

Microsoft®

Project 2010



IN DEPTH

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MICROSOFT® PROJECT 2010 IN DEPTH

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DEDICATION

This book is dedicated to two very important groups of people: our families and our customers.

Our families have been tremendously supportive and patient during the creation of this book. They supported us through empty periods of writer's block and anxious days when customer work took precedence over writing.

Our customers are the best. They challenge us daily with real-world problems that must be solved as efficiently as possible. They have helped us come up with creative solutions that combine practical business processes and best practices in project management with state-of-the-art tools such as Microsoft Project. We are much better consultants because of them.

In addition, we would like to dedicate this book to all project managers out there. Project management is an acquired skill as well as an art. Dedicated project managers make a difficult job look easy. They use the skills of communication and leadership, knowledge of the domain, and practical tools such as Microsoft Project to lead a team through a complex project to a successful conclusion. We applaud their efforts and hope that this book makes the journey a little bit easier.

ACKNOWLEDGMENTS

Over the past several years, we have worked closely with the Microsoft Office Project team. This group of people has helped us understand their plans for the product and the inner workings of the software. They continually seek advice on the future direction of Microsoft Project and have listened carefully to our input and that of their customers to design a product that provides project management capabilities to individual project managers as well as organizations.

QPM would also like to acknowledge the hard-working staff at Que Publishing who have helped make this book what it is today. We would especially like to thank Loretta Yates (acquisitions editor). It has been our pleasure working with her on a project of such a large scale.

WE WANT TO HEAR FROM YOU!

As the reader of this book, you are our most important critic and commentator. We value your opinion and want to know what we're doing right, what we could do better, what areas you'd like to see us publish in, and any other words of wisdom you're willing to pass our way.

As an associate publisher for Que Publishing, I welcome your comments. You can email or write me directly to let me know what you did or didn't like about this book—as well as what we can do to make our books better.

Please note that I cannot help you with technical problems related to the topic of this book. We do have a User Services group, however, where I will forward specific technical questions related to the book.

When you write, please be sure to include this book's title and author as well as your name, email address, and phone number. I will carefully review your comments and share them with the author and editors who worked on the book.

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INTRODUCTION

Throughout this book, you will see that project management is made up of two components: philosophy and tools. Although this book is primarily technical in nature, it is impossible to separate the technology from the environment in which it works. Microsoft Project is not a “silver bullet” that solves all process problems. Although it is great software, it has limitations, and the primary one is that it is only as good as the processes and people that surround it.

Why We Wrote This Book

The Que Publishing *In Depth* series is intended for both beginner and intermediate audiences. The primary purpose of this book is to provide you with knowledge about Microsoft Office Project 2010, a robust project management software application. This book is not meant to be a cradle-to-grave guide about Microsoft Office Project 2010, but rather provides guidance on using it in your everyday work. Although this book is procedural and referential in nature, it also includes theoretical information to help you become familiar with the concepts applicable to project management.

The material covered in this book is simple enough for a beginner to understand, but also enables the reader to grow with the book, as more advanced topics are covered as well.

Intermediate users will find that the material is new and interesting and provides practical tips, tricks, and guidelines based on real-world consulting experience.

Why You Should Use Microsoft Project

Microsoft technology solutions are accepted as the most user-friendly software tools in the world. They are easy-to-use and are also recognized as feature-rich tools that offer great flexibility. Microsoft Project 2010 is no exception to this rule. It automates the process of organizing, scheduling, recording, calculating, tracking, reporting, and analyzing schedule data for any project. The tool will help you achieve your project goals on time and within budget. The strength of the tool continues to grow because millions of users provide input to Microsoft regarding their use of the tool. This input is compiled along with industry best practices in regular releases of the software. You can use this software with the knowledge that it includes solid technology that is backed by the leader in the industry.

What's New in Microsoft Project 2010

Users of previous versions of Microsoft Project will notice a ton of changes. Old functionality remains intact, but is now accessed through the Microsoft “Fluent” interface. The new features identified in this section are explained in more detail in Chapter 1 and where appropriate throughout the book. The features are available in the desktop tools, Microsoft Project Standard and Professional 2010:

- **The Ribbon**—The single most immediate and notable change to Microsoft Project, at least since the initial introduction of Project Server, is the new Ribbon interface. The Ribbon makes it easier to find and use key features in Project, based on your immediate intent.
- **User-controlled scheduling**—The introduction of user-controlled scheduling fundamentally alters a planner’s interaction with Project. Before, users simply had to understand and accept Project’s scheduling decisions. With the introduction of Project 2010, users control when Project shifts start and end dates.
- **Team Planner**—The Team Planner is a radically different way to plan work and resolve resource allocation issues. It is a drag-and-drop interface that, when coupled with user-controlled scheduling, opens up a whole new way to use Project. For the first time, users with much simpler requirements for planning a team’s many small projects can safely ignore “project management” and get immediate, reliable results. Of course, experienced project managers also benefit from the entirely new view for resolving resource bottlenecks.
- **Timeline**—The Timeline view is a flexible and exportable view providing an all-up summarization of a Project’s progress. Much more than simply a Gantt bar rollup, the Timeline view provides a real-time, highly customizable mechanism for tracking key tasks and milestones.



note

There are many additional features in the server components of Microsoft Project 2010 that are discussed in this book.

How This Book Is Organized

This book is divided into five parts, designed to be of interest to a wide variety of readers. Some of the chapters focus on planning and organization, whereas others are focused on technology details. The following information should help you decide which chapters are of most interest to you.

Part I: Getting Started with Microsoft Project 2010

Part I is an introduction to the software application and to the concepts within the project management domain. It is intended for all audiences to provide a context for the successful planning and managing of projects.

Chapter 1, “Power of Microsoft Project 2010,” contains a general introduction to project management, explores the new features of the Project 2010 version, and introduces the tool.

Chapter 2, “Project Quickstart,” covers just the basics of using Microsoft Project 2010 and explains the minimum set of steps you have to take to create, manage, track, and close your project.

Chapter 3, “Microsoft Project and the Project Management Domain,” explores the different project management standards, introduces commonly used terms, and helps to define how Microsoft Project fits into the various definitions.

Part II: Organizing for Success—Project Initiation and Planning

Part II starts with some background on the best practices of the project management domain and walks you through all the necessary steps that have to be performed during the initiation and planning of a project. In addition to the conceptual information, this part explores the features of Microsoft Project 2010 that help you accomplish this goal.

Chapter 4, “Getting Started After the Business Initiative Is Approved,” discusses the concept of establishing the project scope, building the Work Breakdown Structure, and creating the initial framework that you need for a successful project.

Chapter 5, “Setting Up Project for Your Use,” focuses on defining initial properties of your project as well as environment options and preparing the tool for planning your project.

Chapter 6, “Creating Your Project Schedule,” explores the steps for defining and manipulating tasks.

Chapter 7, “Defining Task Logic,” concentrates on defining relationships between tasks and creating task constraints.

Chapter 8, “Defining Project Resources,” provides information about various resource types available in Microsoft Project 2010 and includes steps for creating the resource list for your project.

Chapter 9, “Understanding Work Formula Basics,” helps you understand the subtleties of the Microsoft Project 2010 scheduling engine. You learn about various factors that affect the way your tasks are scheduled. This chapter is key to understanding the logic behind the schedule created by Microsoft Project.

Chapter 10, “Scheduling Single and Multiple Resource Assignments,” describes the process of assigning resources to tasks and discusses the complexities that occur when you use more than one resource on a task.

Chapter 11, “Using Standard Views, Tables, Filters, and Groups to Review Your Schedule,” covers various strategies you can use to review different aspects of your project schedule.

Chapter 12, “Performing a Schedule Reality Check,” discusses strategies you can use to ensure that your schedule is complete and realistic prior to moving into project execution.

Part III: Project Execution Through Completion

Part III guides you through the activities performed during project execution to maintain the accuracy of the project schedule. In addition, you learn the actions you have to perform in order to successfully close the project.

Chapter 13, “Tracking Your Project Progress,” focuses on the activities you perform for project tracking and explores various factors that affect tracking.

Chapter 14, “Analyzing Performance,” covers the features of Microsoft Project 2010 that are available to determine how well the project schedule is tracking the project’s performance.

Chapter 15, “Using Reports for Tracking and Control,” describes the standard basic and visual reports and how they can be used for tracking your project progress.

Chapter 16, “Revising the Schedule,” discusses actions you can take when things don’t go according to plan. In addition, it explores the various strategies you can use to help when your scope, cost, and timeline do not meet expectations.

Chapter 17, “Closing the Project,” covers the work required to properly close a project, report on its conclusion, and finalize the schedule.

Part IV: Tailoring Microsoft Office Project 2010 to Your Needs

After you master all the standard features of Microsoft Office Project 2010, or if you want to explore the customization options Microsoft Project 2010 has to offer, this part helps you learn tips and tricks to achieve the exact results you need.

Chapter 18, “Managing Project Files,” discusses how Microsoft Project 2010 stores, organizes, and uses various types of files. It provides background on the file that determines global settings and methods to save preferred settings.

Chapter 19, “Formatting Views,” provides various options you can use to customize how information is displayed in various views.

Chapter 20, “Creating and Customizing the Basic Reports,” explores options for customizing existing basic reports and provides instructions for creating new reports.

Chapter 21, “Creating and Customizing Visual Reports,” discusses the many options you have when working with visual reports and what you can do to customize your project reports with information that is not available in a standard report.

Chapter 22, “Customizing Views, Tables, Filters, Groups, and Fields,” describes the options you have to customize the look and feel of views, tables, filters, groups, and fields to streamline and optimize your daily management of the schedule.

Chapter 23, “Customizing Toolbars, Menus, and Forms,” discusses what you can do to adjust and personalize the menus, toolbars, and forms within Microsoft Project 2010 that can help you increase productivity and efficiency.

Part V: Microsoft Office Project 2010 Knowledge In Depth

Part V is designed for advanced users of Microsoft Office Project 2010. It explores advanced features for managing resources across projects and working with other applications.

Chapter 24, “Working with Multiple Projects,” explores the complexities and benefits of working with multiple projects as well as options for creating a shared resource pool without using Microsoft Office Project Server 2010.

Chapter 25, “Resolving Resource Allocation Problems,” discusses strategies you can use when resources are allocated to more work than they can manage. In addition, it explores many techniques for resolving resource conflicts, as well as factors that create these types of scenarios.

Chapter 26, “Exporting and Importing Project Data,” includes version compatibility options and ways to exchange selected parts of the information with other applications.

Chapter 27, “Manipulating Data Using Other Applications,” explores ways to manipulate Project data by importing and exporting information with other applications.

Who Should Read This Book

This book is intended to be a comprehensive guide to the use of Microsoft Office Project 2010 for managing projects. This book is a great resource for project managers who are just starting out, as well as ones who are experienced project managers.

This book is organized to follow the standard *PMBOK* process groups and discusses not only the features and functions of the tool, but also the practical application of project management concepts, best practices, and advice from consultants in the field.

Special Features of This Book

The following are special features of this book.



Tips describe techniques and methods that the author has found to be very useful in streamlining or simplifying the use of a feature.



Notes offer advice to help you understand complex ideas or provide alternative explanations of concepts.



Cautions are provided when the use of specific features might result in complex results that are not always necessary or useful in the situation described.

In addition, the Consultants' Tips section at the end of each chapter provides some additional advice from the project management consultants.

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GETTING STARTED AFTER THE BUSINESS INITIATIVE IS APPROVED

The purpose of this chapter is to position your project for success from the start. Planning a successful project requires leadership and management skills and includes the following tasks:

- **Setting the direction**—Establish a goal that your stakeholders and team members can understand and work to achieve.
- **Sharing the vision**—Provide a framework and sufficient detail so that each member of the team knows what to do and when to do it.
- **Establishing the rules**—Establish methods for work to be accomplished, communication to occur, and methods to track status and manage the changes that will inevitably come your way.

After you set the stage for success, you can use Microsoft Project to do what it does best: help you organize and track the work of your team. If you start with these basics, you can optimize all the features that are available to assist you.

Introduction

A project has been approved and you have been assigned as the project manager. Now what? Before you reach for the keyboard to open Project, you need to set up your project for success.

You can draw upon many resources to help you with this process. Several are used in this chapter as the foundation for the author's approach to running successful projects. Dr. William Casey, principal in the Executive

Leadership Group, has provided the foundation for the work on Measure of Success in the next section. The information regarding Work Breakdown Structures is based on two primary sources: *Practice Standard for Work Breakdown Structures, Second Edition* (PMI, 2006) and *Effective Work Breakdown Structures* (Haugen, 2002).

Organizing for Success

Much of your work will ultimately be reflected in a Microsoft Project schedule, but if you start that process before you are ready, you can end up with a project that is out of control. This is because Project was designed to help you manage the *details* of your project schedule—the activities, the calendars, the resources, and many other details that can be captured and managed. Before you dive into the details, however, you need to frame the big picture with the following:

- Where you are going (your goal and objectives).
- What you must provide as results of your project (end products or outcomes, deliverables).
- What boundaries and constraints you must work within (regulatory requirements, budgets, time frames, quality levels, and more).
- How you will manage change when it happens (and it will happen).

The details that will reside within your Project schedule will become important, but it is equally important to start with a well-designed approach that is easy to explain to your team and to your stakeholders. After that is in place, working out the details and controlling the scope of the project will be much more manageable.

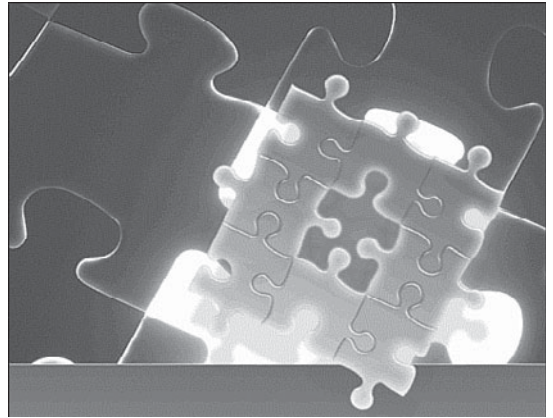
Define a Measure of Success

Projects are most successful when they are focused on the achievement of *one* clear goal. The goal should be measurable and achievable. Project goals can range from very lofty (putting a man on the moon) to very simple (reduce errors in a report); if the team can rally behind the goal and understand the purpose, your chances of success are much improved. There can be many additional objectives involved in reaching the project goal that will also need to be defined, so it is extremely important to reach clarity among the team members and the stakeholders of the primary driver of the project. After this goal is documented, all lower-level objectives can be reviewed against this goal to determine whether they should be included in the scope or should be defined as out of scope.

The illustration in Figure 4.1 explains the point. Jigsaw puzzles come in all sizes and shapes but the point of each is to complete a puzzle. If two puzzles are mixed together or pieces of one puzzle are missing, you cannot complete the goal of finishing the puzzle. All of the puzzle pieces (objectives) must be focused on the same picture and none of them should be missing.

Figure 4.1

If the parts of the puzzle (or deliverables you define for the project) are mixed with another puzzle, are in the wrong place, or are completely left out, the outcome will not be as you expected.



It is very important that the project has one—and only one—driving goal. When stakeholders do not agree on the purpose of the project or have competing needs and objectives, problems occur. A project with multiple goals can result in a lot of churn when things do not go according to plan, because the team cannot easily make a decision on which components are the most critical for project success. Rather than try to accommodate divergent needs, the project must have one driver. All additional objectives should support that goal in some way or should be defined as “out of scope.”

In addition, you must define clear boundaries and rules of fair play to ensure that reaching the goal is done in a manner that does not have a negative impact. The next section develops this idea further.

Clarify the Constraints and Boundaries

This section addresses two topics that are essential to building a good project schedule. It will help the team understand what is in scope and what is out of scope. It will also help you and your team define the work that must be accomplished and the manner in which it will be done.

Define the Boundaries—Rules of Fair Play

Projects exist in an overall mission context that they must support and not negatively impact. A set of rules helps define and guard project boundaries while building a proper framework that enables flexibility within the project. Rules also ensure the overall corporate mission context is protected. For example, a company that produces playground equipment for schools may need to reduce the costs of its manufacturing process. If the company launches a project to reduce costs of the manufacturing process, there are hundreds of ways this could be accomplished. Some of the methods could cause consumer safety issues. To prevent this, the project team could set a boundary that states that the injury statistics for the equipment must not be increased. When the framework is initially set in this way, both the method in which the project is planned and the way that the project is measured will be impacted.

Similarly, putting on man on the moon without getting him back to Earth safely would not be a successful project outcome. Not all projects have boundaries that are this critical or visible, but it is easy to see how they impact the project's budget, schedule, and quality planning. The same is true for even the simplest of projects; the team must determine the rules within which the project will operate. Those decisions will help you decide what is truly in scope, what is out of scope, as well as how and when the project will be completed.

Identify Time, Budget, and Quality Constraints

Clarification of the goal and the scope is critical to obtaining some flexibility in time and budget. In many cases, only one of the factors (time, budget, or quality) is extremely important, and it may become a part of the driving goal. For example, it may be important to be the "first to market" with a particular product concept. In this case, being first is more critical than being the best, so the project manager must focus on timely delivery and limit the number of features or the quality of the product.

Often a project is chartered with preset expectations of not only what the project will provide but also when it will be delivered and how much it will cost. If this is the case, the project manager's job has little to do with managing a project and much more to do with managing expectations. Often, when one of the factors changes, it directly affects the other two. Similarly, if you were to lengthen or shorten one side of the triangle, one of the other two sides, or both, have to be adjusted in order to maintain the shape, as shown in Figure 4.2.

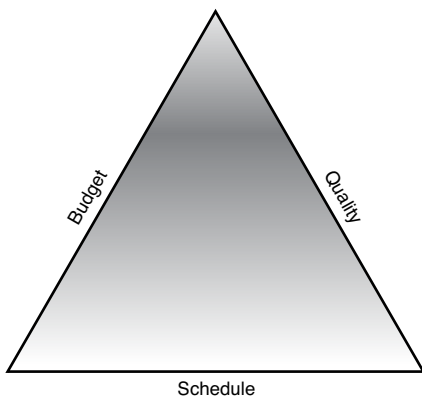


Figure 4.2

Time, budget, and quality are the key variables in a project. You can change the shape of the triangle by increasing or decreasing the variables, but you can only change two of the three.

Regardless of the situation, the project team should still work with the stakeholders to clarify the goals and the boundaries before creating a schedule. Even though the tendency is to get resources engaged in activities as soon as you can, it is more critical to have all resources working on meeting one clear goal.

Define the Final Deliverables

If you have ever worked on a project that never seemed to end, it was probably because there was no clear definition of project completion. The goal that is set for a project must be measurable, and there must be a list of deliverables that, once completed, bring the project to a close.

For a home construction project, the deliverables would include a completed house, landscaping, and a certificate of occupancy (CO). Each deliverable must also include a quality component that can be measured. Because many details must be considered, homebuilders typically list them in a walk-through document for the buyer's approval. The CO may take some time to achieve, but the final result is very clear and measurable.

For a software project, some of the final deliverables would include software, documentation, operational processes, and training. The quality measures can include things such as response times, number/severity of errors in the system test, user acceptance surveys, or other similar measures. The deliverables and the measures should all relate to the driving goal of the project or at least support one of the subordinate goals or objectives.

Without clear, measurable deliverables, there is no way to be sure that all of the stakeholders are in agreement regarding the project's goals. The project team may not even have identified some of the work that the stakeholders are expecting or the quality expectations may not be achievable within the time and cost constraints of the project. It is much better to clarify these points during the planning cycle than to reach the end of the project's budget and time and not be able to deliver work that was never defined.

The process of defining end deliverables will very likely require you to go back and reexamine both the goal and the constraints and boundaries of the project. This is an iterative process and it is time well spent. Without this process working through to completion, you will be creating a list of tasks that may or may not be useful in reaching your goal. The project will certainly expend a large amount of effort but may not earn any true value for the stakeholders.

Establish a Change Control Process

The final component of organizing for success is planning for change. Change is inevitable, no matter how perfectly you plan. The only thing that you can do is prepare and have a process ready so that when it happens, your team knows how to respond.

Change control provides the discipline to identify and communicate the impact of scope changes, quality demands, risks, issues, and the day-to-day complexities of resource management. Project will help you identify, manage, and report on project changes, so it is a good practice to determine the features that you will use during the planning cycle. For example, establish an expectation for when you baseline your project, how often you capture a snapshot of the current schedule, and what criteria you use to determine if you need to reset the baseline because of scope changes. You should also set up guidelines for how you will track progress and status and what features you will use for reporting.

➡ *For more information about capturing the baseline and tracking your progress, see Chapter 13, "Tracking Your Project Progress," p. 433.*

Work Breakdown Structure

After you have clarity on the goal, boundaries, and constraints for your project, it is time to begin the process of identifying all of the work by decomposing the goal into manageable pieces. Of all the projects that fail, most are due to a failure to identify all of the changes to scope or to manage these changes. The *PMBOK Guide* recommends the use of the Work Breakdown Structure (WBS) as the best practice for identifying and managing packages of work in a project schedule. The identification and management of these packages of work are critical to understanding and maintaining project scope.

This section covers key principles of building and using a WBS with a focus on creation of the WBS for accurate and effective management of Microsoft Project schedules. It is important that your schedule is an accurate reflection of the work required to reach a successful conclusion of your project. Using a WBS will help you reach that goal by ensuring you cover 100% of the scope of your project without adding activities that are not related. This book does not attempt to cover all of the details; there are much more thorough reference materials for that, as identified at the beginning of this chapter.

Work Breakdown Structure (WBS) Concepts

You can create a WBS using Project, but it is often more useful to create the first iteration on a whiteboard because it will change multiple times before you are ready to finalize it. The iterative process typically begins with a top-down decomposition of deliverables through successive levels of detail until you reach a level where the work can be planned and controlled. This level is called a *work package*. All levels of decomposition from Level 1 (the project) through the lowest level (work package) are noun-based and focus on the deliverable, not how the deliverable is achieved. Many levels may be required, depending on the complexity of the project, and not all branches of the WBS will require the same number of sublevels of breakdown. The lowest-level WBS element (the work package) will eventually contain the set of activities or tasks that need to be performed to accomplish the achievement identified by the work package. A work package should be able to be assigned to one work group or an individual for performance. If that cannot be done, it may not be broken out as far as it should be.

The example in Figure 4.3 shows the levels of decomposition that are used in a WBS to break a project into the appropriate work packages.

Decomposition of work into appropriate work packages and the associated activities for those packages can be reflected in Microsoft Project as well. The lowest level of the WBS—the work package—will be represented by a summary task. You should keep together all activities within that work package and link them with a starting and an ending milestone.

Figure 4.4 shows an example of a task activity list in Project that is derived from the WBS example in Figure 4.3.

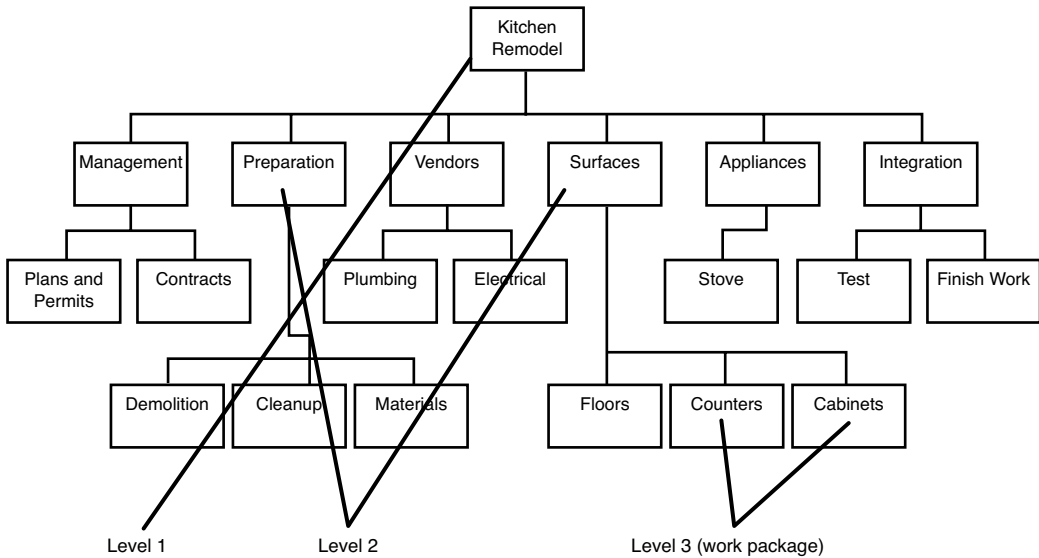
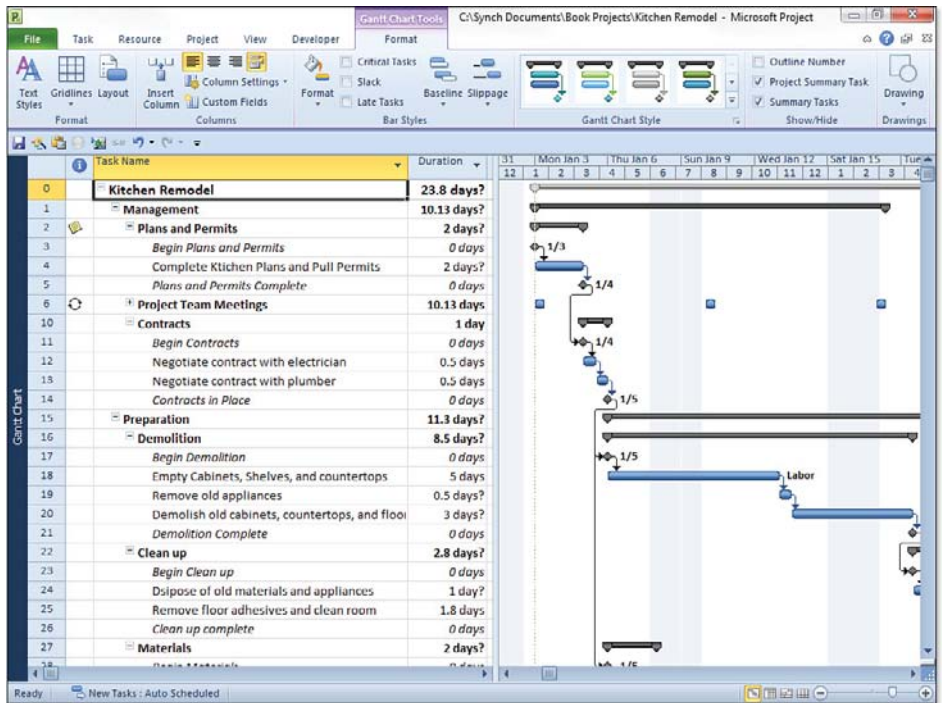


Figure 4.3 Work is decomposed to the lowest level needed for effective management and tracking (work package).

Figure 4.4 Work packages within Project should have a starting and an ending milestone.



There are a few rules regarding building a WBS that you should keep in mind when developing a schedule in Project:

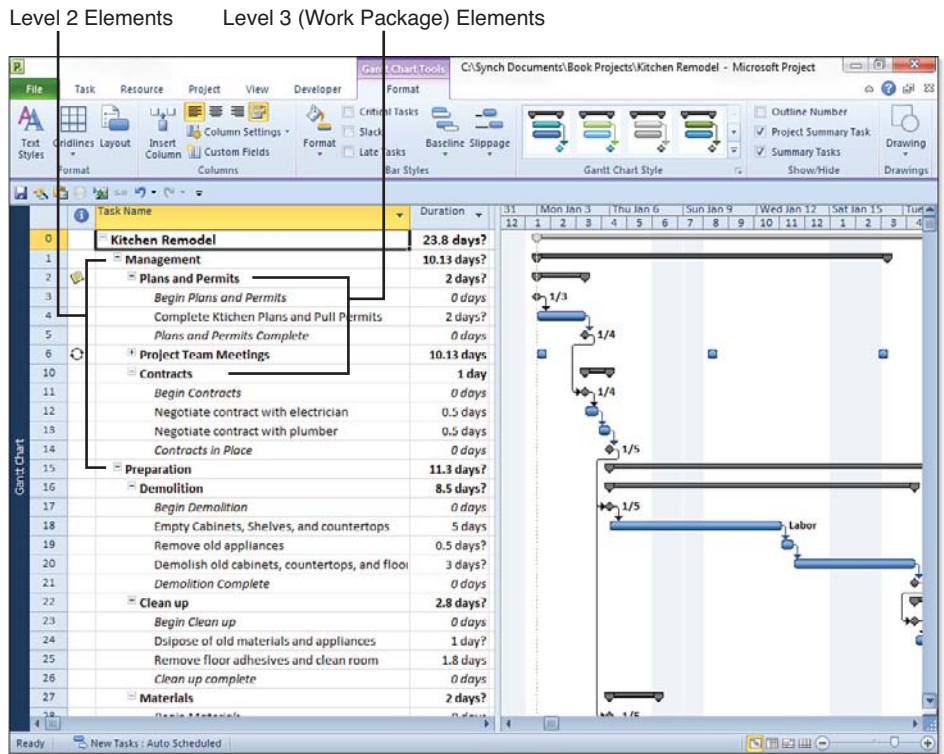
- **Number of levels**—The number of levels in a WBS will vary with the complexity of the project. Some elements may have more levels of detail than others. Elements are described with nouns and adjectives.
- **Level 2 elements**—This level includes project management and at least one other element, depending on the type of deliverables to be produced by the project: product, service, or result. There may also be additional elements at Level 2 and below that support neighboring elements (cross-cutting elements) or represent the next step in a process. See Figure 4.5 for an example.
- **Level 3 and below (work package elements)**—Decomposition continues as needed until the work package, the lowest element of a WBS, is reached. It must be at a level of decomposition sufficient to be controlled and performed by one individual or one organizational entity. A work package is broken into activities and tasks that are described with a verb (see Figure 4.5).
- **WBS dictionary**—Each element of a WBS may be described in more detail in a WBS dictionary. Additional information about the element, including budget, cost, and earned value data may also be included there.
- **100% rule**—Each lower level of decomposition must represent all of the work of the higher-level element; conversely, all higher-level scope must be reflected in one of the lower-level elements. This is called the 100% rule, which ensures that all of the scope has been captured and that nothing extraneous is included.

As you can see from these examples, the WBS can be created in Microsoft Project or as a white-board exercise prior to opening a schedule. The *Practice Standard for Work Breakdown Structures, Second Edition* (PMI, 2006) recommends that the team be involved in the creation of the WBS. The focus for this process should be on the outputs to be produced so that the team uses nouns to describe what will be produced and can identify all of the cross-cutting elements that are required.

WBS and Scheduling

Regardless of the methods that are chosen to create the schedule, the process will be iterative. Some groups will choose to begin the process using top-down decomposition. Others may choose to identify all of the work they can using brain-storming techniques and then organize the work into logical packages. Either method is effective as a starting point. Multiple iterations of each method will be used before the team will be satisfied that all the work has been identified. It is important to remember that certain types of work, such as integration of elements, are often only recognized from the bottom-up view. Examples of this include assembly of components in a manufacturing project or quality testing in a software project.

Figure 4.5 Level 2 elements include Management and at least one other element based on the type of deliverables that the project will produce.



The iterative nature of building a WBS, and subsequently a schedule, requires a great deal of realignment and reordering of elements. When developing and maintaining the WBS structure, it is important that you remember the 100% rule mentioned previously. You should maintain work packages as units and move them as units within the schedule rather than moving individual tasks below the work package. After you have identified the work packages, you can rearrange them, but you should have the same set of lowest-level work packages regardless of the realignment. Use the 100% rule to validate the process and always focus on the outputs of the packages rather than the resources required to do the work.

Figures 4.6 and 4.7 show examples of how work packages can exist in different locations in the project schedule. In this case, the work package called “Cabinets” exists under the Level 2 task “Surfaces” in Figure 4.6, and under the Level 2 task “Storage” in Figure 4.7. Remember, a work package is defined as the lowest level of the WBS; the tasks (activities to be performed) are broken out below the work package level.

Avoid the tendency to define the work according to the groups that may be performing the work during initial decomposition because this will limit your thinking and make it easier to violate the 100% rule. Instead, focus on the work to be delivered and then assign it to a group as appropriate.



Remember that the work package is the lowest component of a WBS; after you are sure that you have captured all of them, organize them in a way that is meaningful to the team. Tasks are defined at the level below the work package.

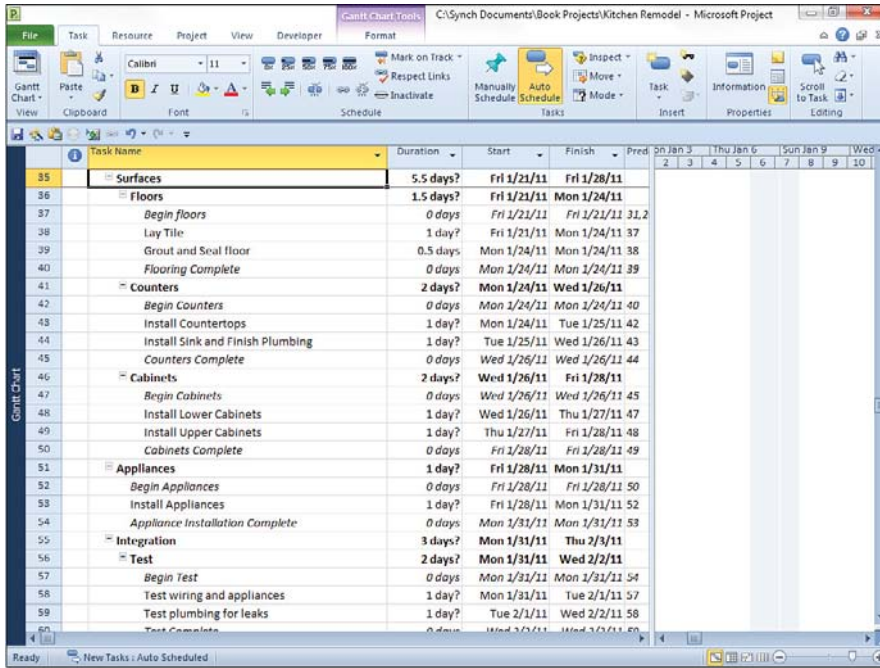


Figure 4.6

Work packages can be aligned in different ways; use the 100% rule to verify the scope.

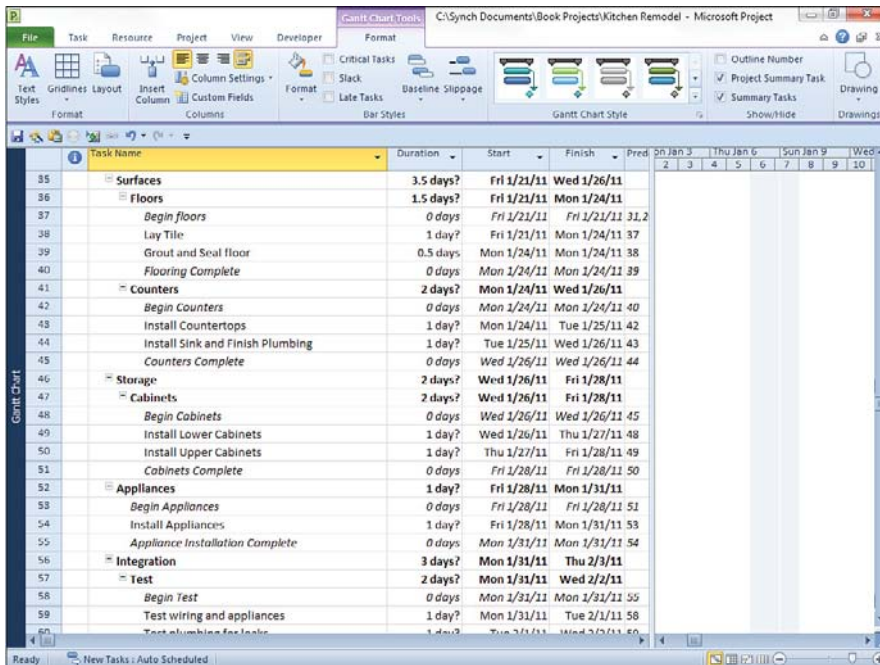


Figure 4.7

The “Cabinets” work package has been moved. If “Storage” existed as a Level 2 component in your WBS, this may be a more appropriate place for the “Cabinets” work package.

After the team is satisfied that all work has been captured and decomposed to the appropriate level, the WBS work packages are set to be the basis for adding precedence and resources and creating a schedule. The work packages should have starting and ending milestones to aid with work flow and to ensure that the focus remains on the production of deliverables. Refer to Figure 4.4 for examples of these milestones.

Use of Templates

Most organizations repeatedly deliver similar projects. Templates can be extremely useful for capturing the best practices developed into repeatable standards and reporting, giving new projects a jumpstart to success. The top two levels of the WBS can often be used consistently across an organization. The project management elements can be standardized, as can many other cross-cutting elements. Standard templates will minimize the amount of startup work required to determine process use for each project and will also improve the organization's ability to control scope on the elements that are consistent across projects.

WBS Numbering

Project has a field called WBS that can be customized to fit the organization's WBS numbering schema. The default WBS code is identical to the outline numbers that Project generates and stores in the Outline Number field. You can display both of these fields in a table by inserting the columns, as shown in Figure 4.8.

Figure 4.8
The Outline Number field and the default WBS code are identical.

Outline Number	WBS	Task Name	Duration	Start	Finish
0	0	Kitchen Remodel	23.8 days?	Mon 1/3/11	Thu Jan 6
1	1	Management	10.13 days?	Mon 1/3/11	Mon
2	1.1	Plans and Permits	2 days?	Mon 1/3/11	Tu
3	1.1.1	Begin Plans and Permits	0 days	Mon 1/3/11	Mo
4	1.1.2	Complete Kitchen Plans and Pull Permits	2 days?	Mon 1/3/11	Tu
5	1.1.3	Plans and Permits Complete	0 days	Tue 1/4/11	Tu
6	1.2	Project Team Meetings	10.13 days?	Mon 1/3/11	Mon
10	1.3	Contracts	1 day	Tue 1/4/11	We
11	1.3.1	Begin Contracts	0 days	Tue 1/4/11	Tu
12	1.3.2	Negotiate contract with electrician	0.5 days	Wed 1/5/11	We
13	1.3.3	Negotiate contract with plumber	0.5 days	Wed 1/5/11	We
14	1.3.4	Contracts in Place	0 days	Wed 1/5/11	We
15	2	Preparation	11.3 days?	Wed 1/5/11	Fri
16	2.1	Demolition	8.5 days?	Wed 1/5/11	Tue
17	2.1.1	Begin Demolition	0 days	Wed 1/5/11	We
18	2.1.2	Empty Cabinets, Shelves, and countertops	5 days	Thu 1/6/11	Wed
19	2.1.3	Remove old appliances	0.5 days?	Thu 1/13/11	Thu
20	2.1.4	Demolish old cabinets, countertops, and floor	3 days?	Thu 1/13/11	Tue
21	2.1.5	Demolition Complete	0 days	Tue 1/28/11	Tue
22	2.2	Clean up	2.8 days?	Tue 1/18/11	Fri
23	2.2.1	Begin Clean up	0 days	Tue 1/18/11	Tue
24	2.2.2	Dispose of old materials and appliances	1 day?	Tue 1/18/11	Wed
25	2.2.3	Remove floor adhesives and clean room	1.8 days	Wed 1/19/11	Fri
26	2.2.4	Clean up complete	0 days	Fri 1/21/11	Fri
27	2.3	Materials	2 days?	Wed 1/5/11	Fr

To insert these fields onto your screen, follow these steps:

1. Right-click on the column header where you want to insert the column (field), and choose Insert Column. This opens the Column Definition dialog box. All columns to the right, including the column in which you right-clicked, shift to the right to make room for the new column insertion.
2. In the Column Definition dialog box, choose either Outline Number or WBS from the drop-down list in the Field Name field.
3. Click OK to close the Column Definition dialog box and insert the column.

Repeat these steps to insert the other column (the one you did not just insert), either Outline Number or WBS.

If your team chooses to use these fields, you must be aware that the Outline Number field and WBS field are identical in Microsoft Project's default mode and the number associated with a work package will change if the package is moved within the project schedule. If the WBS numbering schema must remain the same throughout the life of the project, use a custom field that you must then maintain instead of the automatic WBS field provided by Project.



By default, the value in the Microsoft Project WBS field will automatically change if a work package is moved from one location to another within the schedule.

Creating Custom WBS Codes

To customize the WBS code format in the Microsoft Project WBS field, you can generate custom codes using a *WBS code mask*. The mask contains numbers or characters for each outline level, with separators between the levels. There is a total limit of 255 characters, which is sufficient to handle even the most complex WBS structure. For projects that are part of a larger program, you can also include a project-level code that will be a prefix for all tasks within the project, or you can leave it blank.

To create a custom WBS code, follow these steps:

1. Choose the Project tab, WBS, Define Code to display the WBS Code Definition dialog box, as shown in Figure 4.9.
2. Enter a code prefix for the project, if needed, in the Project Code Prefix box. Identify a separator, such as a colon or period, to make it easier for the reader to identify the levels.
3. Click the first blank row under the Sequence column in the Code Mask table and select the option from the drop-down menu for numbers or letters, as appropriate for your organization. You can display your options with the pull-down arrow, which are as follows:
 - **Numbers (ordered)**—Project will insert sequential numbers for this part of the code. You can edit these numbers later.
 - **Uppercase Letters (ordered)**—Project will insert sequential uppercase letters.
 - **Lowercase Letters (ordered)**—Project will insert sequential lowercase letters.

- **Characters (unordered)**—Project will insert an asterisk (*). You can go back and change it to any character later.
4. Specify the length of the field or choose Any to allow flexibility in the number of characters. Use the pull-down arrow in the Length column to show the options for the number of characters you can use for this part of the formatting:
 - Select Any when you want to later edit this part of the code, using a variety of number of characters.
 - Select 1 through 10 when you want to set a fixed number of characters for this section of formatting.
 5. Identify a separator from the choices in the drop-down menu or type another symbol directly on the keyboard.
 6. Repeat steps 3, 4, and 5 for each additional level of the WBS. The Code Preview field at the top of the dialog box will show you what the custom WBS code will look like as you are creating the mask.
 7. If you want Project to automatically generate the WBS codes for you, select the box Generate WBS Code for New Task. If this box is cleared, you will need to enter the codes manually but will be required to follow the format defined in this process.
 8. If you want Project to check for duplicate codes, select the box Verify Uniqueness of New WBS Codes. The check only occurs when you edit the codes, and you need to modify the codes manually to make them unique. It is generally a good idea to have this box selected to avoid confusion with the WBS codes.
 9. Click OK to save the mask. Project automatically replaces the default WBS code with the new codes you have designed. If your project is complex and has many levels, you may need to widen the column to see the entire code. Select the column header and double-click the right-hand column border. See the following section, “Editing Custom Codes,” to further customize your WBS.

 **note**

If you have not defined enough levels in the mask for all of your WBS, Project will use the default numbering system for the lower levels.

You can force Project to renumber all of the codes in your WBS, but you will lose any special coding that you have done manually. (See the section, “Renumbering the Custom WBS Codes,” later in this chapter.)

If you use the check box to verify the uniqueness for new codes, Microsoft Project only checks the code when it is created or edited.

If your project file has custom WBS codes that were set up when this feature was disabled, and you then decide to enable unique codes, Project will not check the existing codes for uniqueness. If necessary, you can force Project to renumber all of the codes, which is to say generate new codes for the task, to correct your non-unique ones. This also causes you to lose any codes you have entered manually.

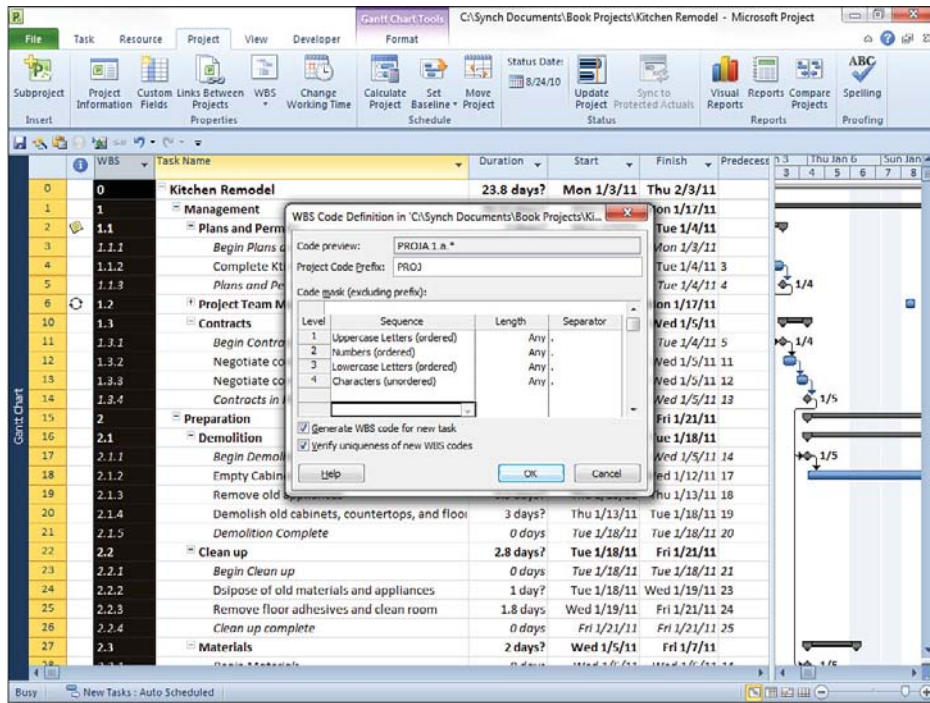


Figure 4.9 Project will create custom WBS codes through your formatted mask.

If you want to reduce the number of defined levels in the mask, you can delete only the bottom-most level of the Sequence table. Start with the bottom-most level and use the Delete key to clear your mask, then work your way up the list, deleting from the bottom up.

Inserting, Deleting, and Moving Tasks with Custom WBS Codes

You should stabilize your WBS and your schedule before adding the custom WBS codes so that you do not have to spend too much time making changes to them. On occasion, however, you will find that you need to add or delete tasks and perhaps move entire work packages to different areas of your WBS. Project makes some automatic numbering changes, and you need to be aware of how these changes work if you use custom WBS codes.

When you insert a new task into a work package (summary task group), Project automatically gives it the next highest codes for the level. If you delete a task, Project rennumbers the tasks that



If necessary, you can edit every task's code, forcing Project to check each task's uniqueness. You can do this quickly and easily by choosing the WBS column, so all of the cells are selected, and pressing F2 to edit the first cell. Then press Enter to force Microsoft Project 2010 to make a uniqueness check. If your code is unique, Project will move onto the next cell in the selection. Press F2 and Enter again to process the next cell. It is easy to move down the column this way quite quickly, provided the codes are unique. If not, you will have to stop and change the code before you finish.

follow. If these are not the behaviors that you want, you will need to manage the addition and deletion carefully.

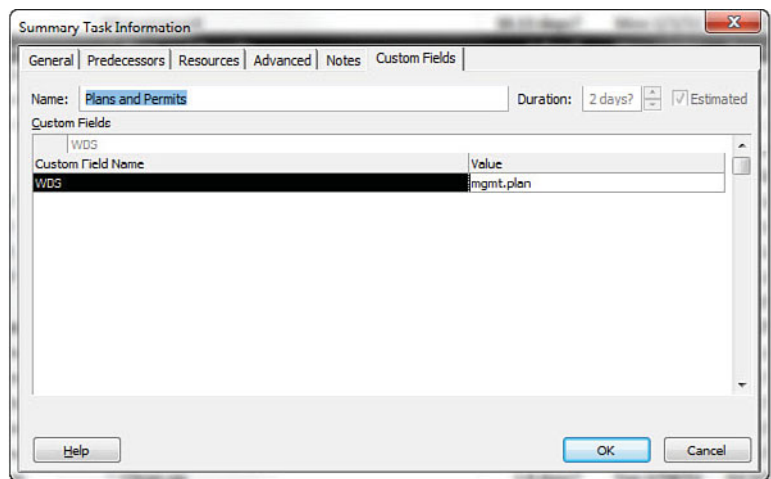
If you move a task to another row within a work package, it keeps its original code even though it will no longer be in sequence. If you move a task from one work package to another (not a recommended practice), it acquires the correct prefix code for the new work package. The final part of the code may change if it would be a duplicate of an existing task within the package.

Editing Custom WBS Codes

Editing custom codes after the code mask is created is straightforward. Select a summary task by double-clicking any field in the row except the row number. The Summary Task Information window appears. Because you have created a WBS code mask, under the Custom Fields tab, a custom field called WBS should be visible. Select the value field for WBS. Make your change in the entry bar immediately above the custom field name list box.

Figure 4.10

You can use the Custom Fields tab of the Summary Task Information dialog box to edit the WBS code.



You will be editing only the last segment of any of the custom codes; all the higher-level segments are derived from the higher levels (summary task levels). You can change the segment codes at the summary task level if the assignment made by Project does not fit with what your organization would like to see.

For instance, in Figure 4.11, the major phases have been edited as abbreviations or acronyms for the name of the phase. AA was the default WBS code for the Planning the Move phase, but it has been changed to PLAN. It makes it easier to realize a task's place within the WBS code.

If you want to show the tasks in their WBS code order, select the View tab, Sort, Sort By and then select the WBS field in the Sort By box.

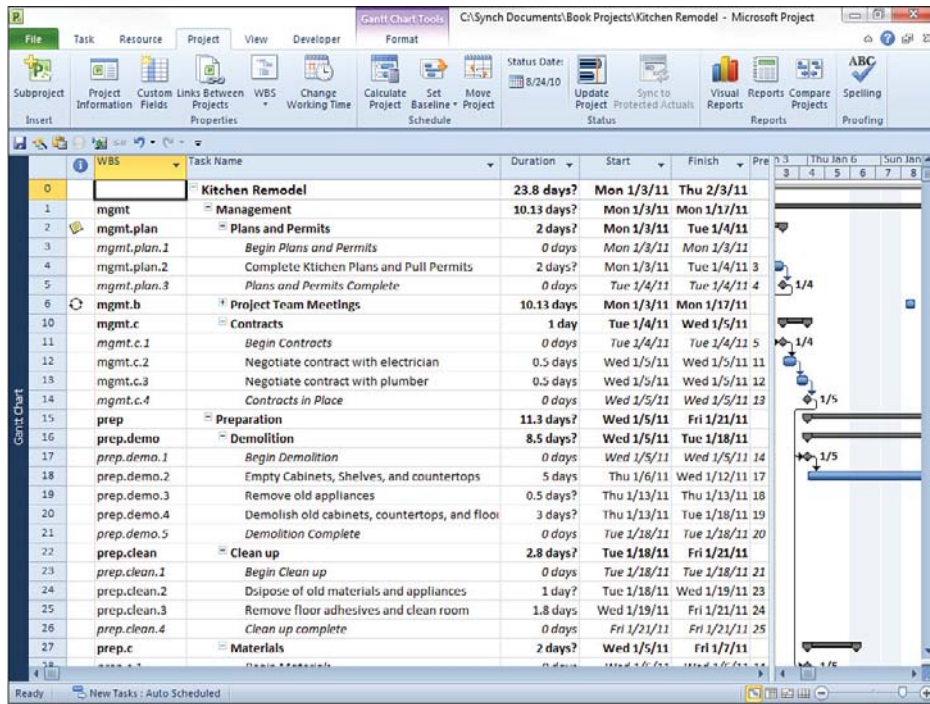


Figure 4.11
Editing the default letters assigned by Project in the custom WBS codes lets you describe how a task fits into the task list.

You lose your edited codes if you edit custom codes for summary tasks and then tell Project to renumber the tasks. Use the following steps to prevent that from happening:

1. Using the Gantt view, select the Format tab.
2. Clear the Show Summary Tasks check box. Only the normal and milestone tasks should be displayed.
3. Choose one of the column headings to select all displayed tasks.
4. Select the Project tab, WBS, Renumber to bring up the WBS Renumbering dialog box (if Renumber is grayed out, a custom WBS code mask has not been created).
5. Click the Selected Tasks button instead of the Entire Project button.
6. Click OK to begin renumbering.
7. You can then restore the display of summary tasks by selecting the Format tab, Show Summary check box. Click any cell to unselect all tasks.

Your entire task list will be displayed again. Your summary tasks have not lost their edited codes, but all of your other tasks have been renumbered to the current order of the outline.

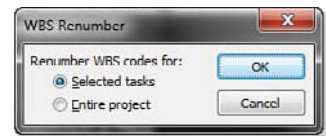
Renumbering the Custom WBS Codes

As you are planning your project, you are likely to revise the task list somewhere along the line. If you have already defined the custom WBS codes by this time, they might not be in sequence after the editing. Microsoft Project will recalculate the WBS codes for the whole project, putting them into sequence for you. Follow these steps to renumber the WBS codes:

1. If you are only renumbering a small, selected set of tasks, choose those tasks first (they must be adjacent to one other). The first selected task will not be renumbered, but will be the starting point for renumbering the rest of the selection.
2. Go to the Project tab, WBS, Renumber to pull up the WBS Renumbering dialog box, shown in Figure 4.12.
3. Pick either Selected tasks or Entire project.
4. Click OK to begin renumbering.
5. If you decide to renumber the whole task list, Project will ask you to confirm your decision. Click Yes or No as necessary.

Figure 4.12

You can renumber the entire project, or just a small select set of tasks, using the WBS Renumbering dialog box.



If, even with a warning to confirm your decision, you still end up realizing that you did not want to renumber, you can go back and use the Undo feature to restore your original codes.

Scope Control and Change Control

If you use the WBS approach to building your schedule, it is much easier to control the scope of the project. The 100% rule defeats the “as long as you are there” phenomenon: the tendency to add features that are not within scope because they would be nice to have.

Using the 100% rule allows you to perform top-down planning and budgeting and also enables tracking and reporting at the work package level. This is essential if you will be using any type of the earned value reporting in your project. You will be able to baseline the project and keep track of history at a work package level rather than trying to manage at the individual activity level.

Change control should also be viewed at the work package level. Budget and schedule impacts are easier to control in logical units, and it is also much easier to see the ripple effect of a requested change at the work package level.

Consultants' Tips

Understanding a Work Breakdown Structure

Microsoft Project uses the term *Work Breakdown Structure (WBS)* to mean a hierarchical list of working activities. The tasks you create in a Microsoft Project schedule are really an *Activity Breakdown Structure (ABS)* showing the relationship of tasks throughout the schedule.

The term WBS has a formal definition and United States government MIL-HDBK-881A standard. That standard describes how a WBS is used to define the cost and management control structures that define the official scope of your project. Even though this is a government military standard, project management discipline has adopted this standard as the basis for defining a Work Breakdown Structure. You should review this standard to better understand the distinction between Activity Breakdown Structure and Work Breakdown Structure.

You should also consider reviewing ANSI/EIA Standard 748 that defines Earned Value Management (EVM) and specifically refers to the formal WBS definitions. EVM is a well-defined strategy to clearly determine how your project is performing against defined Work Breakdown Structure scope.

Use your favorite Internet search engine to learn more about WBS and Earned Value Management.

Define the Full Scope of Your Project

When building a schedule, it is always easier to add more detail later than to take it out. If you keep your schedule focused on deliverables, it will be much easier to identify deliverables that have not been fully defined. This allows much greater flexibility in setting the scope for a project. (This is accomplished naturally if you follow the best practice of creating a WBS prior to creating a schedule! It is extremely difficult to keep WBS principles in mind when you jump to creation of a schedule without having gone through prior creation of a WBS.)

Build WBS First

Many project managers skip the process of building a WBS before they build a schedule because project sponsors tend to push for early resource and date commitments. Microsoft Project is an excellent scheduling tool, and it can be an excellent tool for controlling scope if the Project Manager takes a disciplined approach to developing a WBS from the beginning.

Avoid the tendency to structure your schedule according to workgroup during initial decomposition because it will limit your thinking and make it much easier to violate the 100% rule. Focus on the work to be delivered, describe it completely in a WBS and WBS dictionary, and then assign the logical flow of precedence and the resources. Other fields can be used to structure your schedule according to workgroups, GL codes, and so on, after the WBS is complete.

Define Project Work Packages

Understand the work package level of your project as the most important component for providing scope management and control. This will keep you “out of the weeds,” and you can make decisions based on the impact to the work package rather than trying to deal with many activities. You can rearrange work packages in a variety of ways and still be assured that the scope of the project is accurate. There is no single correct structure for WBS; work packages can be arranged in a variety of ways.

Make sure that all of the work packages within your project support the defined measures of success and that you have an objective method to measure both progress and accomplishment of the project goal. Most project failures are due to not understanding or managing scope; project success requires a clear goal and a scope of work that supports the goal.

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