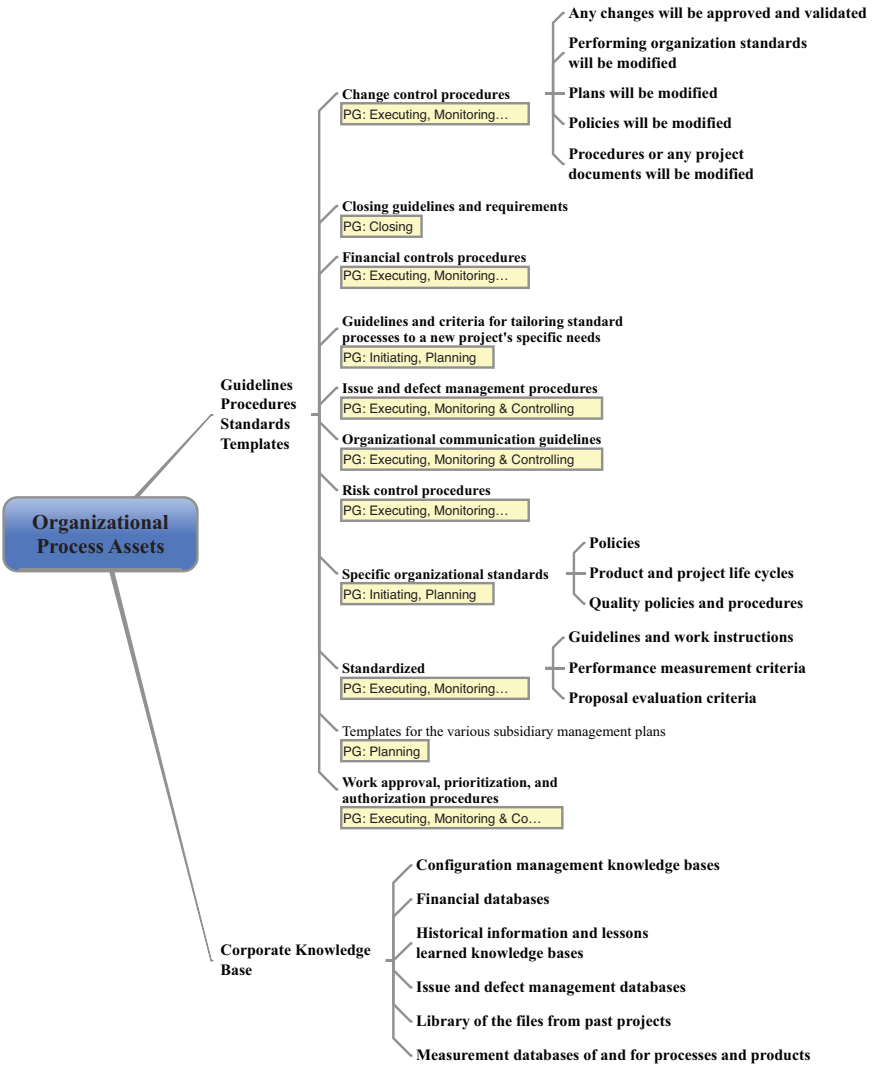

Figure 1-18 Organizational Process Assets listed in the *PMBOK® Guide*–Fifth Edition

Summary

The concepts of project and project management were developed to cope with the amount and the repetitive nature of the work performed in organizations. Organizations act and behave as dynamic systems.

Project management consists of a number of activities, which in turn are collections of tasks, subtasks, and steps. The word *project* can be seen as a collective term for the work performed in moving from a current state (as-is state) to a future state (to-be state) by transforming a given input into an output that had been determined to be of a certain value to the organization. Consequently, a project starts when the transformation begins and ends when the transformation is completed.

There are two views of project management, the PMBOK® view and the holistic view. The PMBOK® view is based on the concept of ten Knowledge Areas and five Process Groups. The holistic view is based on the concept of nine project management activities consisting of tasks, subtasks, and steps. The major difference between the two views is that in the holistic view project scope management embraces the entire project, while the PMBOK® view separates the management of project scope into integration management and a consequently smaller scope management.

The Input-Process-Output (IPO) concept likely has started in historical times when people learned by experience to work more efficiently.

An organization's vision, mission, goals, objectives, strategy, organizational structure, supporting elements, resources, and core values can visually be represented in the Pyramid of Business Maxims.

Two ever-present elements that influence projects, project management, and the organization itself are the Enterprise Environmental Factors and the Organizational Process Assets.

Review Questions

1. Why could our ancestors have come up with concepts like project manager?
2. What is the prerequisite for project execution?
3. What constitutes the work to execute a project?
4. Could the ancient bins be considered predecessors to Kanban bins? If so, explain why.
5. When might it be advisable to classify a project as discontinued and start a new project?
6. What does project management consist of? (Provide a list.)
7. What can be said if a need to loop back is perceived at the closing point of the project?

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2

The Project Charter

α Learning Objectives

Note: To support the learning process and to reinforce the retention of the chapter's content, the learning objectives are not necessarily listed in the sequence of the chapter content.

After having read and comprehended the contents of this chapter, you should be able to:

- Understand what inputs and tools and techniques are used by practitioners to write a Project Charter.
- Understand the steps for the development of a Project Charter.
- State where to find the key elements that define the scope of a project.
- State what must be established at the beginning and agreed upon.
- State what is required to formally authorize a project.
- State some early works of project management.
- State PMI's definition of a Project Charter.
- Provide definitions of goal and objectives.
- Outline the structure of a project.
- List the contents of a SPOR Project Charter.
- Give the reasons for the project management dilemma.
- Formally define a project.
- Explain what the project background should cover.

- Explain what could most likely solve the project management dilemma.
- Explain what constitutes the Lebensraum of a project.
- Explain the steps to complete a Project Charter.
- Explain the significance of the 7-Ws.
- Explain the essential difference between the commonly used version of a charter and the SPOR charter?
- Explain the difference between goals and objectives.
- Enumerate the elements of the approach to manage a software systems development project.
- Discuss the key project scope contents.
- Describe the information an executive summary of a SPOR charter should provide.
- Describe how to avoid discussions about the outcome and deliverables during project execution.
- Address and explain the aspects a business case should consider.

Overview

Chapter 1, "Fundamentals," introduced you to some of the fundamental concepts of projects, project management, the holistic viewpoint of project management, and some fundamental terms important for and useful in project management. This chapter illustrates the aspects, factors, considerations, and steps involved in the activity task of developing and documenting the Project Charter.

The Project Management Institute (PMI) identifies ten Knowledge Areas (KAs) and five Process Groups (PGs), which cover the areas of work or knowledge and the groups of processes necessary and usually sufficient in the practice of managing projects. In the *PMBOK® Guide*–Fifth Edition, the process of developing the Project Charter is part of the group of processes to be performed during the initiation of a project. The inputs, the tools and techniques that can be used, and the output—the Project Charter—for the process of developing the charter are listed in the guide.

The holistic viewpoint of project management, introduced in Chapter 1, identifies nine activity areas. Each activity area contains one or more activity tasks or steps. By the nature of a charter as the founding document, the activity task of developing the Project Charter constitutes the initiating activity area of project management. The Project Charter is the decisive component of a project. Therefore, the Project Charter should be developed before any other project activity takes place. It should be developed in sufficient detail as well as on a quality level that ensures that the charter can serve as the single point of reference (SPOR) for the project. The key to a successful development of a Project Charter is using the Socratic approach of asking questions.

In the *PMBOK® Guide*–Fifth Edition, the knowledge needed to perform the process of developing the Project Charter is part of the collective knowledge identified as belonging to the Knowledge Area that integrates individual project activities. This integration is required to ensure that the various project tasks and processes are effective and efficient and their final outputs result in the coherent project deliverable that has been defined in the project scope. Without the knowledge about such integrating work, there is a real danger that two or more processes are merrily being executed yet *never the twain* might *meet* to achieve the deliverable as required by the project scope.

From the holistic viewpoint of project management, the project scope management activity area includes, as described in Chapter 1, the integrative processes of the PMBOK® Integration Knowledge Area. The tasks that constitute the holistic scope management activity are the initiating of projects; the planning, defining, scoping, and structuring of projects, collectively referred to as PDSS; the managing and leading the execution of projects, referred to as M&L; and the closing of projects. Figure 2-1 shows a visual representation of these constituents.

Fundamentals, which is shown in the initiating task, does not take an input and transform it into an output. Rather, it provides information to establish a common level of knowledge for all interested parties at the beginning of a project. Therefore, it is not considered a subtask. Chapter 1 should be read by all stakeholders prior to, or

at the latest, at the start of initiation to establish a common base of knowledge, terminology, and understanding.

The subtask to develop the Project Charter is identified by an oval in Figure 2-1. The Section I, Section II, Section III, and Section IV captions refer to the sections in this book where the various tasks and subtasks of the scope management activity are described. The icons have been added as a visual aid. For ease of cross-reference, the labels added at the bottom of the rectangle identify the respective project management Knowledge Area and the Process Group in the *PMBOK® Guide.*

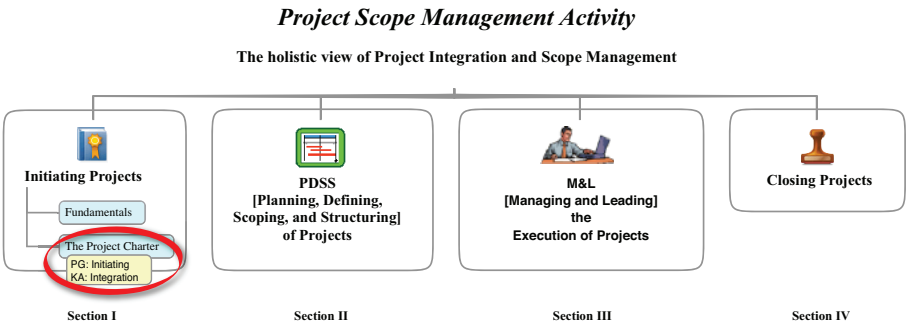

Figure 2-1 The *Develop Project Charter* task within the holistic project scope management activity

We know from life experience that a project is an effort of work to be accomplished within a defined period of time. For example, in school, when we were challenged to start (and complete) a science project, we were given a "must-be-completed-by" date in addition to the start of the science project date. In our daily lives, we often encounter road signs informing us about a road construction project ("your tax dollars at work") scheduled to take place between date A and date B. In other words, a project has a definite start and a definite end point. (We also know from life experience that the original "definite" end point sometimes is pushed further and further into the future.) The Project Management Institute (PMI) formally defines a project as "a temporary endeavor undertaken to create a unique product, service, or result" (PMI Project Definition, 2012).

This means, of course, that there was a point in time when someone within an organization recognized the need for a change to the

organization's products, services, or way of operating. Before such recognition leads to the start of a project, a fundamental activity task must be initiated. First, a person must be selected for this initiating task. Often, this person will be the project manager if the project is approved. Then, the following must be established, and subsequently agreed upon:

- WHAT the project is expected to accomplish (a high-level scope statement) and, if helpful in the particular context, what it is *not* expected to accomplish
- WHO will, or must, be involved in the project
- WHY the project should be undertaken (the benefits of the project)

Additional activities take place to determine and outline the associated time frame, that is, these activities provide the answer to the question:

- WHEN the project is expected to, or must, take place

Another set of activities makes an effort to determine and confine the budget or cost frame of the project:

- HOW much at most the project may cost
- HOW much will the project cost

The budget or cost frame in turn has a considerable influence on HOW the project will be "done."

For example, a project could be done using in-house capacities, using external contract capacities, purchasing a product or service outright, or a mixture of these options. If the proposed project involves geographically distributed aspects, then activities to determine WHERE the project will be done will also take place.

Finally, depending on the nature of the project, the preinitiating activities also establish WITH WHAT or by WHAT means the project should or will be done.

The results of the initiating task are structured to best illustrate the purpose of the suggested project and are presented in a formal document referred to as the **Project Charter**. The Project Charter

is the document that formally authorizes the project. The Project Charter explains and justifies the reasons (the *why*) for this project. A well-written Project Charter furthermore defines the project manager's responsibilities and authority. Defining the project manager's authority, or "power" in the charter, before the start of the project, is a key element for potential project success. The charter should also clearly define who *owns* the level of authority above the project manager's level. Without a clear a priori description of the project manager's level of authority and the identification of the decision-making authority above the project manager, there is a good likelihood of potential conflict and impasse in decision making during the course of project execution.

It is in the nature of things, and especially of projects, that there will be differences of opinions of *what* to do and *how* to do it during the course of the execution of a project. At some point in time, people will interpret the meaning of even a well-defined and signed-off statement differently. For this reason, many projects are subject to the danger of scope creep in spite of an unambiguous scope baseline. When such conflicts arise, the first level of conflict resolution is a clear decision-making authority of the project manager. If the project manager's decision does not solve the issue, or the project manager's decision is not accepted by the stakeholders, the superior level of authority will need to resolve the impasse. While a chain of command does not avoid the emergence of such conflicts, it will mitigate the threat of scope creep and enable the project manager to proceed with the execution and the monitoring and controlling of the project during the life of the project.

In some organizations or within some project management approaches, for example PRINCE2®, the project authorization document is referred to as project brief, which in turn is an elaboration of an initial *project mandate.* Such a project mandate may be a short written or even verbal request that kicks off the project initiation activities.

The Project Management Institute (PMI) formally defines a Project Charter as "a document issued by the project initiator or sponsor that formally authorizes the existence of a project and provides the project manager with the authority to apply organizational resources

to project activities" (PMI Lexicon of Project Management Terms, 2012).

Expanding on this definition, the purpose of the activity task (or process in PMI-speak) *Develop the Project Charter* is to provide an official document containing clear explanations and statements of some or all—depending on the size and nature of the project and on the project management level of maturity of the organization—of the items listed below. The document becomes the official Project Charter when all the people involved or affected by the project (commonly and collectively referred to as the project stakeholders) sign the document.

Project Charter—The Single Point of Reference (SPOR) for the Project

The Project Charter constitutes, or should constitute, the single point of reference (SPOR) for the key elements that define the project scope and determine the success of the project. The importance of creating a comprehensive Project Charter—and that means covering and defining every element and aspect, including time, of a project from A to Z—cannot be stressed enough. A comprehensive Project Charter conceptually corresponds to the documentation provided by a team of architects for the construction of a building or a team of engineers for the manufacture of a technical object.

For each of the above examples, the project, the building, and the technical object, the scope, the deliverables, the responsibilities, the constraints, the costs (including resources), and the time line must be clearly defined. So, when potential buyers of the building or the technical object have read the associated documentation, they will know exactly what they will receive and can thus judge if that what is being delivered is actually what they want. And the construction and manufacturing teams will know, after having read the documentation, what they have to do; when, on a coarse time scale, they have to do each what; and why they have to do it. The who specifically, the where, and the how, as well as the when on a detailed time scale will be identified further down in a work breakdown structure (WBS) and associated work packages.

Likewise, the readers of a comprehensive Project Charter, be it management, the project team, or any other stakeholder in the project, will know what is to be done and when and why it is to be done. And, as above, the who specifically, the where, and the how, as well as the when on a detailed time scale will be identified further down in the project work breakdown structure (WBS), the associated work packages, and in the project schedule.

A project manager or team member of a small project, for example, the project to update an insurance claim form, upon reading the above, might think why so much emphasis on the big picture; most (of my) projects are small. The answer is simple. If we truly understand and can handle the big picture, any small section of the big picture can be handled easily by using common sense to apply only what is needed and what is relevant for the particular case.

Project management presumably has been in use for more than three thousand years. (Could the pyramids or the Acropolis have been built without project management?) Project management literature did become widely available after about the middle of the twentieth century. The works of Frederick Taylor (around 1900) and Henry Gantt (around 1910) are two noteworthy early documents. The Project Management Institute (PMI) published the first version of the *PMBOK® Guide* in 1987. Today, in 2015, there exists an abundance of project management literature and the number of training courses is increasing almost daily. Given all that project management practical experience and the availability of literature and training, you would think that most, if not all projects, are completed on time, within budget, and with the required deliverables. Yet, the field of project management is full of failed projects, as can be seen when searching the Web. Why is that the case?

This project management dilemma has two reasons. The main reason is that very few, if any, projects are founded on an unambiguously written and accepted comprehensive Project Charter—a single point of reference (SPOR) charter—before the actual start of project implementation. The second reason is that projects are viewed as more or less singular events within an organization. They come and go, sort of like the flu. Instead, they should be considered a vital element of an organization's metabolism. How can this dilemma be

avoided? The answer is (a) by spending time, lots of time, to write and complete a comprehensive SPOR charter before any other project work, including detailed resource and schedule planning, is started, and (b) by stakeholders frequently referring back to the SPOR charter during project execution for ongoing verification and validation. Point (a) should be given top priority and all the time it takes to complete the SPOR charter. Point (b) will create and emphasize awareness of the existence of a project and ensure ongoing focus on the project.

A Project Charter that fulfills the above quality conditions must contain, depending on the size and weight of the project, a high-level summary for executive management, an explanation giving the reasons for the existence of the project, a definition of the scope of the project, a declaration of the bounds of the project, a description of the organizational structure and management approach of the project, and a definition and description of the documentation requirements for the development of a Project Charter that have been used for this charter. Figure 2-2 provides a visual representation of the contents of a Project Charter that can serve as a single point of reference.

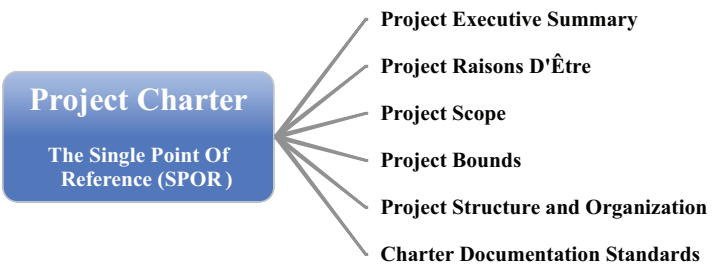

Figure 2-2 The contents of a single point of reference (SPOR) Project Charter

There are forms and checklists available on the Web and in books that provide suggestions for the contents of a Project Charter. Some sources for the contents of a Project Charter use statements like "the Project Charter should contain or describe the business case, requirements, budget, constraints," and so on. Other sources provide a form in which various boxes are laid out in a convenient form for entering the project-specific information. The kind of information to be entered is suggested by the title of the box or a brief text at the top

of each box. In some cases, there are additional boxes that provide explanations about the information to be entered.

While such lists or forms are helpful, using interrogatives as a guide for the development of a charter stimulates critical thinking, facilitates the addressing of necessary details, and thus helps to ensure complete coverage of the scope and domain of the project. Information about and a description of the interrogatives (the 7-Ws) are presented later in this chapter.

A detailed and specific Project Charter, defined and accepted by all stakeholders at the beginning of the project, avoids scope creep, or at least mitigates it to a controlled and documented change. Such a charter furthermore allows and facilitates an accurate and meaningful follow-up of the project after closure by the organization's controller function.

In the real world of business life, it has become an unfortunate practice in many organizations to forego a duly diligent plan versus actual comparison of budget, schedule, and deliverables of a completed project. The standard explanation is "there is no time for such a follow-up, and besides, there were so many changes during the life of the project that these figures and specifications cannot be compared anymore." This is, of course, a weak excuse since the documenting and tracking of changes, given a well-defined Project Charter, is straightforward, albeit the necessary accuracy and consistency can be challenging at times. If a detailed, clear, and concise Project Charter—a charter that accurately and unambiguously defines the project's scope—has been developed and accepted by all stakeholders and if actual project data are accurately and consistently collected, maintained, and appropriately normalized as needed, then a meaningful evaluation, verification, and validation can be made. Luca Pacioli has shown us how as far back as 1494.

As described in Chapter 1, projects are endeavors within an organization to deliver a product, a service, or a transition from a current business state to a new business state in an organized, structured, and tractable way. Such endeavors are not easy as there are many forces that act on any object and often exert pulls in many directions. This makes describing requirements and specification very difficult. An approach to avoid this difficulty can be found if we look at the way

human beings understand and process reality. We tend to organize our thoughts about the world in which we live in an object-oriented (OO) way (Martin & Odell, 1998). Most people, when they hear the term object-oriented, automatically associate OO with object-oriented programming. But OO is much broader than just a programming method. OO concepts can be applied as a general philosophy for conceiving, assembling, or disassembling complex systems. "Object orientation, by its very nature, is a technique for organizing knowledge. As such, it is a very useful integration tool" (Martin & Odell, 1998, p. 1). The object-oriented philosophy (or object-oriented thinking) enables us to develop a SPOR charter. The content of a charter consists of a number of elements or "objects" as described below. Each element or object is a complex system of its own, complex because it comes into existence through interaction with people and people have differing views when they describe or specify an object. Who hasn't experienced the frustration of trying to get a clear requirements specification or scope definition from the requester of a product, service, or change. The OO approach facilitates a structured breakdown of an object, level-by-level, until the level reached is unambiguous in the context of the Project Charter. After the SPOR charter has officially authorized the project, the charter objects, for example requirements and scope, are detailed further in requirements specifications and in scope refinements The former is addressed in Chapter 4, "Project Requirements," the latter in Chapter 5, "The Scoping of Projects." One of the intellectual challenges of the Socratic method of asking questions when interviewing stakeholders and subject matter experts (SMEs) is to bring OO thinking to the interviewees.

The contents of a single point of reference (SPOR) Project Charter are discussed next.

The Executive Summary of the Project

The project executive summary is a key element of the Project Charter and in the reality world of projects, it is not only the most looked-at part of the charter, but it is often this summary that decisively influences the go or no-go decision of upper management. The larger the corporation, the less time (or patience) upper management will have to read the detailed analysis and evaluation of a project

presented in the Project Charter. Instead, upper management will rely on the quality of work performed by the various levels of staff and they trust that the high-level view of the project taken in the executive summary accurately reflects the details documented in the charter.

The executive summary should provide in brief, yet precise and nonverbose sentences the following information:

- The business justification
- The problem statement
- The project complexity (business and technical)
- The project description
- The project impact
- The project interfaces

A SPECIAL NOTE

The bulleted list above and all subsequent bulleted lists are sorted in ascending alphabetical order for ease of reference. This order does not imply an order of importance or a recommendation for a sequence to be used in a charter. The inclusion in the charter of any of the elements from these lists as well as their sequential order usually is dependent on the organization's level of project management maturity and on the size of the project.

The emphasis in the executive summary must be brief and precise. Everything that is important and relevant for management decision making should be presented. Consequently, the executive summary should provide a high-level view of the project's

- Assumptions
- Constraints and boundaries
- Costs
- Goals
- Management approach
- Objectives
- Project team organization/structure

- Risks
- Scope
- Timeline/road map

The emphasis for this part is on high-level view. This is not as easy as one might think. Often, the high-level view meanders into too much narrative detail, which one manager once pointedly criticized as "battlefield prose." On the other side of the coin, one can find high-level views, which are so high in generalities that it is difficult to ascertain from it any information that enables sound decision making. Finding the proper middle path is difficult and requires well-developed critical-thinking capabilities and diligent work ethics.

And, of course, a summary should be, as the word implies, the condensation of a larger text, that is of the other four elements of the charter—the *raisons d'être*, the scope, the bounds, and the structure—not a precursor to it.

The Raisons D' Être of the Project

The section of the charter should provide information on the background of and for this project and present the business case that illuminates the reason for the existence of this project. As stated before, asking questions and having to formulate an answer during the process of developing the Project Charter will trigger more intensive thinking than just going down a list of suggested items.

Project Background

In the project background, you should provide a brief overview of the project, not a detailed description of the project. In the project background, you address the need for the project, that is, you point out why we should undertake the project. Specific information about any kind of expenditures or the exact project goals are not part of the background information. Rather, providing information on the project background serves to create a first (favorable) impression with potential key stakeholders and sponsors. The following questions might help to collect some background information:

- Has a project feasibility study been conducted and what are the results of that study?
- How does the project support and contribute to the realization of the organization's vision?
- What external customer need will be satisfied by this project?
- What internal customer need will be satisfied by this project?
- What issues exist and will be eliminated by this project?
- What problem will be resolved by this project?
- What are the prerequisites for the projects?
- Who has ownership of the project?
  - There may exist two types of ownership: primary ownership and secondary ownership. The primary owner has single responsibility for the project. Single responsibility means "the buck stops here." The secondary owner, also sometimes referred to as co-owner, has contributing or shared responsibility.
- Who is the source of the request for this project?
- Why should we establish this project?

Project Business Case

The business case has usually been assembled by one or more analysts for the person or the function who had perceived the initial idea for the project. The business case should address the need for the project and the benefits derived from the project. When analyzing the business case for the inclusion of its specific content in the Project Charter, the following aspects should be considered:

- Is the mission of this project (still) within the domain of the mission of the organization?
- What is this project's mission statement?
- A project's mission statement should be derived from the mission statements of the business areas, which are affected by this project. This helps to avoid a negative answer to questions of conformity of the project with the purposes of the affected business areas (see question below).

Mission statements describe or should describe the actions an organization performs to achieve its vision. If the actions required for the proposed project, as implied by the description of the project's mission, are in contrast to actions described by the organization's mission statements, the justification for the project should be seriously questioned.

- Are there clearly identified and defined business requirements (within the business case) rather than a general description of the business case?
- Does the project stay within the purpose of each of these business areas?
  - In other words, does the project conform to the mission of each of these business areas?
- Has the business case been approved? (If not, a red flag alert icon should be included in the Project Charter.)
- How and where does the project's mission align with the business mission?
- How does the project's mission align with the business strategy?
- What benefits will this project provide?
- What business drivers can/will affect the project?
- What is the priority of this project?
  - What will be the effect on our organization, or the business of the organization, if we do not perform this project?
- Which business areas are affected by the project?
- Which business goals does the project support?
- Who has approved the business case?

The Scope of the Project

The scope of a project needs to be defined in precise terms. Without such a precise definition, all subsequent statements and estimates will inherit and propagate the initial inaccuracy introduced by the scope statement. There is an entire section of mathematics that deals with the propagation of errors. A name usually mentioned in this

context is Karl Friedrich Gauss, whose bell-shaped curve is familiar to most students and, in particular, to project managers.

Precisely defining the scope of a project is not an easy task, and experience has shown that the root cause for the failed delivery of a project often is the lack of a precise definition of the project scope.

Introduction to Goals, Objectives, and Scope

Before we enumerate the elements that make up the scope of a project, it is worthwhile to address a particular terminology that is used frequently in project management and just as frequently creates considerable confusion among the people involved or it is just quietly accepted without a clear definition and understanding. The culprit terminology consists of two nouns connected by the conjunction *and.* The first noun is *goals*; the second noun is *objectives.* These two nouns are habitually used together—in one breath, so to speak—and, consequently, the statement "goals and objectives" is generally perceived as one term.

The Project Charter is *the* most important document in and for the life of a project. Other important documents are the project management master plan (Chapter 3), the statements of project requirements (Chapter 4), the elaborations on the scope of the project (Chapter 5), and the project work breakdown structure (WBS) (Chapter 6). The WBS, which details and precisely specifies the project deliverables is, or better yet, *must* be fully and exhaustively based on the Project Charter. Detailed project requirements are also derived from and determined by the contents of the Project Charter. They are detailed through elicitation with the stakeholders and are fulfilled with or in the deliverables specified in the WBS. Thus, it stands to reason that, for any project, the development of a detailed, unambiguous, and correct—in the sense of guaranteeing success—Project Charter must be given all the necessary time and attention to achieve that unique quality.

A *conditio sine qua non* for highest quality of any endeavor is that all people involved and all people affected by the consequences of the project fully understand and have the same understanding of every term that is used in a document. The importance of a Project Charter warrants a closer look on the use of the two nouns, goals and

objectives, in practical project work, by management in general, and in the literature on project management.

The term *goals and objectives* is ubiquitous in project management presentations, project documents, and the everyday project language of project teams. One of the first questions asked by upper management of organizations, when the idea of a new project is "run by them," usually is what are the goals and objectives of the proposed project. But if you ask anyone what is the distinction between the two nouns, you rarely, if ever, get a clear and distinct answer.

Although this is not exactly the same, it is, by a broad measure of analogy, somewhat similar to the everyday use of the term *cars and automobiles.* Most people, and even car dealers, when they advertise their automobiles [case in point], use both nouns interchangeably. On the other hand, you might encounter people who will illustrate the distinction by pointing out the brand *X* vehicle is a car while brand *P* vehicle is an automobile.

Project management literature does not provide much help for clear and distinct use of the term *goals and objectives.* Some authors use both nouns as one term but the contextual implication points to the linguistic meaning of the noun objective as defined in language dictionaries. The PMI Lexicon of Project Management Terms (2012) and the glossary of the *PMBOK® Guide*–Fifth Edition both contain a definition of the term objective but neither of these two documents defines the term goal or goals. Despite this lack of definition, a search in the *PMBOK® Guide* shows 30 occurrences of the term *goals* and 18 occurrences of the singular term *goal*.

Various direct or implicit definitions of goals and objectives are encountered in books on or about project management. For example, in his *Field Guide to Project Management,* Cleland defines objectives by stating "... objectives pinpoint what must be achieved to ensure the accomplishment of the mission" (Cleland, 1998, p. 6). Cleland then refers to goals as measurable milestones and defines the term by stating "goals are milestones in meeting... objectives" (Cleland, 1998, p. 7).

Another view is taken by Lientz and Rea in their book *Project Management for the 21st Century* where they state, "the objective is the goal that we hope to achieve at the end of the project" (Lientz &

Rea, 1995, p. 49). Finally, to reference one more source, in their book *Enterprise Architecture Using the Zachman Framework*, O'Rourke, et al. specify that "*goals* spell out the desired end state of the project" and "*objectives* set out clearly what is required for success of the project. Objectives are used to establish metrics to measure success and progress" (O'Rourke, Fishman, & Selkow, 2003, p. 314).

So, what approach should one take when challenged with the task to write a Project Charter? As is often the case in life, taking a step back and using common sense will help to find the answer. Consider the following everyday, real-life example. A high school student wants to get a particular college degree before starting into work life. The desire for a college degree is the student's goal. To achieve this goal, the student will select the courses required for that curriculum and balance the required course sequences and course schedules based on what courses are offered when. For each course, the student will define two measurable objectives, the desired grade for the course [this can be viewed as corresponding to the quality standard for the deliverable in a project] and the date by which the course must be successfully completed. Thus, these measurable project objectives support the reaching of the student's goals.

The analogous approach can be used when writing the Project Charter. It is necessary to set, describe, or define what the organization wants to have, or what state the organization wants to be in, or what capabilities the organization wants to possess when the project has been successfully completed. These descriptions or definitions constitute the project's goals. Next, you must identify quantifiable deliverables and the steps necessary to reach the goals. The type and size of the deliverables and steps are dependent on the level of granularity appropriate and practical for the project, the organizational environment, and the public environment in which the organization operates. These deliverables and steps, together with their attached due dates or completion dates, constitute the measurable objectives. Thus, the measurable project objectives support the reaching of the project's goals.

In the context of a Project Charter, we can now establish the following definitions:

> The *goal* of a project projects [foreshadows] the desired state or capability of the organization after the completion of the project. In other words, a goal is the outcome one wants to achieve.
>
> The *objectives* of a project are specific and measurable items within the domain of the project. These items are deliverables or a state of being, and activities, which may consist of one or more specific actions, that support and enable the reaching of the project goal or goals.

Chapter 1 contains detailed descriptions of the characteristics of the terms *vision*, *mission*, *goals*, *objectives*, and *strategy*.

The scope section expands on the business case highlighted in the executive summary. Although the word *scope* is a familiar term to probably everyone, a clarification of what the term *scope* means and encompasses in the context of project management will be helpful.

> The term *project scope* defines all areas of coverage of the project, that is, it demarcates the complete and unambiguous domain of the project.

A similar explanation of the term *project scope* is given by O'Rourke, Fishman, and Selkow in their book *Enterprise Architecture Using the Zachman Framework* (2003). The scope of a project defines all the elements and describes all the steps necessary and sufficient to get from the pre-project, as-is state of the organization to the post-project goal state. Figure 2-3 provides a visual representation of the key elements that make up the scope of a project.

Figure 2-3 Key scope contents of a Project Charter (in alphabetical order)

The elements are listed and described in more detail in the following sections. Again, the approach of using interrogatives (some or all of the 7-Ws) and asking additional questions will help in specifying the elements of scope specific to the project at hand.

Before we delve into the analysis of the elements of the scope of projects, it is worthwhile to address the different points of view some readers might have about when and where in the course of project management activities one should or could conduct the analysis to define and describe the scope of a project. The *when* determines the specific point on the time axis in the life of a project and the *where* determines during which project management activities the scope analysis is to be done. Basically there are two options, during the initiation of the project or after initiation, when the project has been approved and the various detailed planning activities for the execution and monitoring processes and steps of the project take place.

In project management practice, one can encounter proponents for each of the two views. Is one view better than the other? And if so,

how could one arrive at such a decision? Furthermore, even if everyone involved would agree on the choice, there would immediately be another question to be answered. Will the chosen view be the best choice for any and all projects at any time? It is very doubtful that anyone would answer this question in the affirmative. So, how can we find a practical approach?

As is often the case in real life, a commonsense approach and a simplified analogy will help point out a practical and usable direction. Consider what is involved in starting a construction project. Let us say you plan to build a larger garage than the one you have now. To get started, you will need to address financial aspects and regulatory aspects such as a building permit. To get the financing and to obtain a permit, you will need to define the scope of your construction project. For a garage, this is straightforward; both the bank and the local governmental agency in charge should have sufficient information for decisions if you tell them you are planning a two-car garage, flat roof, wood construction, along the side of your house, on your property, and maintaining the required legal distance to the neighboring property.

The definition of this scope is simple and can easily be made at the initiation of the project. Granular refinements of the scope can be made during detailed planning of the actual construction. Now consider you want to build a five-story building. Both the financial institution and the permit-granting agencies will require a detailed description and specification of your project before they grant you the finances and the permissions. In other words, you and your architect have scoped out the project in detailed documentation during and as part of the initiation of your construction project. You can call this architectural documentation your Project Charter for the five-story building. The planning of the actual construction work will be performed after the approval of the Project Charter.

The above analogy can be applied to other business projects as well. If the project is a short project, for example, the update of some software, the Project Charter would be short since the scope can easily be defined at initiation. Detailed steps within the defined scope domain would be identified during planning activities after the project has been approved. By contrast, a large project requires a thorough

analysis involving all stakeholders and a precise definition of the scope to be documented in the Project Charter.

In line with the object-oriented thinking described earlier, these scope definitions are detailed within the bounds defined in the charter after the official authorization of the project (i.e., after the acceptance of the charter) and documented in the Detailed Project Scope Statement (Chapter 5).

A detailed look at the contents of the Project Charter and how to arrive at project-specific contents follows.

Project Budget

Initially, budget figures are necessarily rough estimates. As the content of the Project Charter is cyclically refined, more insight is gained and the various estimates can also be refined up to a certain level of granularity. A good way to start a project budget is to use a budget template that is broken down into the most common budget categories (and line items). This will provide ideas on possible questions as to the specific nature of the project being considered. The final budget can be defined after completion of the work breakdown structure (WBS). However, an upper bound for the final budget should have been established in the charter to ensure that there is no Johnny-come-lately embellishment. The answers collected to the following questions will provide the basis for the determination of the project's budget appropriate for a Project Charter level:

- What are the sources for potential additional funds?
- What funds are available at the time of writing?
- What is the breakdown of the project budget by major resource and cost categories?
  - What are the initial estimates for each category?
- What is the contingency reserve?
- What is the management reserve?

Project Critical Success Factors (CSFs)

The identification of critical success factors identifies the core of the project, points to where a risk analysis is important, and reduces the likelihood of gold plating. The term *gold plating* is used in project management when someone involved in a project provides or attempts to provide more output than is needed according to the stated requirements or tries to embellish the requirements directly. The following questions help with the identification of CSFs:

- Are the project's CSFs in line with the CSFs associated with the organization's mission statement?
- Are there clearly defined and agreed-upon units of measurement for the key performance indicators (KPIs) for each CSF?
- Are there CSFs for the achievement of some or all of the objectives?
  - These CSFs must be specific and clearly defined to ensure that every stakeholder has the same understanding.
- Are there CSFs for the reaching of the project goals?
- For large projects, has a role been assigned to monitor these CSFs?
- What are the key performance indicators (KPIs) for each CSF?

Project Deliverables Acceptance Criteria

Not only must the deliverables be unambiguously defined but for each deliverable, there must be clear specifications and descriptions of the acceptance criteria. If the nature of the deliverable is subject to a numerical metric, the appropriate bounds and tolerances must also be specified:

- How is/are the outcome(s)/deliverable(s) identified as acceptable?
  - Maintenance acceptance (if appropriate)
  - Post-project user/operations acceptance
  - Project stakeholder acceptance

Project Deliverables and Outcome

The outcome and the deliverables are the reason why a project has been proposed. Both must be unambiguously defined beyond the microshadow of any doubt or possible difference of interpretation. The precise definition will prohibit and prevent any and all scope creep. There must be a surjective ("onto") mapping between requirements and deliverables. A mapping is surjective if every deliverable corresponds to at least one requirement. Stand-alone deliverables are not permitted. Such a correspondence can be documented visually, for instance using mind mapping, or textually using a spreadsheet. The latter is preferable if there are many deliverables. In either case, a visual mapping of high-level requirements onto deliverables should be included in the charter for clarity. The documented mapping enables ongoing tracking during project execution. Figure 2-4 illustrates surjective mapping.

Questions to ask to determine the deliverables and the outcome include the following:

- What documentation must have been produced in final form by the time of project closure?
  - If the organization has clear and current documentation standards, the charter needs only to reference the documentation IDs of the relevant standard.
- What will the project have produced/delivered (if successful)?
  - Ask the stakeholders and SMEs to conduct a thought experiment and imagine that the project has been completed on time, within budget, with the expected quality, and they are 100 percent satisfied. What would they tell someone that they now have that they did not have before the project started?
  - The charter can contain only the key outcome(s) and the top-level deliverables (products and services). However, a surjective relation between requirements and deliverables should be mapped and a visual should be included in the charter.
  - The WBS will identify deliverables on all relevant sublevels.

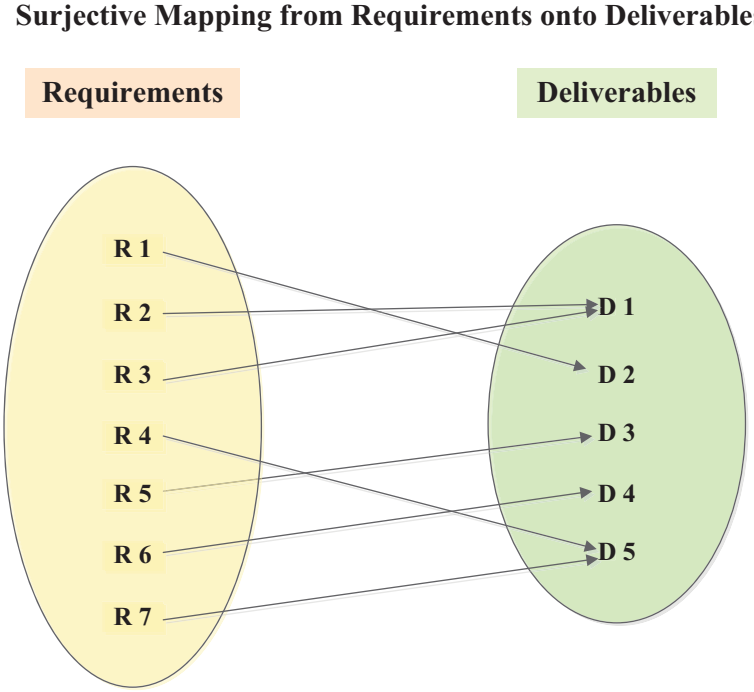

Figure 2-4 Example of surjective mapping from requirements onto deliverables

Project Goals

The project goal or goals must be unambiguously defined and widely published within the organization. Every stakeholder should be able to accurately state the goal or goals of the project on the spur of the moment throughout the life of the project. It is the ongoing task of a project manager to repeatedly educate all stakeholders (which, of course, includes the project team members) on and about the goal(s) (and objectives) of the project. The term project goal and its relationship to vision, mission, objectives, and core values are described in Chapter 1 in the section "The Pyramid of Business Maxims." The following questions will help with the collection of information that will allow for qualified goal(s) definition:

- What is the purpose of this project?
- What are the specific project goals?
  - The above definition of *goal* indicates that the project goal(s) must be specified such that a quantitative measure for each goal can be defined.
  - The project's goals can be formulated by looking at the project's mission statement.
- What are the quantitative key performance indicators (KPIs) for each goal?
  - A quantitative performance indicator can be applied to a goal if and only if there is an unambiguous specification of the following:
    - What is the level of the measure (how much, how many, what percentage)?
    - What is the time for the completion of the measure?
    - What measure is to be undertaken to reach that goal?
- What losses will the successful project avoid or mitigate?
- What opportunities will the successful project exploit?
- What products and services will the project produce and deliver?
- What will this project achieve?

Project Human Resource Requirements (Initial Estimates)

Initially, the human resource requirements can only be educated estimates. As the charter is cyclically refined, so will be the ability to provide better and better estimates. The following questions will help to arrive at estimates for the human resources needed to run the project:

- How many resources are required (internal and external)?
- What and how much education is required for the various stakeholders?
- What and how much training is required for the project team?
- What competencies are required?

- What effort is required?
- What skill set is required?

Project Interfaces

Interactions, and communication across interfaces, often are the cause of problems in projects. The term *interface* is used frequently in project management, so it is not surprising that a search in the *PMBOK® Guide*–Fifth Edition finds 17 instances, but a definition of interface is not provided. In the context of project management, we can describe an interface as a boundary point or a boundary line common to two or more entities. Some examples of entities are business functions, business processes, business units, external organizations, management elements (such as a phase), physical systems, software systems, and the most important one, human beings.

A popular perception is that project managers spend 90 percent of their time communicating. When you communicate, you are interfacing across a common boundary point or line. Interfaces to or between nonhuman entities might sometimes be intricate, but they can (almost always) be implemented to function correctly and consistently. The biggest issues in a project usually stem from interface or communication problems between people. The number or degree of these issues can be reduced by carefully and exhaustively, to the extent possible, addressing and defining interface topics in the Project Charter. The following questions are some examples of how to do this:

- Which business processes are impacted by the project?
- Which cultural aspects must be taken into account?
- Which external entities or organizational units must be taken into account?
- Which external systems must be taken into account?
- Which human or people interfaces must be taken into consideration?
- Which internal organizational units are affected by the project?
- Which internal systems are affected by the project?
- Which legal aspects must be taken into account?

- Which organizational policies and/or guidelines must be taken into consideration?
- Which political aspects must be taken into account?

Project Nonhuman Resource Requirements

Some examples of nonhuman resources are computer hardware, computer software, office material, office space, and special equipment. A good way to discover such requirements is to make a visual of the project operating or execution environment and post it on an internal Web space for all stakeholders to see and comment. This can bring attention to not-thought-of details like physical security provisions, additional parking spaces, and other items. The following questions provide a start on the nonhuman resource requirements:

- What hardware systems are required?
  - Already available in-house?
  - To be purchased or leased?
- What infrastructure requirements are needed?
  - Already available in-house?
  - To be purchased or leased?
- What legal requirements must be satisfied?
- What office space is required?
- What other resource requirements (nonmonetary, nonhuman) are required?
- What software systems are required?
  - Already available in-house?
  - To be developed in-house?
    - With own staff and possibly some external consultancy support?
    - Fully by external consultancy?
  - To be purchased off the shelf?

Project Objectives

As stated previously for the project goals, the project objectives must also be unambiguously defined and widely published within the organization. Every stakeholder should be able to accurately state the objectives of the project on the spur of the moment throughout the life of the project. It is the ongoing task of a project manager to repeatedly educate all stakeholders (which, of course, includes the project team members) on and about the objectives (and goals) of the project. The term *project objectives* and its relationship to vision, mission, goals, and core values are described in Chapter 1 in the section "The Pyramid of Business Maxims." The following questions will help with the collection of information that will allow for qualified definition of SMART objectives:

- What are the quantitative key performance indicators (KPIs) for each objective?
  - A quantitative performance indicator can be applied to an objective if and only if there is an unambiguous specification of the following:
    - What is the level of the measure (how much, how many, what percentage)?
    - What is the time for the completion of the measure?
    - What measure is to be undertaken to fulfill that objective?
- What are the specific objectives of each project goal?
  - The project objectives must be specific and measurable. (A more detailed description of the characteristics of objectives is given in Chapter 1.)

Project Organizational Impacts

Every project will have an impact on the organization. If an impact cannot be stated or specified, the project is superfluous and, because it ties down resources and creates costs, it is counterproductive and should not be undertaken:

- What will be the impact of the project on the bottom line of the organization?

- What will be the impact of the project on the public perception of the organization?
- What will be the impact of the project on the various organizational units?

Project Primary Stakeholder Requirements

The exact documentation of the requirements specified by the primary stakeholders is of outmost importance. Yet it is not easy to arrive at a precise wording of these requirements. Practice has shown, the higher up in management the primary stakeholders are, the more "business-general" are the formulations. The writers of the Project Charter have to be very tenacious to extract enough information from these stakeholders to enable an unambiguous wording of the requirements. After having documented the statements and answers from the stakeholders, you need to review the document together with the stakeholders. The objective is to get the stakeholders to take ownership of the wording. People are less prone to disagree or argue at a later time with statements they have formulated themselves and have officially signed off on. Much time will be saved and much frustration will be avoided during project execution. The following questions should help:

- What exactly does the completed project provide to you, the stakeholder, that you don't have now?
- What is the precise description of the requirement(s) stated by the stakeholder who initiated the project request?
  - Provide the answer to a fictitious or real sounding or review board as a test before you enter the requirement statements in the charter.
  - These are the primary requirements on which the justification of the project is based.

In line with the object-oriented thinking described earlier, these requirements are detailed within the bounds defined in the charter after the official authorization of the project (i.e., after the acceptance of the charter) and documented in the Detailed Project Requirements Statement (Chapter 4).

Project Quality Expectations and Standards

The quality standards that must be met by the project itself and by the project deliverables must be clearly defined. Where appropriate, references to existing internal and external quality standards must be provided:

- What existing documented quality standards must be met?
  - Industry standards
  - Internal standards
  - Legal standards
- What new quality standards must be met?

Project Requirements (High-Level)

The requirements that created the need for a project usually cause or imply requirements for the execution of the project itself. These requirements must not be overlooked:

- What are the (high-level) requirements to plan and execute the project?
  - These are the secondary requirements that are caused by the primary stakeholder requirements. They are necessary in order to conduct a project that satisfies the stakeholder requirements.

Project Schedule

It is almost a popular tradition to regard the project schedule as *the* project plan. But this is not the full story. When we speak of a project plan, we subconsciously take it for granted that the plan includes a detailed schedule. A project plan usually contains all defined tasks, the dependencies between the tasks, resources (human and nonhuman), costs, risks, constraints, contingencies, milestones, and a schedule of tasks. More on the project management (master) plan can be found in Chapter 3, "Project Management Plans and Documents."

Sometimes the nature of a project precludes the creation of a detailed schedule. This would be the case when the project depends on decisions by a political body or on a vote by the citizens. An example would be a large government project like a high-speed railroad or the construction of a new water reservoir. In such cases, you would include projected start and end dates in the Project Charter. A detailed schedule, once decided upon, then would position the project plan on the arrow of time. Of course, since projects are elements of daily life, which is, as we all experience, a dynamic system, some parts of the project plan will be subject to changes introduced by the choice of time. Figure 2-5 visually represents this concept.

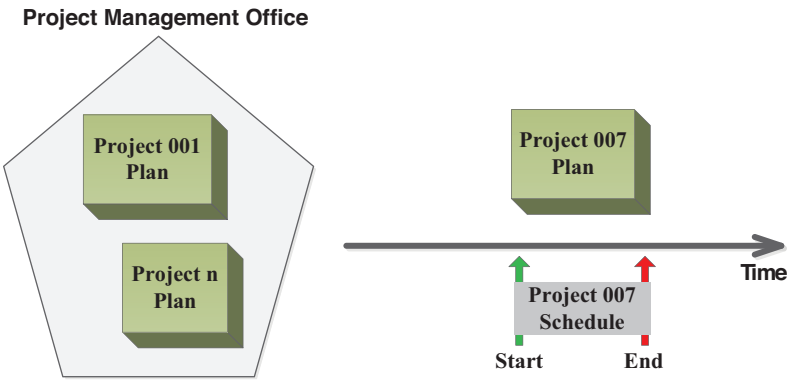

Figure 2-5 Project plan scheduled on arrow of time

In the real world, the benefit of a project to an organization often, if not always, is a function of time. For example, if the project is to implement a customer relationship management system, it might be a good idea to complete this project before all the customers have turned their attention to competitors.

For projects of normal size, a start-end schedule must be defined and included in the Project Charter that allows a positioning of the project "cube" on the time axis such that the organization derives a maximum benefit. Some questions that help in determining the key time points are:

- What is/are the identified business state or deliverables of each key milestone?

- What are the key milestones within the project?
- What is the estimated overall duration of the execution of the project?
- What is the preliminary or proposed or required start point of the project (as appropriate from the business point of view)?
- What is the relative distribution of milestones between the project start and end point?

The Bounds of the Project

The importance of creating a Project Charter cannot be emphasized enough. Without a thoroughly thought-out charter, a project is sent on an uneasy road, which more often than not can lead to partial or even complete failure. Within a Project Charter, every section is a *must-include,* yet there are charters where the bounds of the project were not evaluated and defined with the necessary depth and degree of precision.

A good source to find examples of such charters is to search for public projects that either partially or totally failed, or overran their budgets and/or schedules, and then take a look at the original, baselined Project Charter. We all learn from mistakes, not only our own but also from mistakes made by others. We also can learn from successes achieved by others. Taking a good look at the charter of successful projects can sharpen your view and understanding of what kind of bounds need to be included in a charter, what level of granularity leads to success, and how the information on and about the bounds of the project can be documented.

Project Assumptions

When the authors of a Project Charter are in the process of writing the charter, they have most likely developed a good understanding of the *what,* the *why,* the *how,* the *when,* and possibly even the *who* for that project from their communication with the various stakeholders. Or, the authors have been selected because they are already familiar with the nature of the project from their ongoing work.

While this familiarity is needed and helpful, it also presents a certain degree of danger, namely the risk of *assuming* assumption. What does this mean and why is it a danger? When we are very familiar with a topic of a project and the environment in which this topic lives, we might subconsciously think, or assume, that everybody else is also familiar with the *Lebensraum* of the project, that is, the area in which the project lives. As a consequence, we might not explicitly define and state the assumptions under which the project scope, and thus the expected deliverables, will be delineated.

This potential pitfall can be avoided if the authors of the charter take a step back from the writing process and ask themselves the question: "If I were a newcomer to the organization and not familiar at all with this project, but would be entrusted with the management of the project, what details would I need and want to know to professionally manage the project and bring it to successful closure with the expected deliverables?" By diligently answering this question, the authors will guide themselves to document all the assumptions, including the following:

- Project assumptions (pertaining to all elements of the charter)
  - Financial assumptions
  - Legal assumptions
  - Organizational assumptions
  - Political assumptions
  - Technical assumptions
  - Temporal assumptions

Project Boundaries

Project boundaries, what is in scope and what is out of scope, must be clearly stated to avoid letting project work morph into more than is specifically required:

- Which business functions are explicitly in scope?
- Which business functions/items/deliverables are explicitly excluded/out of scope?

- This list is not only useful but very necessary if the project touches many business areas to avoid potential misunderstanding.
- Specifying exclusions is especially important to avoid inadvertently performing some unnecessary work if there is some in-scope task that normally would include a subtask and subdeliverable, which, for some reason, is not required in the project at hand.

Project Constraints

The description of the potential pitfall given previously for the project assumptions equally applies to the project constraints, as does the proposed solution to avoid the pitfall:

- Project constraints
  - Are there other projects upon which this project depends and/or are there projects which depend on this project?
  - Is there a fixed project completion date (which must be observed or the justification for the project cannot be upheld)?
  - Is there an approved budget (or at least a preliminary budget)?
  - What are the limiting factors to the project and its execution?
- Project tolerances relating to
  - Costs
  - Expected project benefits
  - Quality
  - Risk
  - Time (schedules)

Project Issues

In this section, the priority criteria for classifying and dealing with issues should be defined and explained. Possible project issue priority criteria could be as follows:

- Issue priority 1 (or High)
  - These issues are issues requiring immediate attention and resolution. Most likely, these are issues lying on the critical path.
- Issue priority 2 (or Medium)
  - These issues require close observation and must be resolved before the next checkpoint or project milestone.
- Issue priority 3 (or Low)
  - Because of their low priority, such issues are easily forgotten. It is therefore a good practice to keep them on the radar by creating "low-priority issue checkpoints."
  - These issues should be dealt with at some time during the ongoing project activities, but must have been resolved by the closure of the project.
- What is the issue escalation procedure?
- Who has the final "go or no-go" decision authority if and when a critical point of project continuation is encountered?

Whenever an issue has been resolved, its priority criterion needs to be changed to "closed." As with any project documentation, there should always be a date field to identify the point in time of the identification and description of an issue to identify any change decision.

In this context, an organization needs to make a decision, or already have a relevant policy, whether or not to include only issues in the charter known at the time of writing the charter or to keep updating issues and release a new version of the charter with each update. An alternative could be to include only known issues at the time of writing the charter and point to a separate issue log. This issue log might, at some point, trigger an update of the charter.

Project Risks

Project risks must be identified in the charter to not only provide an objective perception of the project by all stakeholders, but to also ensure proper risk mitigation planning:

- For each risk listed below, provide
  - A clear description of the risk area
  - An approved risk mitigation plan
  - An identified single risk owner
  - A unique identification number (Risk ID)
- Project risks
  - What are the risks tolerances?
  - What contingency reserve has been identified, established, and agreed upon?
  - What is each risk's impact on the project?
  - What is each risk's likelihood of occurrence? (A practical scale is high, medium, or low.)
  - What is the project's complexity?
    - Business complexity
    - Technical complexity
  - What risks have been identified (organized by risk category)?

As with any project documentation, there should always be a date field to identify the point in time of risk identification and description, respectively, to identify the date of any change decision. A changed decision on a risk also needs to be reflected in a risk status field. Awareness of the need and usefulness of risk management has been growing in the past few years and special literature on risk management is available. The *PMBOK® Guide* also contains a dedicated Knowledge Area for risk management making use of five processes from the Planning Process Group and one process from the Monitoring and Controlling Process Group.

The Structure and Organization of the Project

In this section, information and description pertaining to the items listed in the following subsections should be provided with the degree of granularity appropriate for a charter and possible at the time of the writing of the charter.

Project Dependencies

A project depends on aspects outside of the control of the project manager and project team, and, possibly to some extent also on factors beyond the sphere of influence of project stakeholders. A clear statement of such dependencies will help in determining the root cause in case something goes awry in the execution of the project:

- Financial dependencies
- Organizational dependencies
- Technical dependencies
- Temporal dependencies

Project Management Approach

An interesting way to bring about a lively conversation in the presence of official and nonofficial project managers is to mention the term *project management approach.* Very quickly, another term, *project management methodology,* is brought up and adds more passion to the discussion. Textbooks and Web pages contain a number of buzzwords for various manifestations of approaches to managing a project. Two of the most frequently mentioned terms are waterfall and Agile, with waterfall being the more traditional and Agile being the newer term. Each term, as well as the other terms not named explicitly here, has its fervent advocates.

The effect of adhering, sometimes stubbornly, to the formalisms of a methodology can and has led to project managers becoming administrators of forms and templates rather than managing and leading a project team in performing the nine project management activities listed in Chapter 1. Large organizations are especially prone to experience this bureaucratic effect.

From a high-level viewpoint, all projects have the same pattern, initiating, planning, executing, and closing. Planning includes design if needed and executing includes monitoring and controlling. However, a closer look at projects reveals that there are differences between individual projects. So, rather than looking for a silver-bullet methodology, it is better to approach each project on an individual basis to

determine the optimal mix of activity steps for an effective start, the efficient execution, and an efficient closing of the project to deliver the expected result within the defined parameters, such as cost, time, and quality. Common sense is the most useful tool for this task. In the Project Charter, the following items need to be defined:

- How this individual project will be managed
  - Includes descriptions of how each project management activity is executed, monitored, and controlled
- How this individual project will be planned
- How this individual project will be structured

For straightforward projects, such as software systems development, it might be helpful for the explanation of the project management approach to include a visual, such as that shown in Figure 2-6 in addition to the descriptive text.

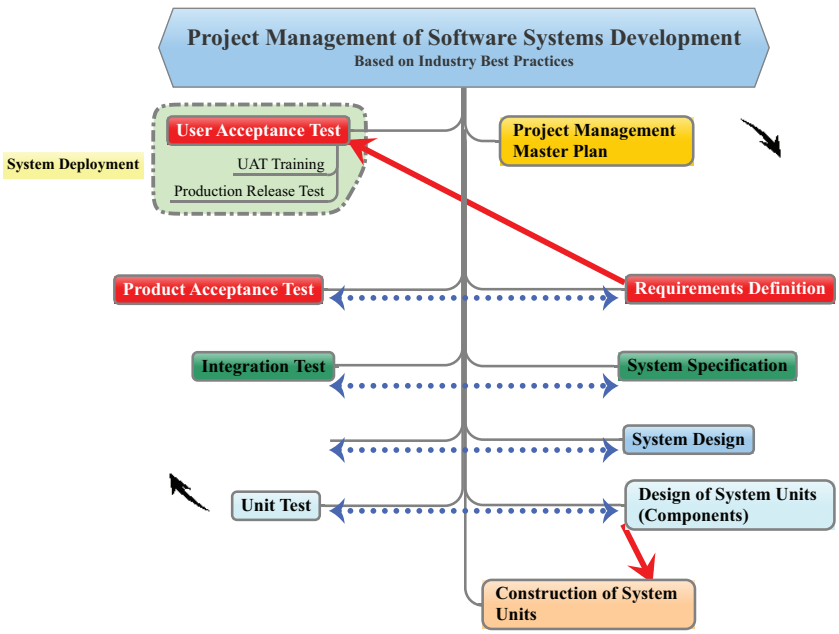

Figure 2-6 Example of a project management approach

Project Manager

In order to specify the requirements placed upon the function of project manager and before an appropriate specification of the project manager's authority level can be agreed upon, a clear description of the job role of the project manager function has to be understood and accepted by all project stakeholders. The following is such a proposal.

> The *job role* of the project manager function is **to make** optimal use of the provided resources—financial, technical, organizational, and human—and **to provide** the leadership necessary and sufficient to fulfill all defined objectives, within the bounds of the environment in which the organization operates, to reach the specified goals.
>
> The operational environment includes the organization's assets, legislation, regulations, technology, the economy, customers, partners, existing culture, competitors, and public infrastructure.
>
> The existing culture embraces local, regional, national, and international, as well as global, elements and aspects.

With this understanding in mind, the answers to the following questions should be specified in the Project Charter:

- What are the required leadership competencies of the project manager?
- What are the required technical qualifications of the project manager?
- What is the overall authority level of the project manager?
- What is the first (and if appropriate, the next) authority level to make project decisions if the project manager's decision is not accepted by other stakeholders?
- What is the highest authority level for decisions (technical, financial, organizational, human resource-related) by the project manager?
- What is the project manager's normal reporting structure?
- Who has been selected as project manager?

Project Stakeholders (Including Approval Authority/Requirement)

All project stakeholders must be identified in the Project Charter, including the authorization level of each stakeholder and whose authorization is required for which element of the project. Of course, individual members of the project team, who are also stakeholders, are not known at the time of the writing of the charter and therefore are not listed. They are identified in the project documentation described in Chapter 3. The following questions help to address the stakeholder identification:

- Who are the external stakeholders?
- Who are the internal stakeholders?
- Who has what approval authority?
- Who is the project sponsor?
- Whose approval is required for what?

Project Team Organization

Although the individual members of the project team are not known at this time, the functions required to make up the project team must be defined in the Project Charter, as well as responsibilities and authority of each function:

- Has the authority level of each function (role) been defined and agreed upon by all stakeholders?
- Has the role of each function been clearly defined?
- Have the responsibilities of each function been defined and agreed upon by all stakeholders?
- What are the names of persons assigned to each role (if and when appropriate and possible)?
- What functions are required for the makeup of the project team?

At the time of the writing of the Project Charter, some items of the above list can only be in outline form. These items must be defined in detail during the development of the scope baseline (Chapter 5) and the creation of the work breakdown structure (WBS) (Chapter 6)

as well as during the detailed development of project elements, such as budget, schedule, and so on, which are not covered in this book. For projects of a specific nature, the Project Charter might contain additional items not listed above. Possible examples could be defense projects, space exploration projects, medical projects, or unique scientific projects.

Project Charter Documentation Standards

As with any document, the writers of the Project Charter should adhere to the documentation standards of their organization. You might ask why include the documentation standards for writing a Project Charter within the Project Charter itself. Wouldn't these standards be in the organization's general documentation standards? The reason for including the documentation standards for writing a Project Charter in the Project Charter itself is based on the positive results experienced with actual charters. The creators of the charter have, by taking the generic charter form containing the charter documentation standards, a practical guide for formatting and completeness check. All readers of the completed Project Charter—be it top management, the project team members, or any other stakeholder—will simultaneously with the charter itself have available a measure of quality, consistency, and completeness against which they can evaluate the content of the Project Charter. They will not need to ask for or look for the separately stored Project Charter documentation standards.

Generally practiced documentation standards for writing a Project Charter include the following:

- Appendix
- Approvals of the charter
- Identification of the authors of the charter
- Identification of the document owner(s); often the authors are also the document owners, at least at the beginning of the project life
- Information about the Project Charter version control

- Project references, such as
  - Enterprise Environmental Factors
  - Organizational Process Assets
  - Signatures of all stakeholders who approved the charter
  - The organization's documentation standards, such as authors (document owners), date, version control, and so on
- References used within the project

Some of the above items are often found at the beginning of the document, for example the document authors, owners, and version control. Other items, such as the references used and the approval signatures, might be placed at the end of the document. An appendix, if included, might contain information that is not part of the charter contents but is deemed worth listing in the document. An example could be the list of charter elements that are part of the organization's documentation standards for a Project Charter but were omitted for this particular project, with an appropriate explanation of the reasons for the omissions.

Inputs to and Activity Tasks for Writing a Project Charter

In Chapter 1, the IBM-based IPO concept of Input–[Process] Activity Task–Output was introduced. The Project Management Institute (PMI) approximates this concept by providing a consistent Input–Tools and Techniques–Output structure throughout the *PMBOK® Guide*–Fifth Edition. The difference to the original IPO (Input–[Process] Activity Task–Output) concept is that the *PMBOK® Guide*–Fifth Edition uses the term *tools and techniques* rather than the term *process* or, respectively, the term *activity task.* For each PMBOK® process, the *tools and techniques* term provides a list of suggested tools and techniques to be used for that particular process. This structure greatly facilitates the learning of any project management activity task (process) for students of project management and it equally well facilitates the consistent application of project management activity tasks (processes) by experienced practitioners.

The general concept used in the *PMBOK® Guide*–Fifth Edition to represent any project management (PMBOK®) process was introduced in Chapter 1. Figure 2-7 visually represents this concept for the (PMBOK®) process *Develop Project Charter.*

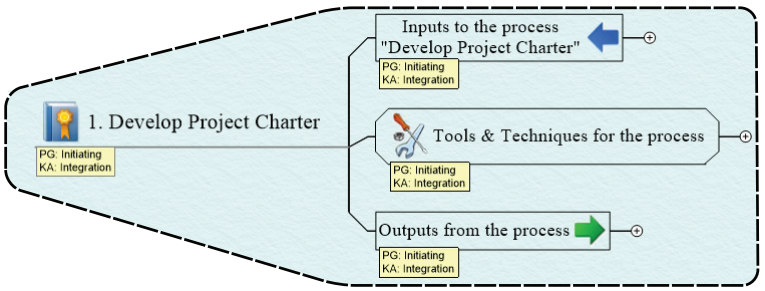

Figure 2-7 The PMBOK® concept for the process *Develop Project Charter*

The icons have been added as a visual aid. Similarly, the labels at the bottom of the rectangles have been added to identify the respective project management Knowledge Area and the Process Group in the *PMBOK® Guide.*

The inputs to the process *Develop Project Charter* as provided by the *PMBOK® Guide*–Fifth Edition, are shown in Figure 2-8.

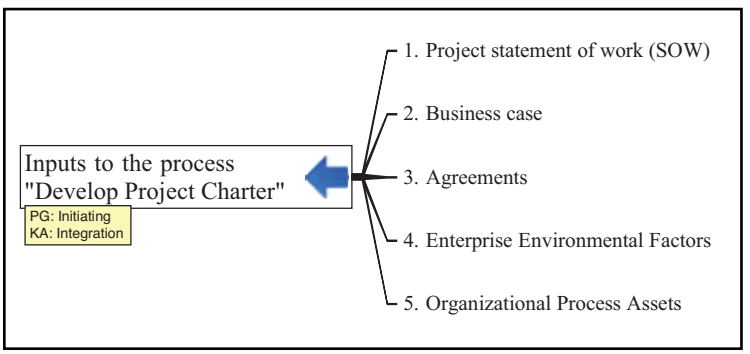

Figure 2-8 The *PMBOK® Guide*–Fifth Edition inputs to the process *Develop Project Charter*

These inputs are to be understood as practical guidelines, not as an exclusive "must." Depending on the organization, these inputs could be just a short statement or two for small projects. On the other end of the scale, in the case of large projects, additional and/or more

in-depth inputs might be required and useful. Two points are important to remember during the analysis and documentation of these inputs:

1. The Project Charter is the single point of reference (SPOR) of and for the project. Therefore, everything that is relevant to and determines the scope of the project and everything that influences the outcome of the project must be addressed, clearly described, unambiguously defined, and included in the Project Charter text.
2. Unnecessary details do not belong in a charter.

Observing the second point can be quite difficult. Where should we draw the line between completeness of must-include-information and unnecessary detail? Knowledge and understanding of the concept of a work breakdown structure (WBS) will help to make the appropriate distinction. In the WBS, the contents of the Project Charter are (or should be) precisely identified as specific deliverables, which are subsequently decomposed through stepwise refinement down to the lowest practical level for the planning of the actual work. This level is usually referred to as the work package level. The WBS is addressed and explained in Chapter 6.

The inputs, tools and techniques, and the output suggested in the *PMBOK® Guide*–Fifth Edition are visually represented using the IPO concept shown in Figure 2-9. The items are listed in alphabetical order. The icons have been added as a visual aid.

The PMBOK® suggestion shown in Figure 2-9 can be broken down into more detail using the IPO concept. The details can serve as a practical guide for developing and completing a Project Charter. A breakdown into two practical steps, first the development and then the completion, is shown in Figure 2-10 and Figure 2-11, respectively. In the development step, use is made of two categories of input, existing documents and project-relevant people. Existing documents, as identified in the *PMBOK® Guide*, are critically analyzed and carefully evaluated to see if any information or data therein could or should be used in the development of the Project Charter. Data and information in the documents judged to be necessary or useful for the development are extracted and synthesized into a meaningful and consistent

structure, as shown in the Output column. Since some of the input documents will have overlapping contents, special care must be taken to avoid redundancies in the structured output.

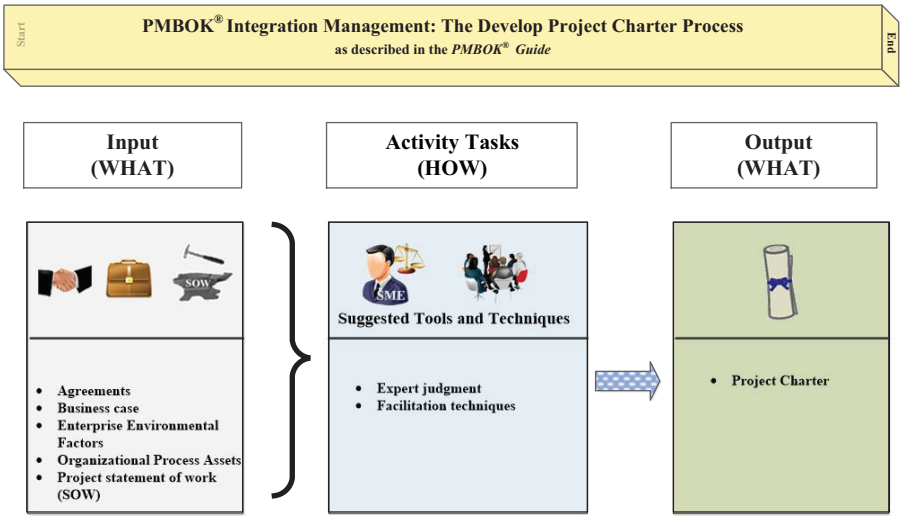

Figure 2-9 Input and tools and techniques for the development of a Project Charter as suggested by the *PMBOK® Guide*–Fifth Edition

Next, individuals are identified who will be or could be stakeholders in the project. Depending on the nature of the project, customers are or can be considered to be stakeholders. Also identified are the individuals who are considered to be subject matter experts (SMEs) in the area or areas covered by the project. There are internal and external SMEs. Internal SMEs are primarily found in the functional areas that presumably will be "touched" by the project. The determination of these functional areas requires some educated guessing since the scope of the project has not yet been defined. The charter has to have been written and baselined first for the definition of the scope to exist; one can consider this mild form of a catch-22 as proof that project management is not an academic, ivory-tower exercise but rather that it is rooted solidly in real, everyday life.

Note that functional areas affected by the project are not the only places where you can find subject matter experts. In large organizations, employees are often transferred several times between functional areas. It can happen that the person with the most thorough

and most intimate knowledge of a subject matter currently is assigned to a functional area far removed from the topics of the project. To find such a person requires detective-like inquiries and, of course, luck plays a role, too. Figure 2-10 is a visual representation of step 1.

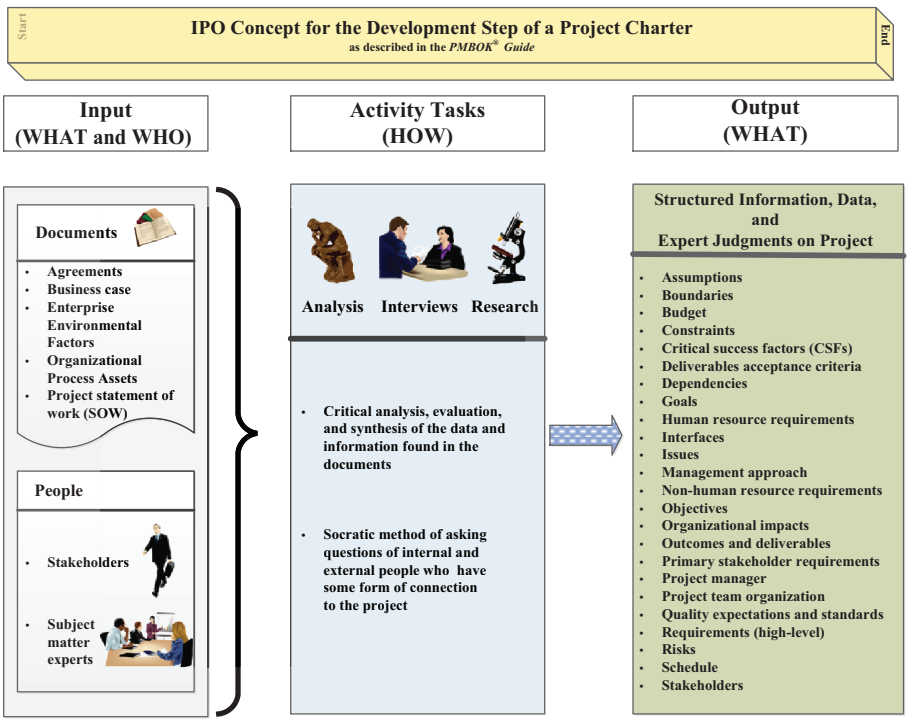

Figure 2-10 IPO concept for the development step of a Project Charter

Conducting interviews with stakeholders and SMEs is not only a difficult and time-consuming effort, but also an art that requires special skills. The purpose of these interviews is, of course, to obtain information, data, and expert opinions on and about the topics alphabetically listed in the Output column of Figure 2-10. You will get the desired results by asking dedicated questions during the interviews. Examples of useful questions are listed in the first part of this chapter under each of the topic headings. In the practice of project management, however, it isn't as simple as just asking useful questions. Many times, if not most of the time, the people being interviewed do not have the answer readily available in their mind, or they can only give a partial answer. The interviewer must guide the stakeholders and

SMEs in their thinking and memory search so that they discover the, hopefully, full answers. This is where special skills in and techniques of asking questions become a significant factor in the successful management of projects.

Two approaches or techniques to asking questions have been very useful in real-life applications, the 7-Ws and the Socratic method. Both techniques can be learned and should be part of any project management training. The term 7-Ws refers to a list of seven interrogatives that cover, when correctly used, the entirety of complex systems. It is not always necessary to use all seven interrogatives. Often, four or five of the seven are sufficient. The 7-Ws go back to the work of Joachim Georg Daries (1714–1791). He used seven Latin interrogatives to define philosophical categories. (Students are usually very surprised when they learn that such illustrious minds as Newton, Leibniz, or Gauss published their works in Latin and not in their native language.) The term 7-Ws is commonly used because all seven questions start with a *W* in German and that is catchier than the term "6-Ws plus 1-H," as it is in English. Table 2-1 lists the 7-Ws in Latin, German, and English. It is worth noting that six of the seven interrogatives define the columns (aspects) of the Zachman Framework for Enterprise Architecture, which represents a comprehensive image of an enterprise. (For the curious, the six rows of the Zachman Framework represent the six perspectives that provide a comprehensive view of an enterprise.)

Table 2-1 The 7-Ws in Latin, German, and English

The 7-Ws			
Latin	**German**	**English**	**Sample Questions**
Quid	Was	What	What action or information?
Quomodo	Wie	How	How is it done or needed?
Ubi	Wo	Where	Where is it done/needed/located?
Quis	Wer	Who	Who performs or needs?
Quando	Wann	When	At what time?
Cur	Warum	Why	Why is it done or needed?
Quibus auxiliis	Womit	With what	By what means is it done?

A point of grammatical explanation might be in order here. Earlier in this chapter, the interrogative pronoun *which* was used, for example when asking about project interfaces. But *which* is not one of the 7-Ws. How is this to be understood? *The Grammar Bible* (Strumpf & Douglas, 2004) provides a clarification. There are three interrogative pronouns (*who*, *which*, and *what*). The interrogative *what* asks for a description; the interrogative *which* is selective in its questioning and refers to one or a few out of a specified collection or group. Using *which* allows us to ask shorter questions compared to using *what* when we are interested in a selection. For example, instead of asking, "Which business processes are impacted by the project?" we could have asked, "What are the business processes that are impacted by the project?" Obviously, the former question is shorter and also feels more natural than the latter.

For completeness of grammatical explanation, the other interrogatives (*when*, *how*, *why*, and *where*) are interrogative adverbs used at the start of a sentence to ask a question, as is the case with the compound interrogative *with what*.

When using some or all of the 7-Ws, the sequence does not have to be the one in the above table. Rather, it depends on the nature of the investigation and on the personal preference of the investigator. The following is an example of how the 7-Ws help to provide a short and clear descriptive identification of a topic. Consider the task to develop a Project Charter. Then, using six of the 7-Ws would provide the high-level information shown in Table 2-2.

Table 2-2 Sample High-Level Information

What	Writing a Project Charter
When	At first prior to, then as part of project initiation
Who	Designated person(s); may be or become the project manager
How	(1) Analyzing existing documentation, (2) Interviewing stakeholders and SMEs
Why	To ensure project success by unambiguously documenting the definition of the project deliverables, requirements, and scope
Where	In the business unit [name] of project implementation

In this example, the *where* interrogative might not be considered important enough to be included in some organizations because it would be taken as a given. On the other hand, if the project were such that, for example, four people would be needed to write the charter and if these four persons would be located in four different geographical areas, or maybe even on different continents, then the *where* interrogative would be needed and also the seventh interrogative *with what* (*womit*) would be needed to provide a full picture. A possible answer to *with what* might be "Using the cloud-based software XYZ."

When drilling down for more details on each of the (first-round) answers, you would use some or all of the 7-Ws again in a second round or more rounds until you decide that all the facts, data, information, processes, and so forth have been clearly defined and understood. As the amount or size of material discovered by cyclically asking the 7-Ws questions increases, the shape (or type or nature) of the questions does not change; it is still *what, when, who,* etc. If one likes visual thinking, it is only a small step to visualize this style of repeatedly asking the same questions as a natural spiral—somewhat reminiscent of a logarithmic spiral that doesn't alter its shape as its size increases. Could this be interpreted that the 7-Ws are fundamental "thinking elements" in nature?

The second technique or approach for interviewing stakeholders and SMEs is called the Socratic method. Basically, the Socratic method is the asking of questions in a systematic way and the step-by-step approach of focusing on definitions, fundamental principles, core issues, and root causes. The maxim of the Socratic method is to always seek out the truth in or the irrefutable logic behind a statement. The method attempts to lead the persons being questioned to critical thinking and reflection on the accuracy, correctness, and validity of their own statements, and thus improve their understanding and extract definitions that were not clearly recognizable at first. In the context of project management and, specifically when writing a Project Charter, the Socratic method helps shake out assumptions in general and especially any implicit or tacit assumptions. Such

assumptions, when brought to light during project execution, usually create big problems and result in clandestine scope creep or open scope changes.

Other aspects that can be identified by the Socratic method are the different perspectives held by stakeholders and SMEs, the different viewpoints taken, the reasoning behind their statements, and the implications and consequences hidden in initial statements. Having brought about clarification and common understanding, the Socratic method enables people to think of alternatives. Being able to provide alternatives when addressing issues and risks in a Project Charter will mitigate them, and thus bring the project one step closer to successful completion.

The development step is the first step in the writing of a Project Charter; the second step is the completion step. The completion step takes the output produced in the development step and transforms it into the desired deliverable, the Project Charter. The activity task that accomplishes this transformation is the composing of the text for the charter. The composition of the charter text usually follows the following pattern. The input is organized according to the importance of each item as seen by the organization. This is commonly done by assigning weights to the items. The resulting text is distributed as a first draft to stakeholders and SMEs for verification and possibly approval. If there is feedback that requires changes to the text, the changes are incorporated and a second draft is distributed. This cycle is repeated until agreement has been reached. Should no agreement be reached after several cycles, upper management will, or should, make a decision about the final version of the text. This document is then declared as baselined and distributed to all stakeholders and SMEs as well as the organization's library of project documentation. This procedure for the completion step of writing a Project Charter is visually represented in Figure 2-11.

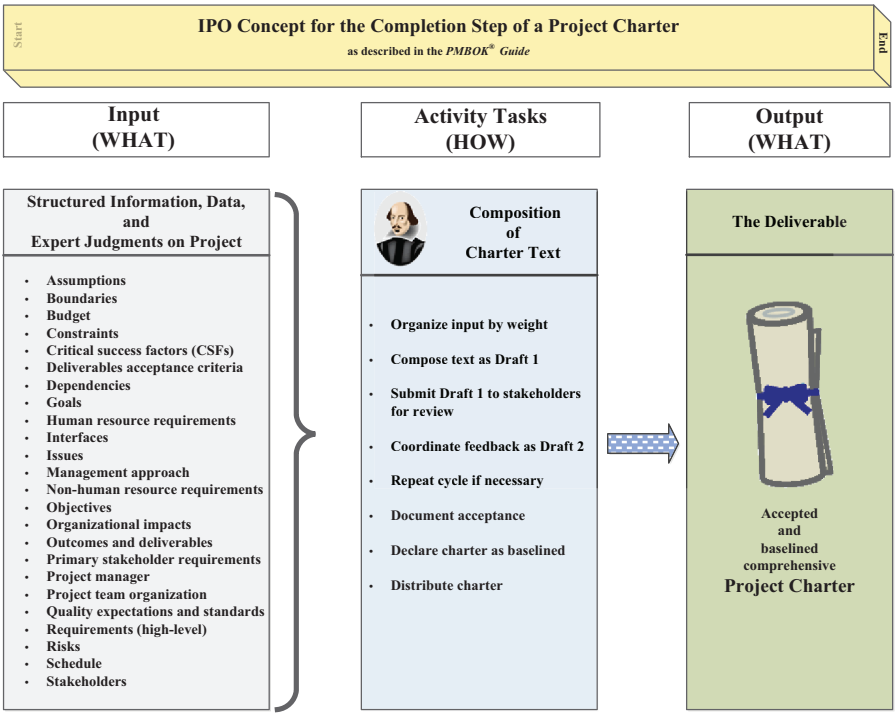

Figure 2-11 IPO concept for the completion step of a Project Charter

A Closer Look at the PMBOK® Inputs and Tools and Techniques

Figure 2-9 displayed the inputs and tools and techniques to the process *Develop Project Charter* as presented in the *PMBOK® Guide*–Fifth Edition. A closer look at these elements is next.

The Agreements

When completed, the charter defines the scope of the project and specifies the deliverable(s). To reach that state, the creators of the charter have to incorporate content requested or required by various sources and presented in different forms, as listed in Figure 2-10. One of these forms is identified as agreements in the *PMBOK® Guide*–Fifth Edition. Agreements is the label used for a collection of written

and verbal statements by stakeholders with respect to the (new) project. These statements provide input for the charter and serve as reference or justification in case there are differences of opinion during the charter approval cycle or at a later point during project execution. Figure 2-12 shows the items collectively referred to by the *PMBOK® Guide* as agreements. The icon has been added as a visual aid.

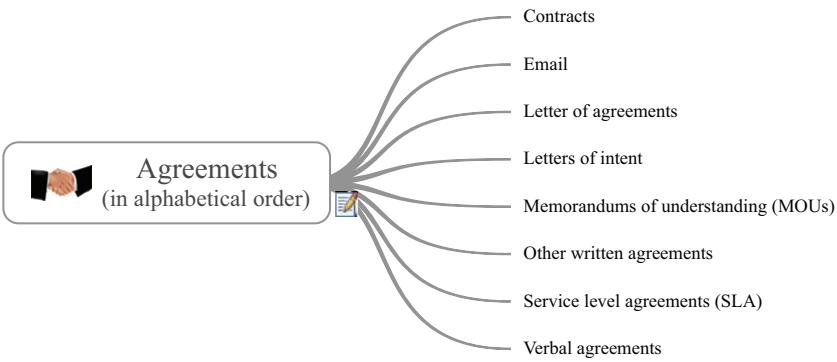

Figure 2-12 The contents collectively known as Agreements as listed in the *PMBOK® Guide*–Fifth Edition

The Business Case

One of the key inputs to the Project Charter is the business case. The business case usually is presented as a narrative supported by selected facts, figures, tables, and graphs. It is designed by the proponent of the project to make "his case" and help to convince management that it is a good decision to approve the requested resources and the required time window for the project. It is not unusual that upper management makes the go or no-go decision on a proposed project after having listened to a business case presentation without taking the time to carefully evaluate a feasibility study (if one has been conducted). As is often the case in real life, friendly persuasion goes a long way. Figure 2-13 lists the contents or the sources for the contents of a typical business case as presented in the *PMBOK® Guide*–Fifth Edition. The icons have been added as a visual aid.

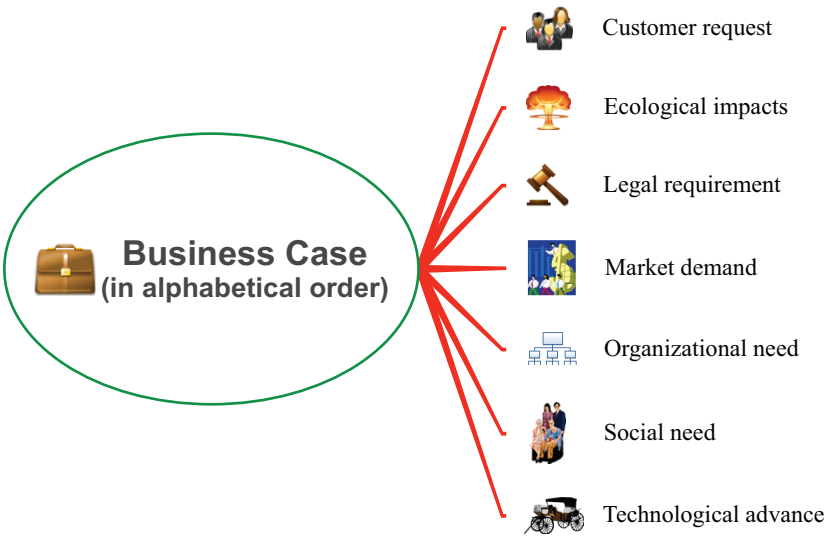

Figure 2-13 The project business case contents according to the *PMBOK® Guide*–Fifth Edition

The Enterprise Environmental Factors

In every organization, any project is subject to a number of constraints or factors that influence the project. Both project planning and project execution are influenced by the environmental conditions created or caused by these factors. Some conditions might affect the project in a positive and enhancing way, while others have a negative and limiting effect on project planning and execution. In either way, these factors are inherent elements of the environment in which the project is to "live" and are thus outside of the control or sphere of influence of the project team, including the project manager. The *PMBOK® Guide*–Fifth Edition lists three main Enterprise Environmental Factors that influence, and respectively limit, the work when developing the Project Charter, as shown in Figure 2-14. Additional factors, not specifically listed, might also exert some influence on the development work.

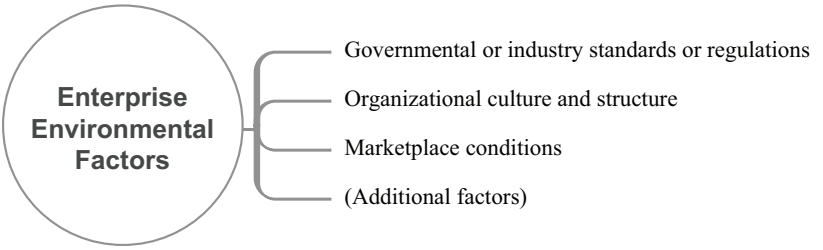

Figure 2-14 The Enterprise Environmental Factors influencing the Project Charter, as listed in the *PMBOK® Guide*–Fifth Edition

The Expert Judgment

One item listed under tools and techniques by the *PMBOK® Guide* for the development of a Project Charter is expert judgment. If one wants to be very precise and logical, then one could say that expert judgment is the result of having applied a tool or a technique rather than designating the judgment obtained from experts as the tool or technique itself. The sources of the expert judgment would have been the subject matter experts (SMEs) and stakeholders that had been interviewed. The actual tool and technique would have been the method of asking the questions and the form in which the questions had been asked.

Expert judgment or opinion on a specific topic can be obtained from a variety of sources. Any person or group with technical or managerial competence in a subject matter can be a source. Earlier in the chapter, expert judgment was collected from stakeholders and internal SMEs. Expert opinion can also be obtained from external SMEs, such as consultants, industry groups, or professional and technical organizations.

The Facilitation Techniques

The *PMBOK® Guide* provides several examples of facilitation techniques. These are as follows:

- Brainstorming
- Conflict resolution

- Meeting management
- Problem solving

Additional facilitation techniques that have been found to be helpful are as follows:

- Forming task force groups
- Lessons-learned analysis (perhaps using role playing)
- Mind mapping
- Problem tracking (if the project is in response to problems)
- Review and improvement tasks of input provided by (external) sources
- Stakeholder goal alignment
- Workshops (onsite, but especially offsite)
- To some extent: six hats thinking (or more if there are more than six key stakeholders each with their own agenda)

A description of each of these facilitation techniques (or facilitation methods) lies outside of the scope (there is that word again) of this book. Descriptions, explanations, and examples of facilitation techniques can be found on the Web.

The Organizational Process Assets

Items that are considered organizational assets can be categorized into two groups:

- A Project Management Library (PML) containing such items as guidelines, policies, procedures, processes, standards for performing project-related work, and templates. Current content management software makes creating and maintaining a PML very straightforward.
- A knowledge base containing data and information relating to all past and present activities. Such a knowledge base may consist of several databases, such as financial database, historical projects database, issues database, and other databases relevant for the organization.

A key item of Organizational Process Assets is the organization's Project Management Library (PML), assuming such a library exists. In many organizations, there exist collections of documents for some, but not for all projects. And, to make it even worse, many of these documents had not been completed or updated when the project closed. It is difficult to consider such a collection a Project Management Library and, consequently, it is of limited use only.

If one inquires into the reason for this state, the answer usually is that time pressure did not allow for proper documentation. The blame is put, of course, on (upper) management. Management does indeed bear the responsibility, but not for exerting unreasonable time pressure. Instead, the responsibility is for not ensuring that the Project Charter clearly states that a deliverable does not meet acceptance criteria, or, to put it more graphically, does not exist until all project documentation specified in the Project Charter has been completed and is up to date.

With today's software, it is easy to maintain documentation concurrent with project progress. But even in the days when software suitable for concurrent documentation was not available, it was possible to build and maintain a practical and useful PML. A detailed description and examples can be found in R. C. Tausworthe's two-volume book on *Standardized Development of Computer Software.* His examples are for software development, but they could easily be applied to other projects.

For the process of developing a Project Charter, the *PMBOK® Guide*–Fifth Edition lists the Organizational Process Assets, as shown in Figure 2-15.

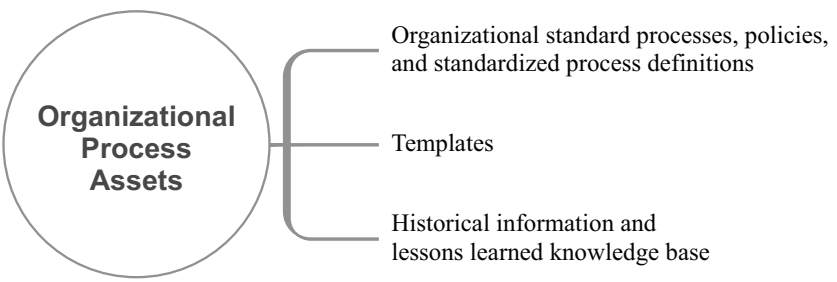

Figure 2-15 The Organizational Process Assets as listed in the *PMBOK® Guide*–Fifth Edition

The Project Statement of Work (SOW)

The project statement of work (SOW) has traditionally been a key factor in procurement and requests for proposals (RFP) negotiations. In the procurement and RFP context, the SOW identified and defined the product, or products, or the services the project, or respectively the contractor, has to deliver. In contracts with government agencies, the statement of work (SOW) is often a key, if not the key, document.

For example, a government agency might decide to employ the services of an Independent Verification and Validation (IV&V) consultant to assess the progress and/or the risk of one of their current projects. The agency will send a statement of work to potential candidates who respond with their respective proposals. Such a statement of work would usually contain a description of the work broken down into activities with the associated time frame and a description of the deliverables.

The *PMBOK® Guide*–Fifth Edition describes the project statement of work (SOW) as a narrative description of the products, the services, or the results that should be delivered by the project. The sources for the *PMBOK® Guide*–Fifth Edition project SOW are listed as business needs, product scope description, and strategic plan, as shown in Figure 2-16. The *PMBOK® Guide* lists the business need as an element of the statement of work (SOW). A comparison of the description given in the reference to the business need element with the description given as the source for the creation of the business case, which the *PMBOK® Guide* presents as a distinct input to the process of developing the Project Charter, reveals an overlapping of the text. This could cause some confusion, especially to someone new to project management. It might be helpful to use the SOW in the traditional sense as a contractual document for the delivery of a product or service only.

The third element of the statement of work as presented in the *PMBOK® Guide*–Fifth Edition refers to the organization's strategic plan. It might be worthwhile to evaluate if reference to the organization's strategic plan, other than a simple statement of compliance to

the plan, is necessary, or even useful, in a statement of work. The significance of a project being fully in line with the organization's strategic plan has been addressed earlier during the description of the concept of a Project Charter as the single point of reference (SPOR).

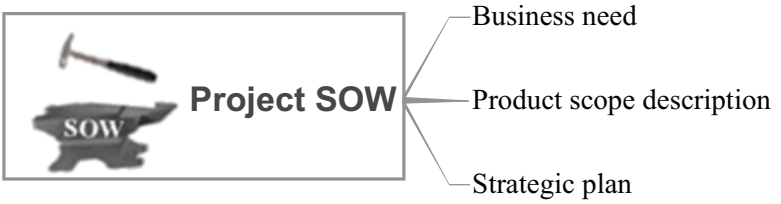

Figure 2-16 The sources for the project statement of work (SOW) according to the *PMBOK® Guide*–Fifth Edition

The business need, the product (and service or result) descriptions, and the strategic plan through the interrogatives about vision, goals, and objectives are addressed in the Project Charter as described above. Having created a single point of reference (SPOR) document, the Project Charter, there is no need for another, intermediate, document called statement of work (SOW). Fewer intermediate documents, which often partially overlap, allow for leaner project management and provide a more direct path to project success. Of course, a specific statement of work (SOW) still needs to be specified for external contracts. In such an SOW, the deliverables are broken down, to the extent possible, into clearly delimitable subdeliverables tied to specific dates. Often, one or several such subdeliverables constitute a line item in the project accounting system.

The Output: The Project Charter

An alphabetic list of 25 project elements contained in a Project Charter (based on the *PMBOK® Guide*) is shown in Figure 2-17. This list serves as an example only. In practice, a Project Charter may contain fewer or additional elements, depending on the organization, the topic of the project, and the size of the project.

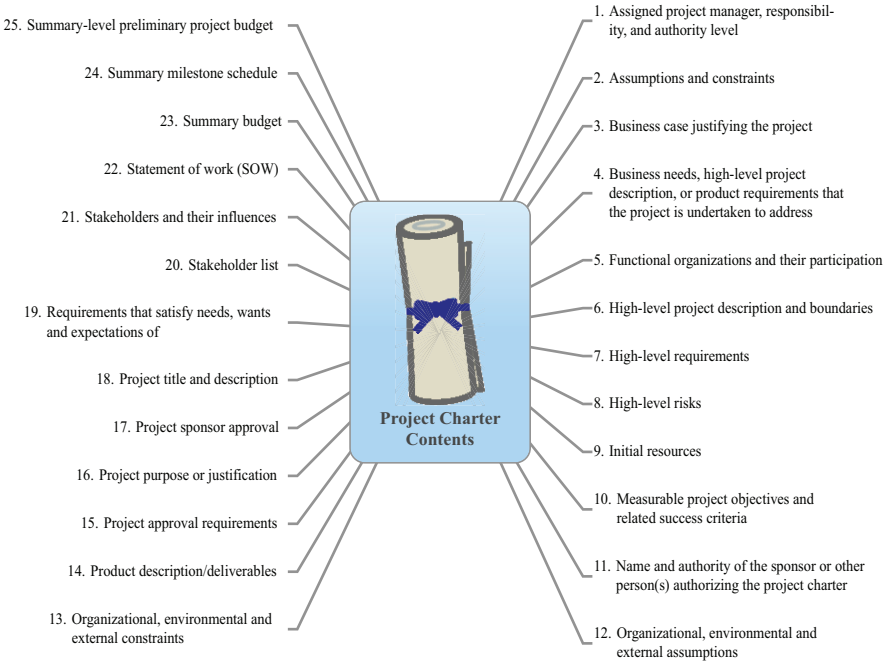

Figure 2-17 Example of the contents that could be in a Project Charter depending on the size of a project

A Charter Case in Point

Could a real-life project serve as a case study for the verification of the need for and the usefulness of a single point of reference (SPOR) charter? This question cannot be answered directly since the concept of a SPOR charter is new. Also, organizations usually do not provide public access to the charter of a project, especially if the project was not completed successfully. As a consequence, we have to take an approach similar to that often used in the calculation of probabilities when the direct way would be difficult. The approach is making use of the concept of a complement. Recall that if p is the probability of an event occurring, the probability of the event not occurring is $(1—p)$, which is called the complement of p.

For our project management consideration, if the event is "success," the complement would be "not-success," which is commonly called failure. If we can attribute success to the presence of a specific parameter, then the conclusion would be that failure can be attributed to the absence of that parameter. Of course, it is difficult, if not impossible, to prove beyond the microshadow of a doubt that the presence of a certain parameter is the unconditional cause of success. But in real life, most assumptions are considered to hold true without 100-percent proof. We will be equally realistic in our case study review of a project with or without a SPOR charter that was not brought to a successful conclusion.

As stated before, the concept of a SPOR charter is new, so we have to assume the complement—namely that a non-SPOR charter was used—and draw our conclusions from that perspective. For the sake of the analysis and to be less abstract, let us make the assumption that the presence and use of a SPOR charter in a project is the cause of success with a probability of 0.95 (or 95 percent). Then, the cause of success in case of a non-SPOR charter is 0.05 (or 5 percent). Conversely, we could surmise that in the case of failure of the project, there would be a likelihood of 95 percent that the project did not have and was not managed using a SPOR charter. But do remember our assumptions.

Consider an organization that started a project in 2001. The project was stopped in 2012 due to high cost overruns. According to the Web site http://www.zdnet.com/blog/projectfailures/california-abandons-2-billion-court-management-system/15363:

> In 2004, planners expected the system to cost $260 million; today [2012], the price tag would be $2 billion if the project runs to completion.

The Web site also cites a 2011 audit according to which the organization

- "Inadequately planned for... the project..."
- "Was unable to provide contemporaneous analysis and documentation supporting key decisions on the project's scope and direction"

- "Did not structure the development vendor's contract to adequately control cost and scope..."
- "Failed to develop accurate cost estimates—in 2004 the cost estimate was $260 million and by 2010 the estimated cost was $1.9 billion"

Not a pleasant story from the views of taxpayers. But for our case study analysis, on the basis of our assumptions, what conclusions or conjectures can we draw from this case in point? Is it reasonable to conjecture that this project did not have and was not managed using a single point of reference (SPOR) Project Charter? Could this project serve as a case in point for spending more time and money up front, before the start of project execution, to develop a SPOR charter?

It would really be interesting to be able to analyze the actual Project Charter of the project and compare it to what a SPOR for this project should look like.

Summary

The development of a Project Charter starts by asking some of the 7-Ws questions. The single point of reference (SPOR) Project Charter must be written and accepted prior to the start of the project. The SPOR charter clearly defines the project background, the requirements, the business justification, the problem statement, the project complexity, a description of the project, the impact of the project, the project interfaces, the bounds of the project, the project goals, the resources, the critical success factors, and the deliverables.

The contents of the single point of reference (SPOR) Project Charter represent the unambiguous scope of the project. A SPOR charter can eliminate many discussions during project execution that disrupt and delay project progress.

A SPOR Project Charter provides a high probability that the project will successfully deliver the expected results.

Review Questions

1. Who must sign the Project Charter?
2. When did PMI publish the first version of the *PMBOK® Guide*?
3. What should a business case address?
4. What philosophy enables us to develop a SPOR charter?
5. What is the project management dilemma?
6. What is the first level of conflict resolution?
7. What high-level views of the project should the executive summary provide?
8. What does the term *project scope* define?
9. What does a Project Charter explain and justify?
10. What are the 7-Ws?
11. How can you avoid different interpretations of project outcome and deliverables?
12. Are documentation standards for a Project Charter important? If so, why?
13. What arguments for the statement, "A Project Charter must always be a SPOR charter," can you present based on the information about the case in point?
14. What reasons other than the Project Charter could have contributed to the failure?
15. Would the reasons you listed in Question 14 disappear if you make a thought experiment and assume the organization would have used a SPOR charter?

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Section II

The Planning, Defining, Scoping, and Structuring of Projects

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3

Project Management Plans and Documents

α Learning Objectives

Note: To support the learning process and to reinforce the retention of the chapter's content, the learning objectives are not necessarily listed in the sequence of the chapter content.

After having read and comprehended the contents of this chapter, you should be able to:

- Understand and discuss Ned Herrmann's four-brain concept.
- Know what document constitutes the key project documentation.
- Understand that the PMBOK® is not a project management methodology.
- Understand how the project management plan is developed.
- Understand how a cost baseline is developed.
- Appreciate the volume of possible project documentation.
- Answer the following questions for the project management master plan:
  - What is the project management master plan?
  - How is the project management master plan created?
  - Who creates the project management master plan?
  - When is the project management master plan created?
  - Why is a project management master plan needed and created?

- Answer the following questions for each subsidiary plan of the project management master plan:
  - What is the plan?
  - How is the plan created?
  - Who creates the plan?
  - When is the plan created?
  - Why is the plan needed?

Overview

In Chapter 1, "Fundamentals," you learned about some fundamental ideas, interpretations, and concepts of project management and you were also introduced to the holistic view of project integration and scope management consisting of the four sections shown in Figure 3-1. For ease of cross-reference, the labels added at the bottom of the rectangles identify the respective project management Knowledge Area and the Process Group in the *PMBOK® Guide.* The icons have been added as a visual aid. Chapter 2, "The Project Charter," introduced the concept of the Project Charter as the single point of reference (SPOR).

Section II of the holistic view addresses the planning, defining, scoping, and structuring activity tasks for the activity management of project scope. This chapter addresses the planning activity task highlighted in Figure 3-1 by an oval.

It was also pointed out in Chapter 1 that the *PMBOK® Guide*–Fifth Edition makes a clear distinction between project integration and project scope management, while the holistic view sees all integrative steps of the activity tasks as being an intrinsic part of scope management.

In Chapter 2 of Section I we saw the introduction of the Project Charter as the single point of reference (SPOR) for a project. The SPOR Project Charter is the heart of any project; all activity tasks of every one of the nine activities in a project draw their lifeblood from this heartbeat. If the SPOR charter is comprehensive, if its content has been defined unambiguously, if it has been reviewed and approved (with signatures) by all stakeholders, then the project is

born with a healthy heart. Just like a body with a healthy heart is able to endure severe strain and master strong challenges, so will a project at the heart of which beats with a healthy SPOR charter. On the other hand, a body born with an organic heart defect must not be subjected to physical challenges and strain to survive for a longer time. Consequently, appropriate precautions are taken.

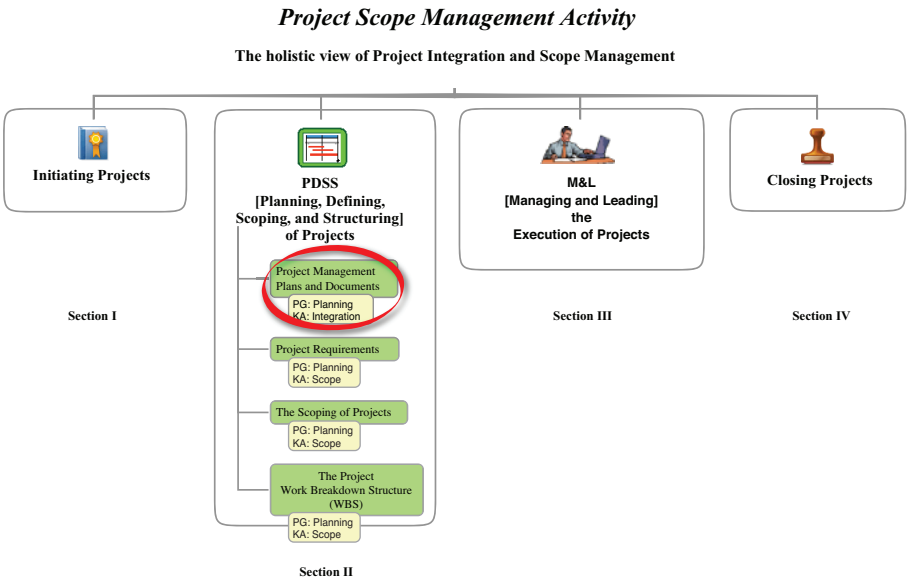


Figure 3-1 The holistic view of project scope management

But in the real world of business life, projects are constantly subjected to severe strains and strong challenges. Projects are not and cannot be protected from such pains by regulations, or compassion, or even laws. A project authorized by and with a non-SPOR charter, that is a charter that contains greyzones subject to different interpretations during execution, is, figuratively speaking, a project born with a "cardiac defect." Keeping such a project alive will run up high "medical bills" in dollars, project completion time, quality of deliverables, and possibly failure to deliver at all. The existence of a SPOR Project Charter provides an additional and very significant benefit to the management of a project that might not be apparent at first glance. When we construct a building, we make sure that an architectural plan has been completed before the start of the various construction

activities. The electricians, the plumbers, and other specialists will know exactly what to do; they do not have to ask someone or decide themselves whether to install three or four outlets. The architectural plan, the single point of reference for the construction project, provides this information. Consequently, their work is straightforward; it might be technically still difficult, but the specialists do not have to think about the *who* (electrician, plumber, etc.), *what, when, why,* and *where*—the architectural plan has stated these specifications. The specialists can concentrate on *how* to provide their deliverable with the required quality. The same holds true for the performing of the various other management activities and tasks, given the existence of a SPOR Project Charter.

Having stated the case for a SPOR Project Charter, the activity tasks addressed in the chapters of Sections II, III, and IV are based on the premise that a SPOR charter has been created and approved. This premise is significant because it influences the manner of approaching these tasks. The contents of Chapters 1 and 2 are most successfully approached through the use of all four thinking processes within the brain (left mode, right mode, cerebral mode, and limbic mode) described by Ned Herrmann in his brain dominance model (Herrmann Brain Dominance Instrument). Writing a SPOR charter is an example par excellence for the application of all the four parts of the brain—logic, structure, vision, communication—to take into consideration the forces of fact, form, future, and feeling that influence a project. A visual representation of the four-brain concept is shown in Figure 3-2.

The planning, defining, scoping, and structuring (PDSS) activity tasks addressed in the chapters of Section II emphasize the use of the left mode thinking processes of the brain, the managing and leading (M&L) activity tasks addressed in the chapters of Section III emphasize the use of the limbic mode thinking processes, while the chapter in Section IV again emphasizes the use of the left mode thinking processes of the brain. For very large (and costly) projects, it can be of practical value to take into consideration the individual aptitudes for thinking processes when assigning people to the various tasks.

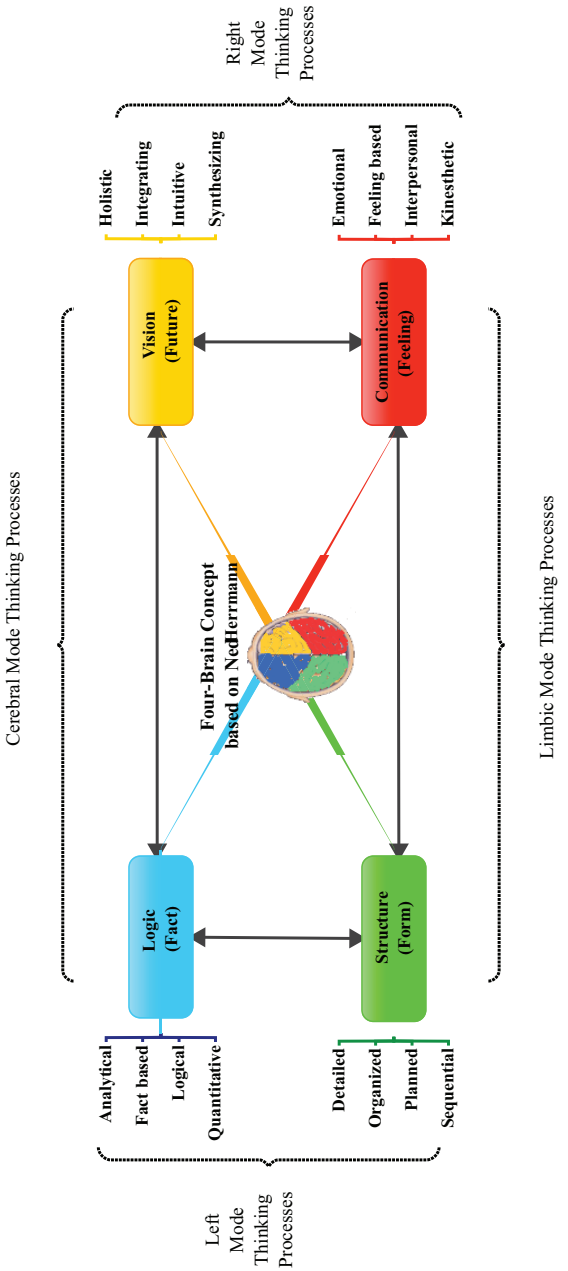


Figure 3-2 Ned Herrmann's four-brain concept

Project Management Planning

Project documentation is vital for any project. The form in which the documentation is kept, be it on paper like in the good old days or on some state-of-the-art electronic media, has no bearing on the importance of the documentation; it just affects the efficiency of creating (e.g., the ease of including visuals), updating, and distributing the documents. There are five key project documents: the SPOR Project Charter, the detailed project details statement, the detailed project requirements statement, the work breakdown structure (WBS), and the project management master plan. The five documents and their relationship are shown in Figure 3-3.

The SPOR project charter is covered in Chapter 2, project requirements are covered in Chapter 4, project scope is covered in Chapter 5, the work breakdown structure (WBS) is covered in Chapter 6, and the project management master plan and the additional project management documentation are covered in this chapter.

The existence of a single point of reference (SPOR) charter decisively influences the nature of the work involved in the planning, defining, scoping, and structuring of projects, as well as the work for the managing and leading of the execution of projects. The closing of a project or of a phase is (or should be) more or less a standard operating procedure in any project while the assessing of the outcome of a project is again aided by being able to reference the SPOR charter.

The first activity task of the activity manage project scope, the activity task to initiate a project, has been completed with the acceptance of the Project Charter. The next activity tasks are the PDSS tasks, as shown in Figure 3-1. An important point to remember when looking at the activity tasks within the management of project scope is that the managing of the scope of a project includes (in the holistic view of project scope management) the integrative steps, which are treated as processes in a separate Knowledge Area in the *PMBOK® Guide*–Fifth Edition.

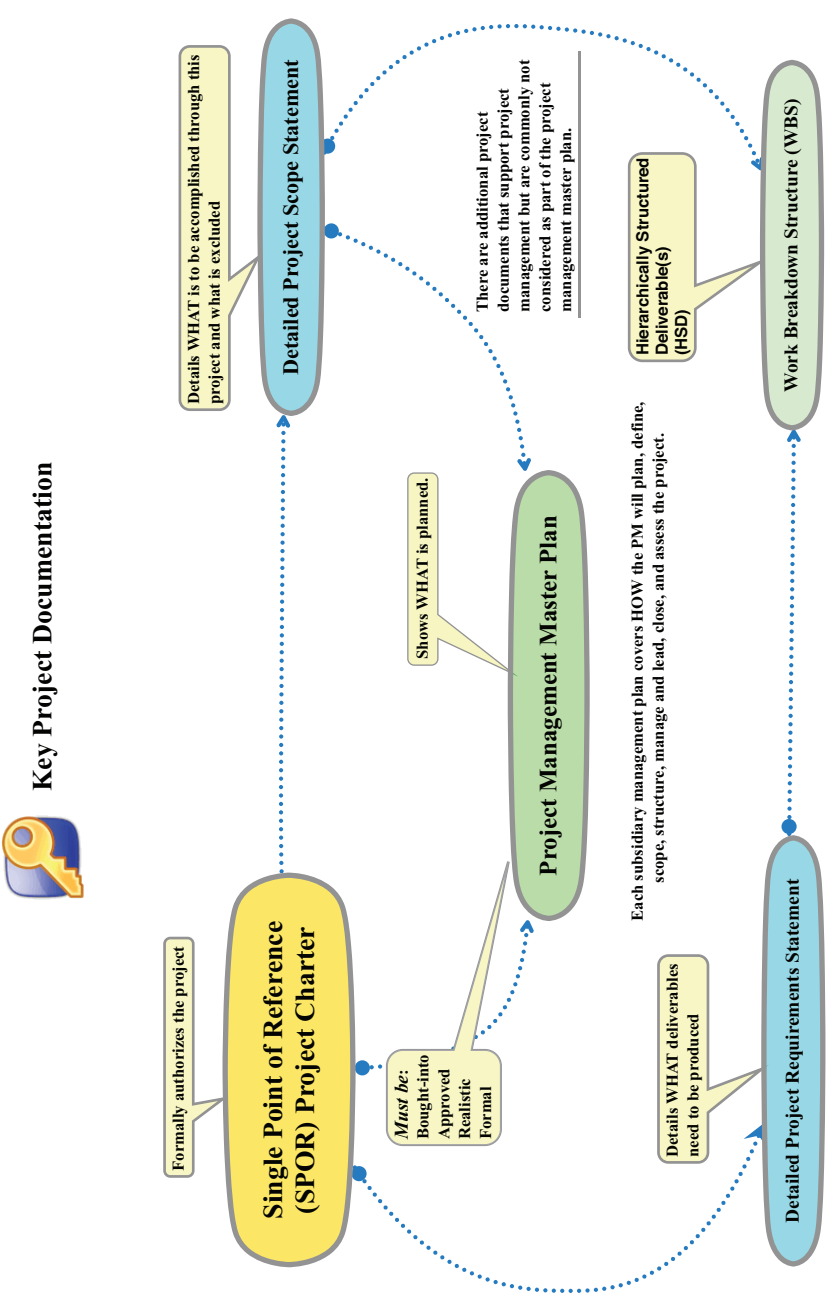


Figure 3-3 Key project documentation

The first of the PDSS activity tasks is the task to establish the project management master plan and a list of supporting project documents. The *PMBOK® Guide* refers to the project management master plan as simply the project management plan and states that the project management plan "integrates all the subsidiary plans and baselines from the planning process" (p. 76). The guide asks for the development of the project management plan as the second process in the Project Integration Management Knowledge Area, as shown by the oval in Figure 3-4.

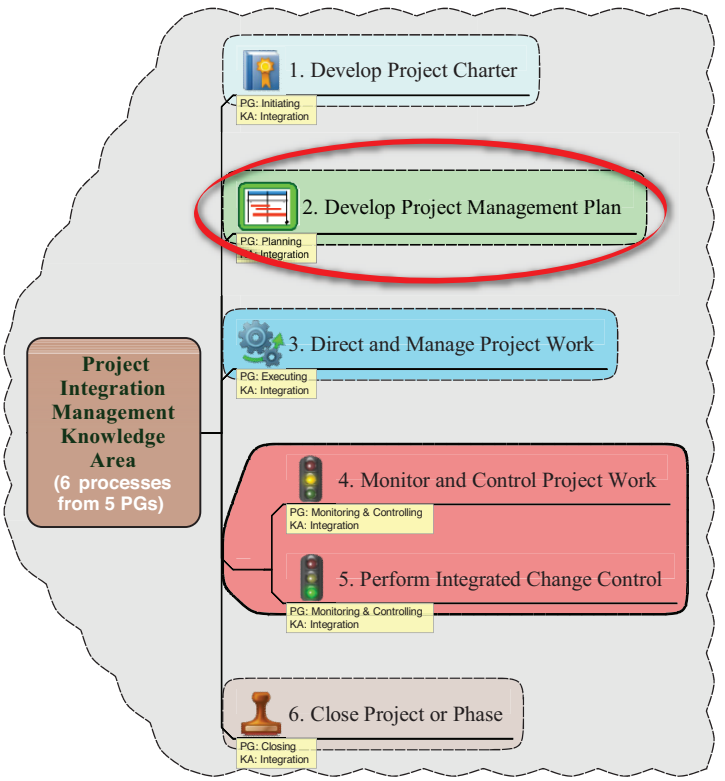


Figure 3-4 Develop project management plan in the *PMBOK® Guide*'s Integration Knowledge Area

While the *PMBOK® Guide* assigned the process to develop the project management plan to its Integration Knowledge Area, as shown in Figure 3-4, it has assigned the process to Plan Scope Management to the Scope Knowledge Area, as shown in Figure 3-5.

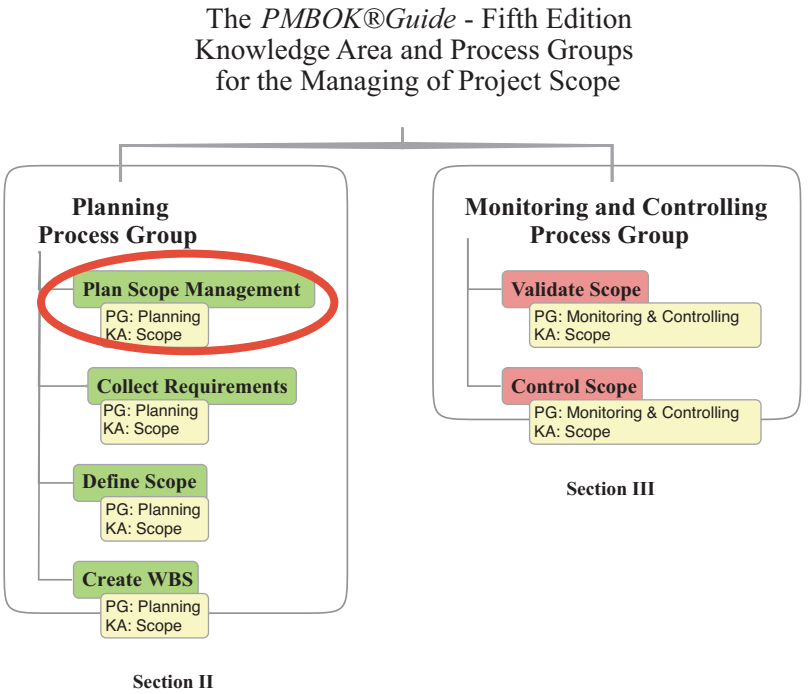


Figure 3-5 The Plan Scope Management process in the *PMBOK® Guide*'s Scope Knowledge Area

The *PMBOK® Guide* explains the specific purpose of the process *Plan Scope Management* as the determination of how to manage scope, that is define scope, validate scope, and control scope.

The *PMBOK® Guide* also provides a list of inputs to the process, a list of outputs from the process, and a list of tools and techniques that are commonly used by practitioners of project management for this process and thus have been established as practice standards. The inputs, outputs, and tools and techniques for the process are shown as a visual in Figure 3-6 in the IPO format. The icons have been added as a visual aid.

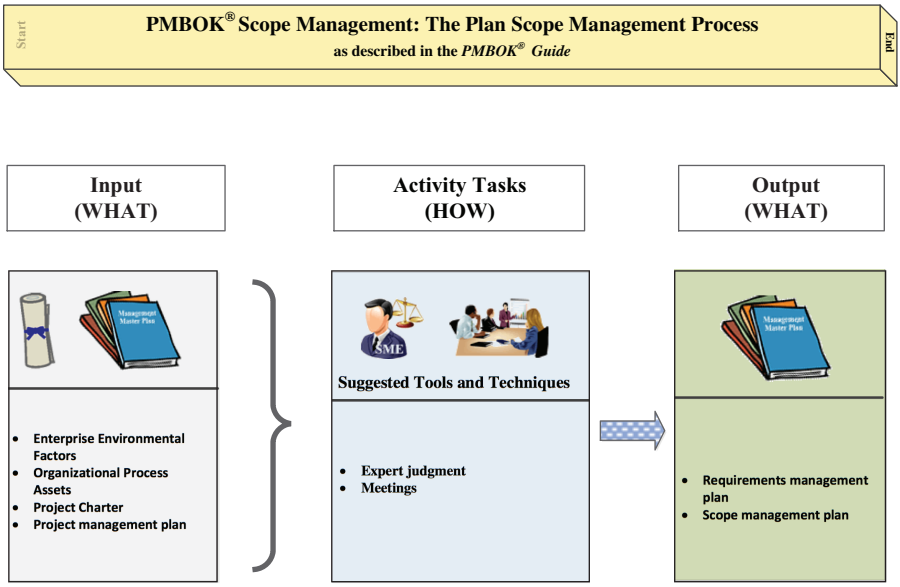


Figure 3-6 The inputs, outputs, and tools and techniques for the process to Plan Scope Management as described in the *PMBOK® Guide*

The *PMBOK® Guide*'s project management plan is the de facto equivalent to the project management master plan, but by including the word *master*, a more precise linguistic specification is achieved, providing an improved possibility of awareness and understanding at first glance. When we hear or read the term *project management master plan*, we intuitively know that within or below the master plan there will be subordinate plans or topic-specific supplemental plans, the journeymen of the master plan, so to speak.

While most project plans are similar, they differ in what needs to be planned depending on the size of the project, the nature of the project, and internal and external factors that exert or may exert some form of influence on the project. Given the existence of the SPOR charter, the key in the development of the project management master plan is *what* to plan, not *how* to plan. This is where the *PMBOK® Guide*–Fifth Edition proves to be an invaluable tool; it tells the reader what to do (the process), what tools and techniques would be useful, and what the output of the process should be. The *PMBOK® Guide* should be on every project manager's desk(-top) for quick reference.

The *PMBOK® Guide* is, contrary to some people's opinion, not a methodology, and PMI® has wisely chosen to call the guide a Project Management Body of Knowledge and not a Project Management Methodology. In addition, this is also pointed out in the guide itself, for example on page 2 and in the *PMBOK® Guide* Annex A1 (p. 417 ff). Nonetheless, there are references to a "PMBOK methodology." For example, the Medical Center of a California University offered a Technical Project Manager position on *Monster* that contained the sentence "At this level, incumbent is directly responsible for project management of complex medium to large complex system, analysis, design, and implementation and follow the Project Management Institute Body of Knowledge methodology (PMBOK)" ("Technical Project Manager UCD," 2014).

After the brief detour to the world of misunderstandings, we turn our attention again to the quest for knowledge and understanding. We can use some of the 7-Ws to investigate WHAT is needed to create a project management master plan. Fortunately, there exists a body of knowledge of project management practice standards we can draw upon. Based on the knowledge presented in the *PMBOK® Guide* for the planning of the management of a project, a standard project management master plan consists of 14 specific or subsidiary plans and three baselines, as shown in alphabetical order in Figure 3-7. This answers the question, WHAT is needed for a project management master plan. Each of the 14 plans and three baselines is looked at in more detail in the following section by asking the five 7-W questions: WHAT, HOW, WHO, WHEN, and WHY.

But before we delve into our quest, let's cover a point on the choice of the word *plan* for the subsidiary plans in the master plan. For example, one of these subsidiary plans is called the Schedule Management Plan. At first glance, the word *plan* can lead to a delay in understanding, especially for someone new to the *PMBOK® Guide* and project management. The novice might ask, is this a plan of the schedule that the project manager has to manage? The *PMBOK® Guide* described the Schedule Management Plan as "a component of the project management plan that establishes the criteria and the activities for developing, monitoring, and controlling the schedule" (p. 148). Wouldn't a word like fundamentals, principles, foundations, basics, elements, or basis be more descriptive of what the *plan* is?

The question *by what means* has been answered in the *PMBOK® Guide* for the master plan and the subsidiary plan with "expert judgment" and "facilitation techniques." It is not necessary to ask *where* in this context; the answer would be trivial as "at the place of work." As mentioned during the introduction of the 7-W concept, the *where* question could be considered in case of a geographical distribution of the people working on the planning of the project.

The Project Management Master Plan

WHAT is the project management master plan?

The project management master plan documents what plans have been defined for the project, how the project is scoped, how it is structured, and how it is managed and led. The master plan consists of the subsidiary plans and baselines, as shown in Figure 3-7.

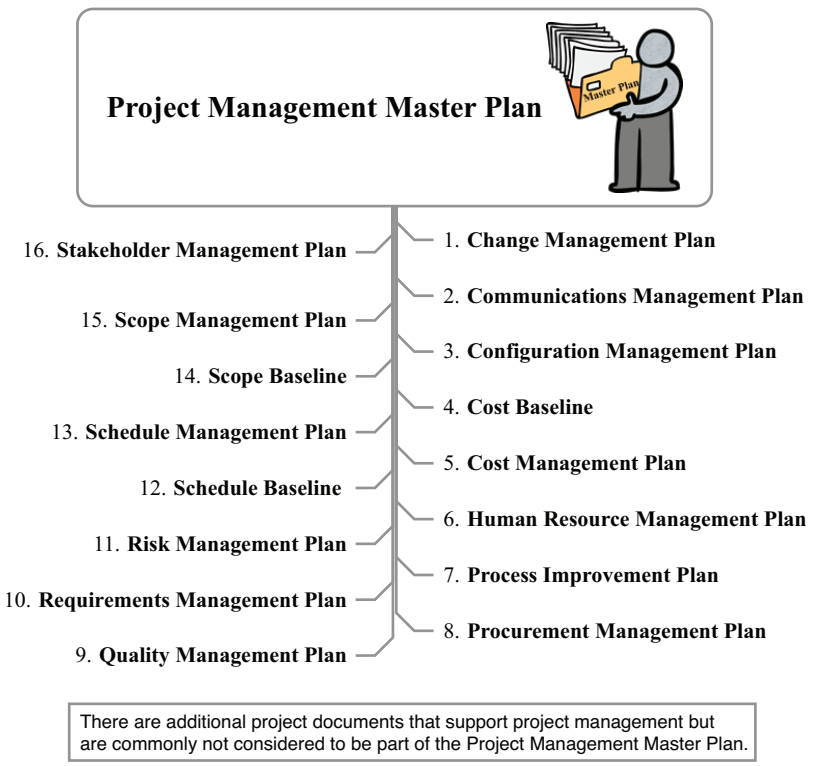


Figure 3-7 Project management master plan (subsidiary plans and baselines in alphabetic order)

As the project progresses, the project master plan will usually go through a number of updates and changes to account for progress, changes, or delays. Keeping a project plan in a baselined state and still be able to handle the fluctuations of life and business life distinguishes a project manager who is a leader from the project manager who is a scheduler. And, since all is in flux as Heraclitus noticed over 2,000 years ago, changes will occur and affect even the best-laid plans of mice and men.

HOW is the project management master plan created?

The project management master plan is created by performing the steps in the following alphabetic list:

- Analyzing the SPOR Project Charter to determine the nature and size of the project.
- Examining the Enterprise Environmental Factors (see Chapter 1) to determine which factors influence the plan or provide support for the development of the plan.
- Examining the Organizational Process Assets (see Chapter 1) to determine which assets influence the plan or provide support for the development of the plan.
- Using Figure 3-8 as a checklist.
- Using the output from other management activities (Figure 3-8).
- Using the plans from completed projects (in the project library) as guides and sources of input.

These steps are also visually shown in Figure 3-8.

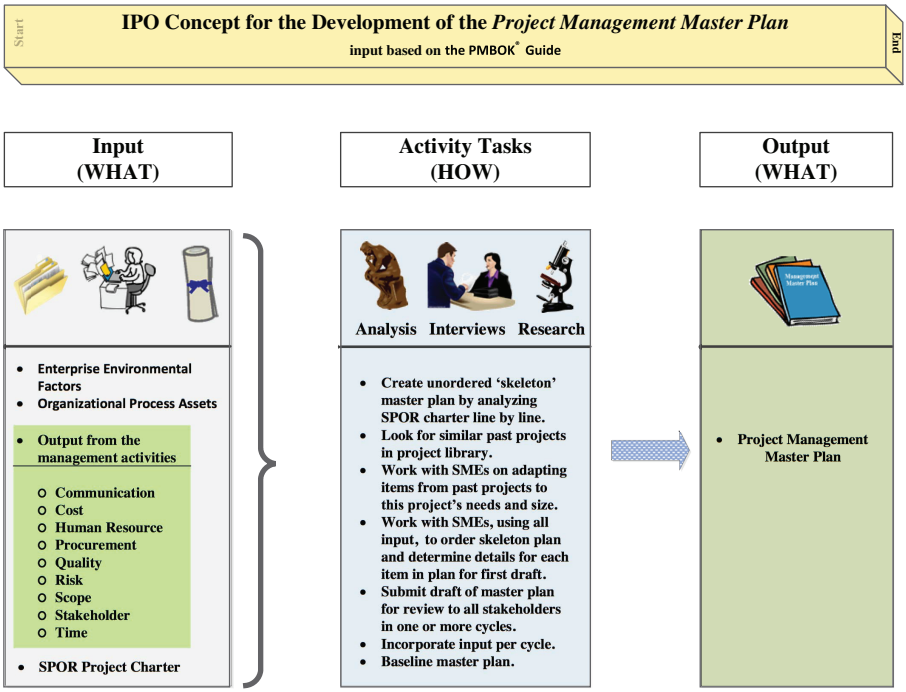


Figure 3-8 IPO concept for developing a project management master plan

WHO creates the project management master plan?

The project management master plan is usually created by the project manager with support from subject matter experts (SMEs) and (potential) project team members. In cases where no project manager has yet been appointed and a project management master plan must be created for some specific reason, the project owner and/or management might select a qualified person to develop a first version of the plan. A subsequently appointed project manager will inherit that plan and will have to manage the project, at least initially, according to that plan. If the project manager perceives a significant need to change the plan, he or she must be very diplomatic in the approach to avoid conflicts that could negatively impact project work and possibly delay or even kill the project. The root causes of problems in projects are almost always people-related.

WHEN is the project management master plan created?

The project management master plan is, or should be, created as soon as the SPOR Project Charter has been approved. In practice, some preliminary work on the plan is started before the approval of the charter. This is done to provide initial estimates of certain data needed for the charter.

WHY is a project management master plan needed and created?

A project management master plan is needed because without a defined plan, the activity tasks and steps within the project would take place in an unordered, chaotic motion that would not lead to the goal of the project and would not achieve the specified objectives. One could refer to the management of a project without a project management master plan as *management by Brownian motion.*

The project management master plan is created to make possible the managing, leading, monitoring, and controlling of a project in an orderly fashion and known sequence. The project management master plan provides the direction in which the project is to progress and the bandwidth within which the activity tasks may vary without triggering an exception that calls for special attention and action.

The Change Management Plan

WHAT is the change management plan?

The change management plan is where the expected changes initiated by the project, the activity tasks and steps planned to monitor and control these changes, and the planned actions to mitigate any issues arising from the changes are documented. The deliverable of a change is the successful completion of the change. Therefore, it must clearly be defined in the plan what constitutes a successful completion so that everybody will recognize it when they see it.

It is in the nature of things that there will also be unexpected changes. The change management plan also anticipates that there will be unexpected changes and documents how to react to such changes and how to align them with the project's goal(s) and objectives. Humans have a natural tendency to resist change. This must also be anticipated in the change management plan and a way must be outlined how to overcome any and all resistance to change.

A key aspect of the change management plan is the communication of planned as well as unexpected changes, as soon as they occurred to the organization. The communication must include the identification of each planned change; the timeline; who is affected by the change; potential risks and possible issues; and when, how often, where, and in what form information about the status of changes is made available to everyone in the organization.

HOW is the change management plan created?

The change management plan, like practically all other plans, is created according to the method or practice shown in the IPO concept for the development of the project management master plan, that is, through document analysis (SPOR charter, documentation from past projects, and output from other project management activities), research of Enterprise Environmental Factors and Organizational Process Assets, and interviews conducted with change management experts (SMEs). Specific attention is paid to the content of the project management master plan relating to the process and procedures for managing change.

WHO creates the change management plan?

The change management plan is usually created by the project manager with support from (potential) project team members, representatives from the business functions or areas that will be affected by the planned changes, and change management experts (SMEs).

WHEN is the change management plan created?

The change management plan is, or should be, started as soon as the SPOR Project Charter has been approved, that is in conjunction with the master plan and expanded as more detailed information becomes available. It should, however, be completed and approved, like all plans, by the start of project execution.

WHY is a change management plan needed?

To paraphrase Albert Einstein, two things are constant in our universe: the speed of light and change—and there might be cause for doubt about the speed of light. So change will happen in a project, whether planned or unexpected, and without a change management plan, the project has a good chance of being derailed.

The Communications Management Plan

WHAT is the communications management plan?

The communications management plan defines the communication needs; responsibilities; how to communicate, manage, and control communication; communication technology; and resources needed (financial, human, technical) for the project. Specifically, the communications management plan should define the following (in alphabetical order):

- How information is distributed.
- How often information is distributed (distribution frequency).
- How receipt of information should be acknowledged.
- In what form information is distributed to whom (the form might depend on the recipient).
- What communication constraints (legal or security) exist for the project.
- What escalation process is defined for the resolution of communication conflicts.
- What templates and forms (for example, a needs/responsibility matrix) will be used in the project.
- When information is needed.
- Who (of the stakeholders) needs what information at what level of granularity.
- Who authorizes changes to the authorized communication process or matrix.
- Who authorizes distribution of confidential information.
- Who classifies confidential information.
- Who is responsible (authorized) to update the communication plan.
- Who is responsible for (owns) which information (and thus communication).
- Why information is needed.

HOW is the communications management plan created?

The communications management plan, like practically all other plans, is created according to the method or practice shown in the IPO concept for the development of the project management master plan, that is, through document analysis (SPOR charter, documentation from past projects, and output from other project management activities), research of Enterprise Environmental Factors and Organizational Process Assets, and interviews conducted with communications management experts (SMEs). Specific attention is paid to the content of the project management master plan relating to communications and the stakeholder register developed in the project stakeholder management activity.

WHO creates the communications management plan?

The communications management plan is usually created by the project manager with support from (potential) project team members, representatives from the business functions or areas that will be affected by the (planned) project, and communications management experts (SMEs).

WHEN is the communications management plan created?

The communications management plan is, or should be, started as soon as the SPOR Project Charter has been approved, that is in conjunction with the master plan and expanded as more detailed information becomes available. It should, however, be completed and approved, like all plans, by the start of project execution.

WHY is a communications management plan needed?

A communications management plan is needed to describe the creation, management, and the distribution of project information and how project communication is organized, managed, and controlled. As is the case with all the other plans, the nonexistence of a communications management plan would lead to difficulties during project execution and could derail the project.

The Configuration Management Plan

WHAT is the configuration management plan?

The configuration management plan identifies those items relevant to the project that are configurable, how they are configured, how the configuration is managed and monitored, and how configuration changes are managed and controlled. Specifically, the configuration management plan should specify the following (in alphabetical order):

- How information regarding changes is communicated and to whom, specifically:
  - Completion of implementation of change
  - Granted change authorization
  - Start of implementation of change
  - Submitted change requests
- How the configurable items are configured at the start of the project.
- What configuration management database is being used.
- What is the definition of the process:
  - To audit change management
  - To authorize changes
  - To document implemented changes
  - To evaluate the impact of requested changes
  - To manage and control the implementation of authorized changes
- What items are configurable.
- What roles and responsibilities are defined for the management of configuration items.
- Who authorizes changes to the configuration management plan.
- Who is assigned to each role (names might not be available initially).
- Who is in charge of configuration management.

HOW is the configuration management plan created?

The configuration management plan, like practically all other plans, is created according to the method or practice shown in the IPO concept for the development of the project management master plan, that is, through document analysis (SPOR charter, documentation from past projects, and output from other project management activities), research of Enterprise Environmental Factors and Organizational Process Assets, and interviews conducted with configuration management experts (SMEs). Specific attention is paid to the content of the project management master plan relating to items that are configurable and items that will require formal change control.

WHO creates the configuration management plan?

The configuration management plan is usually created by the project manager with support from (potential) project team members, representatives from the business functions or areas that will be affected by the (planned) project, and configuration management experts (SMEs).

WHEN is the configuration management plan created?

The configuration management plan is, or should be, started as soon as the SPOR Project Charter has been approved, that is in conjunction with the master plan and expanded as more detailed information becomes available. It should, however, be completed and approved, like all plans, by the start of project execution.

WHY is a configuration management plan needed?

A configuration management plan is needed to ensure that all configurable items are identified and configured; that no necessary changes are overlooked, but are all implemented; that no unnecessary changes are implemented; and that the identical configurations of items are available and used by all people involved and all systems used in the project.

Without consistent configuration management, errors are likely introduced by the use of out-of-sync items, such as word processors, spreadsheets, databases, and more. Since the effect of the propagation of errors is subject to the sensitivity to initial conditions so nicely described by the "butterfly effect," such errors can be very disruptive in a project.

The Cost Baseline

WHAT is the cost baseline?

"The cost baseline is the approved version of the time-phased project budget, excluding any management reserves, which can only be changed through formal change control procedures and is used as a basis for comparison to actual results. It is developed as a summation of the approved budgets for the different schedule activities" (*PMBOK® Guide*, 2013, p. 238).

HOW is the cost baseline determined?

The cost baseline is determined through aggregation of cost estimates for the various activity tasks plus contingency reserves, subsequent summation of all activity tasks with their contingency reserves into associated work packages, the addition of contingency reserves to the work packages, the subsequent aggregation of related work packages with their contingency reserves into control accounts, and the final summation of control accounts. The result of this final summation, the sum or total, is, strictly speaking, a constant cost *base-point* for that time point for which the cost estimate was made. Since the fundamental cost estimates for the activity tasks vary as a function of time over the life of the project, the distribution of base-points forms a line on a time versus cost-value coordinate system. This line is referred to as the cost baseline. Figure 3-9 shows a visual representation of the concept of the development of a cost baseline.

The fundamental cost estimates are arrived at through research and analysis of relevant documents (for example, bids from external sources) and documentation from past projects, expert judgment, various estimating techniques, available cost figures for specific factors (for example, costs due to quality requirements), and possibly some cost-estimating software. At each step, contingency reserves can be added to the cost item before the aggregation or after the aggregation, depending on the organization's practice or the project manager's propensity for detail. For large projects, there is some merit in planning on a very detailed granularity.

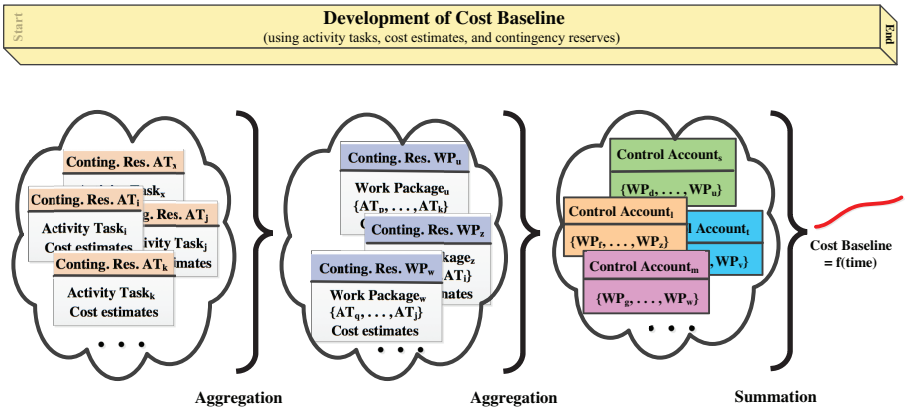


Figure 3-9 The concept of cost baseline development using activity tasks, cost estimates, and contingency reserves

WHO creates the cost baseline?

The cost baseline is usually created by cost accountants, experts in cost estimating, and subject matter experts in the activity tasks for which cost estimates are needed, under the overall leadership of the project manager.

WHEN is the cost baseline declared as baselined?

The cost baseline is declared as baselined when the final summation of control accounts has been accepted by the stakeholder relevant for such a decision. Of course, it is wise to obtain acceptance at each level to avoid having to go back to square one.

WHY is a cost baseline needed?

A cost baseline is needed be able to monitor and control the actual costs of the project at the end of selected periods, to recognize deviations early enough to take corrective actions, and to make reasonable predictions of expected costs for the next period and for the expected costs at completion of the project.

The Cost Management Plan

WHAT is the cost management plan?

The cost management plan is the document that contains the descriptions of the steps or processes to plan, structure, manage,

monitor, and control the costs of the project. Specifically, the cost management plan specifies the following (in alphabetical order):

- Estimating range of accuracy to be used (consistently!)
- How cost variances are managed
- How the cost baseline is managed
- Links to the organization's functions as appropriate, for example, the link between control accounts (in the WBS) and the accounting system (in the Finance unit)
- Performance measurement rules and procedures (for example, setting of measurement points, measuring and tracking techniques, equations to be used for calculations)
- Rounding precision of cost-estimate figures
- Thresholds for control of variances from defined budget, time, or quality lines
- Units of measure for each type of resource
- Who has the authority for authorizing budget changes
- Who has the responsibility for the management of costs

HOW is the cost management plan created?

The cost management plan, like practically all other plans, is created according to the method or practice shown in the IPO concept for the development of the project management master plan, that is, through document analysis (SPOR charter, documentation from past projects, and output from other project management activities), research of Enterprise Environmental Factors and Organizational Process Assets, and interviews conducted with cost management experts (SMEs). Specific attention is paid to the content of the project management master plan that will affect or produce costs.

WHO creates the cost management plan?

The cost management plan is usually created by the project manager with support from cost management experts, people familiar with the work to be performed in the various activity tasks (SMEs), experts from the Controller function (often a part of the Finance function) or the corporate budgeting function (in case of a large corporation), and the help of team members (as needed).

WHEN is the cost management plan created?

The cost management plan is, or should be, started as soon as the SPOR Project Charter has been approved, that is in conjunction with the master plan and expanded as more detailed information becomes available. It should, however, be completed and approved, like all plans, by the start of project execution.

WHY is a cost management plan needed?

The cost management plan is needed because without the availability of a description at the beginning of the project of the processes and steps how to plan, measure, report, and control project costs, the project manager will face an almost impossible task to establish a budget or stay within the budget.

The Human Resource Management Plan

WHAT is the human resource management plan?

The human resource management plan is a guide on how to specify, select, manage, lead, and at completion release human resources for a project. Specifically, the human resource management plan should specify the following (in alphabetic order):

- Backup strategy for each role
- Compliance strategy
- Hiring (includes assigning of internal staff) and release dates for each staff number (resource calendar)
- Level of authority of each role
- Number of staff required for each role
- Organization chart(s) for the project
- Recognition and award strategy
- Responsibility (general and matrix) for each role
- Role required for each activity task
- Safety policies and procedures
- Skills and competency required for each role
- Training need and schedule for each role and staff number

HOW is the human resource management plan created?

The human resource management plan is developed according to the method or practice shown in the IPO concept for the development of the project management master plan, that is, through document analysis, research of Enterprise Environmental Factors and Organizational Process Assets, and interviews conducted with human resource management experts (SMEs). Specific attention is paid to the content of the project management master plan relating to resource requirements and to the activity resource requirements specified in the project time management activity.

WHO creates the human resource management plan?

The human resource (HR) management plan is created by the project manager with support from human resource planning experts in the HR function, people familiar with the work to be performed in the various activity tasks, and support from general administration as needed.

WHEN is the human resource management plan created?

The human resource management plan is, or should be, started as soon as the SPOR Project Charter has been approved, that is in conjunction with the master plan and expanded as more detailed information about requirements and specific activity tasks becomes available. It should, however be completed and approved, like all plans, by the start of project execution.

WHY is a human resource management plan needed?

A human resource management plan is needed for a very simple reason: Project work is performed by people and without the planned availability of the right number of skilled persons for any activity task at the point of time at which the activity task is to be performed, project execution comes to a halt.

The Process Improvement Plan

WHAT is the process improvement plan?

The process improvement plan points out and describes the steps to go through in order to analyze and evaluate project management activities, the activity tasks within each project management activity, and the processes for product development for the purpose

of identifying tasks and process steps that improve project management and product development and thus enhance their value to the organization.

HOW is the process improvement plan created?

The process improvement plan, like practically all other plans, is created according to the method or practice shown in the IPO concept for the development of the project management master plan, that is, through document analysis (SPOR charter, documentation from past projects, and output from other project management activities), research of Enterprise Environmental Factors and Organizational Process Assets, and interviews conducted with business process management experts (SMEs). Specific attention is paid to the content of the project management master plan relating to boundaries of activity tasks (processes), interrelationships between tasks, and indications for the measurement of task efficiency.

WHO creates the process improvement plan?

The process improvement plan is created by either the project team in conjunction with the corporate Quality Assurance function (currently, not every organization has such a function yet) or the corporate Quality Assurance function in conjunction with the project team, depending on the organization's emphasis and power distribution.

WHEN is the process improvement plan created?

The process improvement plan is created parallel to the development of the other plans. It must, or should, be completed and available for quality monitoring and assessment at the beginning of the project execution.

WHY is a process improvement plan needed?

A process improvement plan is needed to ensure that activity tasks and product development processes are subjected to ongoing monitoring, assessment, and development of proposals for improvements.

The Procurement Management Plan

WHAT is the procurement management plan?

The procurement management plan is a document in which the steps and procedures for the purchase or rental (procurement)

of goods, materials, and services are described. The plan also documents the specific procurement activity tasks to be performed and how the procurement activity will be managed within the overall project management.

HOW is the procurement management plan created?

The procurement management plan, like all other plans, is created according to the method or practice shown in the IPO concept for the development of the project management master plan, that is, through document analysis (SPOR charter, documentation from past projects, and output from other project management activities), research of Enterprise Environmental Factors and Organizational Process Assets, and interviews conducted with procurement management experts (SMEs). Specific attention is paid to the requirements documentation, the activity tasks cost estimates, the activity tasks resource requirements, the detailed project scope statement, the project schedule, the risk register, the stakeholder register, and the work breakdown structure (WBS) and its associated WBS dictionary.

WHO creates the procurement management plan?

The procurement management plan is most likely created by experts from the purchasing function of the organization, in conjunction with experts from the marketing function, representatives from the functional areas for which the planned procurements are intended or which are affected by the result of the procurement, legal experts, and members of the project team. As always, the project manager provides guidance and leadership.

WHEN is the procurement management plan created?

The procurement management plan is, or should be, created parallel to the development of the other plans. It must, or should, be completed and available for vendor evaluation and selection at the beginning of the project execution. It is conceivable that there could be very large projects where the first acquisition of goods, materials, or services is several years out. In such cases, a coarse procurement outline might suffice at the start of the project, but the outline must specify explicitly the latest acceptable date for the completion and availability of the final (detailed) procurement plan.

WHY is a procurement management plan needed?

A procurement management plan is needed to identify, specify, or define the following:

- How a seller is selected
- How risks will be managed
- How seller performance is to be measured and graded
- How sellers are to be evaluated for selection
- How sellers are to be managed
- What types of contracts are to be used
- What will be procured in the project

The Quality Management Plan

WHAT is the quality management plan?

The quality management plan specifies and documents these three aspects of quality:

- How adherence to (all) quality requirements will be managed with respect to all deliverables and to the management of the project itself
- What the organization's quality policies, procedures, and standards that must be adhered to in the project are
- What the legal, regulatory, and industry quality standards that are applicable to the project are

HOW is the quality management plan created?

The quality management plan, like practically all other plans, is created according to the method or practice shown in the IPO concept for the development of the project management master plan, that is, through document analysis (SPOR charter, documentation from past projects, and output from other project management activities, the project management master plan itself), research of Enterprise Environmental Factors and Organizational Process Assets, and interviews conducted with quality management experts (SMEs). Specific attention is paid to requirements documentation, the Risk Register, the scope baseline, and the stakeholder register.

WHO creates the quality management plan?

The quality management plan is created by experts from the quality assurance function of the organization, specific subject area experts, and project team members, again under the overall guidance (and responsibility) of the project manager.

WHEN is the quality management plan created?

The quality management plan is, or should be, created parallel to the development of the other plans and must be available at the start of the project.

WHY is a quality management plan needed?

A quality management plan is needed to ensure strict adherence to quality requirements from the very start of the project. An adequate quality management plan or a non-100-percent adherence to a quality management plan has very costly consequences, as has been shown by the various recalls in the automobile industry.

The Requirements Management Plan

WHAT is the requirements management plan?

The requirements management plan is the documentation describing how to go about analyzing requirements (including impact analysis), how to document the results of the analysis so that fulfillment can easily be shown by tracking each deliverable to one or more requirements (see Chapter 2), and how to manage requirements, that is plan, prioritize, trace, track, and report changes.

HOW is the requirements management plan created?

The requirements management plan, like practically all other plans, is created according to the method or practice shown in the IPO concept for the development of the project management master plan, that is, through document analysis (SPOR charter, documentation from past projects, and output from other project management activities), research of Enterprise Environmental Factors and Organizational Process Assets, and interviews conducted with subject matter experts (SMEs) from the requesting functional areas. Specific attention is paid to the scope management plan.

WHO creates the requirements management plan?

The requirements management plan is usually created by experts in business analysis in collaboration with subject matter experts from the requesting functional area and other areas that might be affected by the requirements being implemented. The plan is finalized by or under the leadership of the project manager.

WHEN is the requirements management plan created?

The requirements management plan is, or should be, created parallel to the development of the other plans and must be available at the start of the project.

WHY is a requirements management plan needed?

A requirements management plan is needed to ensure that there is a well-defined and consistent approach to analyzing, documenting, and managing project requirements.

The Risk Management Plan

WHAT is the risk management plan?

The risk management plan documents how the tasks of the project risk management activity are planned, structured, scheduled, executed, measured, documented, and managed.

HOW is the risk management plan created?

The risk management plan, like practically all other plans, is created according to the method or practice shown in the IPO concept for the development of the project management master plan, that is, through document analysis (SPOR charter, documentation from past projects, and output from other project management activities), research of Enterprise Environmental Factors and Organizational Process Assets, and interviews conducted with risk management experts (SMEs). Specific attention is paid to the scope baseline and the constraints listed in the SPOR Project Charter.

WHO creates the risk management plan?

The risk management plan is usually created by members of the project team together with business process experts from the functional areas that have interfaces to the project or even just have a

tangential touch point with the project. In larger organizations, there might be experts in risk management who would be major contributors to the risk management plan.

WHEN is the risk management plan created?

The risk management plan is, or should be, created parallel to the development of the other plans and must be available at the start of the project.

WHY is a risk management plan needed?

There is an inherent risk in any human endeavor and issues pop up whenever there is a movement of any kind, such as the steps taken in the execution of a project or issues are created by forces external to the project. A risk management plan is needed to keep small issues from turning into major emergencies or even into complete disasters.

The Schedule Baseline

WHAT is the schedule baseline?

The schedule baseline is a completed project schedule with start date, intermediate milestones, and end date that has been approved and accepted by all stakeholders and has been frozen as of a specified date. From that date on, it is fixed or constant and can only be changed through the official project change process. During project execution, the actual project schedule is compared to the schedule baseline to determine if there are any deviations from the baseline.

HOW is the schedule baseline determined?

The schedule baseline is determined by all stakeholders having agreed on the proposed project schedule and having accepted it as binding.

WHO creates the schedule baseline?

Formally, the schedule baseline is created by the stakeholders as explained above. The prerequisite is, of course, that a project schedule had been created.

WHEN is the schedule baseline declared as baselined?

The schedule baseline is, or should be, baselined with the completion of the project management master plan.

WHY is a schedule baseline needed?

A schedule baseline is needed to allow for tracking of project progress and enable an early warning if a delay in the planned completion of the project is threatening.

The Schedule Management Plan

WHAT is the schedule management plan?

The schedule management plan is the document where the steps and criteria for the management of the project schedule are described and defined. In particular, it specifies the choice of scheduling method, scheduling tools, formats, policies, procedures, and documentation standards.

HOW is the schedule management plan created?

The schedule management plan, like practically all other plans, is created according to the method or practice shown in the IPO concept for the development of the project management master plan, that is, through document analysis (SPOR charter, documentation from past projects, and output from other project management activities), research of Enterprise Environmental Factors and Organizational Process Assets, and interviews conducted with schedule management experts (SMEs). Specific attention is paid to the scope baseline and, of course, the project management master plan itself.

WHO creates the schedule management plan?

The schedule management plan is created by the members of the project team in conjunction with stakeholder representatives and scheduling experts, again under the leadership of the project manager.

WHEN is the schedule management plan created?

The schedule management plan is created in parallel to the project management master plan and must be completed, at the latest, at enough time before the start of the project to allow for the development of the actual project schedule.

WHY is a schedule management plan needed?

A schedule management plan is needed to ensure that a project schedule is developed that is executable, manageable, easy to update, and consistent with the scheduling from past projects to enable

comparison of projects in general and project management efficiency in particular.

The Scope Baseline

WHAT is the scope baseline?

The scope baseline represents the status of the scope statement, the WBS, and the associated WBS dictionary frozen at a certain point in time. It represents the status as accepted and approved by all stakeholders. The scope baseline can only be changed through the formal change procedure established for the project.

HOW is the scope baseline determined?

The scope baseline, like other plans, is created according to the method or practice shown in the IPO concept for the development of the project management master plan, that is, through document analysis (SPOR charter, documentation from past projects, and output from other project management activities), research of Enterprise Environmental Factors and Organizational Process Assets, and interviews conducted with experts in scheduling management (SMEs). Specific attention is paid to stakeholder approval for requirements, scope definition, WBS, and its associated dictionary being included showing date of approval and name of approver(s). Specific attention is also paid to including the clear identification of the formal change procedure that must be used.

WHO establishes the scope baseline?

The scope baseline is formally established by all stakeholders.

WHEN is the scope baseline declared as baselined?

The scope baseline is declared as baselined through the acceptance of the status of the scope statement, the WBS, and the WBS dictionary at a certain point in time. This point in time must be before the start of the project.

WHY is a scope baseline needed?

A scope baseline is needed to enable the development of the project schedule and thus the management of the project, and to prohibit scope creep (at least theoretically).

The Scope Management Plan

WHAT is the scope management plan?

The scope management plan is the document that contains the description of how the scope will be defined and developed, how the defined scope will be monitored and controlled, and how the adherence of deliverables to the scope will be verified.

HOW is the scope management plan created?

The scope management plan, like practically all other plans, is created according to the method or practice shown in the IPO concept for the development of the project management master plan, that is, through document analysis (SPOR charter, documentation from past projects, and output from other project management activities, the project management master plan itself), research of Enterprise Environmental Factors and Organizational Process Assets, and interviews conducted with scope management experts (SMEs). The *PMBOK® Guide*'s suggestion for planning the scope management plan is shown in Figure 3-6 in IPO format.

WHO creates the scope management plan?

The scope management plan is created by the project manager, members of the project team, representatives from the stakeholders, experts from functional areas touched by the project, and people with specific scope management expertise and experience.

WHEN is the scope management plan created?

The scope management plan is created in parallel to the project management master plan and must be completed early enough before the start of the project to serve as input to the actual definition of scope and the development of the scope statement.

WHY is a scope management plan needed?

A scope management plan is needed to enable the project manager, the project team, and the stakeholders to arrive at an unambiguous scope definition and statement.

The Stakeholder Management Plan

WHAT is the stakeholder management plan?

The stakeholder management plan is the document that contains the strategies to get and keep project stakeholder involved in the planning, execution, monitoring, and closing throughout the life of the project.

HOW is the stakeholder management plan created?

The stakeholder management plan, like practically all other plans, is created according to the method or practice shown in the IPO concept for the development of the project management master plan, that is, through document analysis (SPOR charter, documentation from past projects, and output from other project management activities, the project management master plan itself), research of Enterprise Environmental Factors and Organizational Process Assets, and interviews conducted with stakeholder management experts (SMEs). Specific attention is paid to the stakeholder register.

WHO creates the stakeholder management plan?

The stakeholder management plan is usually created by the project manager together with project team members and people with expertise and experience in stakeholder management. In practice, it can prove to be useful to individually consult with each functional manager of an organizational unit. This helps in determining which specific human aspects should be taken into account for the various stakeholders.

WHEN is the stakeholder management plan created?

The stakeholder management plan should be created as early as possible, ideally when the development of the SPOR Project Charter is started, but at the latest as the first step in the development of the project management master plan.

WHY is a stakeholder management plan needed?

A stakeholder management plan is needed to find the (hopefully) optimal way to engage the stakeholder specific to the project. The stakeholders are, or must be, involved in every planning and definition step of the project since, in reality, it is "their" project. Failure to properly and sufficiently involve stakeholders has led to severe problems in many projects.

Additional Project Management Documentation

The single point of reference (SPOR) project charter and the project management master plan, along with the detailed project requirements statement, the detailed project scope statement, and the work breakdown structure (WBS) with its associated WBS dictionary are the key project documents. However, as the *PMBOK® Guide* (2013) states, "other project documents are also used" (p. 78). In practice, the folder for a well-documented project stored in the organization's project library can be very large. Unfortunately, very few projects have been well documented in the past. Hopefully, the availability of documentation software and supporting databases will improve the availability and quality of project documentation.

Figure 3-10 provides an overview of some of the other documentation created and used in project management. This overview is a selection only and therefore not a complete reference list. Also, project managers often develop, or have the project team develop, ad hoc documentation that is unique to the project. It is important to define the following for each document:

- Who owns (is responsible for the content of) the document
- Who must review the document
- Who needs to receive a copy of the document
- Who authorizes release of the document for distribution
- Who maintains version control of the document

Figure 3-10 Sample list of project documents (other than project management plans)

Summary

Ned Herrmann's four-brain concept describes the various thinking processes that are employed in and by the human brain when performing an activity or a task. The project management activities described in Sections I, II, III, and IV of this book require and make use of different thinking processes described in the four-brain concept. Understanding the fundamentals in Chapter 1 and developing a SPOR Project Charter, however, require and make use of all four parts of the brain.

Developing a project management master plan and its subsidiary plans is vital for the ability to manage and execute a project. A practical approach to the development of these plans is using some of the 7-Ws interrogatives.

A cost baseline is developed using activity tasks, cost estimates, and contingency reserves and performing aggregation and summation.

There exists a large number of additional project documentation that is needed for the management of a project.

Review Questions

1. How many and which documents form the key project documentation?
2. What are the subsidiary plans of the project management master plan?
3. What is Ned Herrmann's four-brain concept?
4. Which thinking processes of Ned Herrmann's concept are used for the contents of Chapter 1 and Chapter 2?
5. Which activity tasks emphasize the use of the left mode thinking processes of the brain?
6. Which thinking processes do the M&L activity tasks emphasize?
7. Which thinking processes does the section on closing projects emphasize?

4

Project Requirements

α Learning Objectives

Note: To support the learning process and to reinforce the retention of the chapter's content, the learning objectives are not necessarily listed in the sequence of the chapter content.

After having read and comprehended the contents of this chapter, you should be able to:

- Describe how stakeholders can be guided to adapt holistic and critical thinking.
- Describe the way team members approach requirements.
- Describe how to make stakeholders be aware of and understand the terms used in a project.
- Explain the effective and efficient way of gathering requirements.
- Describe the failed completions of projects over the past 20–25 years and suggest reasons for these failures.
- Describe the human rational and emotional components.
- Name the principal elements of a traceability matrix.
- Explain the project manager's responsibility concerning the definition of stakeholder requirements.
- Explain the relationship between business functions, business fields, business environments, and the domain of a project.
- Describe how to ensure that stakeholders truly understand the meaning of the terms used in projects.

- Explain the necessity and the benefits of comprehensive open communication in a project.
- Explain the resultant requirement concept.
- Discuss why it is more correct to say that "people fail, not projects...."
- Explain why project success has not improved over the past 20 or so years.
- Locate the relative nature of holistic scope management in the four quadrants within the analytical/conceptual-organizational/practical coordinate system.
- State the definition of success and failure in the management of projects.
- Explain the stepwise approach to defining unambiguous requirements.
- Discuss why stakeholders are usually unable to precisely express their requirements.

Overview

We took a look at project management fundamentals and the single point of reference (SPOR) charter in Chapters 1 and 2 ("Fundamentals" and "The Project Charter," respectively), and the project management master plan as well as additional documentation in Chapter 3, "Project Management Plans and Documents." In this chapter, we will take a closer look at project requirements, which are a highly critical topic for the mission of a project. Project requirements are determined by the goal, the objectives, and the scope of the project as first defined in the Project Charter and subsequently delineated in the scope statement and the project work breakdown structure (WBS).

When determining the requirements for a project, the entire domain of the project must be considered. Requirements are grouped into several classifications. This chapter addresses the nature of requirements, an approach to viewing requirements, the different requirement classifications, the requirement components, the attributes of requirements, and the approach to collecting, or soliciting, project requirements.

As was evidenced during the creation of the Project Charter and the development of the various project management plans and documents, the requirements of a project can and will arise from any point of the project's domain. It might be helpful in this context to have a conceptual image of the domain of a project as an element of business functions, business fields, and the business environment, as shown in Figure 4-1.

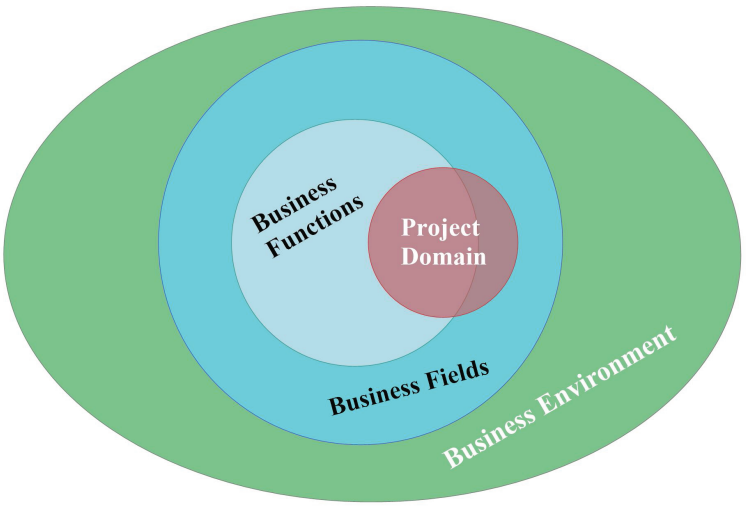


Figure 4-1 Project domain as an element of business functions, business fields, and the business environment

The domain of a project is a subset of the business functions of the organization and the business fields in which the organization conducts its business operations. The business functions and the business fields in turn are embedded in and bounded by the universe of the business environment. The business environment is created by and regulated by governmental legislation, regulations, technology, the economy, customers, partners, existing culture, competitors, and public infrastructure. In addition to these factors, the requirements for a project are also subject to the organizational assets available at the time of the specification of the particular project.

In the *PMBOK® Guide*–Fifth Edition, the knowledge needed to address and manage the project requirements is part of the collective knowledge identified as belonging to the area of work referred

to as project scope management. Figure 4-2 illustrates the organization of the various scope management processes according to the *PMBOK® Guide*–Fifth Edition and where the *Collect requirements process,* identified by an oval, is located in the Project Scope Management Knowledge Area. The Section II and Section III captions refer to the section in this book where the various processes (or activity tasks in the holistic view) are described. For ease of cross-reference, the labels added at the bottom of the rectangles identify the respective Project Management Knowledge Area and the Process Group in the *PMBOK® Guide.*

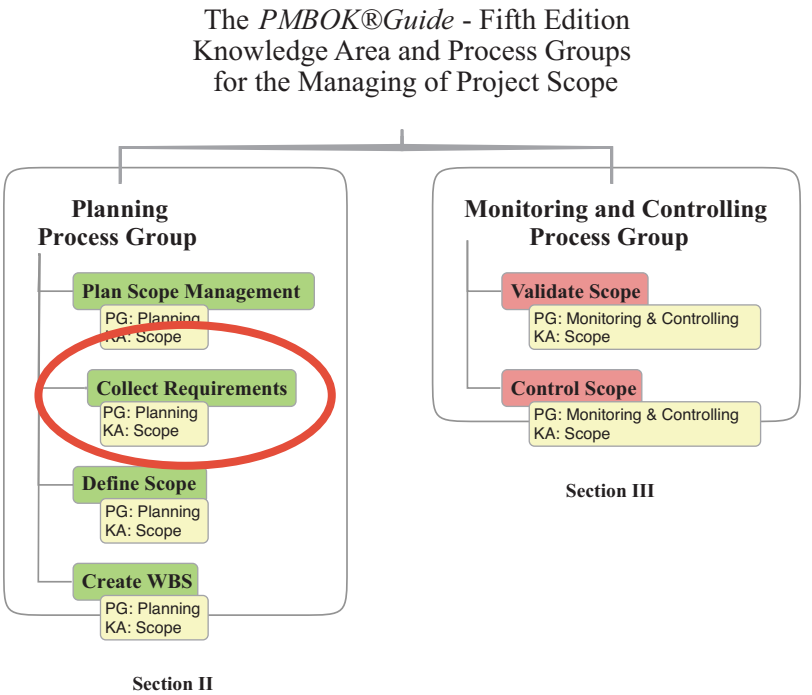


Figure 4-2 Requirements in the *PMBOK® Guide*–Fifth Edition Project Scope Management Knowledge Area

To illustrate both the difference and the similarity between the PMBOK® Scope Management Knowledge Area approach to the management of scope and the holistic view of the project scope management activity, a visual of the latter is shown in Figure 4-3. In both approaches, requirements are explicitly represented. The

PMBOK® Guide addresses requirements as the planning process *Collect requirements*. In the holistic view, requirements are approached through a concept that embraces elements of analytical, conceptual, critical, holistic (of course), and strategic thinking. For ease of cross-reference, the labels added at the bottom of the rectangles identify the respective Project Management Knowledge Area and the Process Group in the *PMBOK® Guide.* The icons have been added as a visual aid.

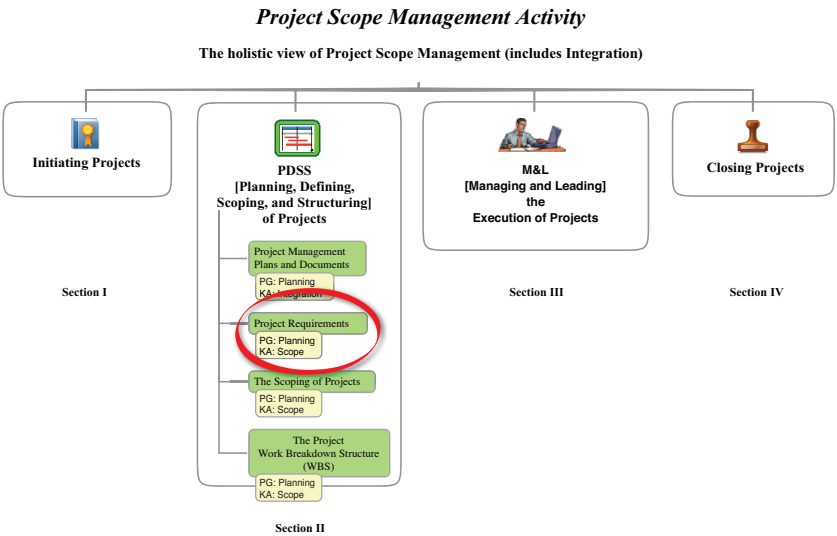
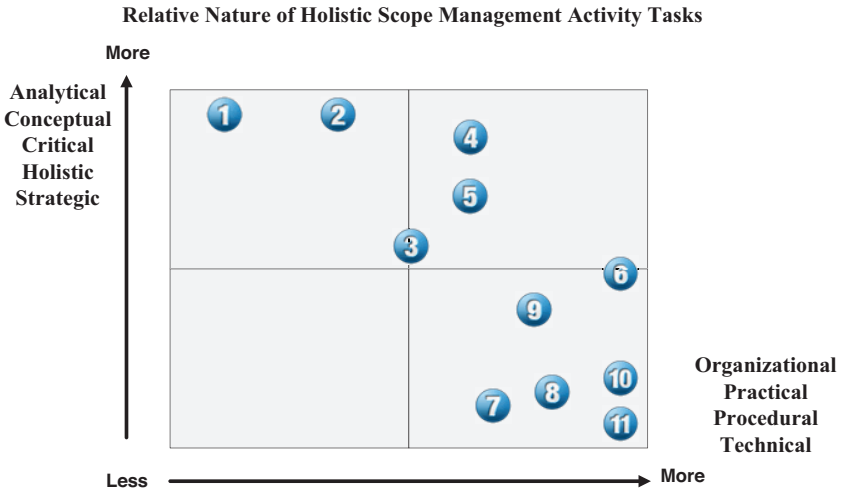


Figure 4-3 Requirements in the holistic view of project scope management activity

At first, this might seem like a moot or even trivial point, but there is significant distinction in the two approaches. The noun process is, as the Latin root of the word reveals, something that proceeds in stages (or steps) and, similarly, the verb *collect* goes back to gather something together. Of course, someone who performs a requirements collection process does think, obviously, during each step of communication with stakeholders. The distinction is that in the holistic concept, the members of the project team approach requirements by thinking first about the nature of requirements, the essence of what constitutes a requirement, and how stakeholders might view requirements. Stakeholders (or *users*) are usually too busy performing their

normal business transactions and do not have time to think about how to express their (new) requirements in precise terms. Using their fundamental understanding of and about requirements and the stakeholders' views, the project team can convey that understanding to the stakeholders. This will make it much easier to communicate and arrive at unambiguous and measurable requirements. Figure 4-4 shows a visual of the relative nature of the holistic scope management activity tasks as addressed in this book.



Legend

1 Fundamentals
2 The Project Charter
3 Project Management Plans and Documents
4 Project Requirements
5 The Scoping of Projects
6 The Project Work Breakdown Structure (WBS)
7 The Directing and Managing of the Work Performed in Projects
8 The Monitoring and Controlling of the Work Performed in Projects
9 The Integrating and Controlling of Changes Occurring in Projects
10 The Controlling and Validating of the Scope of Projects
11 The Closing of a Project or of a Phase

Figure 4-4 The relative nature of holistic scope management activity tasks

Understanding Requirements

What is a requirement? In the broadest sense, a *requirement* can be understood as the expression of a need stated by one or more stakeholders within an organization or as a necessity imposed on an organization by an external force.

The initial expression of a requirement is subjected to several iterations of analysis, rephrasing, evaluation, and critical review before it is finalized in a formal statement. The formal statement is—and it definitely must be to have a chance of successfully delivering the project—accepted and signed off on by the initiating stakeholders. In case of an externally imposed requirement, the formal statement is signed by a representative of the top management of the organization.

If you conduct a search on the Web for "why do projects fail" or "project failures," there is a plethora of responses providing a range of answers based on a multitude of surveys and research papers. These surveys and studies cover a period of over 20 years and companies mostly located in the United States and Europe. The results of the surveys and the findings published in the research papers, the latter conducted by well-known research powerhouses, cannot be directly compared, and much less cumulated. The reason being that there is no common definition of what constitutes failure, what constitutes success, what measurements to apply, and how to apply the measurements. Also, the time point when a project is judged to be a failure is not predetermined and was different in the aforementioned surveys and research papers.

Despite such disparities, there is a common trend in these findings, namely that project failure happens at an undesirable rate. Numbers stated varied between 30 and 70 percent. The reasons given for the failures were varied and very subjective, ranging from lack of management support to lack of time and resources, to lack of user involvement or input, to insufficient or poor planning, to unrealistic expectations, and the like. But there is one common element that always appears in the top five reasons given. This common element is variously stated as incomplete requirements and specifications, lack of clarity of requirements, changes in requirements, or some similar statement. This indicates that the lack of clear, precise, and complete requirements specifications is a major culprit in causing project managers to fail in

delivering a project as originally specified. Or, looking at this from a positive side, clear, precise, and complete requirements specifications are a necessary condition (or requirement) for a project manager to successfully deliver a project as originally specified.

One of the frequently referenced research papers is THE CHAOS report by The Standish Group. This report was first published in 1994. According to this report, on average, only 16.2 percent of the projects are completed on time and on budget, 31.1 percent of projects are canceled before completion, and 52.7 percent of projects cost 189 percent of their original estimates. For larger companies, the report states that only 9 percent of their projects come in on time and on budget. "And, even when these projects are completed, many are no more than a mere shadow of their original specification requirements" (p. 3).

Not a positive picture in 1994. But that was over 20 years ago, so surely, companies and organizations have diligently studied THE CHAOS report (and similar reports from other groups or individuals) and have applied lessons learned since then, right? Wrong! In August 2014, the Project Management Institute (PMI®) released the *2014 Pulse of the Profession® In-Depth Report: Requirements Management—A Core Competency for Project and Program Success.* This report showed that "inaccurate requirements gathering remained a primary cause of project failure (37 percent) in 2014 (up from 32 percent in 2013)." This is in agreement with the findings of other recent studies revealed by the Web search. That raises two questions, why haven't things improved and what is the root cause of inaccurate requirements specifications?

Before answering these questions and taking a closer look at the topic of specifying requirements—the seemingly major culprit causing failure in project management—taking a step back might help to give us a clearer view, sharpen our minds, and enable the critical thinking needed to discern fact from mere excuses. In the 20 or so years spent in project management, I have never seen a project fail or heard of a project failing, I have only seen or heard of project managers who delivered projects in which the goal was not reached and the specified and promised deliverables had not been produced within the constraints defined by the initial project parameters. Yet, as seen

above, many research reports list and describe failed projects. This suggests only one conclusion:

Projects don't fail, people do!

This statement should be a fundamental axiom for all of project management. For the betterment of project management as a business management discipline, there should also be definitions of the terms by which we measure and judge performance of project work. The following is an attempt to provide such definitions, which should be, of course, subjected to critical analysis and, hopefully, improvement:

Success	A project is *successfully* delivered if all goals and all objectives defined in, and all parameter values specified in the officially valid SPOR Project Charter, have been 100 percent reached and 100 percent fulfilled, and all elements of all requirements have been 100 percent satisfied and 100 percent implemented, and no constraints (budget, quality, scope, time) have been transgressed. A Success Check-off List (SCL) must be included in the project documentation library prior to the start of the project (and possibly updated as officially agreed on). Documented final status: Successfully completed.
Incomplete, but accepted	A project is delivered as *incomplete but accepted* if the constraints have been exceeded by not more than budget (5%), quality (0%), scope (0%), time (3%), and all other Success criteria have been fulfilled. Documented final status: Incomplete, but accepted.
Failure	A project is delivered as *failed* if the *success* criteria or the *incomplete, but accepted* criteria do *not* apply. In such a case, either a new project can be initiated using some of applicable parts of the original project or the entire original project as it was stated is abandoned. Documented final status: Failure, abandoned.

Looking at the explanations and reasons given for the failures and in the various research reports, and at the direct or implicit suggestions of what would or could provide improvement, several observations stand out. There is much mentioning of necessary resources, lack of support from above (meaning top management), lack of understanding of scope and/or requirements, heavy use of formalism in processes and reports by project managers, lack of user involvement,

scope creep, variations in mind-sets and attitudes, poor communication, and so on.

What conclusions can be drawn from these observations and from personal experience? Maybe the root cause for failing to successfully deliver projects lies in the project management approach used and also in not looking at projects and stakeholders from a holistic viewpoint. The project management approach currently practiced in many organizations places major emphasis on methodologies (Agile, change management, PRINCE2®, Six Sigma, waterfall, just to name a few), procedures, processes, and tools. This is good, useful, and, of course, necessary for the organizational, practical, procedural, and technical aspects of a project. Project managers and team members need to be proficient in such craftsmanship. For the purpose of developing and maintaining this craftsmanship, a collection of standard tools and techniques, such as the *PMBOK® Guide*, has amply proven its usefulness. However, craftsmanship supports only one-fourth of the entire project management range; three-fourths are not used or maybe even unknown to exist.

Methodologies, procedures, processes, and tools address and foster use of only 25 percent of what is available, and very much necessary as the large number of project delivery failures demonstrates, to manage projects (or any human endeavor) from start to successful delivery. The 25 percent refers to the structure- and form-oriented thinking processes activated in and by the human brain as described by Ned Herrmann in his whole-brain, or four-brain, concept (see Figure 3-2 in Chapter 3). The structure- and form-oriented thinking processes are detailed, organized, planned, and sequential processes.

Projects are implemented for people and project work is performed by people. Whenever people are involved, personal emotions play a deceiving role. But little attention, if any at all, is paid to the human psyche during the management of a project. Instead, more checklists, forms, methodologies, procedures, tools, and the like have been and are still being introduced, with the effect that people, stakeholders, and team members alike become tired or complacent and just "make their check mark" without critically thinking about the item under consideration.

The lack of getting actively, emotionally, and intellectually involved becomes painfully apparent during the attempts to specify

stakeholder requirements. One side becomes terribly annoyed; the other side gets close to a boiling point. This is nicely represented in cartoon graphics when the characters have a heated conversation. Since the introduction of more tools had not brought about any improvements, but rather had an adverse effect, it is time to concentrate on the human side. This means to involve the other three-fourth of the human brain, namely communication (feeling), logic (facts), and vision (future). According to Ned Herrmann, the communication-oriented part of the brain activates emotional, feeling-based, interpersonal, and kinesthetic thinking processes. The logic-oriented part of the brain activates analytical, fact-based, logical, and quantitative thinking processes. And, finally, the vision-oriented part of the brain activates holistic, integrating, intuitive, and synthesizing thinking processes.

We now have arrived at the answers to our two earlier questions, why haven't things improved and what is the root cause of inaccurate requirements specifications? The answer to the first question is, as described above, because project management focuses on policies, procedures, and tools and techniques instead of involving the human side. The answer to the second question is also that the human side—specifically the benefit of holistic thinking (and critical thinking) by all parties involved in the project—has been and still is being ignored.

What can be done to improve the situation and move project management from lingering in the valley of failed deliveries to the ascension of the peak of successes? The solution consists of two parts. For the first part, the project manager must assume responsibility and demonstrate leadership. For the second part, the project manager must practice an all-embracing and completely open style of communication. This communication must be ongoing, must be multifaceted, and must include frequent informal and personal conversations alongside the standard communication media like email, phone, instant messaging, and so on.

In particular, it is the project manager's responsibility to ensure that (a) every stakeholder becomes aware of and knows every and all terms used in the project; (b) that every stakeholder truly does understand what each term actually means in the context of the project; (c) that project work is conducted by all participants on the basis of a comprehensive open communication; and (d) that holistic thinking

(including critical thinking) will be a common practice among all project stakeholders. On the basis of these premises, the probability will be very high that the project manager can successfully deliver the project. A proposal for the approach a project manager could take to provide the information and knowledge described in points (a) through (d) follows next.

Solution Point (a): Definition of Project Terms

Perform the following steps to create a table of definitions of the terms used in *this* project:

- Use an existing glossary or a table of definitions of project terms from the project library. The organization might already have a master table of definitions; if not, this is a good time to start such a table (which will also start your reputation as a competent project manager). A master table of definitions of project terms contains all the terms that were used and defined in all the projects ever started in the organization, regardless of their final documented status.
- Delete the terms that you know (at this time) will not be used in this project. Effectiveness (doing the right thing) and efficiency (doing the thing right) are major contributors to project quality.
- Add new terms to the table of definitions as they come into use in the project.
- Ensure that every stakeholder has any-time access to the table.

If the organization does not have a project library, start one! It is not necessary to have a document management system in place. A designated folder is a good start. It is important that the table of definitions is complete from the start of the project and is kept up to date on a real-time basis. For example, if a new term comes into use at a meeting, the definition of the term should be added to the table immediately after the meeting and be available to all stakeholders (who are automatically notified of the update of the table) within 15 minutes. Stakeholders must have confidence that the table is always up to date. If they do not have this confidence, they will not use the table and thus they will not fully understand the meaning and use

of some terms. As a consequence, stakeholders might not be able to correctly specify potential needs or judge the value or significance of the results of an analysis that had been conducted on some topic or issue and is presented in a meeting or through some other form of communication. This lack of understanding quickly propagates negatively throughout the project, providing another nail for the project's (potential) coffin.

Is requiring a real-time table of the definitions and descriptions of all terms used in a project really necessary and useful? Or is it just another example of a project manager being a stickler for documentation detail? A costly real-life case study provides a clear answer. In 1999, the *Mars Climate Orbiter* approached Mars and $655 million total project costs burned when the spacecraft disintegrated in Mars's atmosphere. What was the root cause? The computer program calculated an incorrect trajectory. What was the reason for this programming error? The "ground-based computer software [which] produced output in non-SI units of pound-seconds (lbf×s) instead of the metric units of newton-seconds (N×s) specified in the contract between NASA and Lockheed" (http://en.wikipedia.org/wiki/Mars_Climate_Orbiter). It appears that a real-time table of definitions and descriptions of all terms used in the project was not used in the project or, if there was such a table, the project manager had not communicated the "must-use" of that table with sufficient intensity and force.

Solution Point (b): Understanding Each Project Term

The need for the projectwide understanding of each project term constitutes a big challenge for a project manager. There are several steps that a project manager and the project team must undertake once the table of the definition of all project terms has been finalized (up to that time point). One important psychological aspect the project manager and the project team need to pay special attention to is: The transfer of knowledge to create full understanding of the project terms must not be conducted with a classical "teacher-in-front-of-an-unknowing-audience" attitude. Rather, the transfer should be achieved through an all-in team participation with a low-key guidance by a facilitator. The steps for the transfer are as follows:

1. First, the project manager and the project team must make sure that they understand the meaning and the implication of every project term.
2. Next, they must create the appropriate transfer material and establish the approaches how to convey the meaning and the implication of every project term to each and every one of the stakeholders. Different stakeholders will best be served by an approach that builds on their individual listening and learning styles and that softens and compensates their individual weaknesses.
3. Then, the project manager must obtain top-management support for scheduling knowledge transfer days that are close to the start of the project and also obtain top-management enforcement that training attendance is compulsory for all stakeholders. If top management appears to be reluctant, it might be a good idea to point to the case of the *Mars Climate Orbiter* crash.
4. At this point, the knowledge transfer sessions can begin.
5. After completion of the transfer sessions, the project manager definitely should publish to all stakeholders and to top management a knowledge transfer completion report containing at least the following:

    a. What knowledge was transferred.
    b. When the knowledge was transferred.
    c. To whom the knowledge was transferred.
    d. Who transferred the knowledge.
    e. Why the knowledge was transferred.
    f. Where the transfer took place.
    g. How the knowledge was transferred.
    h. By what means the knowledge was transferred. (This might be included in the "How.")

The knowledge transfer session should help to create a sense of project unity and provide a feeling of comfort or "we are all on the same knowledge level," thus avoiding the withdrawal reactions caused by the fear of exposing one's possible lack of knowledge or

understanding. Likewise, the little battles of one-upmanship should be reduced or not happen at all.

The knowledge transfer completion report serves four purposes: (1) It documents the attendance of and for each stakeholder, (2) it provides a subject matter reference for each attendee, (3) it constitutes an important part of the overall project documentation, and (4) if well-written, it should reinforce the team spirit developed during the knowledge transfer sessions. An example of knowledge transfer material is provided next using the term *requirement.*

Example: Explaining the Meaning of the Term Requirement

In the many reports about failed projects, the term *requirements,* variously described as incomplete, inconsistent, poorly defined, and so forth, is listed among the top three to five reasons. This raises the question: Did the project stakeholders truly understand what a requirement is and was there an understanding common to all stakeholders? It appears not. The following is an attempt to get to the core meaning of the term *requirement.*

When a requirement is stated by a stakeholder, it is almost always a "raw" statement, that is, the requirement is stated in English prose (or in the language spoken in the country where the organization is located). It is described as the stakeholder currently perceives the need that gave birth to the requirement. A detailed analysis of that requirement—to determine the input it requires; the interfaces it has and creates; the exact output it will deliver; the type, amount, and time it requires for implementation—has not yet been performed. In other words, the exact core requirement is not yet known. That is not a negative, but just normal. Organizations have analysts, developers, subject matter experts, and project managers who will examine the need, arrive at the core requirement, and provide the required deliverable.

As mentioned previously, to be successful, all stakeholders, which always includes the project team, must have a common understanding of what they are talking about. When a need is first stated as a raw requirement, it can be visualized as shown in Figure 4-5.

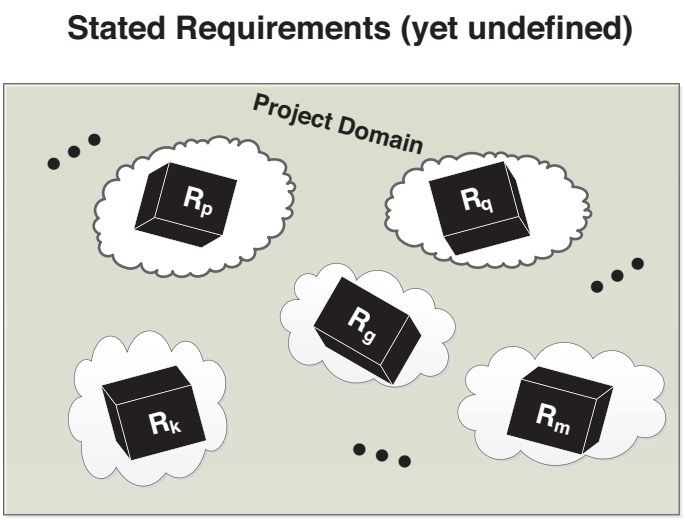


Figure 4-5 Stated requirements still in the "raw"

Many times, the nontechnical stakeholders will not be aware of the fact that their clear need or requirement is actually still a black box floating peacefully in a cloud of unnecessary or distracting data or information elements. The knowledge transfer team has to diplomatically convince the stakeholder that this is indeed the case. A visual like Figure 4-5 might help. As is well known, a picture says more than a thousand words.

Once the stakeholders have understood and accepted that their so obviously clearly stated requirement is nothing more than one of the boxes in the above visual, the project team and the stakeholders can get together and jointly dive into the cloud in search of the true core requirement. This will always take several iterations of asking themselves and each other questions based on the 7-Ws and using the Socratic method. The stronger the feeling of being one team in an all-in open environment, the more productive these search-and-find sessions will be. Taking a normal office room and converting it into a comfortable (*gemütliche*) coffee lounge for all project participants has also proven to be a contributing success factor in medium to large projects. The iterations to find the core requirements are visually represented in Figure 4-6.

Stepwise Approach to Definition of Unique and Unambiguous Requirements

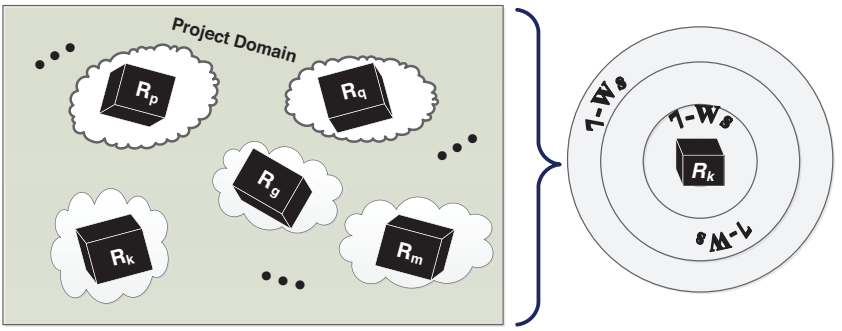


Figure 4-6 Iterative approach to finding the core requirement of a stated requirement

The core of every requirement, once found, must be unambiguously documented specifying all input(s), the output(s) produced by it, and the interface(s) it has with other requirements. This document must be "signed-off on" by all stakeholders relevant for that particular requirement. An example is shown in Figure 4-7.

Unambiguously Defined Requirements with Matching Interfaces

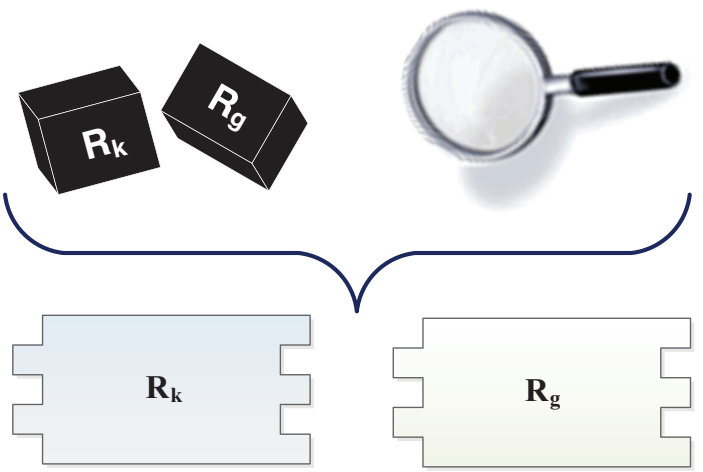


Figure 4-7 Example of two core requirements and their interfaces to each other

As stated before, the project manager must make sure that all stakeholders truly understand the iterative approach necessary to arrive at the core requirement that is at the bottom of the stated requirement. This approach has worked every time when it was applied in different organizations and in different countries. It works because it is based on cooperation, mutual respect, and patience. This is one case where patience speeds up progress after an initial slowdown and, at the end of the project, has shortened the overall elapsed time. This knowledge and the awareness thereof must be transferred to all stakeholders through and during the knowledge transfer sessions.

But, after the core requirement of every stated requirement has been defogged from its surrounding cloud, the analytical work is not over yet. One summary objective on the way to reach the project goal is to be effective and efficient while ensuring quality. Requirements are stated by different stakeholders from their own specific viewpoint. In most organizations, requirements can be classified according to their sources as user requirements, business requirements, and technological requirements. These three groups of requirements can, and usually do, contain requirements that partially overlap. Practice has shown that it is more effective to analyze commonalities before the start of implementation and find a single compound requirement for each possible triple requirement from the three groups. Borrowing a term from our school days, the single compound requirement can be referred to as the resultant requirement. A visual of this concept is shown in Figure 4-8.

As an example, consider a project with five business requirements (B1, B2, B3, B4, B5), three user requirements (U1, U2, U3), and two technological requirements (T1, T2). When the team starts to work on the requirements, some of the work will have been assigned so that a number of people can work in parallel, depending on the available resources, and some of the work must be done sequentially due to the nature of the requirement. Work in this context could be design, coding, or some other form of implementing a requirement. After some time, the team will try to have the thus far implemented pieces of their respective assignments work together. That's when the trouble usually begins. Business requirement 4 does not properly work with user requirement 2, and so on. And now, team members and stakeholders

will spend many nonproductive hours in a perceived endless number of meetings. Sooner or later, the nontechnical stakeholders will throw in the "internal towel" and morph into check box signers, while the project is headed toward the infamous valley mentioned earlier.

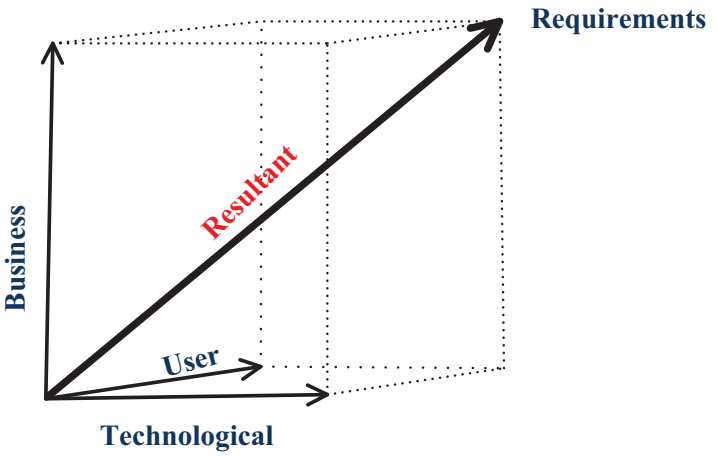


Figure 4-8 Resultant requirement from three different requirements

The solution to avoid this undesirable fate is to spend time before starting any implementation to arrive at the resultant requirements for each possible triple. Then, the implementers need only ensure correct interaction between the single requirement resultants. The first step should be to analyze if there are internal conflicts within the business requirements, within the user requirements, and within the technological requirements, and, if so, proceed to resolve these jointly with the relevant stakeholders. The next step would be to find the resultants. For the aforementioned example, there would be 30 requirement resultants. To arrive at the resultants, the project team (analysts, implementers, testers) would meet with the relevant stakeholders, analogously to the (productive) sessions in which the core requirements were defined. To start, the project team needs to document all possible outcomes of combining the requirements from the three groups. The outcomes can be documented as a table or as a tree (as it is done during risk analysis to arrive at a decision table or a decision tree). For the example from above, the decision tree (in table

form to fit on one page) is shown in Table 4-1. The column headings indicate the IDs of the resultants (with the elements shown in the rows).

Table 4-1 Example of a Decision Tree for the Resultants of Requirement Triples

R1,..., R6	R7, ... , R12	R13, ... , R18	R19, ..., R24	R25, ..., R30
B1 — U1 — T1	B2 — U1 — T1	B3 — U1 — T1	B4 — U1 — T1	B5 — U1 — T1
B1 — U1 — T2	B2 — U1 — T2	B3 — U1 — T2	B4 — U1 — T2	B5 — U1 — T2
B1 — U2 — T1	B2 — U2 — T1	B3 — U2 — T1	B4 — U2 — T1	B5 — U2 — T1
B1 — U2 — T2	B2 — U2 — T2	B3 — U2 — T2	B4 — U2 — T2	B5 — U2 — T2
B1 — U3 — T1	B2 — U3 — T1	B3 — U3 — T1	B4 — U3 — T1	B5 — U3 — T1
B1 — U3 — T2	B2 — U3 — T2	B3 — U3 — T2	B4 — U3 — T2	B5 — U3 — T2

Once the resultants are identified, the project team and the stakeholders relevant to the respective resultants can proceed to simplify each resultant. At first glance, it might look like no simplifications can be made. However, experience shows that careful scrutiny of the elements of each of the three constituent requirements, when considered in unison, does reveal opportunities for simplification. Often the distinction between some elements lies only in the wording, in cases of descriptive requirements, or in the ordering, in cases of measurable requirements. In either case, a useful practical approach is to write down each element so it can be treated as an object and easily moved around. This is the same principle as brainstorming except only the existing elements are recorded, no new ideas. An efficient medium for this is the brainstorming feature offered by some mind mapping software products. Sticky notes can be used in the same way, but their use is obviously not as efficient as the use of software. Whatever the medium, juxtaposing similar-looking objects visually reveals similarity not noticed before. Using the newly discovered similarities, the project team and the stakeholders can formulate simplified elements for a resultant. At the end, it might even turn out that some resultants are congruent and one resultant requirement can be used instead of two.

Such simplifications not only make the implementation much easier and faster, but they also make change management easier should there be a necessity to incorporate changes to some requirements. As technically easy and efficient as the described procedure is, it poses a

big challenge to the leadership competence of the project manager. People, and especially stakeholders and top management, are always impatient and to them, the above procedure might seem to take too long. The project manager must convince everyone of the medium- to long-range (in the project life) benefit of the way used to arrive at unambiguous and relatively easily implementable and changeable requirements. Figure 4-9 shows a visual of how changes would be handled. For example, if there is a change to user requirements, the change would be incorporated into an existing related resultant, or, a new resultant might need to be formed from the change requirement and the related existing resultant. If there are significant changes, it is probably best to create a new project.

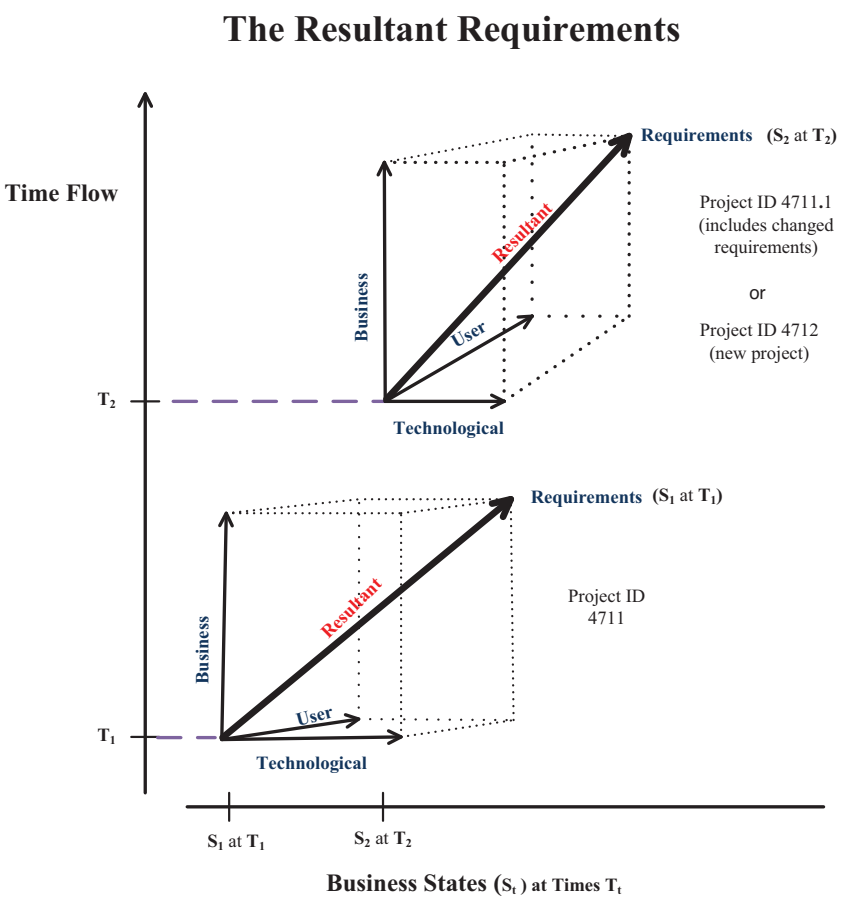


Figure 4-9 Incorporating changes to requirements

Solution Point (c): Comprehensive Open Communication

Comprehensive and open communication is one of the critical project success factors. Consequently, the project manager must continuously practice open communication and continuously monitor that everyone else involved in the project likewise practices open communication. Humans think and communicate according to several modes. The rational and emotional components of human modes of thinking are shown in Figure 4-10 (based on Ned Herrmann).

Human Rational and Emotional Components

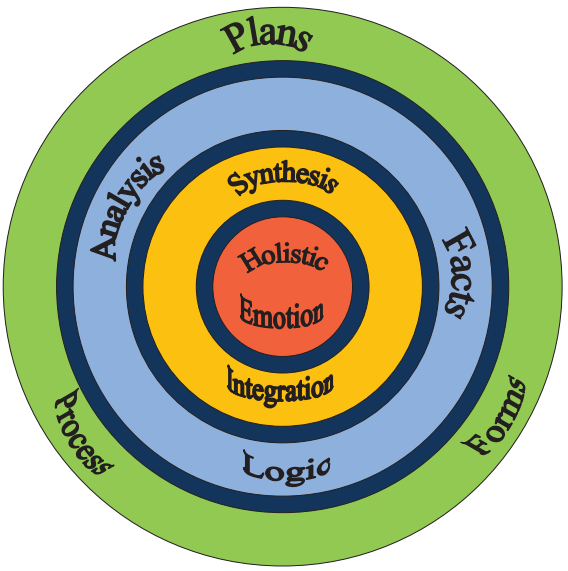


Figure 4-10 Rational and emotional components of human thinking

It is human nature to instinctively protect one's emotion and one's true thoughts. Emotions can be viewed as being located at the center of a person's state of being, enclosed by several layers of protective rational thinking, as shown in Figure 4-10. Routine project work usually takes place in the outermost (light green) ring where people deal with forms and perform processes, that is, sequences of steps, all according to some given plan. In many projects, this is the area (and probably the only one) where stakeholders and the project

team communicate. When subject matter experts (SMEs) are consulted, part of the project team and (maybe) a few stakeholders enter the layer of facts, analysis, and logic (second ring from the outside). Often, stakeholders withdraw with comments like "I'll leave that to you technical people to work out." This is, of course, a self-protection move in a nonopen communication environment.

In projects with standard workplace communication, attempts to enter the area of synthesis and integration (second ring from the inside) are made only very seldom and then usually by an optimistic project manager or project team member. The core layer of holistic thinking and emotions remains closed, except for a brief flash when tempers flare in a critical meeting toward the expected date of completion.

Contrasting the experience from successfully completed projects against the research report of failures, with no apparent improvement over the past 20 or so years, the behavior pattern described above could be one, if not the major, reason for failing to deliver successful projects and for the absence of improvement. In project management, lessons have not and still are not being learned. What can be done? Improvements involving human nature cannot be ordered, but must be presented, fostered, and constantly encouraged by lived examples. Creating an environment of open communication is THE challenge for leadership of a project manager.

Psychology sees communication as a collection of processes by which participants seek to influence one another. In essence, this is the original purpose of project meetings. Participants know this, at least subconsciously, and therefore assume a defensive position from the start. The project manager must provide leadership to bring people to consider these defenses unnecessary. The project manager can achieve this by only using language that has true significance. Karl Jaspers (1999) points out that a language, when used without true significance, loses its purpose as a means of communication and becomes an end in itself.

Open communication must address and involve the emotional side of every person involved in the project. It is a known fact that perception changes information in the mind of a person. One of the things that is counterproductive to open communication is when participants perceive communication in the project as mere transportation

of data. People have different levels of abstraction; therefore, it is important that after each communication (meeting or one-on-one), the key words are documented and provided to the participant(s) and, unless the communication was strictly personal, to all project stakeholders. Again, the project manager's leadership competence is challenged to ensure that this happens. Open communication is achieved when participants feel comfortable to express sentiments and opinions along with facts.

One important point to keep in mind when providing leadership to foster open communication, holistic thinking, and critical thinking: The project manager should not try to manage people, but rather try to manage or at least influence the system that people work in. It is the system that constrains or encourages the individual person.

Solution Point (d): Stakeholder Holistic and Critical Thinking

It is an extremely challenging task for the project manager to bring out holistic and critical thinking in all participants. But the rewards are reaped during the collection and definition of requirements. An approach that promises to bring about success early on in the project is the following.

The project manager gives a presentation shortly before the start of the project. In this presentation, the project manager explains the differences between linear thinking, concentration, on a singular topic, and holistic and critical thinking. Showing visuals of Ned Herrmann's concepts will help in the explanation. Additionally, it will be helpful to present examples of how holistic and critical thinking simplified the gathering and specification of requirements and at the same time improved the quality of the specifications, resulting in stakeholders' requirements being implemented not only as requested and needed but also on schedule or even earlier. The success of this pep talk will depend to a large extent not only on the project manager's didactic skills, but also on how convincingly the enthusiasm for holistic and critical thinking comes across. Again, success hinges on the power of communication. Figure 4-11 shows that communication can bridge the different layers of human thinking all the way to the emotion component and the holistic component at the center.

Human Rational and Emotional Components

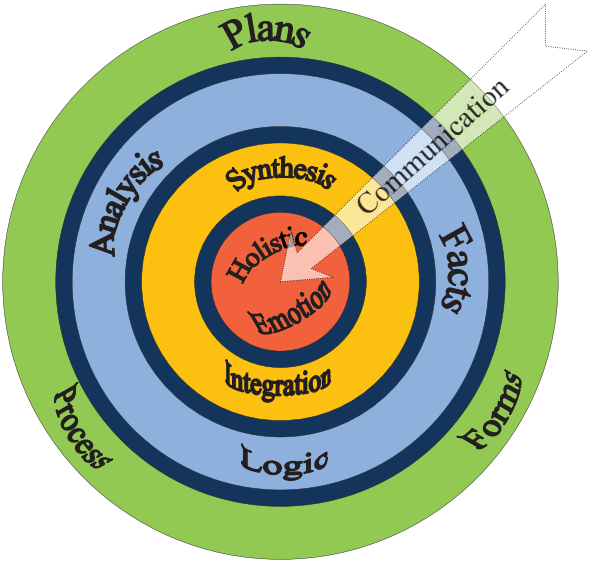


Figure 4-11 Communication bridges the layers of human thinking to reach the core

Requirement Classification and Traceability

Requirements are usually categorized as follows (in alphabetic order):

- Business requirements
- Contractual requirements
- Functional requirements
- Nonfunctional requirements
- Operational requirements
- Performance requirements
- Project requirements (one of which is the Project Review Board)
- Technological (HW, SW, infrastructure) requirements
- User requirements

While it seems useful to have a category for every kind of possible need, a word of caution is in order. Careful discretion must be exercised to avoid that more time and resources are spent on maintaining requirement classifications than on identifying, specifying, and implementing core requirements that actually contribute to the success of the organization.

Requirements Traceability Matrix

A common practice to trace requirements is to create a requirements traceability matrix. Every unambiguously defined requirement is identified by a unique identifier (ID) and various business parameters are interconnected with this identifier, for example, business goals, needs, objectives, opportunities, scope, test scenarios.

A search on the Web results in many links to Web sites that offer templates of requirements traceability matrices (RTMs). Many of these RTMs templates are implemented as spreadsheets with large numbers of columns. Such RTMs soon become unwieldy by sheer size and maintaining the matrix ends up being a full-time job or even position. Here, too, like often in life, less is more. From a practical point of view, it is more efficient to use only a few columns in the RTM and establish links to an object or relational database or mind maps. For example, do not use a cost column in the RTM to track the cost of a requirement, but rather link the requirement's ID to a cost database.

The following is a suggestion of an RTM with a small, but sufficient number of columns, yet providing many interconnections. The project manager and stakeholder should decide together how many and which columns they want to use. Ease of use and maintainability should be an important decision criterion. One suggestion for columns to use is:

1. Requirement-ID
2. Description
3. Owner ID (from Stakeholder Register [DB])
4. Requester ID (from Stakeholder Register [DB])

5. Business objective ID
6. Project objective ID
7. Input from ID
8. Output to ID
9. Element of [child of] ID
10. Container of (= super set to) [parent to] ID
11. Master Table ID (for this requirement)

Each ID constitutes a link. The headings of columns 1 through 10 should be self-explanatory. Column 11 provides the high flexibility that allows the use of the small number of columns. The master table is a table of links to databases or other tables where data relevant for this requirement ID can be found. If data in one of the other location changes, the requirements traceability matrix does not need to be updated. The links in the master table ensure that the most current data pertaining to this requirement ID can always be accessed. The following is a partial list of databases or tables for which links could be stored:

- Constraints DB
- Cost DB
- DB of test results
- Metrics DB (how this requirement is measured)
- Product design DB (if appropriate)
- Resource DB
- Risk DB
- Schedule DB
- Test cases, scenarios, and scripts
- WBS

Collecting and Documenting Requirements

Efficient and effective gathering and specification of requirements builds on a foundation of:

- Communication
- Definition and understanding of all terms
- Holistic and critical thinking

The quality of the gathering and specifying of requirements in turn is heavily influenced by the leadership competence of the project manager, as addressed earlier in this chapter. A proven way to proceed with the actual gathering and specification is to follow the Socratic method and to iteratively use the 7-W interrogatives either directly or in a diplomatic wrapping if the direct question would be perceived as harsh or even aggressive by some stakeholders. An enumeration of points to consider and address as well as some direct questions to ask follows next.

Some of the points to consider when gathering requirements are (in random order):

- Use a stepwise approach as illustrated earlier (the cloud example).
- Obtain agreement on what constitutes completion (i.e., all requirements are fully documented).
- Practice object-oriented thinking (i.e., avoid looking at details too early).
- All requirements are out in the open (i.e., there are no hidden requirements).
- Stay away from the *how* until all requirements are unambiguously defined.
- Weight requirements only after all requirements are unambiguously defined.
- Make sure all stakeholders are represented.
- If top management has set priorities, be sure that they are clearly stated and are accepted by all stakeholders.

- Consider each core requirement to be a stand-alone object, and then define input, output, and interface. Sometimes a requirement object does not interface directly with another requirement object, but does influence that object indirectly. Point to such a case, if it exists.
- Some stakeholders present a solution statement instead of a requirement statement. Differentiate between the two.

Requirements of Requirements

Requirements themselves are subject to quality requirements. Requirements that requirements must satisfy are usually listed as requirements that must be:

- Changeable with relative ease
- Clearly associated to a defined purpose
- Easily identifiable as a requirement at all times
- Signed off on by all stakeholders
- Traceable (backward, forward, to interfaces)
- Unambiguously identified
- Understood and accepted by stakeholders

The approach to gather and specify requirements described earlier in this chapter consists of three simple principles, which are practiced open and comprehensive communication, the definition and understanding (by all stakeholders) of all terms, and practiced holistic and critical thinking by all stakeholders. Communication is practiced through frequent, direct, face-to-face contact between all stakeholders.

The *PMBOK® Guide*–Fifth Edition describes an approach to collecting requirements by listing tools and techniques that are standard practice. The input, the output, and the list of tools described in the *PMBOK® Guide* are visually shown in Figure 4-12.

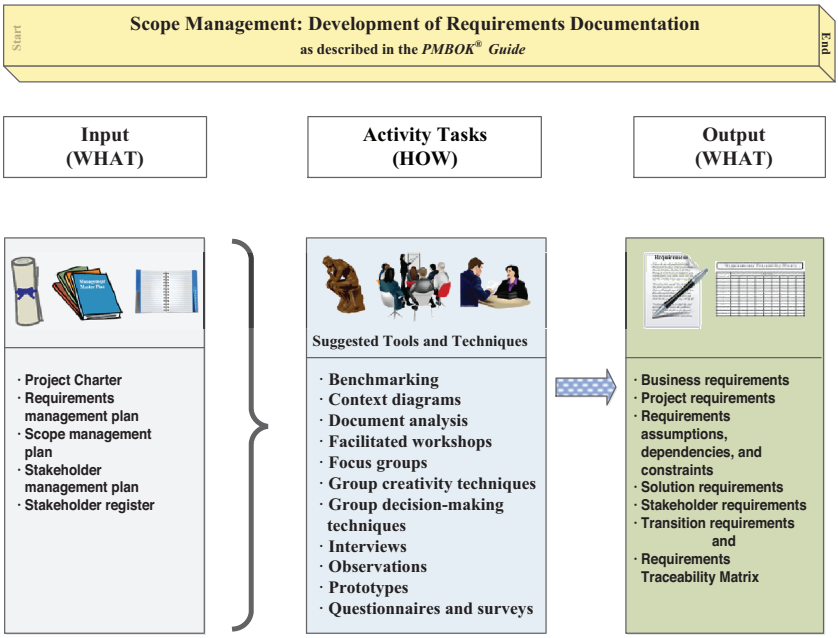


Figure 4-12 Development of requirements documentation based on the best practice standard as described in the *PMBOK® Guide*–Fifth Edition

Summary

The entire domain of a project must be considered to correctly determine requirements. Requirements are grouped into several classifications.

The *PMBOK® Guide* addresses requirements as the planning process *Collect requirements*. In the holistic view, requirements are approached through a concept that embraces elements of analytical, conceptual, critical, and holistic and strategic thinking. The distinction is that in the holistic concept, the members of the project team approach requirements by thinking first about the nature of requirements, the essence of what constitutes a requirement, and how stakeholders might view requirements.

There has been practically no improvement over the past 20 years in the number of projects considered to be failures. Projects don't fail, people do! The outcomes of projects can be classified as *success*, *failure,* or *incomplete, but accepted.*

Little attention, if any at all, is paid to the human psyche during the management of a project. Instead, more checklists, forms, methodologies, procedures, tools, and the like have been and are still being introduced.

There is a lack of getting stakeholders actively, emotionally, and intellectually involved in the specification of requirements. To solve this problem, the project manager must assume responsibility and demonstrate leadership and the project manager must practice an all-embracing and completely open style of communication.

All terms used in a project must be defined in collaboration with stakeholders. It must be verified that all stakeholders really understand the meaning and implication of each term. The project manager must ensure that comprehensive open communication is practiced by everybody involved in the project. Stakeholders must be guided to and encouraged to use holistic and critical thinking.

Requirements must be unambiguously defined and satisfy the quality requirement of requirements.

Review Questions

1. How can you ensure that agreed-upon requirements remain agreed upon?
2. What are the common categories of requirements?
3. What are the most practical categories of requirements?
4. What are the requirements of requirements?
5. What is the common element in the top five reasons given for failed deliveries of projects?
6. What is the difference between the PMBOK® and the holistic view approaches to collect requirements?
7. What is the original purpose of project meetings?
8. When is a project considered to be incomplete but accepted?

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5

The Scoping of Projects

α Learning Objectives

Note: To support the learning process and to reinforce the retention of the chapter's content, the learning objectives are not necessarily listed in the sequence of the chapter content.

After having read and comprehended the contents of this chapter, you should be able to:

- State where the scope of a project is defined in the holistic view of managing projects and why this is the case.
- Describe what a supplement scope statement is.

Overview

The definition of the scope of a project is crucial for the success or failure of that project. Even the best project manager will have extreme difficulty to complete a project for which the scope had not been unambiguously defined before the start of the project. Most likely he or she will not succeed at all.

The reason for that difficulty is obvious by any commonsense standard: "If you don't know the target, you can't find the way," a wisdom that used to be taught to hopeful project managers before the center of attention in project management shifted to the embracement of silver-bullet tools and methods. Looking at the low number of projects brought to a successful end by their respective project managers or at the complement, the high number of projects not brought to

a successful end, there might be a solid justification for speaking of scope crisis in the art and science of project management.

The *PMBOK® Guide* attempts to help project managers avoid a scope crisis by describing a process to define the scope of a project. This process, naturally, is part of the PMBOK® Scope Management Knowledge Area, as shown in Figure 5-1. The *Plan scope management* process is addressed in Chapter 3, "Project Management Plans and Documents."

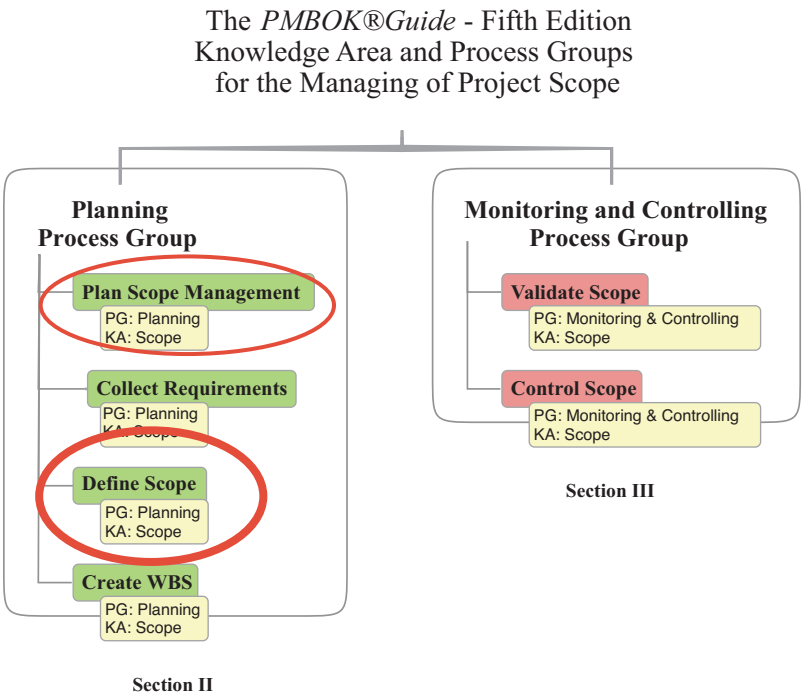

Figure 5-1 The *Define Scope* process in the *PMBOK® Guide* Scope Management Knowledge Area

The PMBOK® Process *Define Scope*

The *PMBOK® Guide* also provides a list of inputs to the process, a list of outputs from the process, and a list of tools and techniques that are commonly used by practitioners of project management for this process and thus have been established as practical standards. The

inputs, outputs, and tools and techniques for the process are shown in Figure 5-2 in the IPO format. The icons have been added as a visual aid.

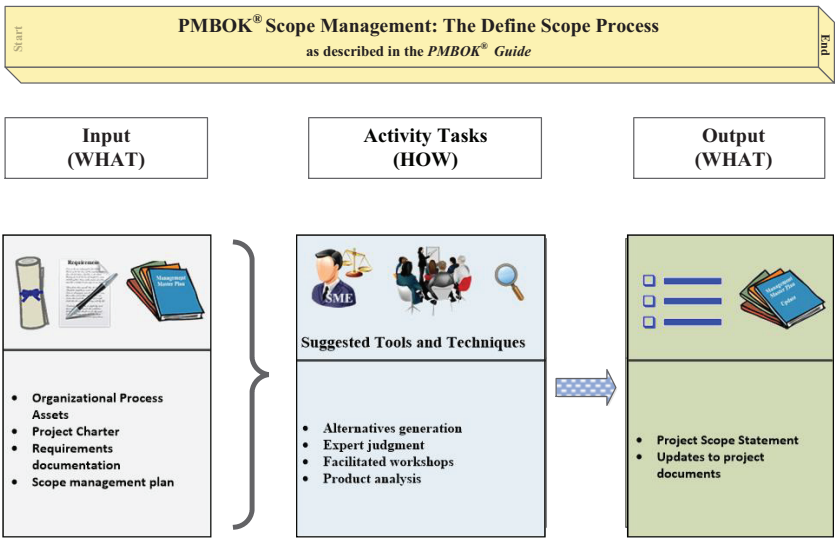

Figure 5-2 The inputs, outputs, and tools and techniques for the *Define Scope* process as described in the *PMBOK® Guide*

The Holistic View of the Scoping of Projects

In the holistic view of managing projects, the scope of a project is defined in the single point of reference (SPOR) Project Charter before the start of project execution. The SPOR charter is described in Chapter 2, "The Project Charter."

After the project has started, there still will be some need for scoping of detailed project work. But this scoping occurs strictly within the boundary of the overall project scope, as defined in the SPOR charter. This kind of scope detailing is comparable to the detailing of what is inside the black box in object-oriented software development. The levels of needed scoping granularity can vary from work element to work element in a project. In the holistic view, this detailed scoping is part of the planning, defining, scoping, and structuring (PDSS) task of the holistic project scope management activity, as shown in Figure

5-3. The results of the detailed scoping (which of course must always be accomplished jointly with the stakeholders relevant to the detail area) must be documented in a scope statement. There will then be a number of supplement scope statements, each addressing a small area. These scope statements must be uniquely identified (ID number and descriptive name) and linked to one or more work breakdown structure (WBS) components as appropriate. They are input to the work package performance description.

The project scope management activity is visually represented in Figure 5-3. The key differences to the PMBOK® approach are that the PMBOK® integration processes are, by definition, an integral part of the holistic scope management and that the project scope is unambiguously defined in the SPOR Project Charter. The holistic subtask *The scoping of projects,* identified by an oval in the figure, addresses the creation of supplement scope statements by detailing a defined scope element within the bounds of the SPOR definition. Such detailing occurs sometimes during project execution and serves to improve understandability without changing the boundary of the black box (the defined SPOR element).

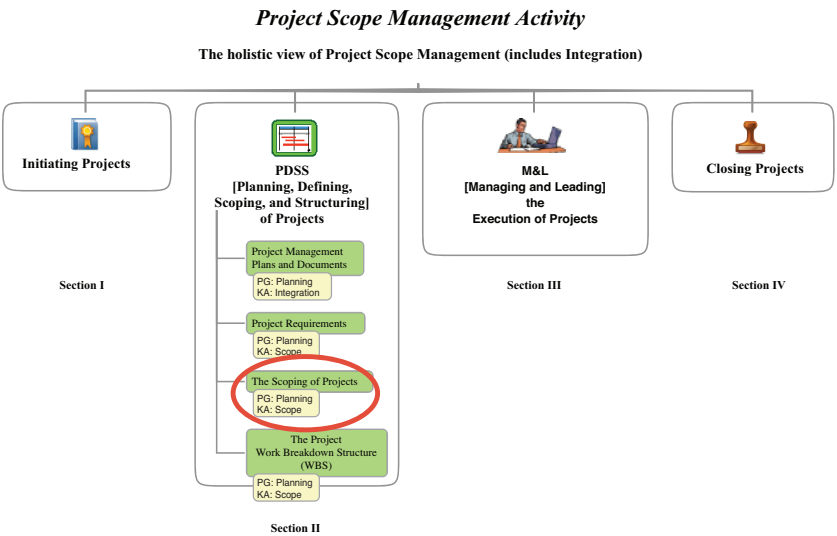

Figure 5-3 The scoping of projects in the holistic view of scope management

For ease of cross-reference, the labels added at the bottom of the rectangles identify the respective Project Management Knowledge Area, which in this case is Scope Management, and the Process Group in the *PMBOK® Guide.* The icons have been added as a visual aid.

The inputs and the outputs listed in the *PMBOK® Guide* and shown earlier in Figure 5-2 are used and produced by practitioners of project management. Since these inputs and outputs are practice standards, they are also used and produced under the holistic view of scope management.

Summary

The practical use of the scoping of projects is represented by the street wisdom "If you don't know the target, you can't find the way."

During the execution of a project, a defined scope element can be associated with a supplements scope statement to improve understandability without changing the bounds of the black box element.

Review Questions

1. When and why could a supplement scope statement be needed?
2. What could a supplement scope statement be conceptually compared to?
3. How are supplement scope statements identified and tracked?

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6

The Project Work Breakdown Structure (WBS)

α Learning Objectives

Note: To support the learning process and to reinforce the retention of the chapter's content, the learning objectives are not necessarily listed in the sequence of the chapter content.

After having read and comprehended the contents of this chapter, you should be able to:

- Trace the historical root of the work breakdown structure (WBS) concept.
- Discuss why the concept of a WBS has been and to some extent still is misunderstood by some people.
- Give a definition of the term WBS in the context of project management.
- List and describe the essential terms used in the creation of a WBS.

Overview

The work breakdown structure (WBS) is most likely the first thing people mention or think of when you talk to them about project management. Everybody is familiar with the visual representation of an organization chart and that is all that a project's work breakdown structure is, isn't it?

Well, not so fast. Purely visually, without reading and comprehending the text in the hierarchical boxes, it might appear to be just something like an organization chart. But, as is often the case in real life, critical thinking is a prerequisite for understanding. I once heard a student, who was just five weeks away from graduation (with a major in project management), say that project management was easy and she was ready to manage a project. When asked for an explanation, she stated, "Project management is easy. All you have to do is make a work breakdown structure." Such "insight" makes you wonder: what was the problem with all those project managers whose projects are listed in the research reports, covering 20 or more years, as "failed projects"?

The intellectual basis of a work breakdown structure goes as far back as about 2,500 years. Wren (2005) quotes statements from Plato and Aristotle who addressed the division of labor. The guilds in medieval Europe were also built on the concept of division of labor. And, of course, one would be amiss not to mention Adam Smith's (1723–1790) strong conviction that the greatest improvements in the productive powers of labor are the effects of the division of labor (*The Wealth of Nations*). In more modern times, "division of work" was the first of Henri Fayol's 14 principles of management (Wren, 2005, p. 215).

Maybe this historical root is the cause (root cause?) why the work breakdown structure (WBS) has been misunderstood by so many people for such a long time, and even today, in 2015, you can find people who talk about the WBS as the way to organize the sequence of the tasks that have to be done in order to perform the work. How can people do that?! Perhaps the noun *work* creates a subconscious image of individual tasks and steps. And, actually they are not all that nescient, or unknowing, to express it in common news media language. And for some time they had good company. Until about the mid-1990s, the then-current *PMBOK® Guide* used the term *task-oriented activities.* Fortunately, the contributors to the subsequent editions have since changed their view. So, what is a WBS?

The *PMBOK® Guide*–Fifth Edition defines the WBS as "a hierarchical decomposition of the total scope of work to be carried out by the project team to accomplish the project objectives and create the required deliverables. The WBS organizes and defines the total scope of the project, and represents the work specified in the current approved project scope statement.... In the context of the WBS, work refers to work products or deliverables that are the result of activity and not to the activity itself" (p. 125).

Do we now know what a WBS is? Let us use the Socratic method of asking questions and then provide the answer to the question on the basis of our understanding of the definition. What does this definition tell us about the *isness,* the quiddity of a WBS? It tells us that the WBS (work breakdown structure) of a project is the breakdown of the total scope of what must be done to completely satisfy the objectives and produce the required (expected) deliverables. The definition also tells us that this breakdown of the project is not done in a random, chaotic fashion, but rather the breakdown is performed in an ordered way so that, when completed, the broken-down parts are arranged in a hierarchical structure.

Since we know that hierarchical means ordered from big to small or top down, we can make the following statement: The WBS of a project depicts, describes, displays, illustrates, maps, models, pictures, portrays, projects, represents, or shows all the elements that make up the total scope, and consequently only the total scope, in a top-down ordered structure.

After this excursion into logical deduction, we have earned a cup of coffee. Now, to the part that is important because it involves the project manager (and thus all of project management). The *PMBOK® Guide* states, "... the total scope of work to be carried out by the project team...." One could say that with the mention of the project team, project management is implied. But that is the problem. Because project management is not mentioned explicitly, it is often forgotten when people create a WBS. To avoid this problem, we can rephrase the *PMBOK® Guide* definition using our newly found understanding as follows:

> A *work breakdown structure (WBS)* is the hierarchically (top down) structured decomposition of the total scope of a project—defined in the SPOR Project Charter—into its elements until the manageable units of work that must be expended to create the required deliverable(s), fulfill the project objective(s), and reach the goal(s) of the project have been attained.
>
> Project management is an integral element of the scope of a project.

Given the human propensity to cling to old habits, we still might encounter some task- and sequence-oriented breakdown structures of the scope of projects even with the above rephrasing. Maybe the business community and in particular the project management community must take the quantum leap and "tunnel" into calling the ominous structure a *scope breakdown structure* (SBS) or maybe call it *deliverable breakdown structure (DBS).* It would certainly provide more clarity.

And maybe, after a short cooling-off period, the community could go back to the more intuitive understanding of "breaking down the work" and use the term *work breakdown structure (WBS)* to define the actual work steps in the sense of "do this, and then do that."

The PMBOK® Process Create WBS

The PMBOK® process *Create WBS* is described in the PMBOK® Knowledge Area Scope Management, which is shown in Figure 6-1. The process itself is emphasized by a blue rectangle. For ease of cross-reference, the labels added at the bottom of the rectangles identify the respective Project Management Knowledge Area and the Process Group in the *PMBOK® Guide*.

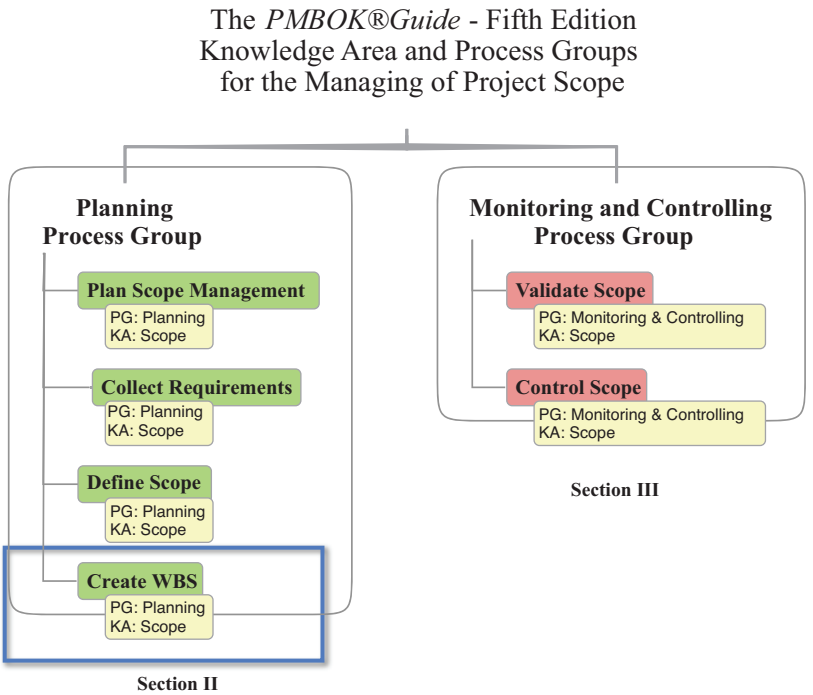

Figure 6-1 The Create WBS process in the PMBOK® Scope Management Knowledge Area

As mentioned previously, the difference between the holistic view and the PMBOK® approach to project management is that the holistic approach includes all integrative tasks (processes in *PMBOK® Guide* terminology) in the project scope management activity, whereas the PMBOK® approach makes a distinction between scope management processes and integration management processes. The holistic view is explained in detail in Chapter 2, "The Project Charter." Figure 6-2 shows the development of a WBS, emphasized by a blue rectangle, as a subtask of the planning, defining, scoping, and structuring (PDSS) task of the holistic scope management activity. For ease of cross-reference, the labels added at the bottom of the rectangles identify the respective Project Management Knowledge Area and the Process Group in the *PMBOK® Guide*. The icons have been added as a visual aid.

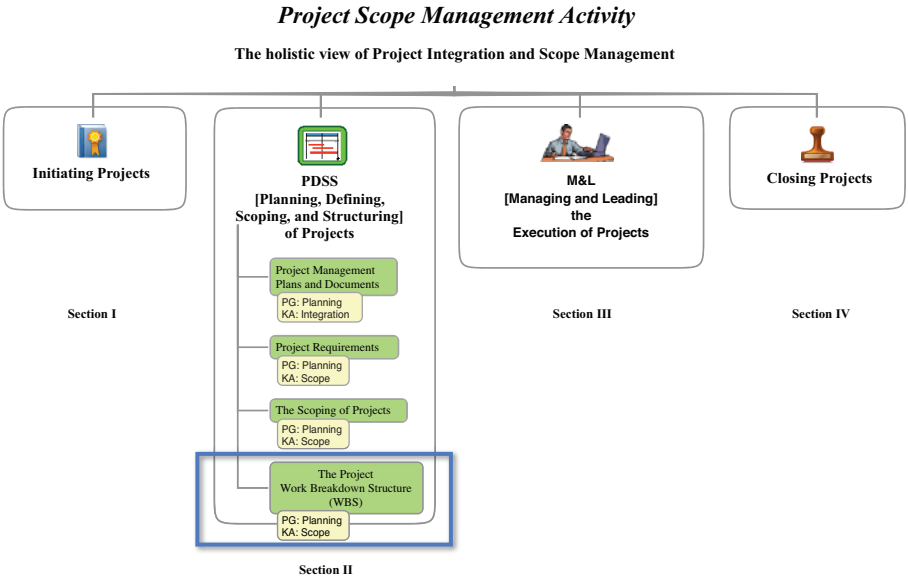

Figure 6-2 The subtask of developing a WBS in the holistic scope management view

The *PMBOK® Guide* also provides a list of inputs to the process, a list of outputs from the process, and a list of tools and techniques that are commonly used by practitioners of project management for this process and thus have been established as practical standards. The inputs, outputs, and tools and techniques for the process are shown in Figure 6-3 in the IPO format. The icons have been added as a visual aid.

The inputs and the outputs listed in the *PMBOK® Guide* and shown in Figure 6-3—since they are practice (in Project Management Institute, Inc. [PMI] terminology) standards performed by practitioners—are used and produced in the holistic scope management as well.

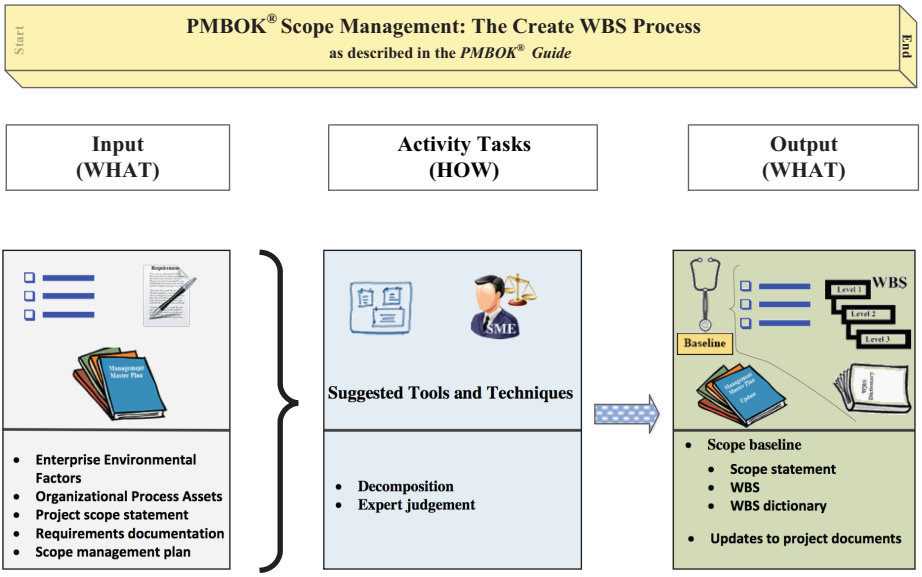

Figure 6-3 The inputs, outputs, and tools and techniques for the development of a WBS as described in the *PMBOK® Guide*

The Making of a Work (or Scope) Breakdown Structure (WBS or SBS)

There is a defined terminology associated with the breakdown structure, which helps in keeping a common understanding between the participants during a project and provides for easy communication. The terms are listed (in alphabetical order) next.

Terminology

- **100 Percent Rule.** The 100 percent rule states and requires that going vertically up a branch of the hierarchical tree, the component on any intermediate level must represent 100 percent of the components below it in the hierarchy. This means that when all vertical branches have been summed up to level 2, the level just below the singular entity at the top, each of the components on level 2 represent the totality of all the components below it. At level 2, the components are always summed

up horizontally with the result that the singular top component represents the sum or the entirety of all components below it. In the case of a project, this sum or entirety is the scope of the project.

The 100 percent rule not only provides a way to check completeness of the scope breakdown, but it additionally provides a practical way to produce the project budget. The work package is the lowest element of a WBS. A work package is broken down further into manageable tasks or steps. These tasks or steps, identifying the HOW to produce the work package, are described using verbs. The costs to perform the tasks or steps—monetary cost, time required, resources required—are estimated at this level. Once the estimates have been accepted, the costs can be aggregated ("rolled up") in their corresponding units into the costs of each work package and then aggregated further along the branches all the way to the top component. The aggregated value represents the budget estimate. The 100 percent rule was originated by Gregory T. Haugan.

- **Component Types.** In various literatures about work breakdown structures, two types of components are described, *discrete* and *level of effort.* A discrete component is generally considered to be a component that is a tangible, unique deliverable. A level of effort component, by contrast, is described as a nontangible task that does not produce one or more definitive deliverables or end products.

  Financial accounting and *project management* are frequently mentioned as examples for level of effort components. A closer look at this classification might be in order. Isn't project management's mission and reason for being the successful delivery of a project? And since a project, if successfully completed or delivered, is its own deliverable, wouldn't it therefore be more correct to also consider project management a discrete component? A similar argumentation can be brought forth for financial accounting.
- **Component.** Any "thing" or better object that occurs anywhere, that is on any level, in the hierarchical decomposition is referred to as a component. When all of the components are reassembled into one singular entity, they represent once again

the scope of the project. Or, expressed in simpler terms, the vertical "bottom-up" sum of all components along their hierarchical branch is equal to the scope of the project. *Sum of all* means 100 percent. Components are always identified by a noun that provides an intelligible description of WHAT it is that must be delivered on the level on which the component is located. Sometimes an adjective is used with the noun if it is helpful or necessary to specify what the component is. The uniqueness of each component allows for the setting of milestones, as deemed useful.

- **Control Account.** Control accounts are used in connection with earned value management. Control accounts are established for WBS components for which an organizational unit has been identified as having the responsibility for the work to be performed to produce the component. The control account can then be used to plan the work to be performed and control the work that has been performed.
- **Element.** A WBS element is any individual WBS component plus its associated fields that provide information about specific characteristics of that component. These fields are commonly referred to as the attributes of a WBS element.
- **Levels.** The hierarchical breakdown structure consists of several levels, successively labeled level 0, level 1, level 2, and so forth until a manageable unit is reached. The number or depth of levels depends on the complexity of the project and the deliverables and, thus, is different for different projects.

  The top element of the structure is referred to as level 1, but in some software as level 0. Presumably the software developers chose zero because it is the ground from which the top-down decomposition is started. The next level is consequently increased by one count to be called level 2, or level 1 if the count started with 0.
- **WBS Dictionary.** The WBS dictionary is a document that contains the necessary information to describe and explain the work steps that must be taken for each WBS element to produce this particular deliverable. The information can be short but must be sufficient to ensure clarity and understandability.

- **WBS ID.** The WBS ID is a unique identification number of every WBS component. The WBS ID number increases by one in the last digit position for components on the same level. The WBS ID increases vertically by adding a digit position for each level below that component. The digit positions are differentiated by a period between successive positions. A generic example is shown in Figure 6-4, and a specific example is shown in Figure 6-6.

  The WBS ID not only serves to identify the various WBS components, but is also the powerful tool that allows you to link the WBS to other management activities, such as cost management, requirements management (requirements traceability matrix), scope management, time management, and so forth.
- **Work Package.** A work package is the component that that has been reached after several successive logical decomposition steps and is the component that is considered to be a manageable unit by the decomposer. Thus, the work package resides on the lowest level of a WBS. The lowest level can be, and usually is, different for the different vertical branches of the hierarchy. The work package is used for planning and control purposes. To paraphrase a popular expression, one could say about a work package that "the WBS [for this branch] stops here."

Generic Example

Figure 6-4 shows a generic example of a work breakdown structure in the classical hierarchical format.

The black icons with white digits serve to identify the particular WBS level where that component resides. These icons are used here for explanatory purpose only; they are not part of the normal representation of work breakdown structures. In this example, the WBS ID numbers start at level 1 using the concept that the top component, the name of the project, which represents the scope of the project, is located at level 0. If the top component is considered to be located at level 1 (as is the case in the *PMBOK® Guide*), the digit 1 followed by a period would precede the currently shown WBS ID numbers. For example, the component with the WBS ID *3. Name* would be identified by the WBS ID *1.3 Name.* The last two components in this

branch would then be identified by the WBS ID *1.3.2.1.1* and WBS ID *1.3.2.1.2,* respectively. This is a nice illustration of where less is more (in clarity, according to the motto "keep it simple").

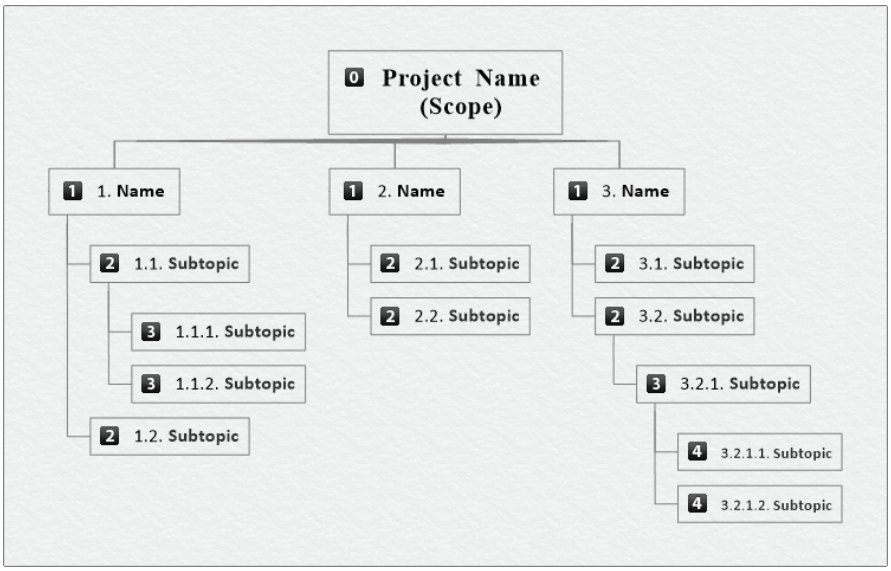

Figure 6-4 Example of a generic hierarchical work breakdown structure (WBS)

An alternative to the classical hierarchical format, the Warnier-Orr or mind map format is shown in Figure 6-5.

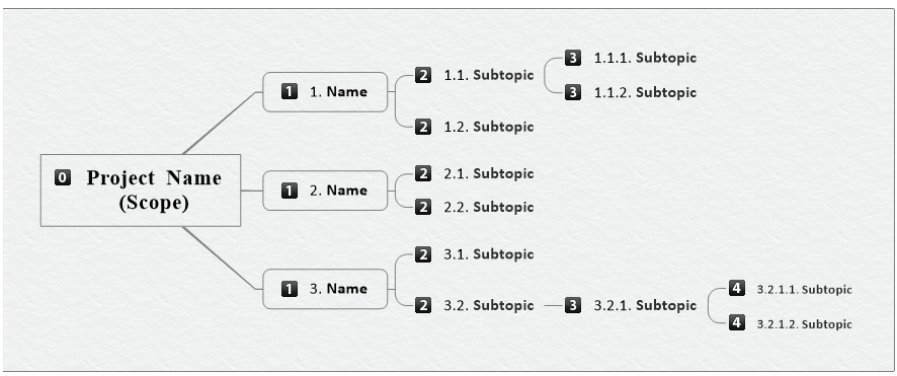

Figure 6-5 Example of a generic work breakdown structure (WBS) in mind map format

The black icons containing white digits serve the same function as explained previously.

Other Breakdown Structures

There are other breakdown structures that are used in organizations; some of them are listed here:

- Activities Breakdown Structure (ABS)
- Bill of Materials (BOM)
- Contract Breakdown Structure (CBS)
- Cost Breakdown Structure (CBS)
- Organizational Breakdown Structure (OBS also known as ORG)
- Resource Breakdown Structure (RBS)
- Risk Breakdown Structure (RBS)

It is important not to confuse these breakdown structures with a work (or scope) breakdown structure (WBS).

3 A WBS Case in Point

Biggerplate (http://www.biggerplate.com) is the provider of a free mind map library where mind map creators can upload their work for free storage and mind map users can download the maps of their choice for free. Biggerplate had decided to hold a one-day mind mapping event in Berlin, Germany. To set up, prepare, conduct, and complete such an event, typical project management tasks have to be performed; in other words, the scope of the project has to be defined in a work breakdown (WBS) structure. Being a company heavily involved with mind mapping, they used mind mapping software as the tool to produce their WBS.

Liam Hughes, founder and CEO of *Biggerplate*, kindly provided the mind map WBS for the event. The mind map WBS is shown in the classical hierarchical WBS format in Figure 6-6. The WBS is only partially displayed due to the legibility issues of a book page.

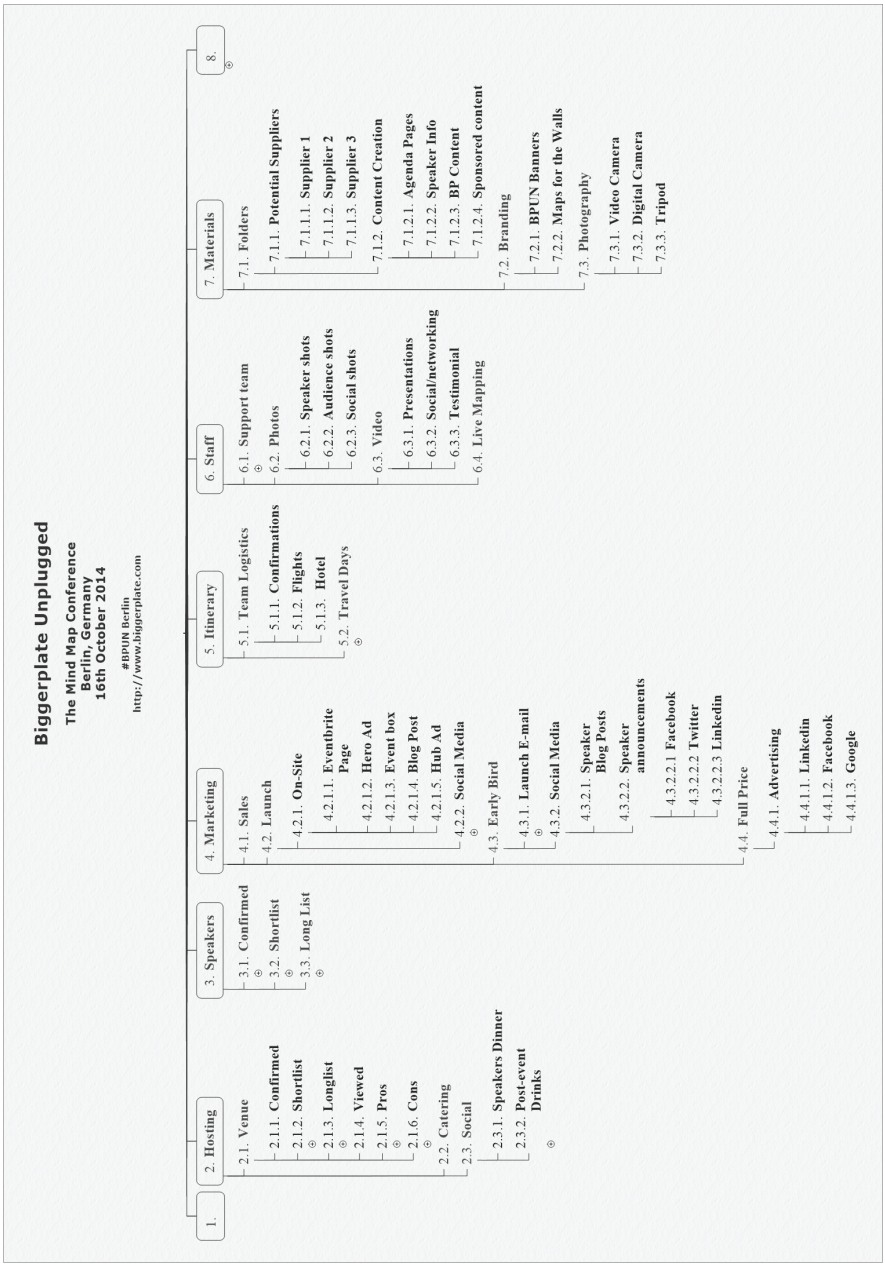

Figure 6-6 Example of a real-life WBS, representing the scope of organizing an international one-day event

Summary

The intellectual basis of a work breakdown structure goes as far back as about 2,500 years.

The concept of a WBS has been and still is misunderstood by some people today. PMI only recently (mid-1990s) changed the definition or description of what a work breakdown structure (WBS) is from task-oriented activities to a deliverable-based decomposition of the total scope of project work.

A SPOR-based definition of a WBS is provided in this chapter.

Key terms used in the definition of a WBS are the 100 percent rule, component types, component, control account, element, levels, WBS dictionary, WBS ID, and work package.

Popular representations of a WBS are the hierarchical, top-down structure and the Warnier-Orr-like mind map format.

There are several WBS look-alike structures used in organizations.

Review Questions

1. What could have been the student's (mentioned at the beginning of this chapter) understanding of project management and a WBS?
2. What statement can we make about a WBS based on the meaning of the adjective *hierarchical*?
3. What are some other WBS look-alikes?

Section III

The Managing and Leading of the Execution of Projects

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7

The Directing and Managing of the Work Performed in Projects

α Learning Objectives

Note: To support the learning process and to reinforce the retention of the chapter's content, the learning objectives are not necessarily listed in the sequence of the chapter content.

After having read and comprehended the contents of this chapter, you should be able to:

- Explain the meaning and significance of "To lead people walk behind them."
- Describe the features of each stage in the "Project Playhouse."
- List the artifacts needed to direct and manage project work.
- Describe the deliverables produced by the subtask directing and managing project work.
- Know the importance of saying "no" in certain situations when managing a project.
- Have a feeling for the volume of tools and techniques to manage a project.
- List the aspects a project manager must consider to provide quality communication.
- Explain the factors that must be observed in visual communication.

- Develop a watch list or tracking system to maintain real-time information to enable and support the directing and leading of project work.

Overview

To lead people walk behind them.
—Lao Tzu

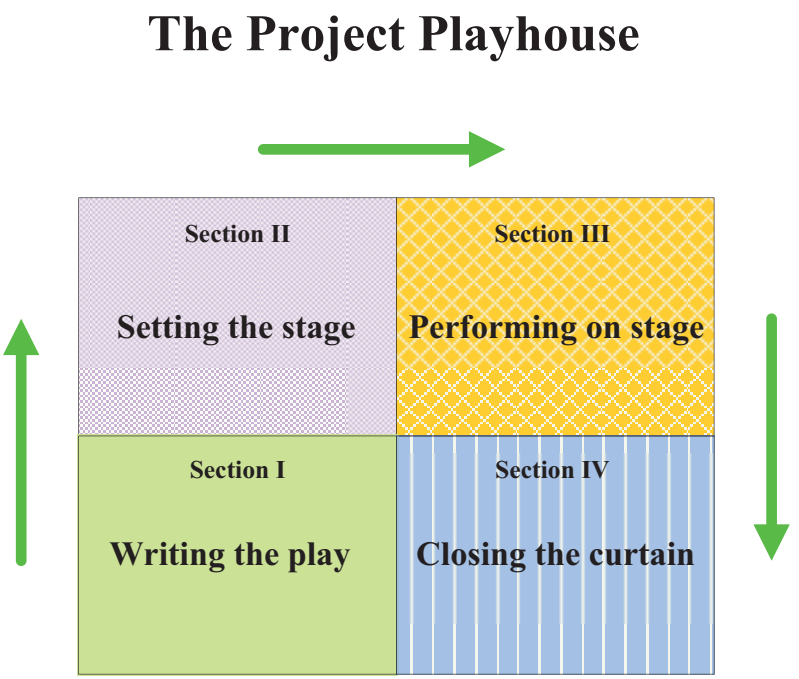
The scope management activity is one of the nine project management activities introduced in Chapter 1, "Fundamentals." As has been pointed out in the previous chapters, managing a project means managing the scope of the project, and managing the scope involves the management of all the other eight project management activities like time, cost, quality, and so on. Thus, managing the scope integrates managing the other eight activities. Each of the nine (scope plus the other eight) management activities consists of a number of activity tasks. The scope management activity consists of the four main tasks (1) the initiating of projects; (2) the planning, defining, scoping, and structuring of projects; (3) the managing and leading of the execution of projects; and (4) the closing of projects. Each main task in turn consists of one or more subtasks. A subtask can be further differentiated into steps, depending on the level of granularity that promises maximum efficiency in the execution of the subtask.

Chapter 4, "Project Requirements," contains a four-quadrant diagram depicting the distribution of all subtasks relative to analytical, conceptual, critical, holistic, and strategic concepts and thinking on one side (in Quadrant I and Quadrant II) and organizational, practical, procedural, and technical skills and work on the other side (in Quadrant III). Many projects are subject to considerable time pressure and as a consequence, the projects are often not closed properly. The proper closure of a project is addressed in Section IV of this book (Quadrant IV in the four-quadrant diagram).

The main task of managing and leading the execution of projects is the task where project managers spend, out of practical necessity, most of the time that constitutes the life of the project. Could this necessity be a contributing factor to the low number of projects that were completed successfully? Spending more time up front on the main task of planning, defining, scoping, and structuring has led to successful completion of projects. In these successfully completed projects, the project manager was able to manage and lead the execution of the planned project work within the allotted time and with the anticipated effort.

A possible conceptual framework for the management of projects is the four-quadrant matrix view. As a didactic aid, one can compare a project in its entirety to a "playhouse." The stages of a project can be related to the stages of a performance in a theater or playhouse. This playhouse is made up of four quadrants of a matrix, as shown in Figure 7-1. Imagine a vertical line drawn down the center of the matrix dividing it into a left side and a right side. The left side of the matrix constitutes the strategic and conceptual thinking element of the framework, while the right side represents the practical, hands-on side of the framework. The left side consists of Quadrant I and Quadrant II. The right side is made up of Quadrant III and Quadrant IV.

In Quadrant I, the initiating activity subtasks are performed that are covered in Section I of the book, which are "Fundamentals" and "The Project Charter." In Quadrant II, the PDSS subtasks, described in Section II, are performed. The subtasks to manage and lead the execution of projects, described in Section III of the book, are performed in Quadrant III. And finally, the subtask of the closing of projects, described in Section IV, is performed in Quadrant IV. The right side of the matrix, the practical framework side, is the area where the practice standards collected and documented in the *PMBOK® Guide* prove to be not only immensely useful, but also "practically" indispensable.



Legend: The section (quadrant) numbers refer to the sections in the book

Figure 7-1 The four-quadrant matrix representation of a project

The conceptual and critical thinking work done in Quadrants I and II of Figure 7-1 (and described in Sections I and II of this book) is usually known only to a few project insiders in an organization. Not until the project enters the main stage of project execution will the majority of the people become aware of the existence of the project. Consequently, when the project manager starts to manage and lead the execution of the project, he or she will perform on the main stage of the "project playhouse."

The main task of managing and leading of the execution of projects consists of four subtasks, one of which is the directing and managing of the work performed in projects. In this chapter, we look at a project manager's approaches and steps that have proven to be practical and useful for this subtask. We start by showing a visual representation of the process *Direct and Manage Project Work* as described in

the *PMBOK® Guide*–Fifth Edition and the subtask *The Directing and Managing of the Work Performed in Projects* as part of the holistic view of the project management activity Scope Management.

The PMBOK® Process Direct and Manage Project Work

Figure 7-2 shows a visual representation of the process to direct and manage project work as described in the Integration Knowledge Area of the *PMBOK® Guide.* For ease of cross-reference, the labels added at the bottom of the rectangles identify the respective project management Knowledge Area, which in this case is, of course, Integration, and the Process Group in the *PMBOK® Guide.* The icons have been added as a visual aid.

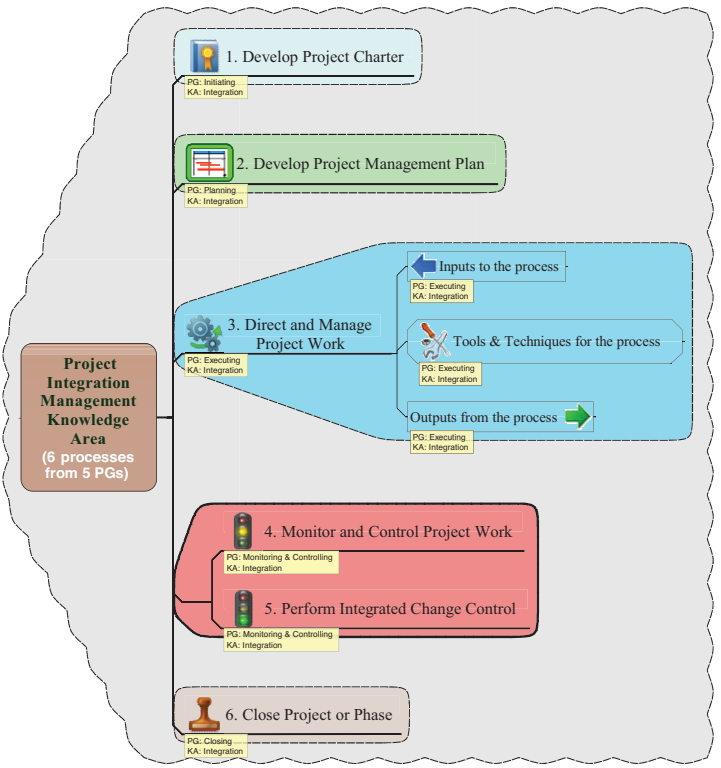


Figure 7-2 The PMBOK® process *Direct and Manage Project Work*

The *PMBOK® Guide* also provides a list of inputs to the process, a list of outputs from the process, and a list of tools and techniques that are commonly used by practitioners of project management for this process and thus have been established as practical standards. The inputs, outputs, and tools and techniques for the process are shown in Figure 7-3. The icons have been added as a visual aid.

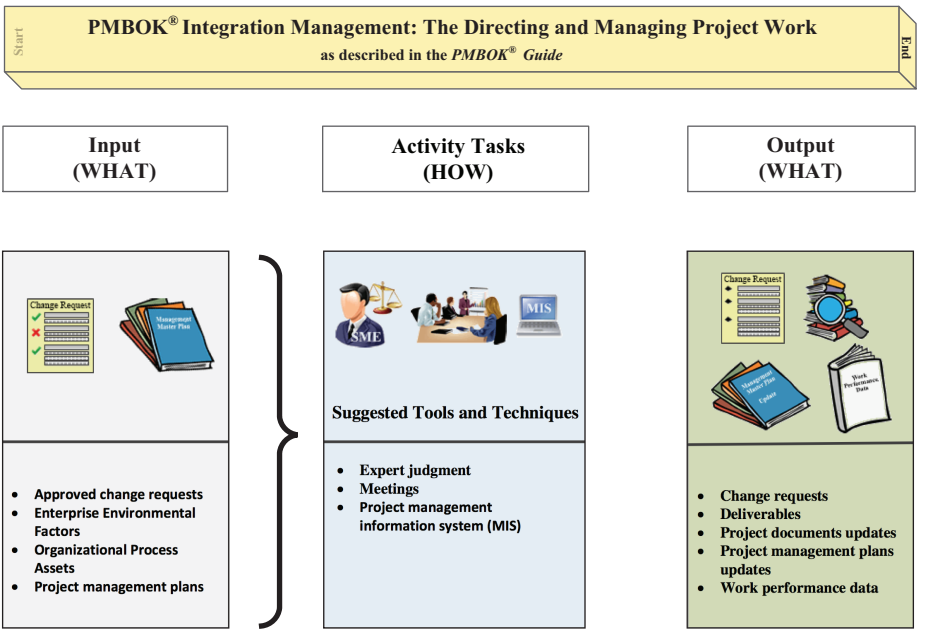


Figure 7-3 The inputs, outputs, and tools and techniques for the directing and managing of project work as described in the *PMBOK® Guide*

Examples of the elements of the Enterprise Environmental Factors and the Organizational Process Assets are shown as visuals in Chapter 1. The project management plans are described in Chapter 3, "Project Management Plans and Documents," within the context of the holistic view of the Project Management Master Plan and its subplans. Chapter 3 also contains a visual listing of additional project documents that are needed and used to manage projects. The *PMBOK® Guide* describes a project management information systems (MIS) as "e.g., an automated tool, such as a scheduling software tool, a configuration management system, an information collection and distribution system, or web interfaces to other online automated systems" (p. 55).

Availability and use of an MIS varies from organization to organization, but most organizations have some version of a scheduling tool.

The Holistic View of Directing and Managing the Work Performed in Projects

As pointed out in earlier chapters, the integration processes described in a separate Integration Knowledge Area in the *PMBOK® Guide* are an integral element of the project management activity Scope Management from a holistic viewpoint of project management. The activity subtask of the holistic Scope Management activity referred to as *The Directing and Managing of the Work Performed in Projects* is a subtask of the main task called *Managing and Leading [M&L] the Execution of Projects*, as shown in Figure 7-4.

The all-important and all-encompassing purpose of the task to direct and manage the work performed is to ensure that the expected deliverables are produced as planned. To achieve this end, the project manager must constantly coordinate the work of the project team and the work or actions of the stakeholders with the project master plan and its subsidiary plans. There are various tools, techniques, and resources available that the project manager can use to produce the artifacts that document the state of the project at various times. One important caveat for any project manager is not to get lost in managing and directing the production of reports. Reports per se do not add much value to the final deliverables. The value of reports, if wisely requested and evaluated with great care and much intuitive foresight, lies in their indication of the beginning of slippage.

Figure 7-3 listed the artifacts that are produced by the directing and managing steps performed by the project manager. A key artifact is the work performance data collection. The definition of the type of data to be collected is very important and must be decided before the start of the project. This importance is akin to the importance of defining the complexity of the project within the Project Charter. Usually the data fields are defined during the planning of costs, quality, time, and so forth. One data field that is sometimes overlooked for use during the project execution is return on investment (ROI). In many projects, ROI is calculated after the project has been closed,

if it is calculated at all. Producing one ROI figure per time unit will illustrate where the project is headed.

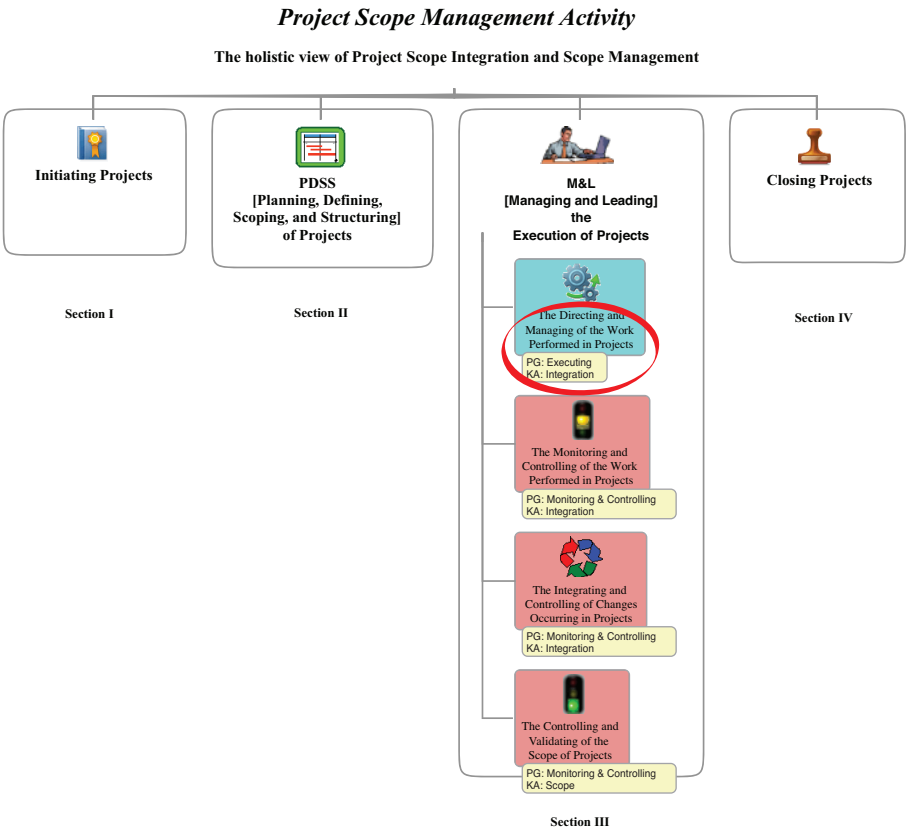
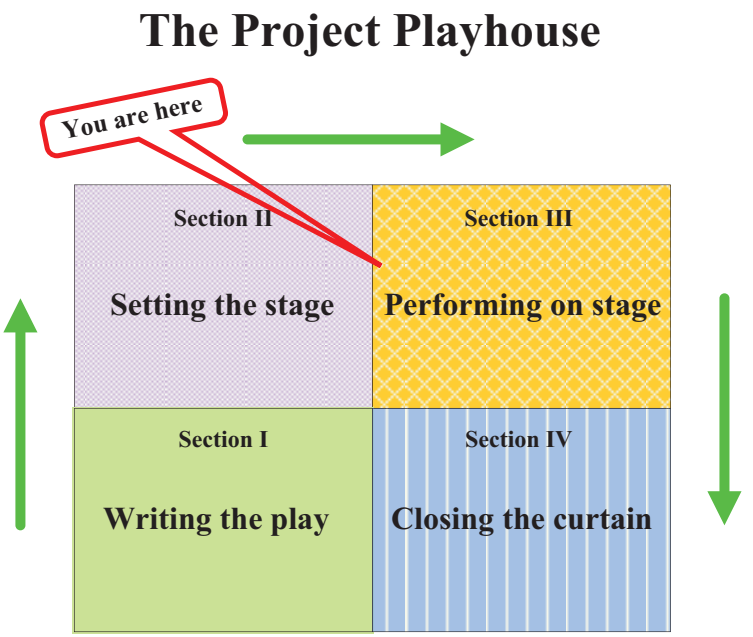


Figure 7-4 Directing and managing project work as an element of the holistic view of project scope management

For ease of cross-reference, the labels added at the bottom of the rectangles identify the respective project management Knowledge Area, which in this case is Integration, and the Process Group in the *PMBOK® Guide*. The icons have been added as a visual aid.

The inputs and the outputs listed in the *PMBOK® Guide* and shown earlier in Figure 7-3—since they are practice standards performed by practitioners—are used and produced in the holistic scope management as well. If the project has been managed according to

the holistic viewpoint, as described in Sections I and II, up to the beginning of project execution, the project manager is in a solid position when starting the work on the actual implementation of the project. As stated earlier, the stages of a project can be related to the stages of a performance in a theater or playhouse. The starting point of the execution is shown in Figure 7-5.



Legend: The section (quadrant) numbers refer to the sections in the book

Figure 7-5 Starting project execution on the stage of the project playhouse

The project management assets that should be available to the project manager at this point are shown in the following list:

- The approved single point of reference (SPOR) Project Charter
- The defined and accepted requirements

- The approved project management master plan and all subsidiary plans
- The defined and accepted scope of the project
- The accepted work breakdown structure (WBS)
- The approved budget
- The team members (internal, external, and consultants) with the skills required for each task or subtask, scheduled to be available on the planned implementation date
- The technical equipment (hardware, software, and supporting materials)
- The infrastructure as defined in the project requirements
- The names of the permanent members of the Project Review Board

If these project management assets are not fully available at the time when project execution (or implementation) is to start, the project manager must press the *Safety Halt* button—it could also be called the *Emergency Halt* button—and call an emergency meeting of the Project Review Board and top stakeholder management. In reality, it should never come to that because any good project manager will not have closed or have considered as closed and accepted the SPOR Project Charter, the requirements, the scope, the budget, and the project master plan with its subsidiary plans. Overlooking or ignoring the open status of any of the artifacts is an indication of insufficient project management qualification and, consequently, the pressing of the *Halt* button amounts to self-dismissal.

There is, however, one possible scenario where open statuses are overlooked, or better, tolerated. This is the (not infrequent) situation where upper management pressures the project manager to "go on." That puts the project manager between a rock and a hard place. Resisting the pressure will undoubtedly create an unfavorable attitude toward the project manager from upper management, but giving in will come to haunt the project manager when the *Halt* button must be pressed. The way out is for the project manager to remember that, during the job interview, top management made it clear that they

wanted a strong project manager. Of course, when they get him, they don't want him anymore. The key point for a project manager to bear in mind is that management might pressure you into a poor decision, but they won't pressure you out of the consequences.

Tools and Techniques

When work is performed in a project, a number of practice-oriented, that is, nonplanning, tasks and steps are executed. It stands to reason that various tools and techniques will be used by those who actually do the work and also by those who direct and manage the performers and their work. Over the years, many tools have been created and many techniques have been developed that have proven to be useful in the management of projects. Some tools are better suited for project planning; others are more helpful during project execution. Whatever the nature of a tool or technique, the usefulness (or the beauty) of what is created with the tool depends on the skill and creativity of the hand—or the mind—that uses it. Many sculptors have used a hammer and a chisel, but it took the hand and mind of Michelangelo to create a *David* and a *Pietà*.

Analogously, the usefulness of a project management tool or a project management technique and the benefit derived from their use depends on the skill and mind-set of the project manager, and, for the actual work performed by the project team, on the skill and competence of the individual performing the work.

Figures 7-6, 7-7, and 7-8 provide a visual list of tools and techniques that are used by practitioners at various stages in the management of a project. The sources are varied; many items shown are listed in the *PMBOK® Guide* and others have been collected over the years from a variety of sources. The overall list is rather large (more than 110 entries) and had to be separated into three figures to still be legible when shown on one page.

Figure 7-6 Project management tools and techniques (alphabetic A–D)

Figure 7-7 Project management tools and techniques (alphabetic E–P)

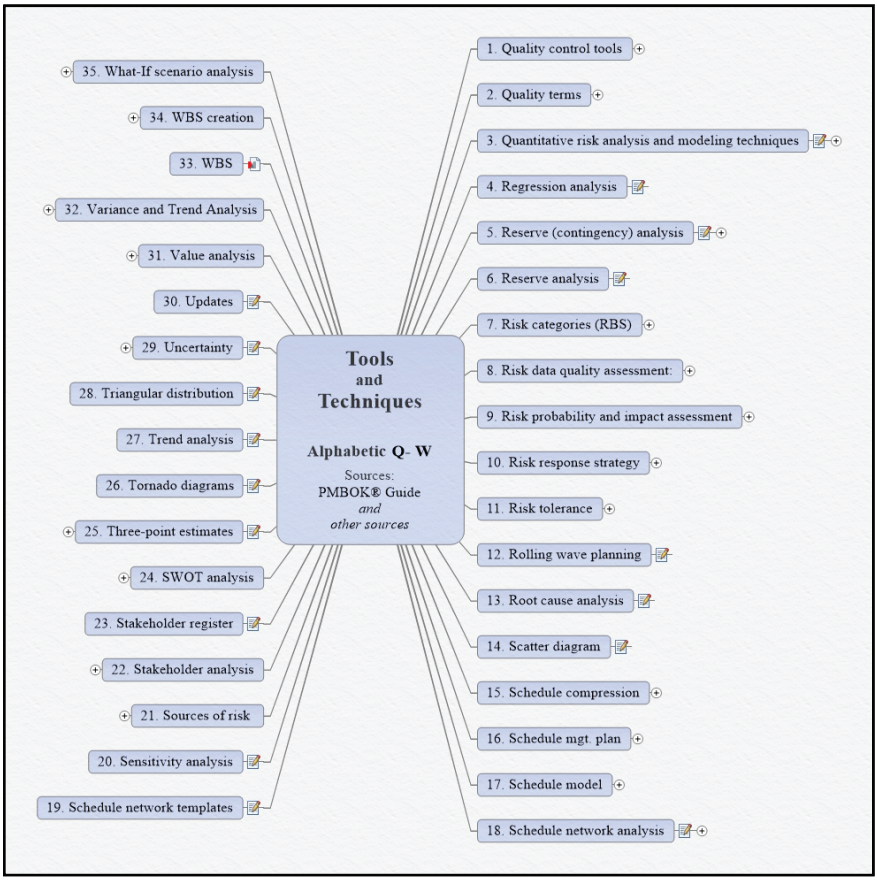


Figure 7-8 Project management tools and techniques (alphabetic Q–W)

Two items that are fundamental prerequisites for an effective and efficient use of any of the above tools and techniques are common sense and critical thinking. Critical thinking is a skill that can be trained and, in due course, acquired. It is not clear if common sense is trainable. Some people opine that childhood environment and early opportunity to observe and experience examples of common sense provide a fertile ground for commonsense development. Judging by the historical example of how early settlers and farmers managed and accomplished the development of the western frontier, that opinion has some merit to it.

Aspects of Managing and Leading the Execution of Projects

There are many words of advice or wisdom that are passed on from experienced project managers to a novice or that just float around in the project management universe. Often these statements are cloaked into more or less witty phrases. For example, there's a piece of advice about risk management that humorously assures you that "if you don't attack the risks, the risks will attack you."

But humor aside, most of the advice given is derived from either painful (usually) experience or from positive experience and has a serious core. The following takes a closer look at experiences that suggest useful approaches to and steps for the directing and managing of the work performed in projects.

Probably the wisest advice is given by Lao Tzu, quoted at the beginning of the chapter. "To lead people walk behind them." For the project manager, this means let the team perform their tasks and just observe if progress is made within the defined bandwidth of the specified parameters and with adherence to the specified quality standards. When the work to implement (or execute) the project starts, the planning, defining, scoping, and structuring has been completed and accepted by all stakeholders. This is a "must-be-the-case" before the start of execution. If not accepted completely and by all, do not start the project! At the Olympics, an athlete does not win a medal for starting in a competition, but for completing it (in first, second, or third place). As a project manager, you do not win a gold medal for starting a project, but for completing it. Admitted, it will be difficult to resist the political pressure to just start the project even if not completely signed off, but, as a much-feared CEO once told a project manager, after several unsuccessful attempts to pressure the project manager into starting a not-fully-supported project, "it takes a top manager to know when not to start a project."

Throughout this book, much emphasis has been placed to point out the key task for and the principal obligation of a project manager: communication. The project manager must communicate with all, to all, and about all events and changes that occur while work is performed in the project. To be able to perform quality communication,

the project manager must continuously watch for and become fully aware of the following:

- The current status of all tasks and steps.
- The percentage of resources still available.
- The rate of resource consumption.
- Any variations in the rate of resource consumption.
- The "coordinates" of where on the road to successful completion the project currently is located.
- The current morale or team spirit.
- First signs of interpersonal conflicts.
- Adherence to, or deviations from, the direct path toward the project goal.
- Close unison between the individual goals and objectives of team members and the project goal.
- The current openness and use of interproject communication, that is, communication among team members, among stakeholders (this is not easy to determine), between team members and stakeholders, and possibly between the project and external participants. In addition, if top management is not included in the term *stakeholders* (this might be the case for small to medium-sized projects), the project managers must ensure that top management stays in the loop on a summary level.

To accomplish these requirements, the project manager should lead the project by walking behind the participants, as Lao Tzu has taught us. Walking behind means that the project manager sees what is being accomplished. There is then no need to have team members fill out weekly status reports or have weekly status meetings with the round-robin verbal status reporting. Such meetings accomplish little, but rather do take the drive out of people.

The project manager should consider the issues log as a seismograph for the project and monitor it accordingly to detect the first signs of slippage. It is one of nature's laws that before falling, we slip. This law also applies to projects; there is slippage before failure.

It cannot be stated often enough: Project management means leading a project and leading is accomplished through and with

communication. Communication can be in the form of verbal interactions or distribution or presentation of visuals. In this context, the term *visual* includes graphs, diagrams, pictures, and text.

To be understood and accepted, verbal interactions must be based on clarity of expression, clarity of content, politeness, frankness about issues, respect for the opinion of participants in the conversation, and honesty. Communication involving visuals must observe the verbal factors and the following additional factors specific to the medium used for reports and presentations:

- The message delivered in a report or a presentation must be clear, concise, and complete.
- The content must have been quality assured.
- If there are several messages, the contents of the messages should be expressed in a standard format.
- Show effects must not be part of a message.
- There must not be any implicit complications. If there were any in the first draft of the report or the presentation, they must have been resolved, or, if that was not possible, these complications must be presented as (new) issues.
- The report or presentation must be structured, that is, messages must be grouped according to similarities and/or significance.

During the course of directing and managing the work performed in the project, the project manager will invariably encounter differences between what was planned and the current actual. When these difference exceed the bounds within which variances can be tolerated, the project manager must ensure that the issue is clearly documented in the issues log, assign an owner to the issue, discuss it with team members, and, if the cause lies outside the team range, include appropriate stakeholders in the analysis of what caused the variance and what can be done to bring the project back into the "on-track zone." The issue, the cause of the issue, and the corrective action taken must be communicated to all stakeholders and documented for use in the lessons-learned documentation.

It usually does not work well to just document the issue in the issues log and expect stakeholders to read the log on their own. The project manager must conduct regular follow-ups of the issues and

everybody involved in the project should be aware of the project manager doing this. This is the best, and maybe the only, way to ensure that the issues log is kept up to date.

From and for Practical Project Cases

The beauty of having documented and proven practice standards, such as the ones described in the PMBOK® *Guide*, is that they provide a way to structure the managing and leading subtask (of the project scope management activity). The approach to structuring described next has enabled project managers to successfully complete their projects. To apply the approach, you need to perform the steps described below. It is important to remember that all planning, defining, scoping, and structuring must have been completed before starting the execution of the project. The project playhouse visual is designed to point this out. Furthermore, you also should be conscious of the fact that the standards listed in the PMBOK® *Guide* are just that, namely standards based on common practices. In a particular project, there might be a need for additional sub-subtasks or inputs or required outputs or new tools and techniques. Simply supplement the *PMBOK® Guide* list of practice standards by adding the new items and make sure that the amended list is added to the Organizational Process Assets.

The approach consists of asking questions like the ones stated below and to also provide the answers. To get the answers, you will need to cross-reference the project management master plan, the work breakdown structure (WBS), other project documentation, and the *PMBOK® Guide* list of practice standards. A useful way to cross-reference the practice standards (and other collections of information) is to create a mind map. Examples are shown below and in the other three chapters of Section III.

Input (What)

1. Ask, "What do I need to be in control of this subtask?"

   To get the answer, write down the inputs listed as practice standards in the *PMBOK® Guide*.
2. For each item on the list, ask, "When do I need it?"
3. For each item on the list, also ask, "Where does it come from?"

Output (What)

1. Ask, "What do I have to produce (or deliver) to successfully manage this subtask?"

   To get the answer, write down the outputs listed as practice standards in the *PMBOK® Guide*.
2. For each item on the list, ask, "When do I have to deliver it?"
3. For each item on the list, ask, "Who needs it?"

Tasks and Subtasks (How or By What Means)

1. Ask, "How can the output (or artifact to be delivered) be produced?"

   As appropriate for the nature of the answer, there might be drill-down questions, such as who needs to help or what is needed to produce it.

Example

According to the *PMBOK® Guide*, the activity subtask of directing and managing the work performed in projects requires the inputs shown in Figure 7-9.

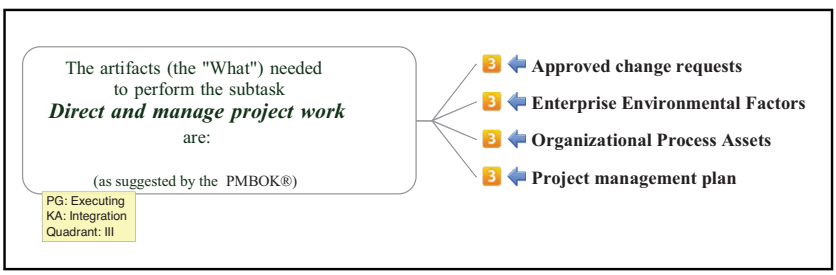


Figure 7-9 What do I need to direct and manage project work?

Example of Answers

For ease of cross-reference, the icon numbers are used to identify the PMBOK® process in the respective Knowledge Area, which in this example is the Integration Knowledge Area. The arrow pointing

to the left indicates "is input to." The arrow pointing to the right indicates "is output from."

Enterprise Environmental Factors and Organizational Process Assets are generic knowledge bases that provide input to most subtasks. Both are updated by some results produced by the work performed in projects, but there is no specific process listed in the *PMBOK® Guide* that is comparable to the treatment of the other PMBOK® processes.

A cross-reference check of a PMBOK® Über mind map reveals the information shown in Table 7-1 about the sources of the required input artifacts.

Table 7-1 Sources of the Inputs to Directing and Managing the Work Performed in Projects

Input Artifact	Is Delivered by the PMBOK® Process	Is the Result of the Management Activity	Holistic Activity Task	Book Section (Quadrant)
Approved change requests	Perform Integrated Change Control	Holistic Scope (in the PMBOK®, the activity is part of Integration KA)	Monitoring & Controlling	III
Project management plans	Develop Project Management Plan	Holistic Scope (in the PMBOK®, the activity is part of Integration KA)	Planning	II

This simple example is straightforward; other items are more involved, such as change requests. According to the *PMBOK® Guide*, change requests are provided, that is, delivered as output, by 17 subtasks (or PMBOK® processes). This involves project management activities (or PMBOK® Knowledge Areas) other than scope and integration and is thus outside of the scope of this book.

However, as a project manager, you have to deal with all nine project management activities (see Chapter 1) or all ten PMBOK® Knowledge Areas. Using a PMBOK® Über mind map, you can create subsequent mind maps of all inputs, all outputs, and all tools and

techniques to which you can apply the question approach described previously. These maps should be used in subtask order and in alphabetic order. Once established, the project manager or a designated team member has a convenient way to track what, when, from whom and what, to whom, and how throughout the life of the project. You could conceptually compare the availability of such information to the monitoring and control board of a power plant (on a smaller scale, of course).

For completeness, the visuals for the questions about outputs and tools and techniques for the task of directing and managing the work performed in projects, as defined in the *PMBOK® Guide*, are shown in Figures 7-10 and 7-11, but not described in detail.

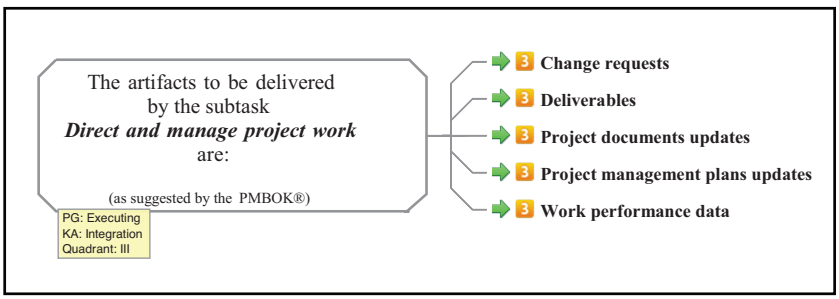


Figure 7-10 What do I have to deliver from directing and managing project work?

The project manager can now connect these items to the time axis as defined in the project management master plan and put them on his or her watch list or on some team member's watch list.

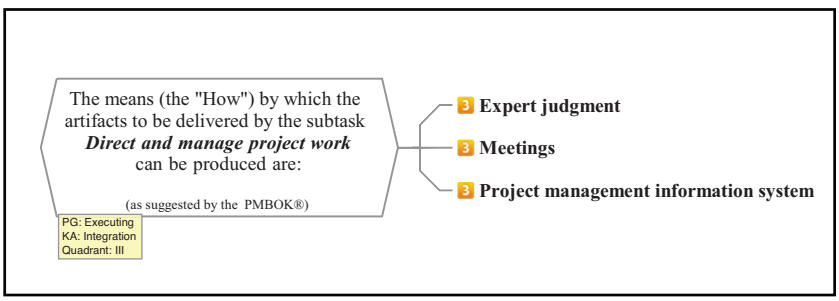


Figure 7-11 How or by what means can I produce the artifacts to be delivered?

Knowing what tools, equipment, or resource availability will be needed allows the project manager to arrange for their availability for the time and possible amount or volume required.

Summary

Managing and leading a project means managing the scope of the project and managing the scope involves the management of the other eight project management activities.

The four-quadrant matrix view of initiating a project; of planning, defining, scoping, and structuring (PDSS) a project; of managing and leading (M&L) a project; and of closing a project can serve as a framework for project management.

The directing and managing of project work requires four key artifacts as input to deliver five new artifacts. Updates to existing artifacts are considered new artifacts in the context of this transformation.

The project manager can provide quality communication by continuously paying attention to ten key elements. Verbal interaction must be based on clarity of expression, clarity of content, politeness, frankness about issues, respect for the opinion of participants in the conversation, and honesty. Communication involving visuals must observe the verbal factors and additional factors specific to the medium used for reports and presentations.

Project managers can establish a watch list or tracking system of project management information needed for and provided by the directing and managing of project work.

Review Questions

1. What are the means by which the input artifacts are transformed into output artifacts during the directing and managing of project work?
2. What must verbal interaction be based on?
3. What must have been completed before starting the execution of a project?

8

The Monitoring and Controlling of the Work Performed in Projects

α Learning Objectives

Note: To support the learning process and to reinforce the retention of the chapter's content, the learning objectives are not necessarily listed in the sequence of the chapter content.

After having read and comprehended the contents of this chapter, you should be able to:

- Explain why managing and leading the execution of projects does not progress in a linear fashion.
- Understand why the four subtasks of managing and leading the execution of projects must be performed in parallel to avoid veering off course.
- List the artifacts that are delivered by the subtask of monitoring and controlling project work.
- List the artifacts needed to monitor and control project work.

Overview

The scope management activity consists of the four main tasks: (1) the initiating of projects; (2) the planning, defining, scoping, and structuring of projects; (3) the managing and leading of the execution of projects; and (4) the closing of projects. Each main task in turn consists of one or more subtasks. The main task of managing and leading the execution of projects consists of four subtasks, one of which is monitoring and controlling the work performed in projects.

In Chapter 7, "The Directing and Managing of the Work Performed in Projects," we looked at the aspects that a project manager needs to consider and the actions he needs to undertake to be able to manage the execution of a project and lead the project team and the stakeholders to jointly fulfill the defined requirements and ultimately bring the project to a successful closure with the delivery of the expected results. In this chapter, we will look at a project manager's actions, approaches, and aspects that have proven to be practical and useful in monitoring and controlling the work performed in projects.

Following the pattern established in Chapter 7, we first look at the representation of the Monitoring and Controlling Process Group as described in the *PMBOK® Guide*–Fifth Edition. Then we consider the holistic view.

The PMBOK® View of Monitoring and Controlling Project Work

Figure 8-1 shows a visual representation of the process to manage and control project work as described in the Project Integration Management Knowledge Area of the *PMBOK® Guide.* For ease of cross-reference, the labels added at the bottom of the rectangles identify the respective Project Management Knowledge Area, which in this case is Integration, and the Process Group in the *PMBOK® Guide.* As pointed out in previous chapters, the *PMBOK® Guide*–Fifth Edition defines two separate Knowledge Areas, Project Integration Management and Project Scope Management, to describe the tasks for managing the scope of a project, while from the holistic viewpoint, these tasks are all part of a unified scope management activity.

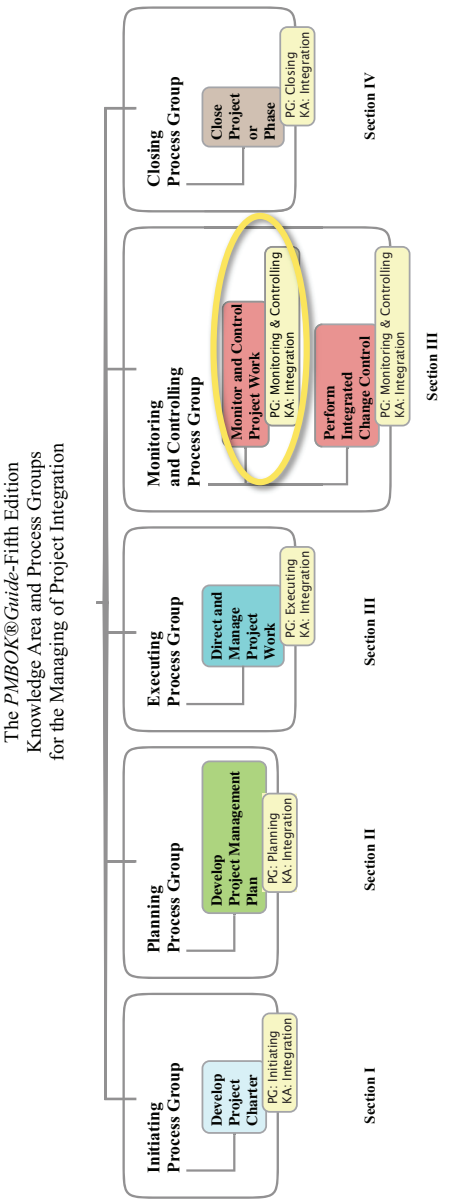


Figure 8-1 The PMBOK® view of monitoring and controlling project work

The *PMBOK® Guide* also provides a list of inputs to the process, a list of outputs from the process, and a list of tools and techniques that are commonly used by practitioners of project management for this process and thus have been established as practical standards. The

inputs, outputs, and tools and techniques for the process are shown, using the IPO diagramming view, in Figure 8-2. The icons have been added as a visual aid.

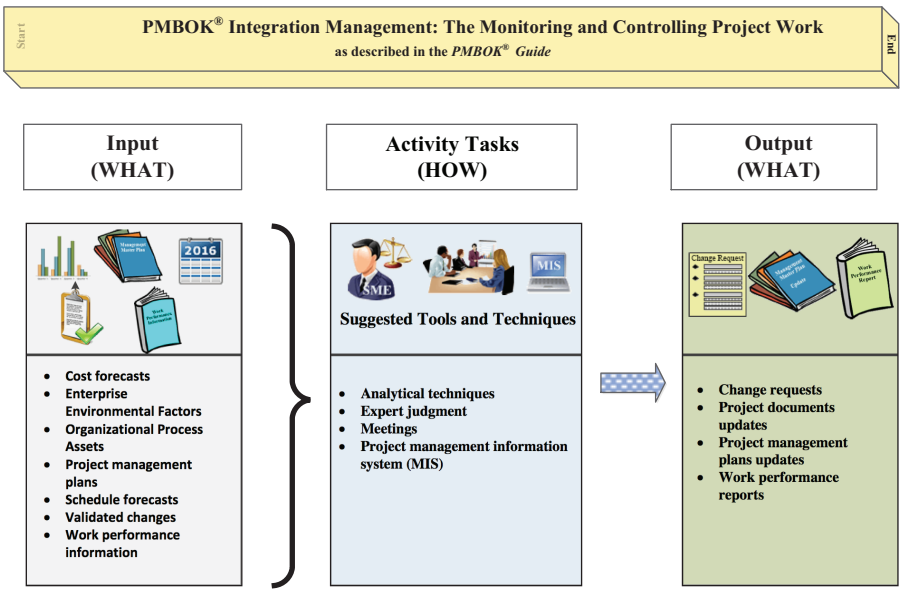


Figure 8-2 IPO view of the PMBOK® process *Monitor and Control Project Work*

The Holistic View of Monitoring and Controlling Project Work

In the holistic view of scope management, managing and leading the execution of a project integrates four activity subtasks, which are shown in Figure 8-3. One of these four subtasks, the monitoring and controlling of the work performed in projects, is the topic of this chapter.

For ease of cross-reference, the labels added at the bottom of the rectangles identify the respective Project Management Knowledge Area, which in this case is Integration, and the Process Group in the *PMBOK® Guide.* The icons have been added as a visual aid. The inputs and the outputs listed in the *PMBOK® Guide* and shown in Figure 8-2 are—since they are practice standards—used and produced

in the holistic scope management activity as well. Thus, Figure 8-2 also shows the inputs and outputs used and produced when managing the scope of a project from a holistic viewpoint.

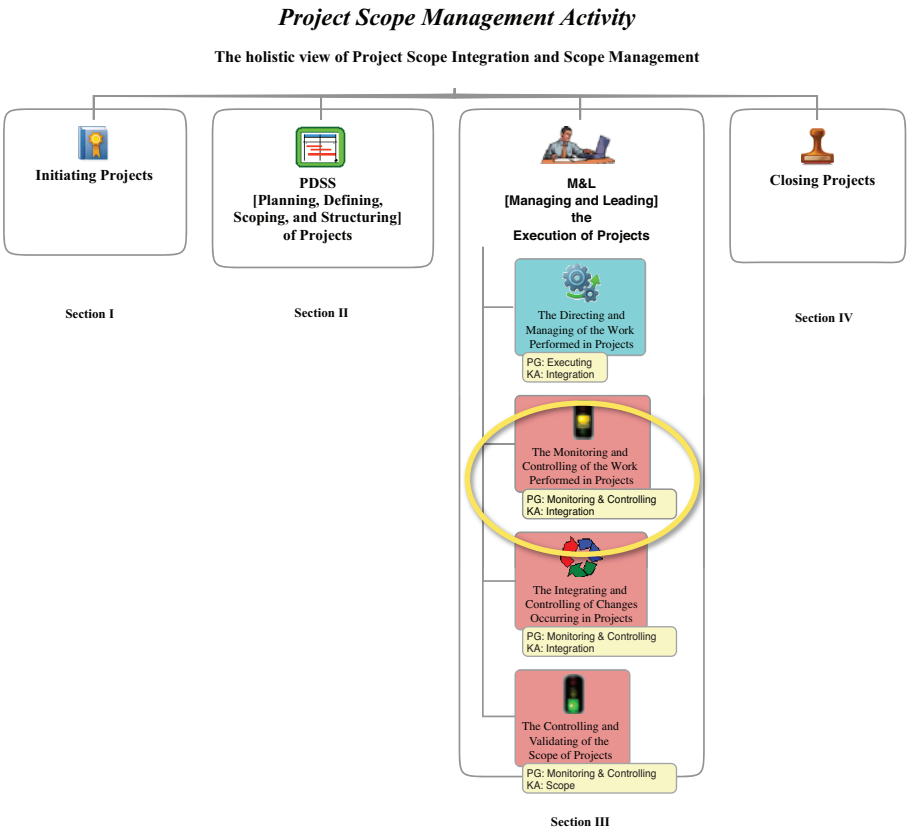


Figure 8-3 Holistic view of monitoring and controlling project work

The purpose of monitoring and controlling the work performed in projects is to ensure that the project is on track to meet the project goal and objectives. As pointed out in the chapter on directing and managing the work performed in projects (Chapter 7), if the project has been managed according to the holistic viewpoint—as described in Sections I and II—up to the beginning of project execution, the project manager stands on a solid foundation to monitor and control the work performed during the actual implementation of the project. The project manager conducts the subtask of monitoring and controlling the work performed parallel to the subtask of directing and

managing the work done by the project team as well as parallel to the other two subtasks. This concept of performing managing and leadership subtasks in parallel is visually shown in Figure 8-4. The subtask of directing and managing the work performed in projects was the topic of Chapter 7. The subtask of integrating and controlling changes is the topic of Chapter 9, "The Integrating and Controlling of the Changes Occurring in Projects," and the subtask of controlling and validating the scope is the topic of Chapter 10, "The Controlling and Validating of the Scope of Projects." As stated before, this chapter addresses the subtask of monitoring and controlling the work performed.

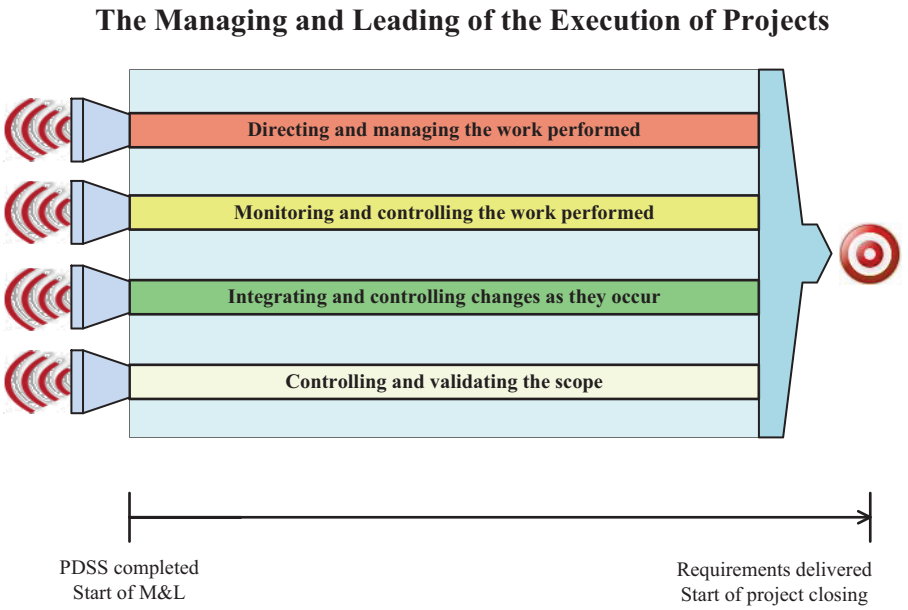


Figure 8-4 The tasks performed to manage and lead project execution according to the PMBOK® Project Integration Management Knowledge Area

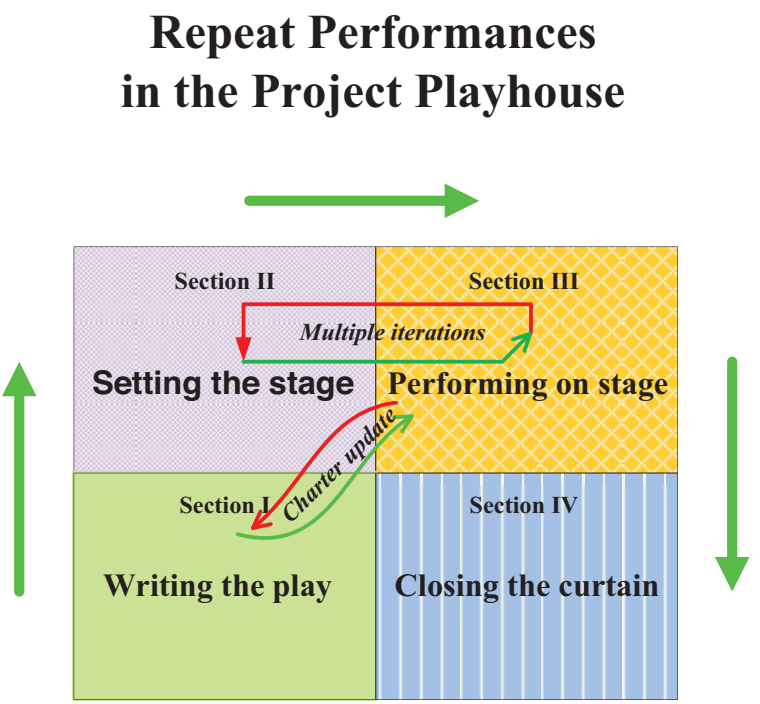
Although the visual could give the impression that project activity tasks and subtasks are executed in a linear sequence, akin to a body that keeps moving along the initial line of force that set it into motion (neglecting friction for the sake of the pedagogical analogy) and in the absence of an opposing force. This is definitely not the case in project management. This will be addressed in more detail in the following paragraph. But first, let us consider the multiple benefits of visuals. Everybody is familiar with the phrase "a picture is worth (or says more

than) a thousand words." The visual about the managing and leading of the execution of projects nicely illustrates this popular wisdom. The first-impression intention is to illustrate the parallel execution of the four subtasks. A second look at the visual makes it apparent that neglecting one of the four subtasks (depicted as engines) will create an uneven supply of thrust to the "project spaceship" and will cause the ship to veer off course and possibly miss the target altogether.

Next, let us take a look at the reasons for, or causes of, nonlinear project progress. First of all, friction is an inherent element in any human endeavor. There will be some natural friction within the project team and some friction between the team and the stakeholders. That is just one reason why the project manager must be capable of providing leadership. Next, there will be forces, however small at first, that impede the ideal and desirable linear progress. Accumulative effects from the forces often require reassessment of planned values and the intended sequences of steps.

Two of the most popular impeding forces are cost increases or cost overruns and clandestine or open attempts to change the scope. Scope changes will be addressed in Chapter 10. Cost increases can be caused by outside influences as well as by having made assumptions during the initial estimating that turn out to have been too optimistic. Whatever the reasons, there will be points on the project's time axis where it is necessary to revisit the planning, defining, scoping, and structuring (PDSS) section described in Section II of this book and represented in Quadrant II of the four-quadrant visual introduced in Figure 7-1 of Chapter 7. In some cases, it might even be necessary to change the Project Charter, although this should be avoided if at all possible. A point that should be considered very seriously is that if the change is too significant to avoid or absorb it in the current SPOR charter, it could almost always be wiser to terminate the current project and initiate a successor project. Such a decision requires strong and competent top management; but, if made, the decision will not only avoid unnecessary project costs, but it will also be much better for the career of the project manager. The latter point should give a project manager the strength to bring the termination idea into the discussion with top management. Figure 8-5 illustrates this cyclic element in project management. The contents of each section of this book correspond to one quadrant in Figure 8-5. Consequently, the

terms quadrant and section can be used interchangeably. For example, the quadrant labeled "Setting the stage" can be referred to as Quadrant II or as Section II.



Legend: The section (quadrant) numbers refer to the sections in the book

Figure 8-5 Project planning and execution feedback and iterations cycle

From and for Practical Project Cases

In Chapter 7, an approach was introduced to create a watch list for the management of the execution of a project. This list is created by using the input, output, and tools and techniques information provided by the *PMBOK® Guide* for every process in the PMBOK® Process Groups. This might look to be too simple, but as experience teaches us, simplicity is powerful. As a matter of fact, it has been very useful to start documentation for the management of a project if no documentation from prior projects exists in an organization.

Two caveats expressed in Chapter 7 are so important that they are repeated here. The first caveat was that all planning, defining, scoping, and structuring must have been completed before starting the execution of the project. The second caveat was a reminder that the standards listed in the *PMBOK® Guide* are standards based on common practices and thus not an exhaustive list of project management practices. There might be a need in a project for additional sub-subtasks, inputs, required outputs, or new tools and techniques. If this is the case, the new additions should be documented and included in the Organizational Process Assets to be available for use in future projects.

The approach described in Chapter 7 consists of the project manager asking specific questions pertaining to a subtask and also providing the answers. The answers can be found by cross-referencing the project management master plan, the work breakdown structure (WBS), other project documentation, and the PMBOK® list of practice standards. The creation of mind maps has proven to be a very practical and sustainable way of providing an information base that is easy to use and easy to maintain. As an example, the approach to take management control of the inputs to the subtask of monitoring and controlling the work performed is shown in Figure 8-6 and in Table 8-1, which lists the answers found.

Example

For ease of cross-reference, the icon numbers are used to identify the PMBOK® process in the respective Knowledge Area, which in this example is the Integration Knowledge Area. The arrow pointing to the left indicates "is input to." The arrow pointing to the right indicates "is output from."

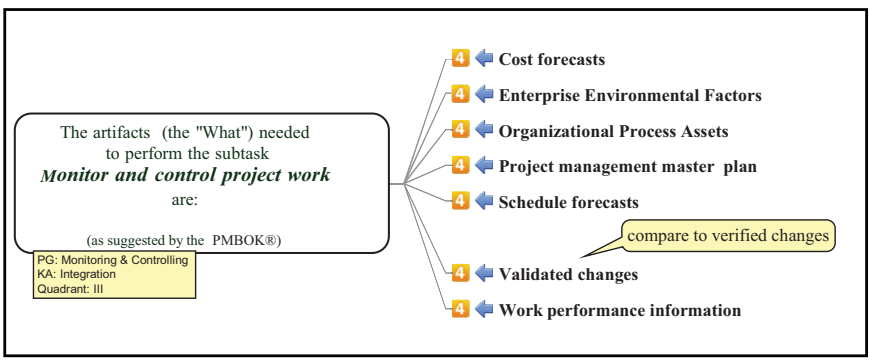


Figure 8-6 What do I need to monitor and control project work?

Example of Answers

Enterprise Environmental Factors and Organizational Process Assets are generic knowledge bases that provide input to most subtasks. Both are updated by some results produced by the work performed in projects, but there is no specific process listed in the *PMBOK® Guide* that is comparable to the treatment of the other PMBOK® processes.

A cross-reference check of a PMBOK® Über mind map reveals the information shown in Table 8-1 about the sources of the required input artifacts.

Table 8-1 The Sources That Deliver the Artifacts Needed to Monitor and Control the Work Performed

Input Artifact	Is Delivered by the PMBOK® Process	Is the Result of the Management Activity	Holistic Activity Task	Book Section (Quadrant)
Cost forecasts	N/A; computed by plan versus actual or estimates to complete	Holistic Scope (in the PMBOK® the activity is part of Integration KA)	Monitoring & Controlling	III
Project management plans	Develop Project Management Plan	Holistic Scope (in the PMBOK® the activity is part of Integration KA)	Planning	II
Schedule forecasts	N/A; computed by planned versus forecasted finish dates or estimated time to complete	Holistic Scope (in the PMBOK® the activity is part of Integration KA)	Monitoring & Controlling	III
Validated changes	Perform Quality Control	Quality Management	Monitoring & Controlling	III
Work performance information	Validate Scope Control Scope	Scope Management	Monitoring & Controlling	III

For completeness, the visuals for the questions about outputs and tools and techniques for the task of monitoring and controlling the work performed in projects, as defined in the *PMBOK® Guide*, are shown in Figure 8-7 and Figure 8-8, but not described in detail.

Figure 8-7 shows the artifacts to be delivered by the subtask *Monitor and control project work*.

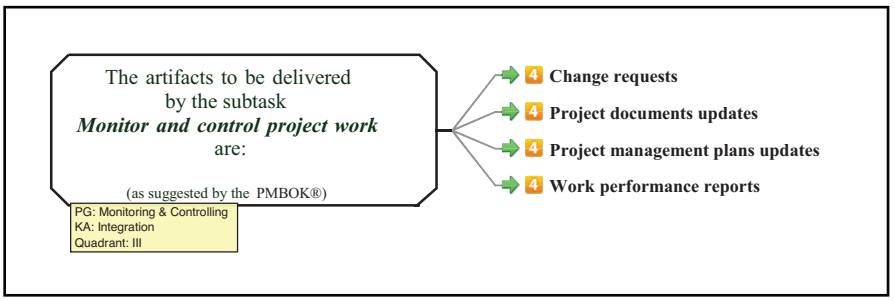


Figure 8-7 What do I have to deliver from monitoring and controlling project work?

The project manager can now connect these items to the time axis as defined in the project management master plan and put them on his or her watch list or on some team member's watch list who is assigned to the subtask to keep track of the deliverables.

Figure 8-8 shows the means by which the artifacts to be delivered by the subtask *Monitor and control project work* can be produced.

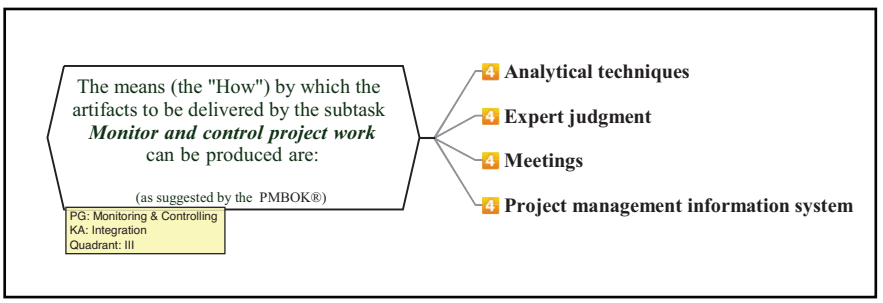


Figure 8-8 How or by what means can I produce the artifacts to be delivered?

Knowing what tools, equipment, or resource availability will be needed allows the project manager to arrange for their availability for the time and possible amount or volume required.

Summary

Four tools and techniques are considered practice standards to transform seven input artifacts into four new artifacts.

The purpose of the subtask monitoring and controlling the work performed in projects is to ensure that the project is on track to meet the project goal and objectives. This subtask must be performed in parallel to the other three subtasks of the task managing and leading the execution of projects.

Managing and leading the execution of projects does not proceed in a linear fashion; rather, it often involves several iterations that possibly require updates to the project documents created in the PDSS task.

The project manager can add to the watch list or tracking system created in the directing and managing project work subtask.

Review Questions

1. What is the prerequisite for providing a project manager with a solid foundation on which to stand during the monitoring and controlling of project work?
2. What is the purpose of monitoring and controlling the work performed in projects?
3. What are the means by which given artifacts can be transformed into new artifacts during the monitoring and controlling of project work?

9

The Integrating and Controlling of the Changes Occurring in Projects

α Learning Objectives

Note: To support the learning process and to reinforce the retention of the chapter's content, the learning objectives are not necessarily listed in the sequence of the chapter content.

After having read and comprehended the contents of this chapter, you should be able to:

- Know which artifacts are inputs to the subtask of integrating and controlling changes occurring in projects.
- Describe the project management framework of the four quadrants.
- List the artifacts delivered by the subtask integrating and controlling changes occurring in projects.
- Describe the purpose of controlling and integrating changes in a project.
- Add the tracking of changes to the watch list or tracking system created during one of the other subtasks of managing and leading the execution of projects.

Overview

The integrating and controlling of changes occurring in projects is the third of the four subtasks that constitute the activity task of managing and leading the execution of projects.

Chapter 7, "The Directing and Managing of the Work Performed in Projects," addressed the aspects that a project manager needs to consider and the actions to undertake to direct and manage the work performed in a project. Chapter 8, "The Monitoring and Controlling of the Work Performed in Projects," addressed the actions, approaches, and aspects that have proven to be practical and useful in monitoring and controlling the work performed in projects. In this chapter, we will look at what a project manager should take into consideration to control the changes that occur during the life of the project and how to integrate these changes so that that they fit into the defined domain of the project and do not disrupt the progress to reach the project's goals and objectives.

The approach taken is analogous to the approaches used in Chapter 7 and Chapter 8. First, we look at the way integrated change control is addressed in the *PMBOK® Guide*, and then we look at the integration of changes as handled in the holistic view.

The PMBOK® Process Perform Integrated Change Control

The PMBOK® process *Perform integrated change control* is part of the PMBOK® Integration Knowledge Area and within this area; it belongs to the Monitoring and Controlling Process Group. Figure 9-1 presents a visual representation of where in the Integration Knowledge Area the *Perform integrated change control process* is located. For ease of cross-reference, the labels added at the bottom of the rectangles identify the respective project management Knowledge Area, which in this case is Integration, and the Process Group in the *PMBOK® Guide.* The icons have been added as a visual aid.

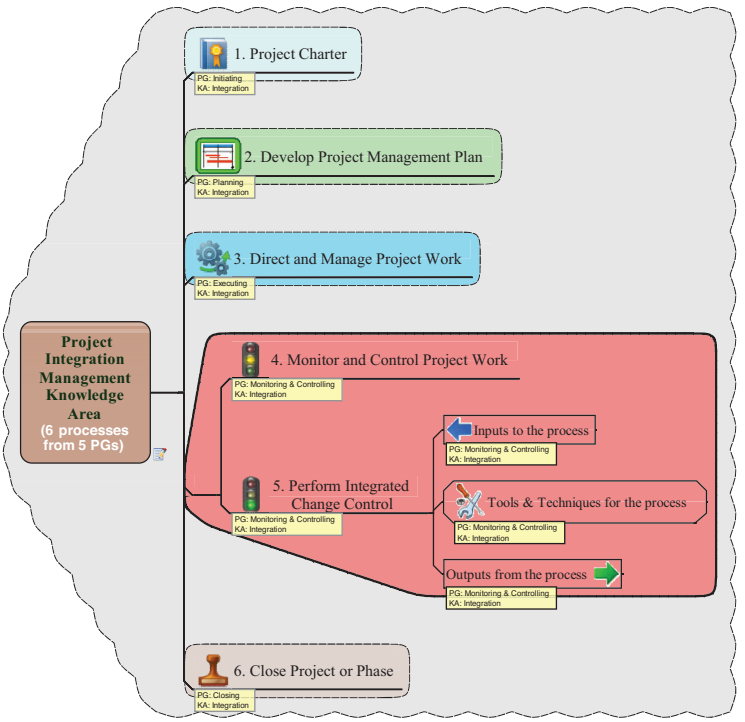


Figure 9-1 The PMBOK® process *Perform integrated change control*

As pointed out in previous chapters, the *PMBOK® Guide*—Fifth Edition defines two separate Knowledge Areas, Integration and Scope, to describe the tasks that manage the scope of a project, while from the holistic viewpoint these tasks are all part of a unified scope management activity.

Figure 9-1 shows that there are inputs to the PMBOK® process, outputs from the process, and tools and techniques that are commonly used by practitioners of project management for this process and thus have been established as practical standards. The specific inputs, outputs, and tools and techniques for this process are individually listed in Figure 9-2. The icons have been added as a visual aid.

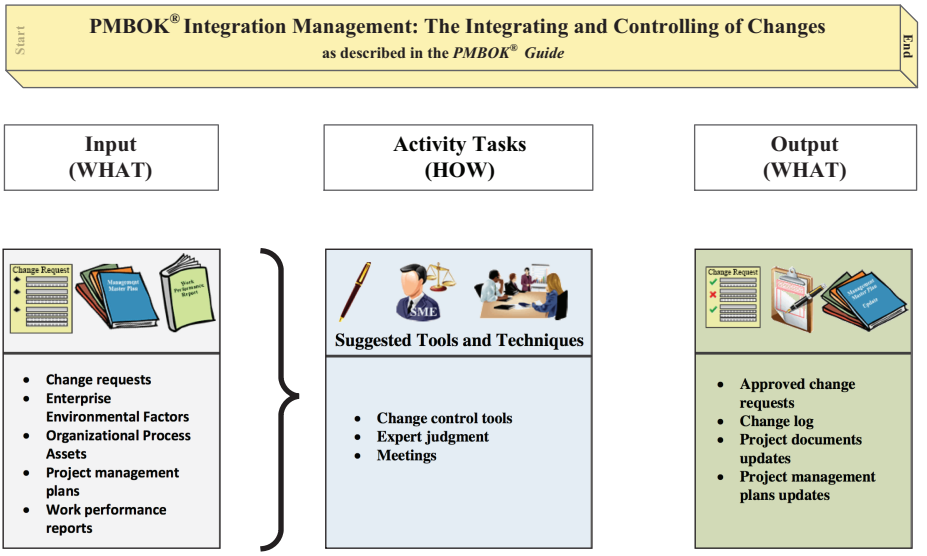


Figure 9-2 IPO view of the PMBOK® process *Perform integrated change control*

The individual artifacts are addressed in the following sections.

The Holistic View of Integrating and Controlling the Changes Occurring in Projects

As can be seen in Figure 9-2, the *PMBOK® Guide* considers controlling the changes occurring in a project as part of the PMBOK® Integration Knowledge Area. It has frequently been pointed out that in the holistic view, the scope of a project defines and embraces all aspects of a project and, thus, changes occurring in a project are controlled and managed as an integral part of the scope management activity.

In the holistic view of scope management, managing and leading the execution of a project integrates four activity subtasks, which are shown in Figure 9-3. The subtask of integrating and controlling the changes occurring in projects is identified by an oval.

The purpose of controlling and integrating changes is to ensure that:

- All changes are identified and documented. That is, no changes occur without being noticed.
- The impacts of changes are determined.
- The costs of the changes are determined.
- The cause that triggered the perceived need for the change is identified.
- Possible risks associated with the change are identified.
- All changes are reviewed, understood, and accepted by all stakeholders.

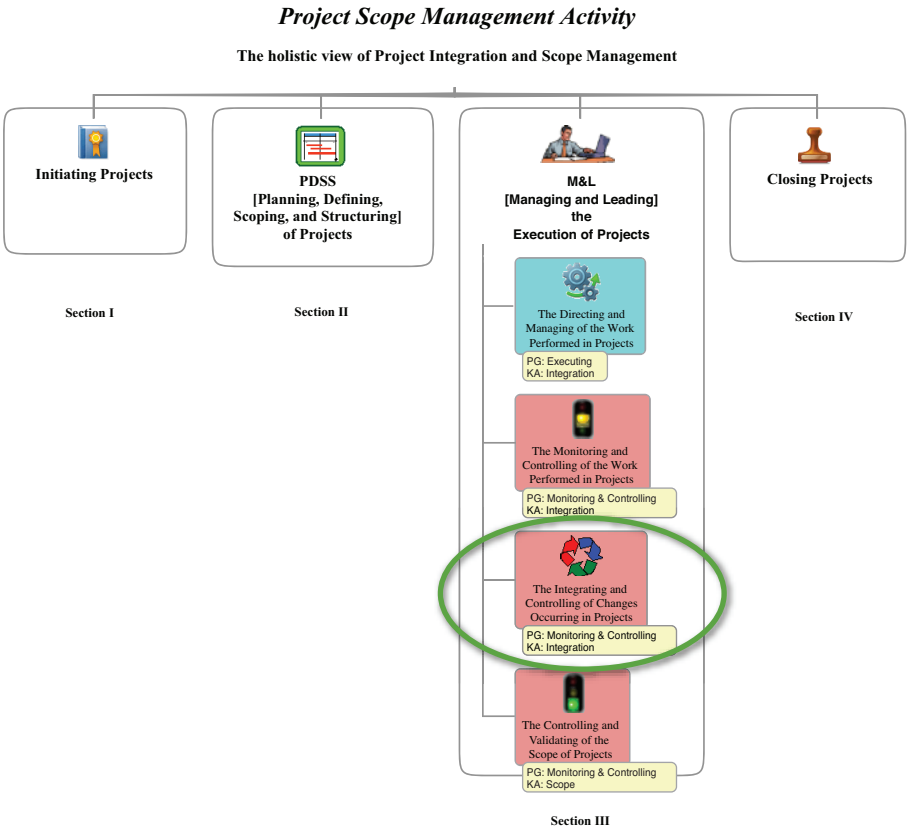


Figure 9-3 The holistic view of controlling and integrating changes in a project

The procedure for controlling and integrating changes must have been defined in the change management plan (a subsidiary to the Project Management Master Plan).

For ease of cross-reference, the labels added at the bottom of the rectangles identify the respective project management Knowledge Area, which in this case is Integration, and the Process Group in the *PMBOK® Guide*. The icons have been added as a visual aid. The inputs and the outputs listed in the *PMBOK® Guide* and shown in Figure 9-2 are—since they are practice standards—used and produced in the holistic scope management as well.

One of the benefits of the holistic viewpoint is that it enables the conception of a simple structure of project management and from this concept the construction of a project management framework. The concept and the framework have been introduced in the previous chapters but without explicitly referring to it as a framework. This was done intentionally to allow for the experience of the naturalness of the concept and framework. The framework is shown in Figure 9-4.

A Project Management Framework

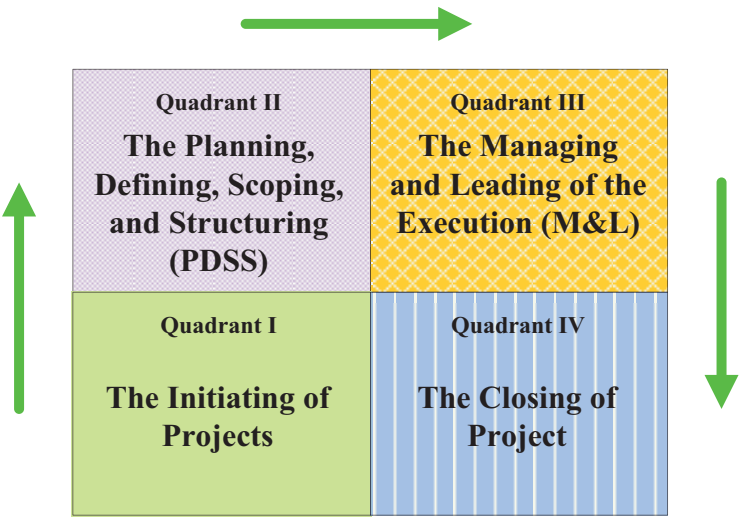


Figure 9-4 The project management framework based on a holistic viewpoint

Given the scope of this book, the details of the framework are specific to the holistic project scope management activity (the PMBOK® Integration and Scope Management Knowledge Areas). When the other eight project management activities (time, cost, etc.) are considered under the framework, the details for each of these activities are applied correspondingly to Quadrant II and Quadrant III. Both Quadrant I and Quadrant IV apply to the entire project and are thus "filled" with appropriate details only once. In other words, depending on which project management activity is under consideration, the nature of the details in Quadrants II and III will be different. By contrast, the nature of the details in Quadrants I and IV remains constant, that is, Quadrant I will always contain the Fundamentals and the SPOR Project Charter. The wording of the Project Charter might, of course, be changed during the life of the project, but it is still the Project Charter. Quadrant IV is "filled with life" when the project is closed.

The benefits of the framework structure have already been described in Chapters 7 and 8. The simplicity of the structure illustrated the inherent similarities between the four subtasks building Quadrant III of the framework. This simplicity provided for the repetition of approaches to the management subtasks and steps and the opportunity for similarity of descriptions. The visual representation of the four elements of Quadrant III has been introduced in Chapter 8 and is repeated in Figure 9-5 for convenient reference. The topic of this chapter is the third subtask in Figure 9-5.

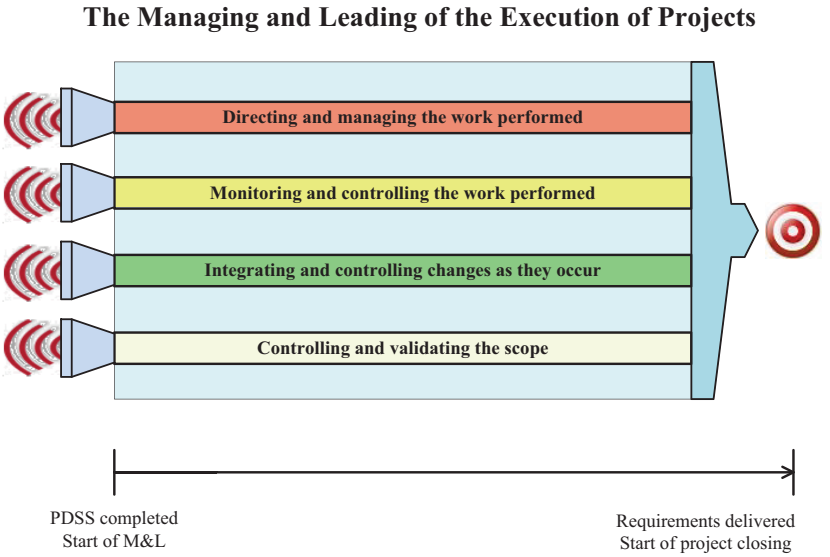


Figure 9-5 The four elements of Quadrant III of the project management framework (for the holistic scope management activity)

From and for Practical Project Cases

Just as the framework provides overall simplicity and opportunity for repetition for the management of projects, so does the simplicity of object-oriented thinking when performing the individual steps of a task or subtask. The objects, or artifacts, required for a step or produced by a step are clearly identified and can be traced and thus controlled and managed by the project manager by creating watch lists. Similarly, the means (or tools and techniques as the *PMBOK® Guide* refers to them) are identified and can be acquired, learned, and applied by the project manager.

The creation and use of watch lists and the benefits derived from the watch lists are described in Chapter 7 and Chapter 8 and are not repeated here. The following example, shown in Figure 9-6, for the creation of watch lists presents the questions to be asked relevant to

the subtask of controlling and integrating the changes occurring in projects.

Example

For ease of cross-reference, the icon numbers in Figure 9-6 are used to identify the PMBOK® process in the respective Knowledge Area, which in this example is the Project Integration Management Knowledge Area. The arrow pointing to the left indicates "is input to." An arrow pointing to the right indicates "is output from."

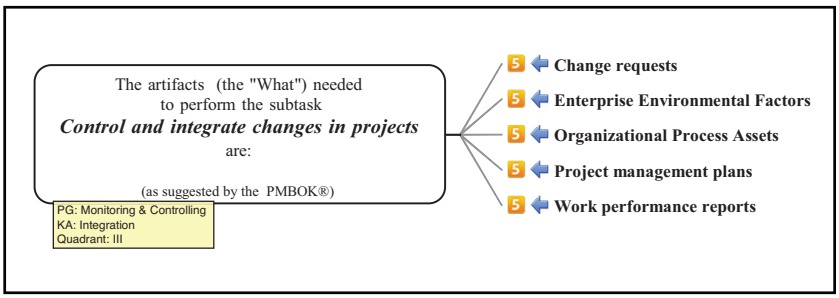


Figure 9-6 What do I need to control and integrate changes occurring in projects?

Example of Answers

Enterprise Environmental Factors and Organizational Process Assets are generic knowledge bases that provide input to most subtasks. Both are updated by some results produced by the work performed in projects, but there is no specific process listed in the *PMBOK® Guide* that is comparable to the treatment of the other PMBOK® processes.

A cross-reference check of a PMBOK® Über mind map reveals the information shown in Table 9-1 about the sources of the required input artifacts.

Table 9-1 Sources That Deliver the Artifacts Needed to Monitor and Control the Work Performed

Input Artifact	Is Delivered by the PMBOK® Process(es)	Is the Result of the Management Activity	Holistic Management Activity	Book Section (Quadrant)
Change requests	Direct and Manage Project Work	(PMBOK® Integration KA)	Scope	III
	Monitor and Control Project Work	(PMBOK® Integration KA)	Scope	
	Perform Integrated Change Control	(PMBOK® Integration KA)	Scope	
	Validate Scope	(PMBOK® Scope KA)	Scope	
	Control Scope	(PMBOK® Scope KA)	Scope	
	Control Schedule	(PMBOK® Time KA)	Time	
	Control Costs	(PMBOK® Cost KA)	Cost	
	Perform Quality Assurance	(PMBOK® Quality KA)	Quality	
	Control Quality	(PMBOK® Quality KA)	Quality	
	Manage Project Team	(PMBOK® HR KA)	HR	
	Control Communications	(PMBOK® Comm. KA)	Communications	
	Control Risks	(PMBOK® Risk KA)	Risk	
	Control Procurements	(PMBOK® Proc. KA)	Procurement	
	Conduct Procurements	(PMBOK® Proc. KA)	Procurement	
	Plan Procurements Management	(PMBOK® Proc. KA)	Procurement	II
	Control Stakeholder Engagement	(PMBOK® Stakeholder KA)	Stakeholder	III
	Manage Stakeholder Engagement	(PMBOK® Stakeholder KA)	Stakeholder	
Project management plan	Develop Project Management Plan	(PMBOK® Integration KA)	Scope	II
Work performance report	Monitor and Control Project Work	(PMBOK® Integration KA)	Scope	III

For completeness, the visuals for the questions about outputs and tools and techniques for the task of monitoring and controlling the work performed in projects, as defined in the *PMBOK® Guide*, are shown in Figure 9-7 and in Figure 9-8, but not described in detail. Figure 9-7 shows the artifacts to be delivered by the subtask *Control and integrate changes in projects*.

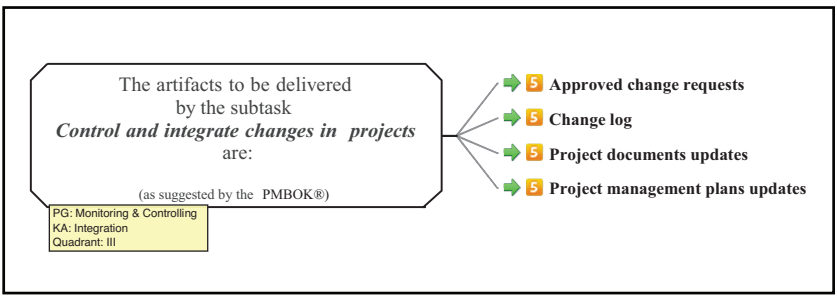


Figure 9-7 What do I have to deliver from controlling and integrating changes in projects?

The project manager can now connect these items to the time axis as defined in the project master plan and put them on his or her watch list or on some team member's watch list. Figure 9-8 shows the means by which the artifacts to be delivered by the subtask *Control and integrate changes in projects* can be produced.

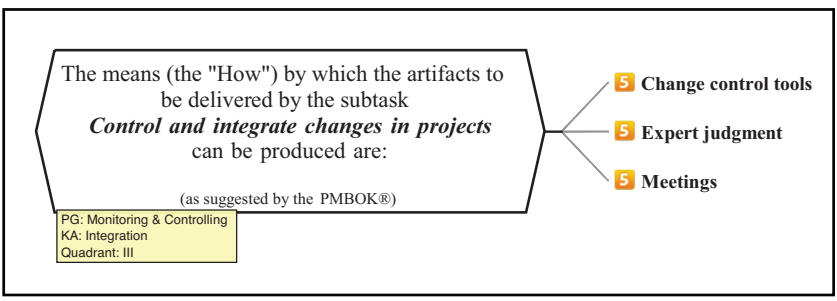


Figure 9-8 How or by what means can I produce the artifacts to be delivered?

Knowing what tools, equipment, or resource availability will be needed allows the project manager to arrange for their availability for the time and possible amount or volume required.

Knowledge is power, as the saying goes. Having full knowledge at any time down to the lowest level of granularity about the network of *What from Where, What to Where,* and *How (by what means)* in each case will enable the project manager to manage and lead the work performed in the project with a high probability for successfully providing the expected deliverables within the parameters defined in the SPOR Project Charter and the project management master plan.

To gain such knowledge, the project manager needs to ask questions like the ones shown in Figure 9-6, Figure 9-7, and Figure 9-8 about all tasks and subtasks in all nine project management activities. In PMBOK® terminology, this means asking the questions about all Process Groups and processes in all ten Knowledge Areas. The result will be a large map of relationships or a number of large tables, depending on one's preference and relevant summaries. Below are three summary examples of results in matrix form obtained when asking the questions about PMBOK® processes within the PMBOK® Project Integration Management Knowledge Area. Recall that this book's scope is limited to the PMBOK® Project Integration Management and Project Scope Management Knowledge Areas.

The summary of artifacts (inputs) delivered to the PMBOK® processes used in the PMBOK® Project Integration Management Knowledge Area is shown in Figure 9-9.

Integration Management
(PMBOK®)
Inputs

Inputs delivered to →	1 Dev. the Project Charter	2 Dev. the Project Mgt. Plans	3 Direct. & Manag. the Work	4 Monit. & Contr. of the Work	5 Integr. & Contr. of Changes	6 The Closing of Projects	
Accepted deliverables						x	1
Agreements	x						1
Approved change requests			x				1
Business case	x						1
Change requests					x		1
Cost forecasts				x			1
Enterprise Environmental Factors	x	x	x	x	x		5
Organizational Process Assets	x	x	x	x	x	x	6
Outputs from other processes		x					1
Project charter		x					1
Project management plan			x	x	x	x	4
Project statement of work (SOW)	x						1
Schedule forecasts				x			1
Validated changes				x			1
Work performance information				x			1
Work performance reports					x		1
Inputs used: unique (16); total usage (28 times)	5	4	4	7	5	3	28

Figure 9-9 Artifacts delivered to the PMBOK® integration management processes

The summary of artifacts (outputs) delivered by the PMBOK® processes used in the PMBOK® Project Integration Management Knowledge Area is shown in Figure 9-10.

Outputs produced (delivered) by →													
Outputs produced: unique (12); total produced (17)	1	1	5	4	4	2	17

Figure 9-10 Artifacts produced (delivered) by the PMBOK® integration management processes

The summary of means (tools and techniques) used for performing the processes in the PMBOK® Project Integration Management Knowledge Area is shown in Figure 9-11.

Integration Management
(PMBOK®)
Tools &Techniques

Tools & Techniques used for →	1 Dev. the Project Charter	2 Dev. the Project Mgt. Plans	3 Direct. & Manag. the Work	4 Monit. & Contr. of the Work	5 Integr. & Contr. of Changes	6 The Closing of Projects	
Analytical techniques				x		x	2
Change control tools					x		1
Expert judgment	x	x	x	x	x	x	6
Facilitation techniques	x	x					2
Meetings			x	x	x	x	4
Project management information system				x			1
Project MIS			x				1
T&T used: unique (7); total usage (17 times)	2	2	3	4	3	3	17

Figure 9-11 The tools and techniques used in the PMBOK® integration management processes

Summary

Five artifacts are required to integrate and control changes occurring in a project and produce four new artifacts as deliverables from the subtask.

Six items can be identified to describe the purpose of controlling and integrating changes occurring in a project.

The project management framework introduced earlier for the scope management activity is applicable to the other eight project management activities as well.

Information from integrating and controlling changes can be used to enlarge and strengthen the watch list or tracking system created earlier.

For the PMBOK® Project Integration Management Process Groups, three matrices are shown providing information about which artifacts are input to which processes, which artifacts are produced by which processes, and which tools and techniques are used for which processes.

Review Questions

1. What are the questions you must ask if you want to add information about changes to the watch list or tracking system created earlier?
2. What are the means by which a project manager can integrate and control the changes occurring in projects?

10

The Controlling and Validating of the Scope of Projects

α Learning Objectives

Note: To support the learning process and to reinforce the retention of the chapter's content, the learning objectives are not necessarily listed in the sequence of the chapter content.

After having read and comprehended the contents of this chapter, you should be able to:

- Describe what is meant by scope creep.
- List the five artifacts that are required inputs to the subtask of validating scope of a project.
- Describe how change requests are addressed and handled.
- Describe the assessment criteria for the evaluation of change requests.
- List the four deliverables produced by the subtask of validating the scope.
- List the five artifacts that are required inputs to the subtask of controlling the scope of a project.
- List the five deliverables produced by the subtask of controlling the scope.

Overview

There are four subtasks that comprise the task of managing and leading the execution of projects. The first three of these subtasks are

addressed in Chapters 7, 8, and 9 ("The Directing and Managing of the Work Performed in Projects," "The Monitoring and Controlling of the Work Performed in Projects," and "The Integrating and Controlling of the Changes Occurring in Projects," respectively).

Probably the most common, or at least one of the top three explanations given for a project manager not having delivered the expected results of the project, is that "there were unexpected changes in scope that we could not have anticipated." These unanticipated changes have a special name, which is the much-feared *scope creep.* The task to avoid scope creep by controlling and validating the defined and accepted scope of the project is not only one of the most important tasks in the management of a project, but it is also an ongoing effort. This chapter addresses the controlling and validating of the scope of projects.

The approach taken is analogous to the approaches used in Chapter 7 and Chapter 8. First, we look at the way integrated change control is addressed in the *PMBOK® Guide*, and then we look at the integration of changes as handled in the holistic view.

The PMBOK® Processes to Validate and Control Scope

The *PMBOK® Guide* defines two Knowledge Areas, the Integration Knowledge Area and the Scope Knowledge Area. It has been pointed out frequently in this book that from a holistic viewpoint, these two Knowledge Areas constitute one single activity, namely the Project Scope Management Activity. This is described in detail in Chapter 1, "Fundamentals." The *PMBOK® Guide* Knowledge Area Project Scope Management is shown in Figure 10-1. The *Validate scope* and the *Control scope* processes are identified by an oval.

For ease of cross-reference, the labels added at the bottom of the rectangles identify the respective project management Knowledge Area, which in this case is Scope, and the Process Group in the *PMBOK® Guide.* The section labels refer to the sections in this book in which the specific topics are addressed.

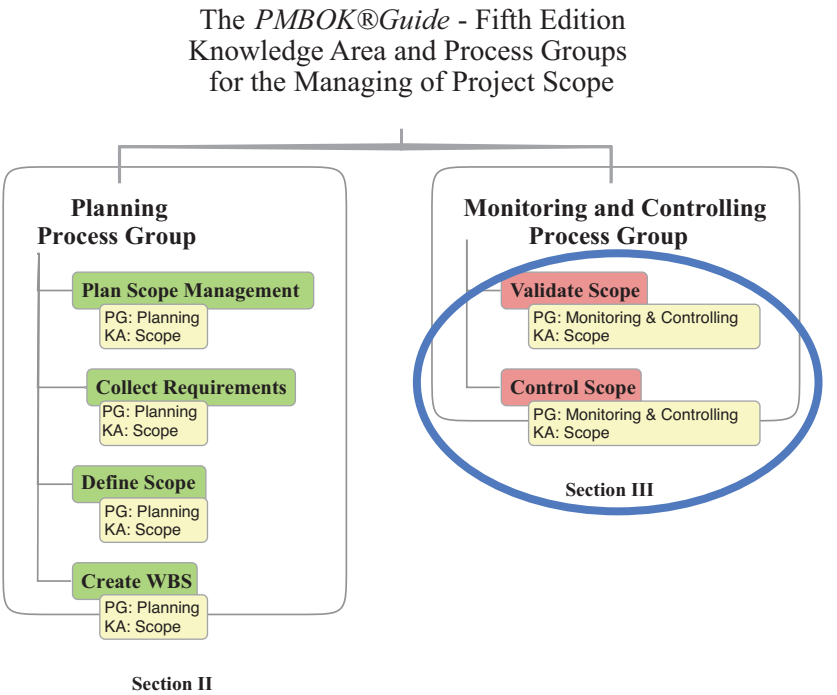


Figure 10-1 The PMBOK® *Validate scope* and *Control scope* processes

For each of the two processes, the *PMBOK® Guide* lists the inputs and the outputs and also suggests the tools and techniques for transforming the inputs into the outputs. As with all *PMBOK® Guide* suggestions, the tools and techniques for controlling and validating the scope of a project are the best practices used by practitioners. Figure 10-2 shows the specific items of the input, output, and tools and techniques as listed in the PMBOK® using the IPO format. For a description of the IPO format and its background, see Chapter 1.

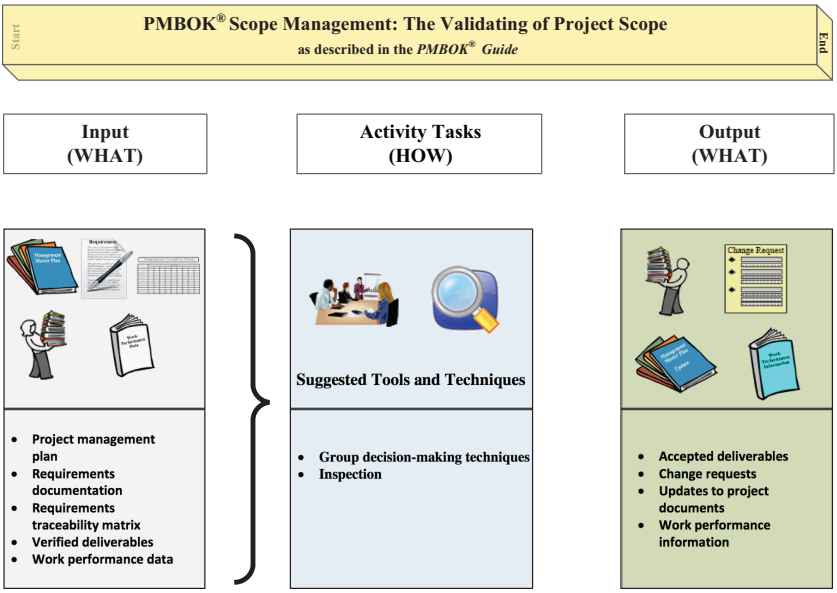


Figure 10-2 IPO view of the PMBOK® process *Validate scope*

The subtask of validating the scope of the project produces outputs that are key items on the way to successful completion of the projects: the deliverables accepted by the stakeholders with the authority to declare acceptance. This is different from declaring deliverables to be the "correct" deliverables from the specification point of view and declaring that the deliverables meet the quality standards specified for these deliverables.

The Holistic View of the Controlling and Validating of the Scope of Projects

Figure 10-3 shows the holistic view of the entire project scope management activity. The controlling and validating of scope are considered to be of such closely related nature that they are subsumed into a common collection of steps and thus performed as one subtask. This task is identified by an oval.

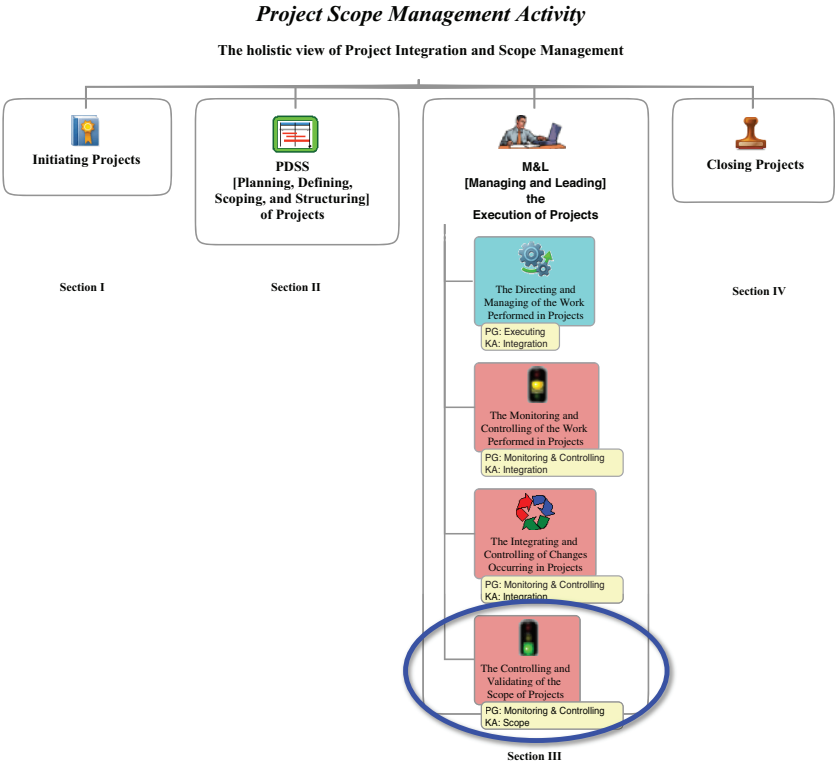


Figure 10-3 The holistic view of controlling and validating the scope of projects

For ease of cross-reference, the labels added at the bottom of the rectangles identify the respective project management Knowledge Area, which in this case is Scope, and the Process Group in the *PMBOK® Guide*. The icons have been added as a visual aid. The inputs and the outputs listed in the PMBOK® and shown in Figure 10-2 are—because they are practice standards—used and produced in the holistic scope management as well.

Since the *PMBOK® Guide* differentiates between validating and controlling the scope in projects, it supplements the inputs, outputs, and tools and techniques for validating scope shown in Figure 10-2 with an additional list of inputs, outputs, and tools and techniques for controlling scope. These items are shown in IPO format (recall that the IPO concept is described in Chapter 1) in Figure 10-4.

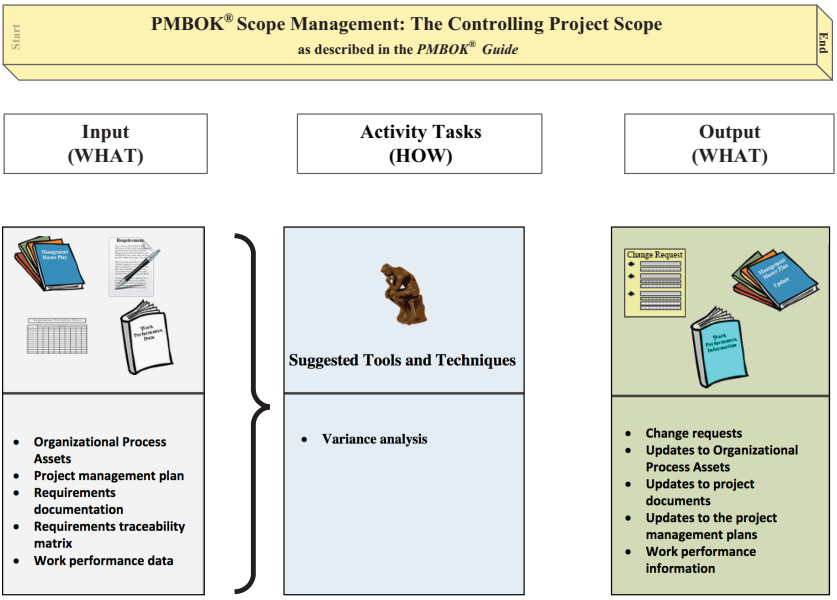


Figure 10-4 IPO view of the PMBOK® process *Control scope*

The purpose of the subtask of controlling and validating the scope of projects is to ensure that (a) the deliverables stay within the defined scope and that (b) complete and understandable documentation is developed and kept up to date to enable the relevant stakeholder (customer) to examine and validate the deliverables for acceptance.

Since the controlling and validating of the scope of projects is of such critical importance, special care must be taken when change requests are processed. The first step is to determine if the requested change affects the scope of the project or not. Depending on the size of the project, this examination could be conducted by the project manager or a team member. In a larger project, it might be advisable to have a trio of designated people perform the first examination.

Change requests that do not affect the scope are marked to follow the established change request procedure. Change requests that appear to affect the project's scope should be passed on to the Change Control Board. This board must evaluate the impact, the benefit, and the risks associated with a particular change request. If the board has established that a change request will affect the scope of the project, the size, effect, and all other consequences must be communicated

to all stakeholders. The most difficult part in this communication is to ensure that stakeholders take the time to fully comprehend the consequences of an approval of the change request. All stakeholders who approved the initial scope of the project must approve all scope-changing requests.

Typical assessment criteria for the evaluation of the change request are:

Assessing the impact

- **Cost.** What additional amount of money will be required?
- **Quality.** What are the detailed effects on the quality of the expected deliverables?
- **Resources.** How many additional human resources will be required? How much in nonhuman resources will be required to be obtained?
- **Risk.** What are the risks (categorized) associated with the change? What new risks will possibly be added?
- **Time.** What is the effect on the project schedule?

Benefits

- What are the specific tangible benefits?
- What are the nontangible benefits?

Although procedures can be established to control and validate change requests that affect the scope of a project, controlling scope creep is much more difficult. In essence, the project manager must constantly keep an eye on his or her watch list, review every change request, and perform both "management-by-walking-around" and "management-by-ongoing-communication."

Two ways of at least reducing, even if not avoiding all opportunities for scope creep, is to require that a change request form is completed even for the smallest change and publish a list of "frequent change requesters."

A prerequisite for any hope of controlling scope creep is the definition or at least description of the project's complexity in the Project Charter. Such definitions allow adequate planning and anticipation. Any "late-night" discovery of complexity usually creates panic and

results in quick fixes or patch work. Both are forebodes of eventual disaster.

From and for Practical Project Cases

There is the description in Chapters 7, 8, and 9 of an approach the project manager can use to create watch lists. The details are not repeated here; instead, three questions are presented that a project manager should ask himself or herself to create a watch list relevant to the subtask of controlling and validating the scope of projects. For ease of cross-reference, the icon numbers are used to identify the PMBOK® process in the respective Knowledge Area, which in this example is the Scope Knowledge Area. The arrow pointing to the left indicates "is input to." An arrow pointing to the right would indicate "is output from."

The question about what inputs are needed to control and validate the scope of a project is shown in Figure 10-5.

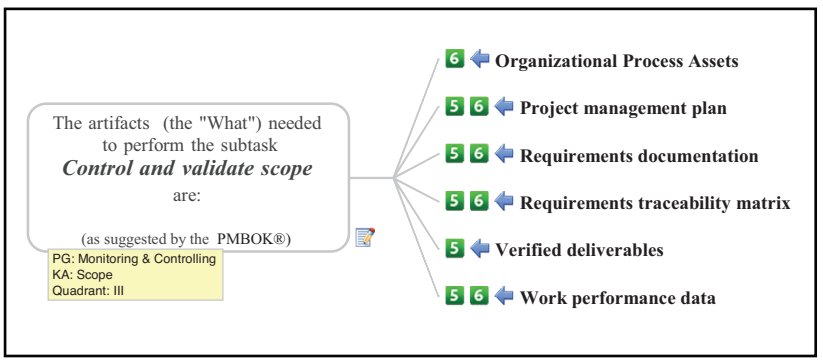


Figure 10-5 What do I need to control and validate the scope of a project?

The question about what the project manager has to deliver from controlling and validating the scope of a project is shown in Figure 10-6.

The question how or by what means the artifacts listed in Figure 10-6 can be produced is shown in Figure 10-7.

Knowledge is power, as the saying goes. Having full knowledge at any time down to the lowest level of granularity about the network

of *What from Where*, *What to Where*, and *How (by what means)* in each case will enable the project manager to manage and lead the work performed in the project with a high probability for successfully providing the expected deliverables within the parameters defined in the SPOR Project Charter and the project management master plan.

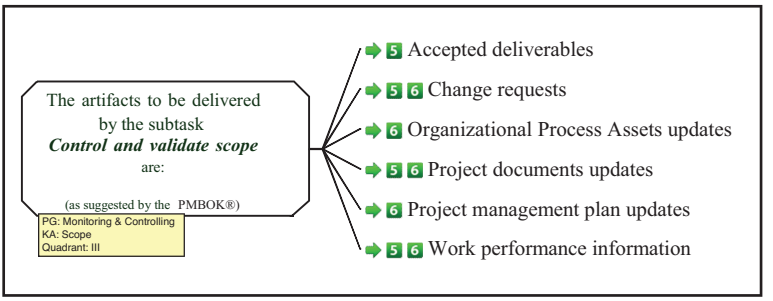


Figure 10-6 What do I have to deliver from controlling and validating the scope of a project?

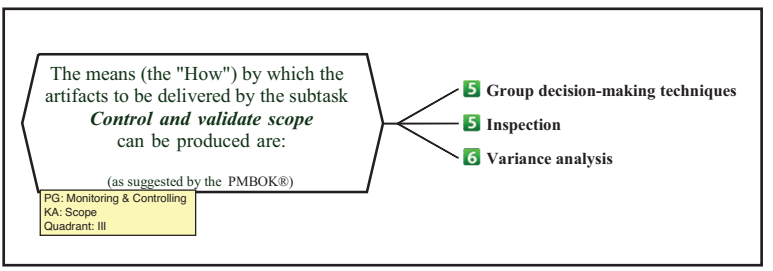


Figure 10-7 How or by what means can I produce the artifacts to be delivered?

To gain such knowledge, the project manager needs to ask questions like the one shown in Figure 10-5 about all tasks and subtasks in all nine project management activities. In PMBOK® terminology, this means asking the questions about all Process Groups and processes in all ten Knowledge Areas. The result will be a large map of relationships or a number of large tables, depending on one's preference and relevant summaries. Below are three summary examples of results in matrix form obtained when asking the questions about PMBOK® processes within the PMBOK® Scope Knowledge Area. Recall that this book's scope is limited to the PMBOK® Integration and Scope Knowledge Areas.

The summary of artifacts (inputs) delivered to the PMBOK® processes used in the PMBOK® Scope Knowledge Area is shown in Figure 10-8.

Scope Management (PMBOK®)
Inputs

Inputs delivered to →	1 Plan Scope Mgt	2 Collect Requirements	3 Define Scope	4 Create WBS	5 Validate Scope	6 Control Scope	
Enterprise Environmental Factors	x			x			2
Organizational Process Assets	x		x	x		x	4
Project charter	x	x	x				3
Project management plan	x				x	x	3
Project scope statement				x			1
Requirements documentation			x	x	x	x	4
Requirements management plan		x					1
Requirements traceability matrix					x	x	2
Scope management plan		x	x	x			3
Stakeholder management plan		x					1
Stakeholder register		x					1
Verified deliverables					x		1
Work performance data					x	x	2
Inputs used: unique (13); total usage (28 times)	4	5	4	5	5	5	28

Figure 10-8 Artifacts delivered to the PMBOK® scope management processes

The summary of artifacts (outputs) delivered by the PMBOK® processes used in the PMBOK® Scope Knowledge Area is shown in Figure 10-9.

Scope Management (PMBOK®)
Outputs

Outputs produced (delivered) by →	Plan Scope Mgt 1	Collect Requirements 2	Define Scope 3	Create WBS 4	Validate Scope 5	Control Scope 6	
Accepted deliverables					x		1
Change requests					x	x	2
Organizational Process Assets updates						x	1
Project documents updates			x	x	x	x	4
Project management plan updates						x	1
Project scope statement			x				1
Requirements documentation		x					1
Requirements management plan	x						1
Requirements traceability matrix		x					1
Scope baseline				x			1
Scope management plan	x						1
Work performance information					x	x	2
Outputs produced: unique (12); total produced (17)	2	2	2	2	4	5	17

Figure 10-9 Artifacts produced (delivered) by the PMBOK® scope management processes

The summary of means (tools and techniques) used for performing the processes in the Scope Management Knowledge Area is shown in Figure 10-10.

Scope Management (PMBOK®)
Tools &Techniques

Tools & Techniques used for →	Plan Scope Mgt 1	Collect Requirements 2	Define Scope 3	Create WBS 4	Validate Scope 5	Control Scope 6	
Alternatives generation			x				1
Benchmarking		x					1
Context diagrams		x					1
Decomposition				x			1
Document analysis		x					1
Expert judgment	x		x	x			3
Facilitated workshops		x	x				2
Focus groups		x					1
Group creativity techniques		x					1
Group decision-making techniques		x			x		2
Inspection					x		1
Interviews		x					1
Meetings	x						1
Observations		x					1
Product analysis			x				1
Prototypes		x					1
Questionnaires and surveys		x					1
Variance analysis						x	1
T&T used: unique (18); total usage (22 times)	2	11	4	2	2	1	22

Figure 10-10 The tools and techniques used in the PMBOK® scope management processes

Summary

Five artifacts are required inputs to validate the scope in a project and produce four new artifacts as deliverables from the subtask. Five artifacts are required inputs to control the scope in a project and produce five new artifacts as deliverables from the subtask.

Change requests must be handled with special care to determine if and how they could possibly affect the project scope. A special procedure for handling these requests must be established and strictly adhered to.

Assessment criteria for the evaluation of change requests must be established to determine the impact and the possible benefit of a change request.

Information from controlling and validating the scope can be used to enlarge and strengthen the watch list or tracking system created earlier.

For the PMBOK® scope management process, three matrices are shown providing information about which artifacts are inputs to which processes, which artifacts are produced by which processes, and which tools and techniques are used for which processes.

Review Questions

1. What are the criteria to assess the impact of a change?
2. By what means are the input artifacts transformed into new deliverables by the subtask of controlling the scope?
3. By what means are the input artifacts transformed into new deliverables by the subtask of validating the scope?
4. What are the criteria to assess the benefits of a change?

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Section IV

The Closing of Projects

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11

The Closing of a Project or of a Phase

α Learning Objectives

Note: To support the learning process and to reinforce the retention of the chapter's content, the learning objectives are not necessarily listed in the sequence of the chapter content.

After having read and comprehended the contents of this chapter, you should be able to:

- State the importance of the formal closure of a project.
- Describe the purpose of the project closure acceptance documentation (PCAD).
- Give a presentation to stakeholders about the purpose and content of the PCAD and the stakeholder involvement in the development of PCAD.
- Explain the purpose and the elements of lessons learned documentation.
- Ask the relevant questions to discover and document lessons learned.

Overview

The formal closing of a project is often neglected in and by organizations. The most frequent reason given is "... we should, but we have pressing new problems that need to be solved." This is, of course, a poor excuse and the organization deprives itself of learning from past failures (or successes) and in the end, it will pay a high price, most likely much higher than the anticipated gain from starting to work on other projects.

Major elements of the closing of a project (or a phase) are receiving stakeholder acceptance of the final delivery, conducting a formal handover or deployment, depending on the nature of the deliverables, documenting lessons learned, formally releasing human resources, and establishing an official end-of-project date.

Following the tradition established in the previous chapters, we start by taking a look at the PMBOK® process *Close project or phase* as described in the *PMBOK® Guide*–Fifth Edition.

The PMBOK® Process Close Project or Phase

Figure 11-1 shows a visual representation of the process to close the project or phase as listed in the Integration Knowledge Area of the *PMBOK® Guide.* For ease of cross-reference, the labels added at the bottom of the rectangles identify the respective project management Knowledge Area, which in this case is Integration, and the Process Group in the *PMBOK® Guide.*

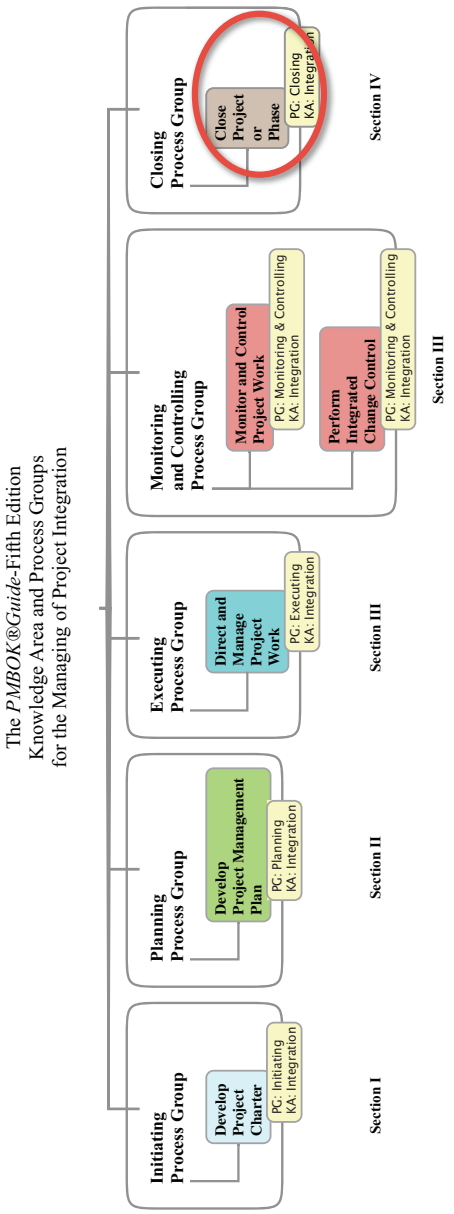

Figure 11-1 The PMBOK® process *Close Project or Phase* within the Integration Knowledge Area

The *PMBOK® Guide* also provides a list of inputs to the process, a list of outputs from the process, and a list of tools and techniques that are commonly used by practitioners of project management for this process and thus have been established as practical standards. The inputs, outputs, and tools and techniques for the process are shown in Figure 11-2. The icons have been added as a visual aid.

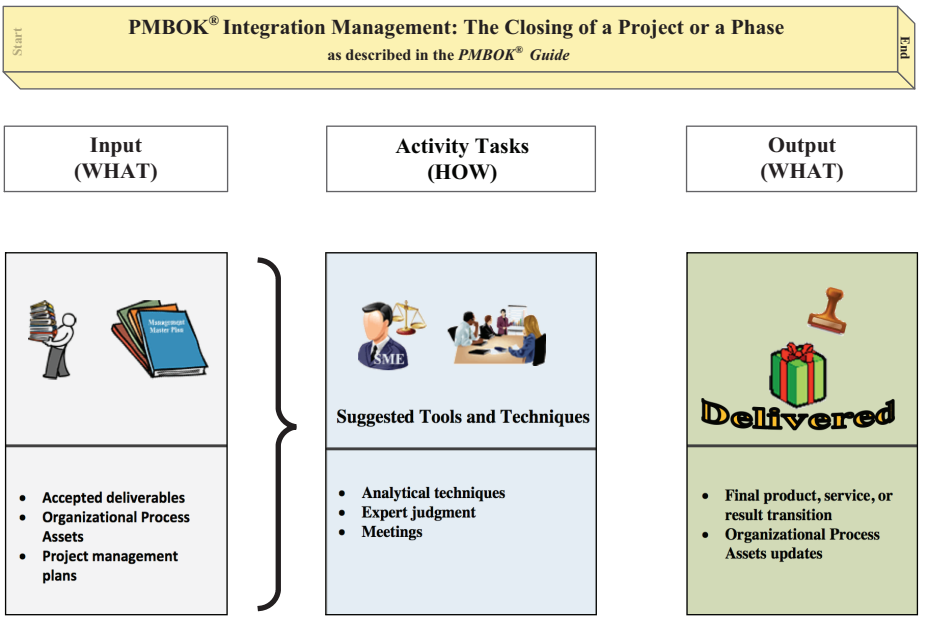

Figure 11-2 IPO view of the PMBOK® process *Close Project or Phase*

The Holistic View of the Closing of a Project or a Phase

There is no difference in the actual work done during the closing of a project between the PMBOK® view and the holistic view other than the often-mentioned fact that the PMBOK® integration processes are included in the holistic scope management activity as tasks. Figure 11-3 shows the holistic scope management with the task of closing a project or a phase.

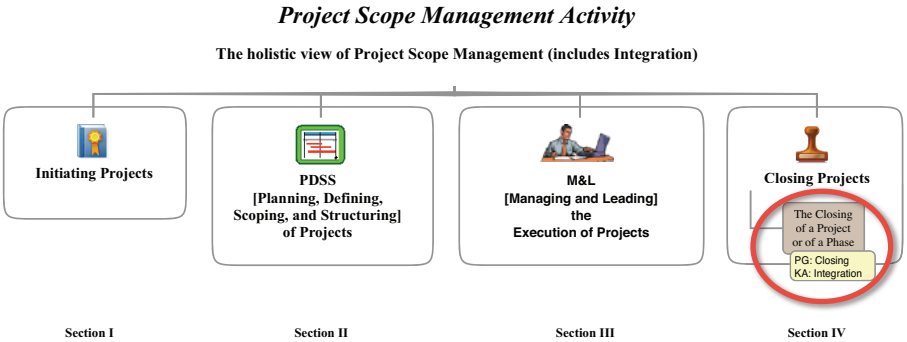

Figure 11-3 The closing of a project within the holistic scope management activity

The subtask of closing a project or a phase is identified by an oval. The icons have been added as a visual aid. The section numbers refer to the sections in the book. The inputs and the outputs listed in the *PMBOK® Guide* and shown in Figure 11-2 are—since they are practice standards—used and produced in the holistic scope management as well.

A first look at the input artifacts and the output artifacts might create the impression the closure task is small, of minor importance, and requires little effort. The accepted deliverables are entered into the closing task and are delivered as the final product or service. The Organizational Process Assets are input and output, which means they probably are updated. The HOW column indicates that these steps take place in one or more meetings with subject matter experts (SMEs) providing the analytical skill for the transition.

This impression is, however, far removed from the reality of closing a project. There are two key elements in a project, the official authorization of the project and the official closing of the project. The former is represented by the single point of reference (SPOR) Project Charter and the latter is represented by the project closure acceptance documentation (PCAD). The SPOR Project Charter rests on the foundation provided in Chapter 1, "Fundamentals," and is described in detail in Chapter 2, "The Project Charter." We now take a look at the details of the project closure acceptance documentation (PCAD), which also rests on the foundation of Chapter 1, and it is only appropriate that the PCAD documentation is described in the final chapter of the book.

The Project Closure Acceptance Documentation (PCAD)

The Project Charter, created at the beginning (but before the start) of a project defines and describes what the forthcoming project is all about, its goals, objectives, parameters, reason(s) for being, constraints, and its scope. The PCAD can be considered to be the counterpart of the charter, created at the end of a project, when the destination has been reached.

Another way to look at the two documents (note that the PCAD usually is a set of documents) is to view the Project Charter as a statement of promises, namely What the project will deliver, When, Why, How, By What Means, Who will deliver it, and sometimes Where it will be performed and/or delivered. The PCAD documents if and to what extent the promises have been fulfilled. Just like the SPOR Project Charter, the PCAD must be developed in collaboration with the stakeholders.

Organizations use various forms for that check for fulfillment; some ask only for a summary check figure, while others are more detailed. For maximum benefit, there should be an actual value for every original plan value and a description of the actual state for every description of an original plan description—somewhat like double-entry accounting. When closed, the project should have a zero "balance."

The project closure acceptance documentation (PCAD) is a set of documents (often called reports). Which documents are a part of the set differs from organization to organization. Your organization might have forms specific to project closure. At a minimum, the documents and reports listed below should be included in the PCAD set, depending on the nature of the project. For example, if the project does not involve the development or update of software, there would be no need to collect software development metrics. The elements are listed in alphabetical order.

Elements of Project Closure Acceptance Documentation (PCAD)

- ***Budget-related administration.*** Final settlement and closing of any accounts payable, internal and external, must occur; this includes payment to team members, for example, overtime.
- ***Contract closure.*** All procurement and other subcontractor contracts must be settled according to the agreements as defined in the procurement management plan.
- ***Deliverables.*** The handover documentation is given to the end customer as well as any other documentation relating to the deliverables.
- ***Formal acceptance of deliverables document(s).*** The official acceptance document(s) are signed by the appropriate stakeholder or end customer.
- ***Lessons learned documentation.*** A detailed breakdown of the lessons learned documentation is listed in the following section.
- ***Organizational Process Assets update.*** The documentation that was used to update the Organizational Process Assets and the date of the update.
- ***Original project documentation.*** This includes the SPOR Project Charter, business case, and any other documents as they were available at the start of the project.
- ***Project Evaluation Report (PER).*** The PER is a very important report and usually consists of a rather large set of documents. At a minimum, the report should address and contain the following:
  - An executive summary of the PER
  - Lessons learned (a copy or at least a shortened version of the full lessons learned documentation)
  - An *original plan* versus *actual result* comparison of the major project parameters, such as

    Cost

    Deliverables

Goal(s)
Objectives
Quality
Risk recognition, handling
Schedule(s)
Scope
Stakeholder expectation/satisfaction

- Trendline of project progress over the life of the project

- ***Post mortem review meeting.*** Included if not taken care of in team and stakeholder review meetings.
- ***Project documentation.*** All project documentation produced during the life of the project, including training, handbooks, questionnaires, and so forth.
- ***Project-specific infrastructure administration.*** For example, canceling services, lines, equipment, and so on.
- ***Security handling of intermediate and final data.*** The storage or disposal of such data as outlined in the project management master.
- ***Software development metrics.*** If the project involved software development or update of software. This is important for the update of the Organizational Process Assets.
- ***Team-related administration.*** For example, releasing staff, handling open staff vacation days, and so on.
- ***Transition of project results to business functions.*** For example, to maintenance, operations, and possibly other organizational units.

Lessons Learned Elements

The purpose of lessons learned is (a) to avoid running into the same or similar problems in a project, (b) to support finding the root causes of problems or issues, and (c) to support the continuous improvement goal of the organization.

Lessons learned is a vital document that adds considerable value to an organization. It appears that the lessons learned concept is not used to the extent it should be used. The requirement to complete a lessons learned report was standard project management in the 1990s, yet recent research reports reveal that many projects do not deliver the expected results, as a search on the Web for "project failure" reveals.

At a minimum, a lessons learned report should contain the following items, which are listed here in alphabetical order. An organization might have a form with a particular layout for their lessons learned report.

- ***Communication.*** What worked well, where improvements should be made, what kind of improvements should be made
- ***Date.*** When a specific lesson learned item was adopted into the organization's standard procedure or method
- ***Description.*** Of the original situation and what was learned from handling it
- ***Identification.*** Of the lessons learned item; the lessons learned should be given a unique identification number and a descriptive name
- ***Originator.*** The name of the person who noticed that the item provides a valuable lessons learned
- ***Procurement.*** What turned out to be good procurement management, what should be improved, how to make the improvement
- ***Requirements I.*** What worked well for the definition of requirements, where improvements should be made, what kind of improvements
- ***Requirements II.*** What requirements (if any) turned out to be unreasonable, why they are unreasonable, and how these types of requirements should/could be avoided in other projects
- ***Review.*** The date of the review, the name of the participants, the evaluation of the item, and the decision reached by the reviewers

- ***Risk.*** What turned out to be good risk management, what should be improved, how to make the improvement (include list of risk defects)
- ***Stakeholder.*** What turned out to be good stakeholder management, what should be improved, how to make the improvement

Lessons Learned Questions

Some typical, and very useful, questions one should ask to determine lessons learned listed below:

What worked?

- What was it?
- What were potential pitfalls?
- What were the key success factors?
- What should/could have been done differently?
- How was it done?
- How were the key challenges mastered?
- When was it done?
- Where was it done?
- Who has done it?
- Why did it work?

What failed?

- What was it?
- How was it attempted?
- When was it attempted?
- Where was it attempted?
- Who has attempted it?
- Why did it fail?

Lessons learned information should be looked for and collected during the entire project life. A lessons learned early in the project might help avoid a problem later on in the project. It might also help to discover root causes of still hidden problems.

A nice little game in a project is to create a number-based ranking of lessons learned originators for the project. The top three ranks could be given some kind of reward (depending on the wisdom and generosity of top management).

Summary

There are three artifacts needed as input to the task of closing a project or a phase. Two items are delivered by the task. Three tools and techniques have established themselves as practice standards for the closure of projects.

Project closure acceptance documentation (PCAD) is the companion and counterpart to the SPOR Project Charter. Together they constitute the two elements that define a completed project.

The elements of the PCAD must be collected and completed in collaboration with the stakeholders. Lessons learned are an integral part of PCAD. There are specific questions for lessons learned that help in the description and documentation.

Review Questions

1. What are the categories of questions to ask when documenting lessons learned?
2. By what means is project closure performed?

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Index

D

E

F

G

H

I

J-K

L

M

N-O

P

Q

R

S

T

U

V

W

X-Y-Z