

# Chapter 5: Project Scope Management

**Information Technology Project  
Management, Seventh Edition**



Information Technology  
PROJECT MANAGEMENT | 7e

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Note: See the text itself for full citations.

# Learning Objectives

- ▶ Understand the importance of good project scope management
- ▶ Describe the process of planning scope management
- ▶ Discuss methods for collecting and documenting requirements to meet stakeholder needs and expectations
- ▶ Explain the scope definition process and describe the contents of a project scope statement
- ▶ Discuss the process for creating a work breakdown structure using the analogy, top-down, bottom-up, and mind-mapping approaches

# Learning Objectives

- ▶ Explain the importance of validating scope and how it relates to defining and controlling scope
- ▶ Understand the importance of controlling scope and approaches for preventing scope-related problems on information technology (IT) projects
- ▶ Describe how software can assist in project scope management

# What is Project Scope Management?

- ▶ **Scope** refers to *all* the work involved in creating the products of the project and the processes used to create them
- ▶ A **deliverable** is a product produced as part of a project, such as hardware or software, planning documents, or meeting minutes
- ▶ Project scope management includes the processes involved in defining and controlling what is or is not included in a project

# Project Scope Management Processes

- ▶ **Planning scope:** determining how the project's scope and requirements will be managed
- ▶ **Collecting requirements:** defining and documenting the features and functions of the products produced during the project as well as the processes used for creating them
- ▶ **Defining scope:** reviewing the project charter, requirements documents, and organizational process assets to create a scope statement
- ▶ **Creating the WBS:** subdividing the major project deliverables into smaller, more manageable components
- ▶ **Validating scope:** formalizing acceptance of the project deliverables
- ▶ **Controlling scope:** controlling changes to project scope throughout the life of the project

# Figure 5-1. Project Scope Management Summary

## Planning

Process: **Plan scope management**

Outputs: Scope management plan, requirements management plan

Process: **Collect requirements**

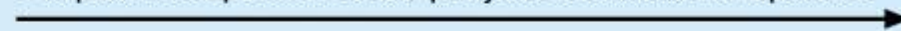
Outputs: Requirements documentation, requirements traceability matrix

Process: **Define scope**

Outputs: Project scope statement, project documents updates

Process: **Create WBS**

Outputs: Scope baseline, project documents updates



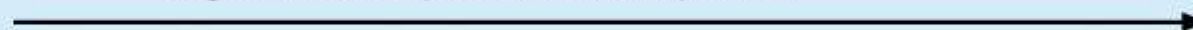
## Monitoring and Controlling

Process: **Validate scope**

Outputs: Accepted deliverables, change requests, work performance information, project documents updates

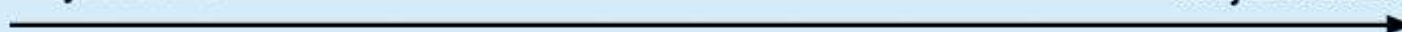
Process: **Control scope**

Outputs: Work performance information, change requests, project management plan updates, project documents updates, organizational process assets updates



Project Start

Project Finish



# Planning Scope Management

- ▶ The project team uses expert judgment and meetings to develop two important outputs: the scope management plan and the requirements management plan
- ▶ The scope management plan is a subsidiary part of the project management plan



# Scope Management Plan Contents

- ▶ How to prepare a detailed project scope statement
- ▶ How to create a WBS
- ▶ How to maintain and approve the WBS
- ▶ How to obtain formal acceptance of the completed project deliverables
- ▶ How to control requests for changes to the project scope



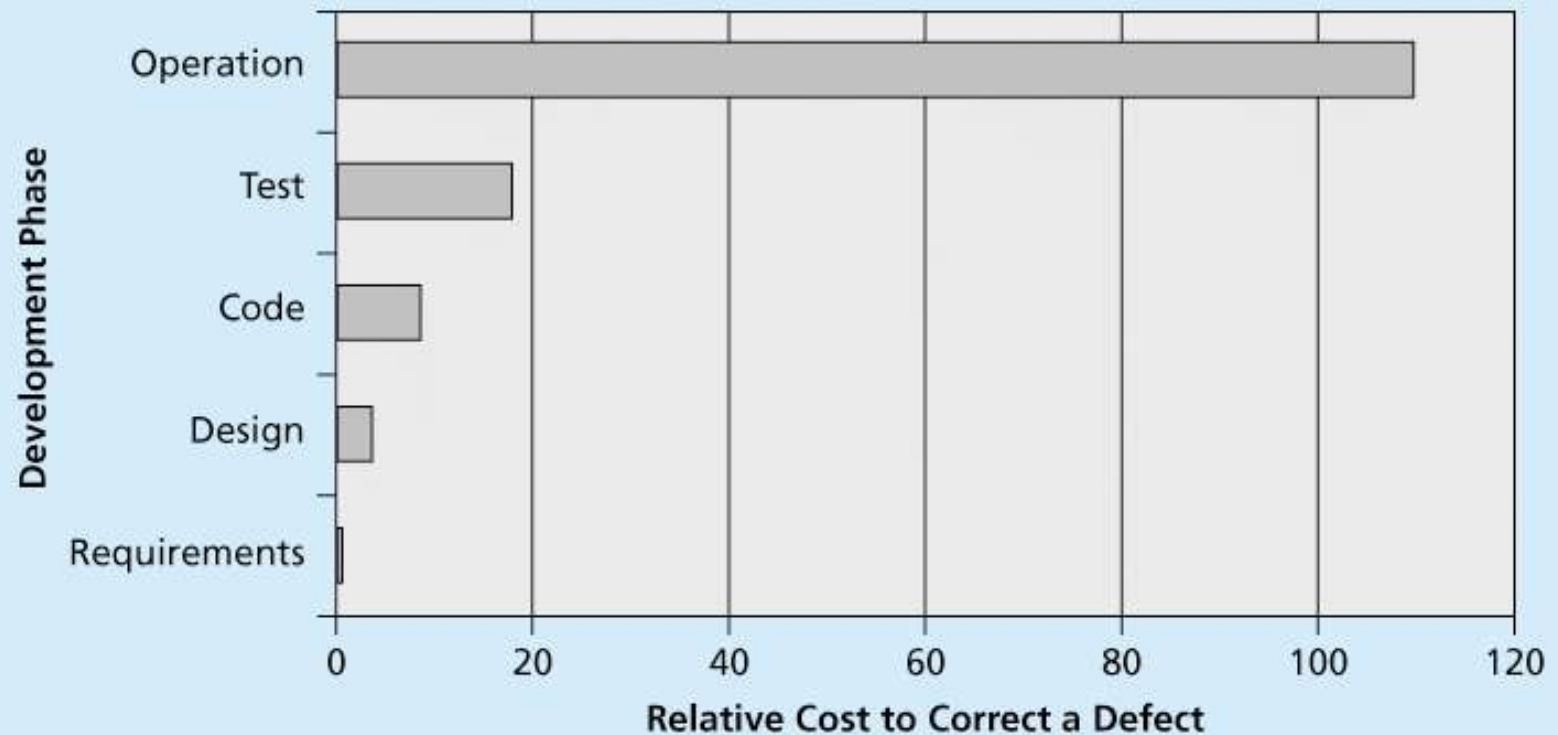
# Requirements Management Plan

- ▶ The PMBOK® Guide, Fifth Edition, describes requirements as “conditions or capabilities that must be met by the project or present in the product, service, or result to satisfy an agreement or other formally imposed specification”
- ▶ The **requirements management plan** documents how project requirements will be analyzed, documented, and managed

# Collecting Requirements

- ▶ For some IT projects, it is helpful to divide requirements development into categories called elicitation, analysis, specification, and validation
- ▶ It is important to use an iterative approach to defining requirements since they are often unclear early in a project

# Figure 5-2. Relative Cost to Correct a Software Requirement Defect



Source: Robert B. Grady, "An Economic Release Decision Model: Insights into Software Project Management." *Proceedings of the Applications of Software Measurement Conference* (Orange Park, FL: Software Quality Engineering, 1999), pp. 227–239.

# Methods for Collecting Requirements

- ▶ Interviewing
- ▶ Focus groups and facilitated workshops
- ▶ Using group creativity and decision-making techniques
- ▶ Questionnaires and surveys
- ▶ Observation
- ▶ Prototyping
- ▶ **Benchmarking**, or generating ideas by comparing specific project practices or product characteristics to those of other projects or products inside or outside the performing organization, can also be used to collect requirements

# Statistics on Requirements for Software Projects (2011 Survey)\*

- ▶ Eighty-eight percent of the software projects involved enhancing existing products instead of creating new ones
- ▶ Eighty-six percent of respondents said that customer satisfaction was the most important metric for measuring the success of development projects
- ▶ Eighty-three percent of software development teams still use Microsoft Office applications such as Word and Excel as their main tools to communicate requirements

\*John Simpson, “2011: The State of Requirements Management” (2011).

# What Went Right?

- ▶ Genesys Telecommunications Laboratories uses Accept software, a product planning and innovation management application and winner of the Excellence in Product Management Award from 2006–2008
- ▶ Accept helps them instill a consistent, repeatable, and predictable process for new product definition and development
- ▶ They can define what information comprises a requirement and enforce discipline around that process

# Requirements Traceability Matrix

- ▶ A **requirements traceability matrix (RTM)** is a table that lists requirements, various attributes of each requirement, and the status of the requirements to ensure that all requirements are addressed
- ▶ Table 5-1. Sample entry in an RTM

Requirement No.	Name	Category	Source	Status
R32	Laptop memory	Hardware	Project charter and corporate laptop specifications	Complete. Laptops ordered meet requirement by having 4GB of memory.



# Defining Scope

- ▶ **Project scope statements** should include at least a product scope description, product user acceptance criteria, and detailed information on all project deliverables. It is also helpful to document other scope-related information, such as the project boundaries, constraints, and assumptions. The project scope statement should also reference supporting documents, such as product specifications
- ▶ As time progresses, the scope of a project should become more clear and specific

# Table 5-2. Sample Project Charter (partial)

**Project Title:** Information Technology (IT) Upgrade Project

**Project Start Date:** March 4

**Projected Finish Date:** December 4

**Key Schedule Milestones:**

- Inventory update completed April 15
- Hardware and software acquired August 1
- Installation completed October 1
- Testing completed November 15

**Budget Information:** Budgeted \$1,000,000 for hardware and software costs and \$500,000 for labor costs.

**Project Manager:** Kim Nguyen, (310) 555-2784, knguyen@course.com

**Project Objectives:** Upgrade hardware and software for all employees (approximately 2,000) within nine months based on new corporate standards. See attached sheet describing the new standards. Upgrades may affect servers as well as associated network hardware and software.

**Main Project Success Criteria:** The hardware, software, and network upgrades must meet all written specifications, be thoroughly tested, and be completed in nine months. Employee work disruptions will be minimal.

**Approach:**

- Update the IT inventory database to determine upgrade needs
- Develop detailed cost estimate for project and report to CIO
- Issue a request for quote to obtain hardware and software
- Use internal staff as much as possible for planning, analysis, and installation

# Table 5-3: Further Defining Project Scope

## **Project Charter:**

Upgrades may affect servers . . . (listed under Project Objectives)

## **Project Scope Statement, Version 1:**

Servers: If additional servers are required to support this project, they must be compatible with existing servers. If it is more economical to enhance existing servers, a detailed description of enhancements must be submitted to the CIO for approval. See current server specifications provided in Attachment 6. The CEO must approve a detailed plan describing the servers and their location at least two weeks before installation.

## **Project Scope Statement, Version 2:**

Servers: This project will require purchasing ten new servers to support Web, network, database, application, and printing functions. Virtualization will be used to maximize efficiency. Detailed descriptions of the servers are provided in a product brochure in Appendix 8 along with a plan describing where they will be located.

# Media Snapshot

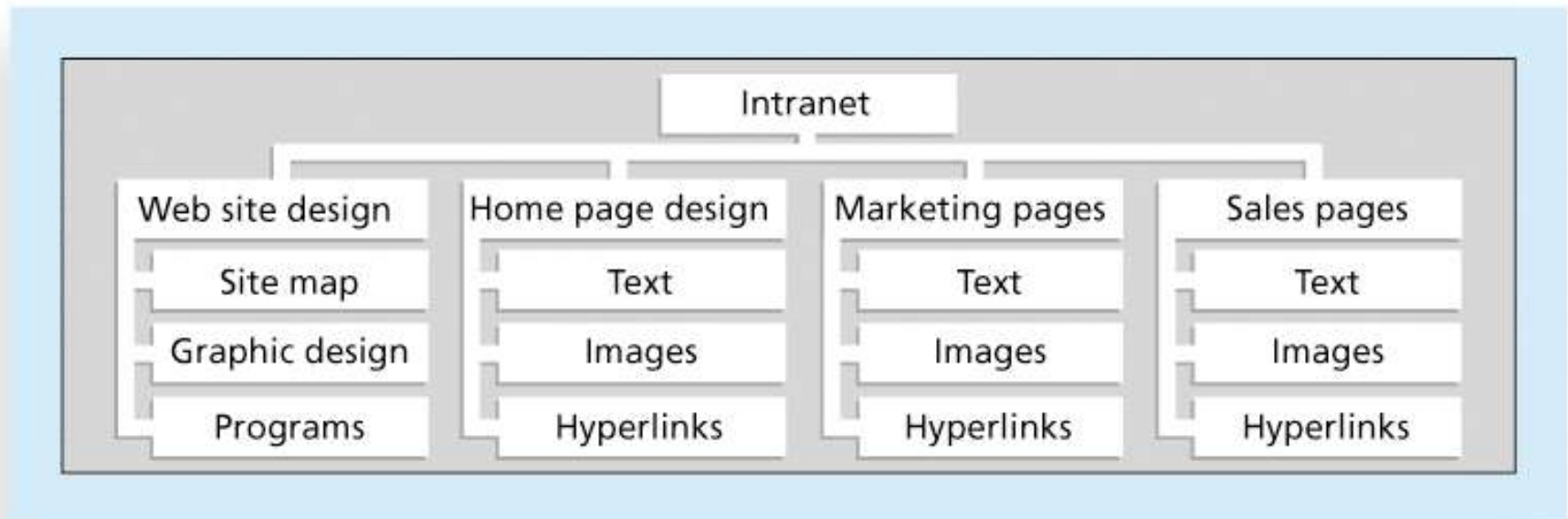
- ▶ Many people enjoy watching television shows like *Trading Spaces*, where participants have two days and \$1,000 to update a room in their neighbor's house. Since the time and cost are set, it's the scope that has the most flexibility
- ▶ Although most homeowners are very happy with work done on the show, some are obviously disappointed. Part of agreeing to be on the show includes signing a release statement acknowledging that you will accept whatever work has been done
- ▶ Too bad you can't get sponsors for most projects to sign a similar release form. It would make project scope management much easier!

# Creating the Work Breakdown Structure (WBS)

- ▶ A **WBS** is a deliverable-oriented grouping of the work involved in a project that defines the total scope of the project
- ▶ WBS is a foundation document that provides the basis for planning and managing project schedules, costs, resources, and changes
- ▶ **Decomposition** is subdividing project deliverables into smaller pieces
- ▶ A **work package** is a task at the lowest level of the WBS
- ▶ The **scope baseline** includes the approved project scope statement and its associated WBS and WBS dictionary

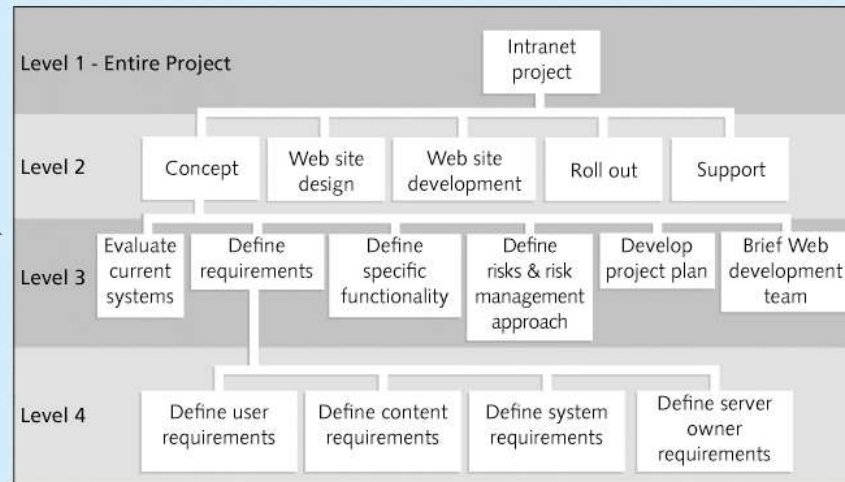


# Figure 5-3. Sample Intranet WBS Organized by Product



# Figure 5-4. Sample Intranet WBS Organized by Phase

Chart form →

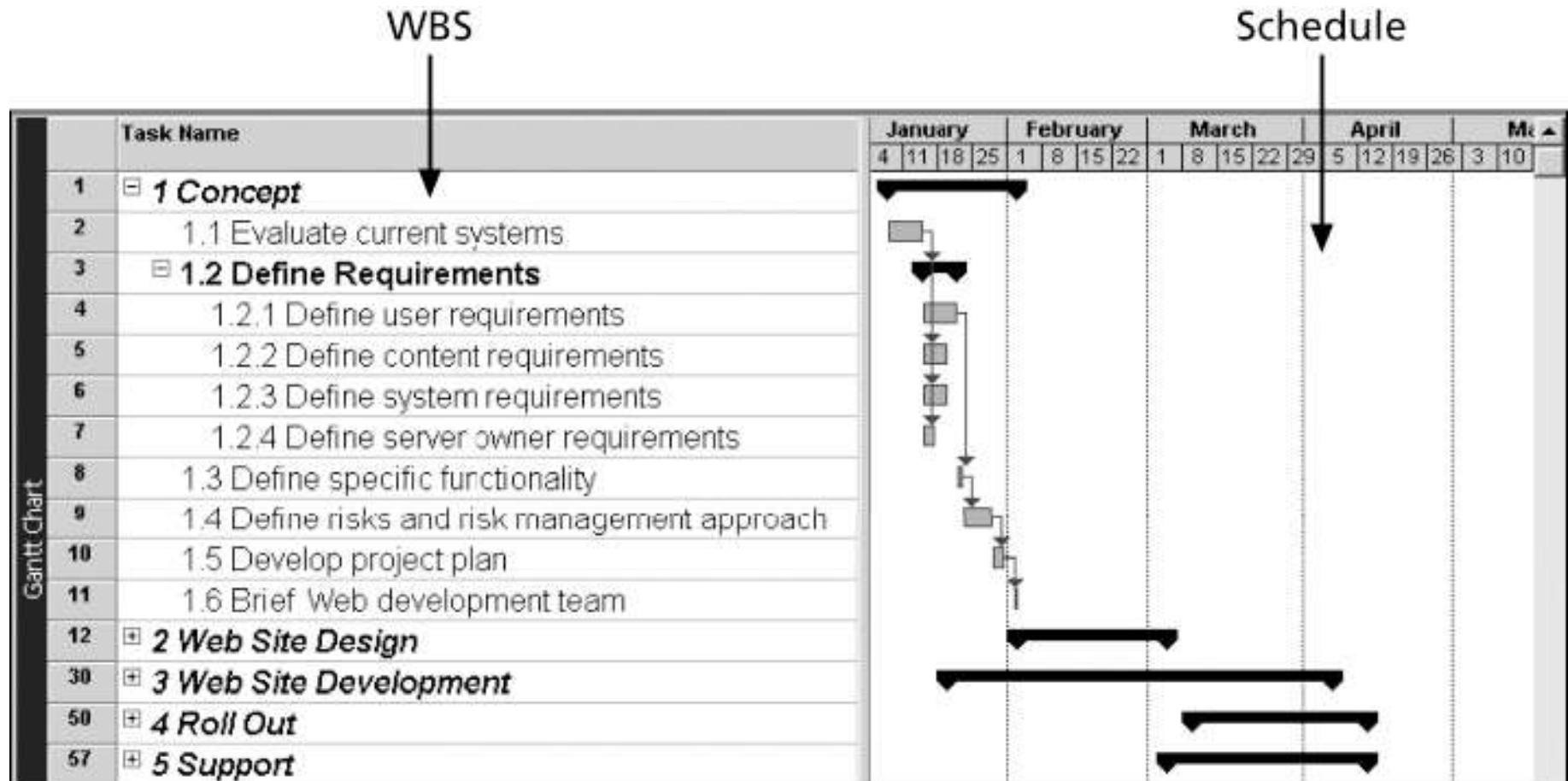


## Tabular form with PMI numbering

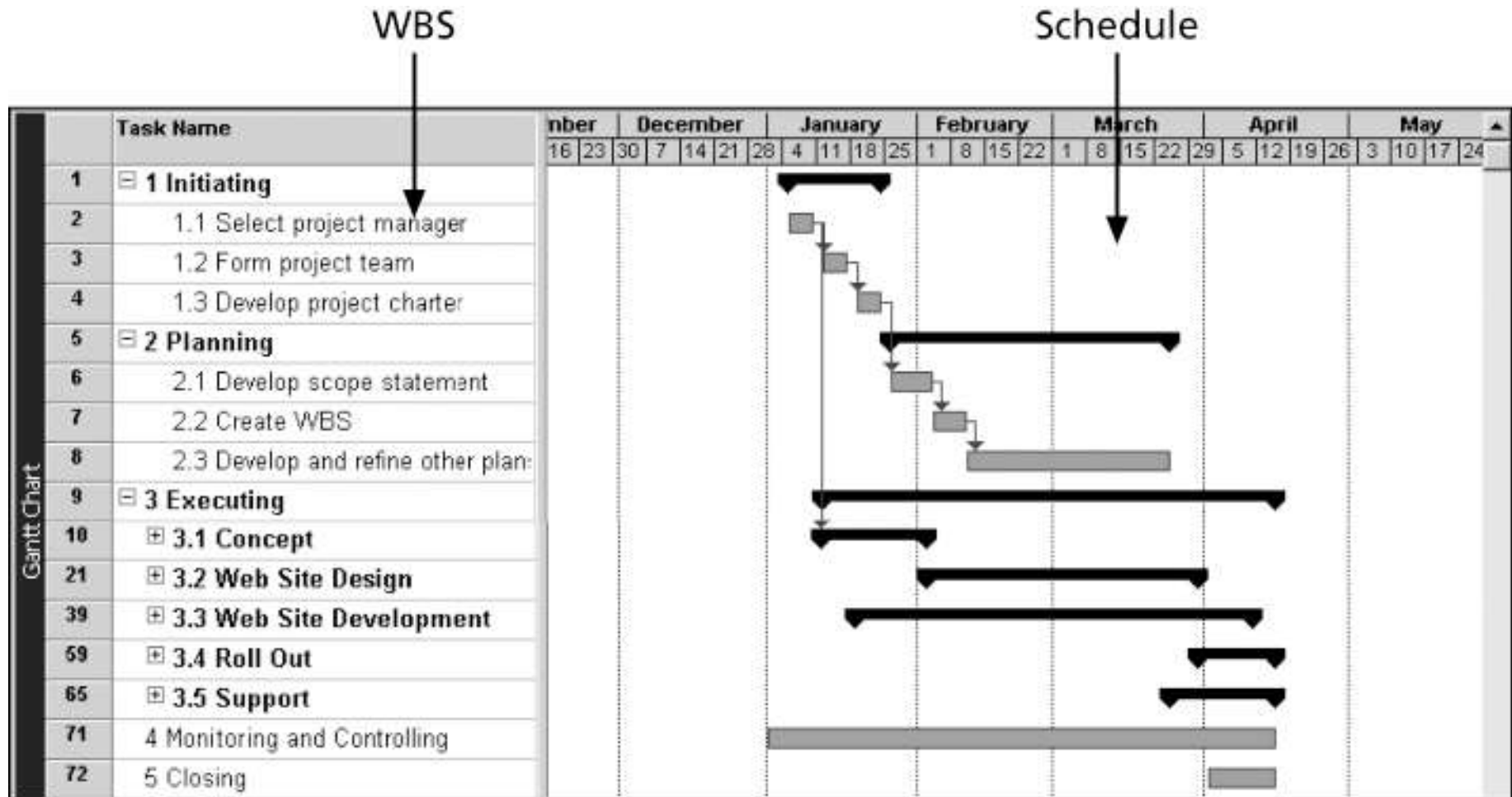
- 1.1 Concept
  - 1.1.1 Evaluate current systems
  - 1.1.2 Define requirements
    - 1.1.2.1 Define user requirements
    - 1.1.2.2 Define content requirements
    - 1.1.2.3 Define system requirements
    - 1.1.2.4 Define server owner requirements
  - 1.1.3 Define specific functionality
  - 1.1.4 Define risks and risk management approach
  - 1.1.5 Develop project plan
  - 1.1.6 Brief Web development team
- 1.2 Web site design
- 1.3 Web site development
- 1.4 Roll out
- 1.5 Support



# Figure 5-5. Intranet WBS and Gantt Chart in Microsoft Project



### Figure 5-6. Intranet Gantt Chart Organized by Project Management Process Groups



# Table 5-4: Executing Tasks for JWD Consulting's WBS

## 3.0 Executing

### 3.1 Survey

### 3.2 User inputs

### 3.3 Intranet site content

#### 3.3.1 Templates and Tools

#### 3.3.2 Articles

#### 3.3.3 Links

#### 3.3.4 Ask the Expert

#### 3.3.5 User requests feature

### 3.4 Intranet site design

### 3.5 Intranet site construction

### 3.6 Site testing

### 3.7 Site promotion

### 3.8 Site roll out

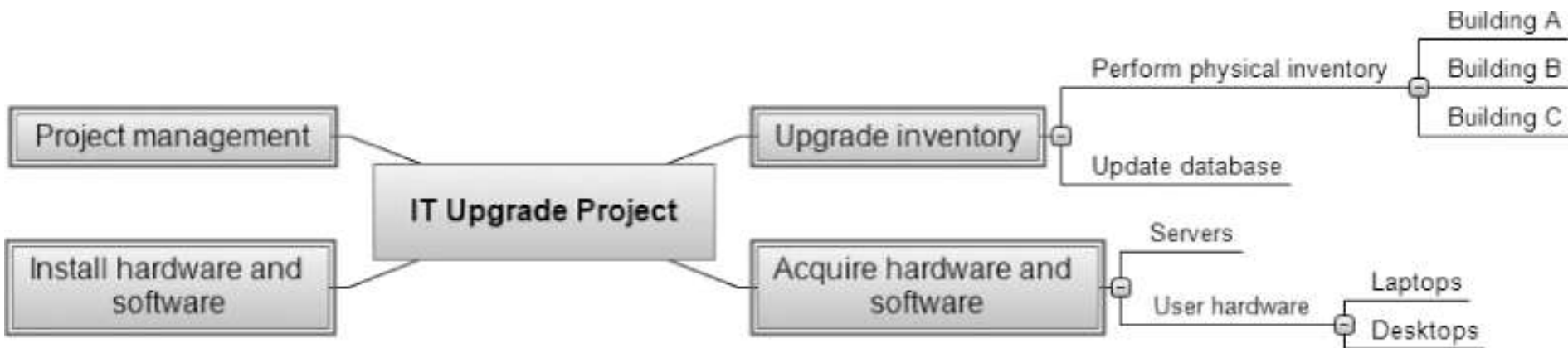
### 3.9 Project benefits measurement

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# Approaches to Developing WBSs

- ▶ Using guidelines: Some organizations, like the DOD, provide guidelines for preparing WBSs
- ▶ The **analogy approach**: Review WBSs of similar projects and tailor to your project
- ▶ The **top-down approach**: Start with the largest items of the project and break them down
- ▶ The **bottom-up approach**: Start with the specific tasks and roll them up
- ▶ Mind-mapping approach: **Mind mapping** is a technique that uses branches radiating out from a core idea to structure thoughts and ideas

# Figure 5-7. Sample Mind-Mapping Approach for Creating a WBS

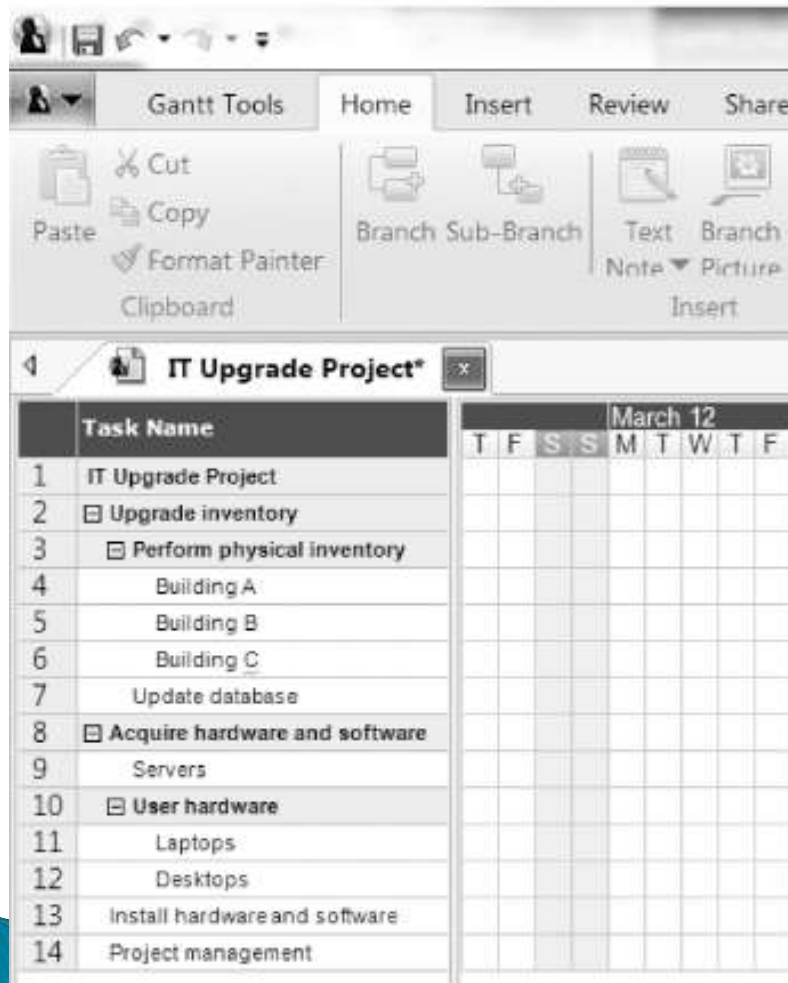


Source: MatchWare's MindView 4 Business Edition

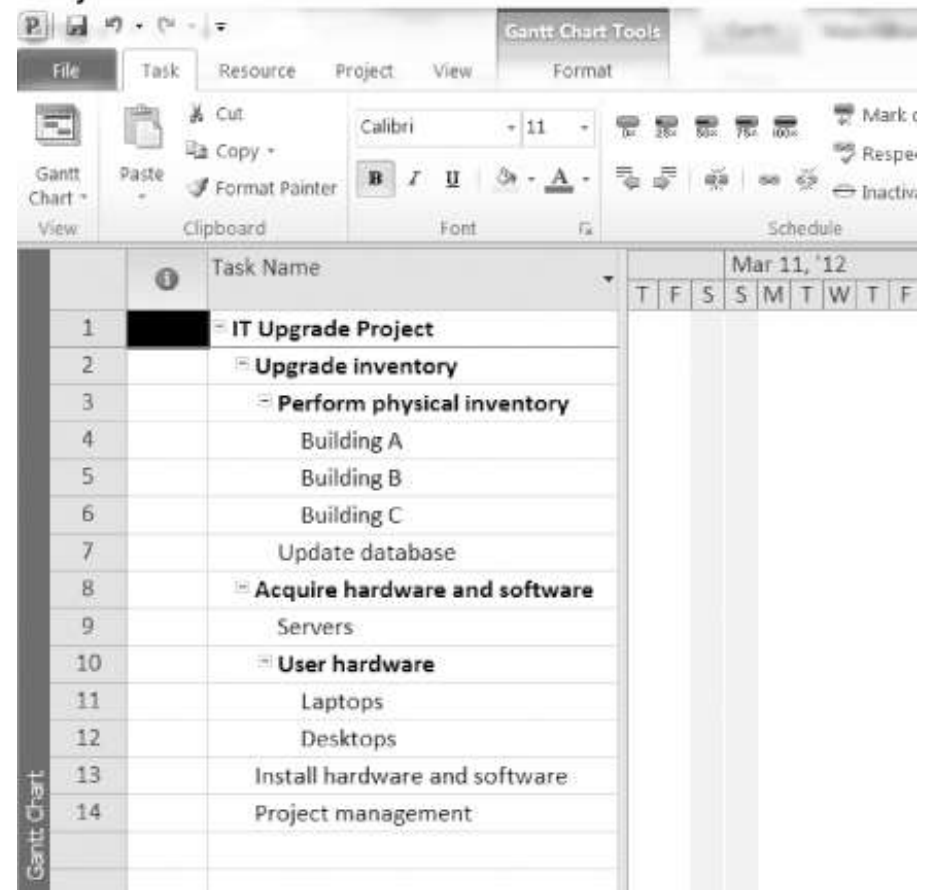


# Figure 5-8. Gantt Charts With WBS Generated From a Mind Map

MindView 4.0 Gantt Chart



Project 2010 Gantt Chart



# The WBS Dictionary and Scope Baseline

- ▶ Many WBS tasks are vague and must be explained more so people know what to do and can estimate how long it will take and what it will cost to do the work
- ▶ A **WBS dictionary** is a document that describes detailed information about each WBS item



# Table 5-5. Sample WBS Dictionary Entry

## WBS Dictionary Entry March 20

**Project Title:** Information Technology (IT) Upgrade Project

**WBS Item Number:** 2.2

**WBS Item Name:** Update Database

**Description:** The IT department maintains an online database of hardware and software on the corporate intranet. However, we need to make sure that we know exactly what hardware and software employees are currently using and if they have any unique needs before we decide what to order for the upgrade. This task will involve reviewing information from the current database, producing reports that list each department's employees and location, and updating the data after performing the physical inventory and receiving inputs from department managers. Our project sponsor will send a notice to all department managers to communicate the importance of this project and this particular task. In addition to general hardware and software upgrades, the project sponsors will ask the department managers to provide information for any unique requirements they might have that could affect the upgrades. This task also includes updating the inventory data for network hardware and software. After updating the inventory database, we will send an e-mail to each department manager to verify the information and make changes online as needed. Department managers will be responsible for ensuring that their people are available and cooperative during the physical inventory. Completing this task is dependent on WBS Item Number 2.1, Perform Physical Inventory, and must precede WBS Item Number 3.0, Acquire Hardware and Software.

# Advice for Creating a WBS and WBS Dictionary

- ▶ A unit of work should appear at only one place in the WBS.
- ▶ The work content of a WBS item is the sum of the WBS items below it
- ▶ A WBS item is the responsibility of only one individual, even though many people may be working on it
- ▶ The WBS must be consistent with the way in which work is actually going to be performed; it should serve the project team first, and other purposes only if practical

# Advice for Creating a WBS and WBS Dictionary (cont'd)

- ▶ Project team members should be involved in developing the WBS to ensure consistency and buy-in
- ▶ Each WBS item must be documented in a WBS dictionary to ensure accurate understanding of the scope of work included and not included in that item
- ▶ The WBS must be a flexible tool to accommodate inevitable changes while properly maintaining control of the work content in the project according to the scope statement

# What Went Wrong?

- ▶ A project scope that is too broad and grandiose can cause severe problems
  - Scope creep and an overemphasis on technology for technology's sake resulted in the bankruptcy of a large pharmaceutical firm, Texas-based FoxMeyer Drug
  - In 2001, McDonald's fast-food chain initiated a project to create an intranet that would connect its headquarters with all of its restaurants to provide detailed operational information in real time. After spending \$170 million on consultants and initial implementation planning, McDonald's realized that the project was too much to handle and terminated it

# Validating Scope

- ▶ It is very difficult to create a good scope statement and WBS for a project
- ▶ It is even more difficult to verify project scope and minimize scope changes
- ▶ **Scope validation** involves formal acceptance of the completed project deliverables
- ▶ Acceptance is often achieved by a customer inspection and then sign-off on key deliverables



# Global Issues

- ▶ Many countries have had difficulties controlling the scope of large projects, especially those that involve advanced technologies and many different users
- ▶ For example, the state government of Victoria, Australia, has a Web site for its public transportation smart card at [www.myki.com.au](http://www.myki.com.au).
- ▶ There were many problems in developing and implementing the smart card

# Controlling Scope

- ▶ Scope control involves controlling changes to the project scope
- ▶ Goals of scope control are to
  - influence the factors that cause scope changes
  - assure changes are processed according to procedures developed as part of integrated change control, and
  - manage changes when they occur
- ▶ **Variance** is the difference between planned and actual performance



# Best Practices for Avoiding Scope Problems

1. Keep the scope realistic. Don't make projects so large that they can't be completed. Break large projects down into a series of smaller ones
2. Involve users in project scope management. Assign key users to the project team and give them ownership of requirements definition and scope verification
3. Use off-the-shelf hardware and software whenever possible. Many IT people enjoy using the latest and greatest technology, but business needs, not technology trends, must take priority
4. Follow good project management processes. As described in this chapter and others, there are well-defined processes for managing project scope and others aspects of projects

# Suggestions for Improving User Input

- ▶ Develop a good project selection process and insist that sponsors are from the user organization
- ▶ Have users on the project team in important roles
- ▶ Have regular meetings with defined agendas, and have users sign off on key deliverables presented at meetings
- ▶ Deliver something to users and sponsors on a regular basis
- ▶ Don't promise to deliver when you know you can't
- ▶ Co-locate users with developers

# Suggestions for Reducing Incomplete and Changing Requirements

- ▶ Develop and follow a requirements management process
- ▶ Use techniques such as prototyping, use case modeling, and JAD to get more user involvement
- ▶ Put requirements in writing and keep them current
- ▶ Create a requirements management database for documenting and controlling requirements

# Suggestions for Reducing Incomplete and Changing Requirements (cont'd)

- ▶ Provide adequate testing and conduct testing throughout the project life cycle
- ▶ Review changes from a systems perspective
- ▶ Emphasize completion dates to help focus on what's most important
- ▶ Allocate resources specifically for handling change requests/enhancements like NWA did with ResNet

# Using Software to Assist in Project Scope Management

- ▶ Word-processing software helps create several scope-related documents
- ▶ Spreadsheets help to perform financial calculations, weighed scoring models, and develop charts and graphs
- ▶ Communication software like e-mail and the Web help clarify and communicate scope information
- ▶ Project management software helps in creating a WBS, the basis for tasks on a Gantt chart
- ▶ Specialized software is available to assist in project scope management

# Chapter Summary

- ▶ Project scope management includes the processes required to ensure that the project addresses all the work required, and only the work required, to complete the project successfully
- ▶ Main processes include
  - Define scope management
  - Collect requirements
  - Define scope
  - Create WBS
  - Validate scope
  - Control scope