

ERIC S. NORMAN, PMP, PgMP  
SHELLY A. BROTHERTON, PMP  
ROBERT T. FRIED, PMP

# WORK BREAKDOWN STRUCTURES

THE FOUNDATION FOR  
PROJECT MANAGEMENT  
EXCELLENCE

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Project Management Institute



# **WORK BREAKDOWN STRUCTURES: THE FOUNDATION FOR PROJECT MANAGEMENT EXCELLENCE**

**Eric S. Norman, PMP, PgMP**


**Shelly A. Brotherton, PMP**

**Robert T. Fried, PMP**



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# Preface

So why write a book about Work Breakdown Structures? Actually, the answer is quite simple. In the vast body of project management literature, there is comparatively little written about Work Breakdown Structures (WBS)—and that is a problem. It is a problem because, not surprisingly, at this time in the evolution of Project Management as an advancing profession, the WBS has emerged as a foundational concept and tool. The WBS ensures clear definition and communication of project scope, while at the same time it performs a critical role as a monitoring and controlling tool. The WBS supports a variety of other Project Management processes—providing a baseline for planning, estimating, scheduling, and other “ing”-type activities. With the WBS performing this critical role, we believe it is important for Project Management literature to include additional material—and specifically, a detailed instructional text regarding Work Breakdown Structures.

This book is intended to be a beginning step in filling the information gap that exists between what is currently written about Work Breakdown Structures and what the authors have learned is needed by program and project managers today.

To be both specific and unscientific at the same time, if you were to stack all of the publications and writings about Work Breakdown Structures on a table, the pile would be an alarmingly scant 5 to 6 inches tall. We know this to be true—we’ve performed the experiment. Compare that with writings on risk management, project scheduling or the softer side of Project Management—negotiating, leading, managing projects, and so on, and the sky-scrapers of literature on these subjects dwarf the one-story dwelling of information on Work Breakdown Structures.

This book takes a new approach to the discussion of Work Breakdown Structures. First, you will notice that the text is laid out as a typical project might be managed—from concept and planning through delivery and project closeout, while the role of the WBS is explained during

each step of the effort. Additionally, we use a single, common metaphor for the WBS throughout the text. While we discuss many applications and formats for the WBS, and we expand on concepts and examples throughout the book, this single metaphor provides a cohesive thread for you to follow from beginning to end.

Most importantly, however, the book is designed to function not only as a text, but also as a desk reference. To date, the vast majority of writings about Work Breakdown Structures have provided guidance about development of the tool or explain the benefits derived from using the WBS as a basis for planning.

Here, we explain how the WBS is first developed, then applied and continually referenced throughout the life of a project. So as a practitioner, if you are beginning a new project and are interested in examining how the WBS is utilized during Initiating and Planning phases, you will find helpful information in the early chapters of the book. By contrast, if you are at the midpoint in a project, perhaps during Executing or Monitoring and Controlling phases, the central chapters will provide reference material and information about the interplay between the WBS and other key Project Management processes such as Staff Planning, Communications, Risk, Change and Schedule Management. (*PMBOK® Guide*—Third Edition, pp. 121–122, 205–214)

Finally, we present new concepts for Work Breakdown Structures in this book. These new concepts relate specifically to what we will call *transition* activities. For example, woven throughout the chapters is the concept that during the life of a project, the WBS functions in different ways, depending on the phase of the project. For instance, during Initiating and Planning phases, the primary role of the WBS is to document and collect information, serving as a point of clarification that describes and defines—often in great detail—the boundaries of the project’s scope as well as the “deliverables” and outcomes of the project. During Executing and Monitoring and Controlling phases, the WBS transitions from its passive role as a collection of information to one of action, in the role of project decision support, utilized as a reference and source for control and measurement. This key transition brings the WBS to life during the evolution of a project and is explained in the book.

To detail the layout of the book, the following is a brief synopsis that includes the three major parts and content of each chapter.

Part I, “Introduction to WBS Concepts,” includes Chapters 1 and 2 of the book and is focused on the presentation of key baseline information regarding WBS constructs.

- In **Chapter 1** we present basic WBS concepts. This chapter provides background and foundational information on which the remainder of the book is based. Here, we include some general, some specific and a few very important definitions about Work Breakdown Structures. We also include a brief historic look at Work Breakdown Structures and introduce our key metaphor, the House example. More about this later.
- **Chapter 2** presents the WBS in more detail. In this chapter we discuss the key quality attributes of the WBS and explain the process of decomposition. We also present and explain a variety of WBS representations and describe how the quality attributes for a WBS apply similarly to projects, programs, portfolios, and ultimately, the enterprise.

Part II, “WBS Application in Projects,” is the largest component of the book, comprising Chapters 3 through 10. It discusses the role of the WBS in each project phase from Initiating, through Planning, Executing, Monitoring, Controlling, and Closing. The chapters that make up the Planning discussions occupy the lion’s share of Part Two—and that is a natural outcome, because the WBS is predominantly, though not exclusively, a planning tool. The House Metaphor will frequently appear in these chapters, and will take many forms. We will use this metaphor to ground our discussions and to provide a consistent and familiar place to return to when the going (and the detail of our writing) gets tough.

- **Chapter 3** discusses the role of the WBS in the Initiating phase and includes reviews of the interaction between the WBS and the Project Charter, the Preliminary Scope Statement, contracts, agreements, Statements of Work (SOW) and Contract Statements of Work, which apply to project components that have been contracted or subcontracted to providers outside the project or program organization.
- **Chapter 4** reviews how the *Product* Scope Description and the *Project* Scope Statement are used to build and construct a refined

Scope Baseline. In this chapter the initial construction of the Work Breakdown Structure occurs. Most importantly, in this chapter we explain the value of deliverable-based management as contrasted with an activity-based approach. Beyond this, key information and examples of the WBS Dictionary are presented along with examples of criteria for product and project acceptance.

- In **Chapter 5** we examine in detail the role of the WBS in build versus buy decisions along with in-depth discussions of the role of the WBS in Cost Estimating and Cost Budgeting.
- **Chapter 6** addresses key interactions of the WBS during additional planning activities. These include detailed discussions of the WBS during Quality Planning, Staff Planning, Risk Identification and Planning as well as the role of the WBS in the most carefully planned project management process—Communications Planning.
- **Chapter 7** introduces new concepts that enhance the process of translating the Scope Management aspects of the WBS into a representation of elements that can be used to create the Network Diagram. This process is examined in detail, and ultimately a completely new representation of scope—the Scope Relationship Diagram is presented. In this chapter, we also explain how the various individual WBS elements are oriented and related to one another. The Scope Relationship Diagram is introduced to represent how various elements of scope interact, and can in turn be used as a basis for Project Schedule development. While this book is not intended to detail the process of network diagramming or schedule development, the subjects are discussed briefly to help ease the transition from WBS to Project Schedule.

The role of the WBS in Executing and Monitoring and Controlling phases is discussed in Chapters 8 through 10. In these chapters, we discuss how the WBS performs the foundational role as a reference point for all project execution processes and is used as a source for decision making when risks or changes must be addressed. It should be noted here that we discuss Executing and Monitoring and Controlling activities together in this book. The Project Management Institute's *PMBOK® Guide*—Third Edition approaches this issue in two ways. In parts of Chapter 3 of the *PMBOK® Guide*—Third Edition, there is a clear separation between Executing and Monitoring and Controlling processes. A strong argument can be made, however, for describing the

execution of a project as the work being performed within the effort while the Monitoring and Controlling process is simultaneously applied as the core Project Management activity that ensures the work is performed against the proper tasks, using the proper resources and is directed at the appropriate deliverables. The key theme, here, is that Executing and Monitoring and Controlling must be thought of as a common set of processes where Executing is the product-related activity and Monitoring and Controlling is performed as a guidance and management function over all other project activities. This concept is reinforced in the *PMBOK® Guide—Third Edition*. Figure 3.2 depicts how Monitoring and Controlling processes encompass and interact with all other project management process groups. The *PMBOK® Guide—Third Edition* defines this process: “The integrative nature of project management requires the Monitoring and Controlling process group interaction with every aspect of the other process groups” (*PMBOK® Guide—Third Edition*, p. 40).

As is the case in the Executing phase of a project and thereby, the Executing and Monitoring and Controlling portions of this book, Monitoring and Controlling activities are based largely on the scope definitions and detail provided by the WBS and the WBS Dictionary. Chapter 9 exposes the various functions of both the WBS and its associated Dictionary. These chapters should be truly seen as the “action” section of the book, representing the point in a project, program or portfolio where managers must manage and leaders must lead. If Initiating, Planning and Executing phases of a project (and by coincidence, the layout of this book) can be considered the setup discussion, then Monitoring and Controlling can be seen as the action part, with a strong emphasis on the controlling activities. It is between these phases that the role of the WBS is “transitioned” from passive to active.

- **Chapter 8** is the where the proverbial rubber meets the Project Management “road”. In this phase of the project the WBS is transitioned from a planning tool to a decision support resource. The construction and design of this foundation tool is complete, and now the WBS is pressed into action as the source for decision guidance for the remainder of the project. In this chapter, we discuss how the WBS informs decisions that the Project Manager and stakeholders must make and aids in the process of Acquiring the Project Team (*PMBOK® Guide—Third Edition*, p. 209). Additionally, as the Project Manager leads and directs the project, the WBS guides

Project Execution and provides the starting point for Change Management (Scope Management) and Quality Assurance. Beyond this, the WBS and WBS Dictionary provide a foundation and baseline for Action and Issue, Risk, Change, Budget/Financial and finally Earned Value Management (EVM).

- **Chapter 9** examines how the WBS and WBS Dictionary are used as the foundation for decision making regarding project Performance Management and the essential activities the Project Manager must address regarding Stakeholder Management.

In the last section of Part II, we have a single chapter that discusses project closeout and carefully examines the activities the Project Manager must perform in order to successfully close, deliver and transition the completed project from the project team to the receiving organization or team. As in the Executing and Monitoring and Controlling project phases, this is a particularly active time for the WBS. Here it is used as a reference point to ensure all deliverables detailed in the WBS have been completed, delivered, accepted and turned over to the customer.

- **Chapter 10** includes a discussion of Scope Verification and Scope Management. These interactions within the project represent some of the most critically important activities of the project manager, program manager or leader, clearly articulating, communicating, reinforcing and protecting the boundaries established for the project. These boundaries are established through the Scope Statement, contracts and agreements that have been drafted and approved by the sponsor and key stakeholders. The WBS and WBS Dictionary are the key project documents/artifacts that represent these boundaries in a way that provides for the programmatic application of agreements within the project effort. This is the fundamental role of the WBS in a project management setting. Additionally in this chapter, we describe how customer acceptance criteria are referenced for each of the deliverables found in the WBS and described in the WBS Dictionary. Activities that signal completion are also included, such as training and warranty period coverage, support protocols, documentation turnover, contract closure, subcontract closure and formal sign-off and acknowledgment by the receiving organization.

The authors have included Part III of the book, “WBS for Project Management Decomposition,” to help project managers clearly communicate

the process components and outcomes that project managers routinely oversee during the performance of each project they lead. Though it is well understood that project managers perform an important, and perhaps critical, role in the delivery of projects, defining that role and the process deliverables associated with it has been a challenge for many. With this in mind, in Part III we discuss various ways of representing project management roles and deliverables that are an essential, often overlooked part of the project's work. Chapter 11 presents a focused discussion that describes various approaches for thoroughly and accurately representing project management in the WBS as an important component of the complete scope of the project.

- In **Chapter 11** we explain the origin of the WBS components we have included for Project Management and describe various approaches to the decomposition of the project management work present in nearly every project. In this chapter we provide a number of examples of the deliverables and outcomes that are seen as products of the project management process and share teachings about the best approach for specific projects. Most importantly, we have included two fully elaborated decompositions of the project management work as it is defined in The Project Management Institute's *PMBOK® Guide*—Third Edition. These two (complete) tables represent the views presented in the *PMBOK® Guide*—Third Edition and show the decomposition of project management deliverables by Process Group and by Knowledge Area as well. Your authors believe that the careful and accurate representation in the WBS of the project management work necessary to deliver a project is critical to the successful delivery of the project itself, and have provided this chapter to help ease that process for you.

This book presents three important themes. First is the idea that the WBS *transitions* from a paper/planning exercise during Initiating and Planning phases of the project to an *action* and *work performance* management tool in Executing, Monitoring and Controlling, and Closing. The second key theme is that a significant transition occurs between the scope defined by the WBS and the task, activity and milestone lists that make up the start of project schedule development. The third theme presented is that Monitoring and Controlling occurs throughout a

project, from Initiating through Closing, and it is not an isolated process that occurs following Execution.

This book brings together the collective experience of three veteran, battle-hardened program/project managers. We met initially as Project Management Institute volunteers, where we made up three quarters of the project core team for the development of PMI's *Practice Standard for Work Breakdown Structures*—Second Edition. Although each of us has been blessed with a variety of experiences leading large and small initiatives with budgets ranging from thousands of dollars to those in the tens of millions, we each had faced similar challenges and expressed similar concerns about the clarity and concreteness of Project Scope and objective statements and our ability to manage to specific defined deliverables, once the projects we had been chartered to deliver got under way. This book describes our methods for clarifying, addressing and resolving those challenges, and provides us an opportunity to share our successes and lessons learned—big and small, with you.

We would like to thank our spouses, children, pets, colleagues, partners and associates who have supported us during the development of this book for their unending guidance, friendship, patience and love. Most importantly, one of our colleagues has had a significant impact on our writing—though he hasn't directly participated in the development of the book. We invoked his guidance and literate counsel as a regular part of our reviews and we are eternally grateful. George Ksander, we thank you for the countless contributions you've made to the quality of this effort. We would also like to extend a special thank you to Bob Argentieri and the folks at John Wiley & Sons, Inc for having faith in our vision—enough to encourage the development of the final product.

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- Project Management Institute. 2004. *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)—Third Edition*. Newtown Square, PA: Project Management Institute.
- Project Management Institute. 2004. *Practice Standard for Work Breakdown Structures*. 2nd ed. Newtown Square, PA: Project Management Institute.



# Foreword

The Work Breakdown Structure (WBS) is used as input for every other process of creating the schedule and the project budget. In that sense, the WBS is the foundation of the schedule and the budget as the foundation is for a house. If the foundation is weak the house will never be strong. It is hard to recover from a weak WBS. Needless to say, Eric and his team are focusing on a very important topic in this book. Rightfully they note that the available literature on this topic is thin. On the other hand, the WBS's we see in practice are often amazingly poor. This is not a paradox; the one explains the other perhaps. WBS's are an intuitive concept for some and an eternal mystery for others. It is time that some people wrap their mind around this issue. I think there is a real need for this book.

The book is like a handbook on how to implement *The Practice Standard for the WBS-2<sup>nd</sup>* Edition (published by PMI), another product of mostly this same team. These people were in fact so productive that the Practice Standard would have been a much thicker document were it not for the missive from PMI to keep the standard lean and mean. Not to worry, the team decided to simply publish all their brain products in this book as a separate publication.

The book builds entirely on top of the concepts in the PMBOK and the Practice Standard. It is valuable besides these standard documents in that:

- This book provides new processes that are the connecting dots between concepts explained on an abstract level in the standards. I liked for example the authors' new process of mapping out dependencies between WBS-deliverables, which I think is an essential activity, particularly in large programs.
- This book provides new concepts. For example, the notion that monitoring and controlling occur during the entire project, not just

during the PMBOK's *'Monitoring and Controlling'*. After all, who inspects the inspectors?

- This book provides new diagramming techniques. For example, the concept of defining relationships between scope elements cannot be found elsewhere. Other new things are the diagramming methods put forward by the authors: the *Scope Relationship Diagram* and the *Scope Dependency Plan*.

The authors take a courageous step by pushing the envelope for the betterment of our profession. I am personally very curious to see how these new processes, concepts and diagrams fare in the ocean of ideas and the often ferocious debates between thought leaders in our field.

There is no doubt in my mind that Eric Norman, Shelly Brotherton and Robert Fried have positioned themselves firmly in the category of project management thought leaders with this book. I encourage you to let them lead your mind for a few hours.

I hope you will enjoy reading this book as much as I did.

Eric Uyttewaal, PMP

Author of "Dynamic Scheduling with Microsoft Office Project 2003"

President of ProjectPro Corp.

## **Part I**

# Introduction To WBS Concepts



# Chapter 1

## Background and Key Concepts

“If you don’t know where you’re going, any road will take you there”

*Anon*

### CHAPTER OVERVIEW

This chapter is placed up front not only because it is Chapter 1, but also because we wanted to provide background information for you before beginning the process of developing Work Breakdown Structures. This chapter introduces key concepts about the WBS that are discussed in much more detail later in the book, along with historic information about the emergence and evolution of the WBS over a number of decades. We also introduce the House metaphor.

The house what? The **House metaphor**. For our purposes, we will use the term metaphor here to mean a symbol or example that will represent how this concept can be applied in practice—although the example itself is fictitious. Actually, the House metaphor is a tool or rather, a section of a WBS from the construction of a house that we have developed for use throughout the book to help us illustrate our intended meaning—when words alone aren’t enough to clarify and communicate key points or concepts. Following is an outline view of the House metaphor we will use, in one form or another, throughout the remainder of the text.

This metaphor is an important tool to cover at the beginning of the book because we will use it to describe, discuss and illuminate concepts throughout the text. We will use the House metaphor to illustrate examples, to provide a common, practical application of a topic or concept, and as a starting point for detailed examination of related topics.

- 1 House Project
  - 1.1 Primary Structure
    - 1.1.1 Foundation Development
      - 1.1.1.1 Layout—Topography
      - 1.1.1.2 Excavation
      - 1.1.1.3 Concrete Pour
    - 1.1.2 Exterior Wall Development
    - 1.1.3 Roof Development
  - 1.2 Electrical Infrastructure
  - 1.3 Plumbing Infrastructure
  - 1.4 Inside Wall Development: Rough Finish

Exhibit 1.1 House Metaphor—Outline Example

At the highest level, this chapter will contain the following:

- A general description of the Work Breakdown Structure and its role in project management
- WBS background and history
- Key terms and definitions
- The House Metaphor

## WORK BREAKDOWN STRUCTURES

Let us begin . . .

Work Breakdown Structures were first used by the U.S. Department of Defense for the development of missile systems as far back as the mid-1960s, and they have been a fundamental component of the Project Management lexicon for nearly as long. The concept of the WBS and the practices around its use were initially developed by the U.S. Department of Defense (DoD) and National Aeronautics and Space Administration (NASA) for the purpose of planning and controlling large acquisition projects whose objective was development and delivery of weapons or space systems (Cleland, *Air University Review*, 1964, p. 14). These projects often involved many industrial contractors each with responsibility for separate components of the system and were managed by a central administrative office, either within a governmental agency or within one of the contracting firms which served as prime contractor. In

this environment, the WBS was used to “. . . ensure that the total project is fully planned and that all derivative plans contribute directly to the desired objectives” (NASA, 1962).

The point is, that if true, and we assert right here that the statement is true, then the statement raises a question: “If the WBS is a fundamental building block for most projects, most of the time, then why are there so many conflicting viewpoints and approaches to development and use of Work Breakdown Structures?”

The answer to that question is somewhat elusive, and is one of the driving factors for writing this book. In the sections and chapters that follow we will examine various approaches to WBS development and will present a number of concepts, attributes, challenges and ultimately, recommendations for your consideration and use.

## DEFINING WORK BREAKDOWN STRUCTURES

The *PMBOK® Guide*—Third Edition, defines a **Work Breakdown Structure** as “a deliverable-oriented hierarchical decomposition of the work to be executed by the project team to accomplish the project objectives and create the required deliverables. It organizes and defines the total scope of the project. Each descending level represents an increasingly detailed definition of the project work.” The WBS is decomposed into Work Packages. **Work Packages** are defined in two different ways in the *PMBOK® Guide*—Third Edition. In the text, Work Packages are said to be the “lowest level in the WBS, and is the point at which the cost and schedule can be reliably estimated. The level of detail for Work Packages will vary with the size and complexity of the project. The **deliverable orientation** of the hierarchy includes both internal and external deliverables” (*PMBOK® Guide*—Third Edition, pp. 112, 114). Later in this chapter we provide the Work Package glossary definition for you.

There are a number of important concepts presented in this definition for the WBS. Of particular interest is the concept of deliverable orientation. The inclusion of these words is a key change from the definitions for the WBS in earlier editions of the *PMBOK® Guide* and reflects the expanded role the WBS performs in projects today. These changes are highlighted in Table 1.1.

Today, the WBS is understood to be more than an organization of the work of the project. The current definition, with the inclusion of the

Table 1.1 WBS Definition—Changes by Version

The Project Management Body of Knowledge (PMBOK®) (1987)	A Guide to the Project Management Body of Knowledge (PMBOK® Guide) (1996)	A Guide to the Project Management Body of Knowledge (PMBOK® Guide—Second Edition) (2000)	A Guide to the Project Management Body of Knowledge (PMBOK® Guide—Third Edition) (2004)
A task-oriented 'family tree' of activities.	A deliverable-oriented grouping of project elements which organizes and defines the total scope of the project. Each descending level represents an increasingly detailed definition of a project component. Project components may be products or services.	A deliverable-oriented grouping of project elements which organizes and defines the total scope of the project. Each descending level represents an increasingly detailed definition of a project component. Project components may be products or services.	A deliverable-oriented hierarchical decomposition of the work to be executed by the project team to accomplish the project objectives and create the required deliverables. It organizes and defines the total scope of the project. Each descending level represents an increasingly detailed definition of the project work. The WBS is decomposed into work packages. The deliverable orientation of the hierarchy includes both internal and external deliverables.

(Sources: Project Management Institute, *The Project Management Body of Knowledge (PMBOK®)*. PMI. Newtown Square: PA. 1987.; Project Management Institute, *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)*. PMI. Newtown Square: PA. 1996.; Project Management Institute, *A Guide to the Project Management Body of Knowledge (PMBOK® Guide—Second Edition)* PMI. Newtown Square: PA. 2000.; Project Management Institute, *A Guide to the Project Management Body of Knowledge (PMBOK® Guide—Third Edition)* PMI. Newtown Square: PA. 2004.)

deliverable orientation wording, indicates that the process of developing the WBS includes the definition and articulation of specific outcomes of the project—the end products and results. By doing so, it becomes a reference point for all future project activities.

This critically important concept will be expanded later in the book, but we want to point to this definition as a departure point for our writing



as well as a point of reference for you. Deliverable orientation is one of the Core Characteristics for the WBS, which we will discuss in Chapter 2. It is a fundamental attribute that will allow your WBS to be more than “shelfware” for your project, and will enable it to perform a critical role as a baseline document for communication of scope and outcomes during the initial phases of your project. In later phases, the WBS performs an active role as a basis for other key executing and monitoring and controlling activities. With these thoughts in mind, we can now take a broader look across the project management horizon to examine current trends and to establish context for our discussion.

There are additional reasons for preferring a deliverable orientation for WBS construction over task/activity or process orientations. With process and task-oriented Work Breakdown Structures, the deliverables or outcomes described by the WBS are the project processes themselves, rather than the project’s products or outcomes. When this is the case, the project team spends a great deal of energy on refinement and execution of the project’s processes, which can ultimately become models of care and efficiency—but that do not necessarily produce the desired outcomes for the project because the focus has been on the process of producing outcomes, not the outcomes themselves.

Additionally, task/activity WBS construction is truly a contradictory concept from the outset. As we will examine later, tasks and activities are truly part of the project scheduling process and have no place in the WBS to begin with. Later, in Chapter 7, we will discuss the creation of the Project Schedule and will explain that tasks, activities and milestones are outcomes of the decomposition of the WBS that extends beyond the Work Package level, (the lowest level of decomposition of the WBS) and yields elements that are carried forward into the project schedule. So from our perspective, developing a WBS based around tasks and activities is simply a contradiction in terms. To us, and to those who wish to develop high-quality Work Breakdown Structures that focus attention on outcomes and deliverables, this truly cannot be useful.

## IMPORTANCE OF THE WBS

Everyday practice is revealing with increasing regularity that creation of a WBS to define the scope of the project will help ensure delivery of the project’s objectives and outcomes. There are numerous writings that

point to the WBS as the beginning step for defining the project and insist that the more clearly the scope of the project is articulated before the actual work begins, the more likely the success of the project. Here are a few examples from recognized, reliable Project Management sources:

- John L. Homer and Paul D. Gunn “The intelligent structure of work breakdowns is a precursor to effective project management.” (Homer and Gunn, 1995, p. 84).
- Dr. Harold Kerzner: “The WBS provides the framework on which costs, time, and schedule/performance can be compared against the budget for each level of the WBS” (Kerzner 1997, p. 791).
- Carl L. Pritchard: “The WBS serves as the framework for project plan development. Much like the frame of a house, it supports all basic components as they are developed and built” (Pritchard 1998, p. 2).
- Dr. Gregory T. Haugan: “The WBS is the key tool used to assist the project manager in defining the work to be performed to meet the objectives of a project” (Haugan, 2002, p. 15).
- The *PMBOK® Guide*—Third Edition stresses the importance of the WBS in the Planning Process Group, which begins with three essential steps—Scope Planning (3.2.2.2), Scope Definition (3.2.2.3) and Work Breakdown Structure Development (3.2.2.4). (*PMBOK® Guide*—Third Edition).

Experienced Project Managers know there are many things that can go wrong in projects regardless of how successfully they plan and execute their work. Component or full-project failures, when they do occur, can often be traced to a poorly developed or nonexistent WBS.

A poorly constructed WBS can result in negative project outcomes including ongoing, repeated project re-plans and extensions, unclear work assignments for project participants, scope creep, and its sister, unmanageable, frequently changing scope, as well as budget overruns, missed deadlines and ultimately unusable new products or delivered features that do not satisfy the customer nor the objectives for which the project was initiated.

## WBS LESSON LEARNED: A BRIEF ILLUSTRATION

Why is this the case? How can all of these problems be linked to the completeness or quality of the WBS? To answer this question, let us

take a brief look at what typically happens following missed deliverables or project component failures. Once it becomes obvious something will be missed by the project team—the delivery date, key features or functionality, or perhaps the budget, the dust settles.

Shortly afterward (and exactly how long “shortly” is can vary quite a bit) the project leader and functional managers stop looking for someone to blame and cooler heads prevail. Quite often someone emerges (most likely an executive or Project Sponsor) and asks to see the “project’s documentation.” At this point the Project Manager scrambles to produce the project plan, project schedule, risk plan and register, change request log and the WBS for the project—if it exists. In a very short time, this person, who hasn’t been close to the project on a day-to-day level, “down in the trenches” with the project team, will undoubtedly pull out a single project document and point to specific wording that describes precisely what should have been delivered by the project team, and when. That document is often the Scope Statement, the project’s Charter or its contracts and agreements.

Having found the desired scope statements and agreements, the project executive or sponsor will call a series of meetings with the appropriate responsible parties, and will ask some very pointed questions about the reasons the project didn’t result in the outcomes specified in the foundational documents—and will immediately begin negotiations to get what he/she intended to have delivered, delivered. Most notably, the project executive or sponsor may, at this point commit to ensuring the delivery will happen by taking a much more active role in the day-to-day activities of the project. This is *not* the most desirable outcome for a Project Manager wishing to be the master of his or her own project destiny.

Examining this scenario a little more closely, we can find the root cause. The sponsor/executive wants to take a more active role in ensuring the project has a higher likelihood of reaching its desired objectives because he or she believes that key project information, vital to making decisions about the project’s outcomes didn’t reach the decision maker(s). Clearly, this was a communications problem from the beginning. It truly doesn’t matter whether the Project Manager believes the project communications were effective or not. The sponsor/executive believes they were not, and is taking an active role as a result. Key deliverables were missed—and there had been plenty of opportunity to surface the issues relating to the absent scope elements.

So what can the Project Manager do to learn from this experience? Beyond learning how to manage the pain of embarrassment and lead the recovery process following the missed deliverable(s), the Project Manager should look carefully at root causes. So now would be a good time for the Project Manager to ask him or herself, “What is (frequently) the cause for this scenario?” The answer is fairly straightforward: poor communication and validation of changes to the approved scope, schedule, and feature/functionality.

When this occurs, the Project Manager very quickly realizes that the obvious solution to the problem exists within the project’s documentation.

Had the project’s WBS clearly articulated the project deliverables (internal, interim and endpoint) and outcomes, at each critical interval along the way to delivery, the Project Manager could have validated progress against the stated scope—represented by the WBS. When challenges to scope and schedule were presented to the sponsor and/or other stakeholders, using the Change Management process for the project, these could be balanced against the documented, agreed-upon scope and feature/functionality described by the WBS and explained by the project plan. In the absence of clear WBS deliverables and outcomes, these discussions are considerably more elusive and difficult.

For the Project Manager, it’s a lesson learned. For this discussion, the scenario becomes a template for defining critical success factors for scope management and communication. Those factors include a clearly articulated WBS, a scope management and scope control process (Change Management), and an effective communications process that will enable the Project Manager to articulate agreed-upon deliverables and the decisions that affect the schedule for completion of those deliverables.

It is essential for the Project Manager to find tools that will help communicate the frequency and impact of changes that follow the initiating and planning phases of the project—when the WBS is finalized and approved. If the WBS for the project was constructed so that it clearly defined the deliverables and outcomes for the project—including those that are transitional or temporary (interim) in nature, prepared for internal organizations as well as the end customer, then the Project Manager has at his or her fingertips a highly valuable tool. The WBS becomes the static document that can be referenced in an unemotional manner.

To avoid these project pitfalls, the WBS is used as a foundational building block for the initiating, planning, executing, and monitoring

and controlling processes and is central to the management of projects as they are described in the *PMBOK® Guide—Third Edition*. Typical examples of the contribution the WBS makes to other processes are described and elaborated in the *Practice Standard for Work Breakdown Structures—Second Edition*.

To explain, there are many project management tools and techniques that use the WBS or its components as input (*PMBOK® Guide—Third Edition*, Chapter 5, Section 5.3). For example, the WBS utilizes the **Project Charter** as its starting point. The high-level elements in the WBS should match, as closely as possible, the nouns used to describe the outcomes of the project in the **Project Scope Statement**. In addition, the **Resource Breakdown Structure** (RBS) describes the project's resource organization and can be used in conjunction with the WBS to define work package assignments. The **WBS Dictionary** defines, details, and clarifies the various elements of the WBS.

Transitioning from the WBS to the Project Schedule is discussed in Chapter 7 and takes a number of references from the chapter on Project Time Management of the *PMBOK® Guide—Third Edition*. **Activity Definition**, the starting point for project schedule development relies on the WBS for the decomposition process, beginning at the lowest level of the WBS—the Work Package, to produce relevant project tasks, activities and milestones. Activity Sequencing describes and illustrates the logical relationships between these tasks, activities and milestones and shows the dependencies and precedence for each, orienting them in a Project Schedule Network Diagram.

Whether you choose Arrow Diagram Method (ADM), where the activities are shown on arrows that link nodes of the network diagram (Activity On Arrow), or the Precedence Diagram Method (PDM) where the nodes represent the project's activities while the arrows depict dependencies between them (Activity On Node), the starting point for this process is the WBS, where the scope of the project has been carefully decomposed to the Work Package level.

The WBS is also used as a starting point for **Scope Management** and is integral to other Project Management processes, and as a result, the standards that define these processes explicitly or implicitly rely on the WBS. Standards that take advantage of the WBS either use the WBS as an input (e.g., PMI's *Practice Standard for Earned Value Management (EVM)* and the *Practice Standard for Scheduling* or incorporate the WBS as the preferred tool to develop the scope definition (e.g., the *PMBOK®*

*Guide*—Third Edition, *OPM3*<sup>®</sup>). Beyond this, other practices recognized world-wide frequently reference the WBS as the starting point for scope. These practices include Prince2, (Projects in Controlled Environments), CMMI (Capability Maturity Model Integration) and RUP, the (Rational Unified Process).

## WBS CONCEPTS

As we noted at the beginning of this chapter, the WBS, as defined in the *PMBOK*<sup>®</sup> *Guide*—Third Edition, is “a deliverable-oriented hierarchical decomposition of the work to be executed by the project team to accomplish the project objectives and create the required deliverables. It organizes and defines the total scope of the project. Each descending level represents an increasingly detailed definition of the project work. The WBS is decomposed into work packages.”

With this definition, it is clear the WBS provides an unambiguous statement of the objectives and deliverables of the work performed. It represents an explicit description of the project’s scope, deliverables and outcomes—the “what” of the project. The WBS is not a description of the processes followed to perform the project . . . nor does it address the schedule that defines how or when the deliverables will be produced. Rather, the WBS is specifically limited to describing and detailing the project’s outcomes or scope. The WBS is a foundational project management component, and as such is a critical input to other project management processes and deliverables such as activity definitions, project network diagrams, project and program schedules, performance reports, risk analysis and response, control tools or project organization.

## DESCRIBING THE WBS

The upper levels of the WBS typically reflect the major deliverable work areas of the project, decomposed into logical groupings of work. The content of the upper levels can vary, depending on the type of project and industry involved. The lower WBS elements provide appropriate detail and focus for support of project management processes, such as schedule development, cost estimating, resource allocation, and risk assessment. The lowest-level WBS components are called, as we’ve discussed earlier, Work Packages. The glossary definition for Work Package is, “A deliverable or project work component at the lowest level of the Work