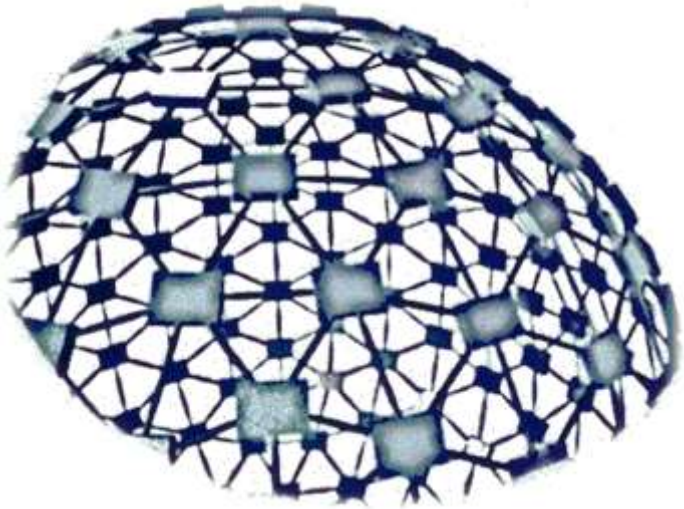

Chapter 5
Project Scope Management

Learning Objectives (1 of 2)

- *List key reasons why good project scope management is important*
- *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*
- *Explain the importance of validating scope and how it relates to defining and controlling scope*

Learning Objectives (2 of 2)

- *Given an information technology (IT) project situation, show how recommended approaches for controlling scope can improve the potential for project success*
- *Describe how software can assist in project scope management*
- *Discuss considerations for agile/adaptive environments*

Opening Case Study

Kim Nguyen was leading a meeting to create the work breakdown structure (WBS) for her company's IT upgrade project. This project was necessary because of several high-priority, Internet-based applications the company was developing. The IT upgrade project involved creating and implementing a plan to make all employees' IT assets meet new corporate standards within nine months. These standards specified the minimum requirements for each desktop or laptop computer, including the type of processor, amount of memory, hard disk size, type of network connection, security features, and software. Kim knew that to perform the upgrades, the project team would first have to create a detailed inventory of all the current hardware, networks, and software in the entire company of 2,000 employees.

Kim had worked with other stakeholders to develop a project charter and initial scope statement. The project charter included rough cost and schedule estimates for the project and signatures of key stakeholders; the initial scope statement provided a start in defining the hardware, software, and network requirements as well as other information related to the project scope. Kim called a meeting with her project team and other stakeholders to further define the scope of the project. She wanted to get everyone's

Opening Case Study

ideas on what the project involved, who would do what, and how they could avoid scope creep. The company's new CEO, Walter Schmidt, was known for keeping a close eye on major projects. The company had started using a new project management information system that let everyone know the status of projects at a detailed and high level. Kim knew that a good WBS was the foundation for scope, time, and cost performance, but she had never led a team in creating one or allocating costs based on a WBS. Where should she begin?

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***
  - *Ensures that the project team and stakeholders have the same understanding of what products the project will produce and what processes the project team will use to produce them*

Project Scope Management Processes (1/2)

- *Main processes*
  1. *Planning scope management: determining how the project's scope and requirements will be managed*
  2. *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*
  3. *Defining scope: reviewing the project charter, requirements documents, and organizational process assets to create a scope statement*
  4. *Creating the WBS: subdividing the major project deliverables into smaller, more manageable components*
  5. *Validating scope: formalizing acceptance of the project deliverables*
  6. *Controlling scope: controlling changes to project scope throughout the life of the project*

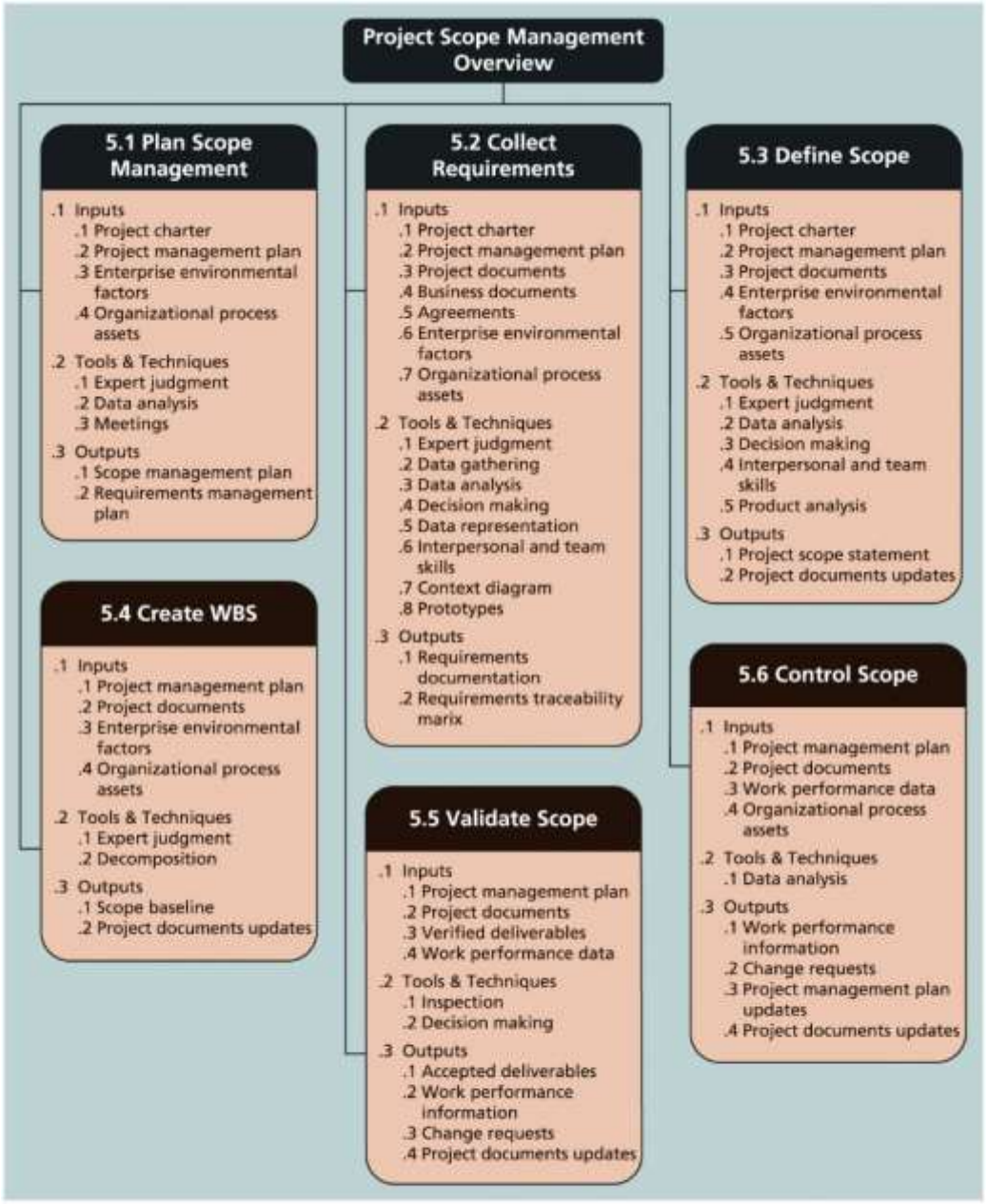

FIGURE 5-1 Project scope management overview

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Project Scope Management Processes (2/2)

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1. Planning Scope Management

- *The project team uses expert judgment, data analysis, and meetings to develop two important **outputs***
  - *Scope management plan (part of the project management plan)*
  - *Requirements management plan*
- *Scope management plan describes HOW to:*
  1. *Prepare a detailed project scope statement*
  2. *Create a WBS*
  3. *Maintain and approve the WBS*
  4. *Obtain formal acceptance of the completed project deliverables*
  5. *Control requests for changes to the project scope*

1. Planning Scope Management

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Table 4-3. Sample contents for the IEEE software project management plan (SPMP)

Major Section Headings	Section Topics
Overview	Purpose, scope, and objectives; assumptions and constraints; project deliverables; schedule and budget summary; evolution of the plan
Project Organization	External interfaces; internal structure; roles and responsibilities
Managerial Process Plan	Start-up plans (estimation, staffing, resource acquisition, and project staff training plans); work plan (work activities, schedule, resource, and budget allocation); control plan; risk management plan; closeout plan
Technical Process Plans	Process model; methods, tools, and techniques; infrastructure plan; product acceptance plan
Supporting Process Plans	Configuration management plan; verification and validation plan; documentation plan; quality assurance plan; reviews and audits; problem resolution plan; subcontractor management plan; process improvement plan

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1. Planning Scope Management

- *Requirements Management Plan*
  - *The PMBOK® Guide, Sixth Edition, describes a requirement as "a **condition** or **capability** that is necessary to be present in a product, service, or result to satisfy a business need"*

- *The requirements management plan, documents how project requirements will be collected, analyzed, documented, and managed*

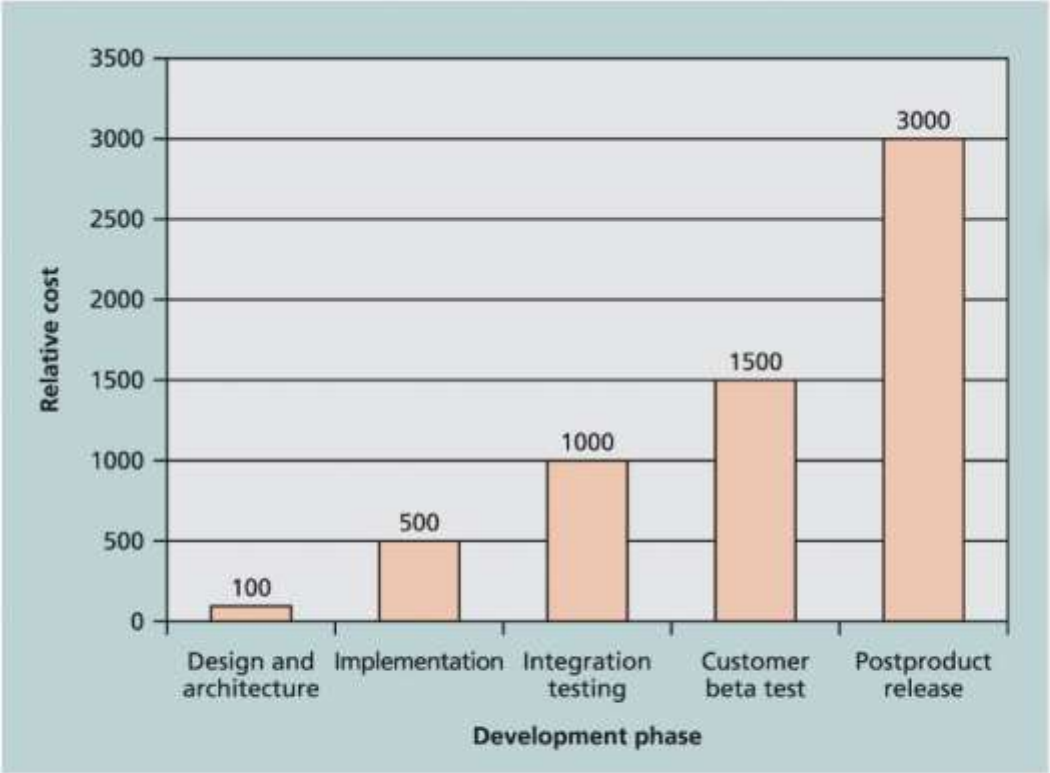
What Went Right?

- *U.S. Bureau of Labor Statistics projected the number of jobs for business analysts to increase 19% by 2022*
  - *49% of survey respondents had the resources in place to do requirements management properly*
  - *53% failed to use a formal process to validate requirements*
- *There are several certification programs available for business analysis to help meet this need*

2.Collecting Requirements

- *Several ways to collect requirements*
  - *Interviewing stakeholders*
  - *Holding focus groups and facilitated workshops*
  - *Using group creativity and decision-making techniques*
  - *Utilizing questionnaires and surveys*
  - *Conducting observation studies (Immersive Ethnography)*
  - *Generating ideas by comparing specific project practices or product characteristics (i.e., benchmarking)*

2. Collecting Requirements



Source: IBM Software Group, "Minimizing code defects to improve software quality and lower development costs," Rational Software (October 2008).

FIGURE 5-2 Relative cost to correct a software defect

2. Collecting Requirements

Requirement's traceability matrix (RTM): *a table that lists requirements, various attributes of each requirement, and the* ***status*** *of the requirements to ensure that all requirements are addressed*

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

Table 5-1 Sample entry in a requirements traceability matrix

Best Practice

- *Book called How Google Tests Software describes how Google changed their culture as quality rests on the shoulders of those writing the code*
  - *Do not rely on testers to ensure quality*
  - *Do not believe in fads or buzzwords*
    - *Including Agile*

3. Defining Scope (1 of 2)

- *Important elements of a project scope statement*
  - *Product scope description*
  - *Product user acceptance criteria*
  - *Detailed information on all project deliverables*
- *It is also helpful to document other scope-related information*
  - *Project boundaries, constraints, and assumptions*
  - *Supporting document references (e.g., product specifications)*
- *As time progresses, the scope of a project should become clearer and more specific*

3. Defining Scope (2 of 2)

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 10 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 Attachment 8, along with a plan describing where they will be located.

Table 5-3 Further defining project scope

Media Snapshot

- *Inaccurate requirements gathering continues to be one of the main causes of project failure*
  - *For every dollar spent on projects and programs, 5.1% is wasted due to poor requirements management*
- *Organizations need to develop people, processes, and culture to improve requirements management*

4. Creating the Work Breakdown Structure (WBS)

- **Creating Work Breakdown Structure (WBS) :** involves subdividing the major project deliverables into smaller, more manageable components.
- A **WBS** is
  - a deliverable-oriented grouping of the work involved in a project that defines the total scope of the project
  - a foundation document that provides the **basis for** planning and managing project schedules, costs, resources, and changes
- **WBS vocabulary**
  - **Decomposition** is subdividing project deliverables into smaller pieces
  - A **work package** is a task at the lowest level of the WBS

Creating the Work Breakdown Structure

Organized by Product

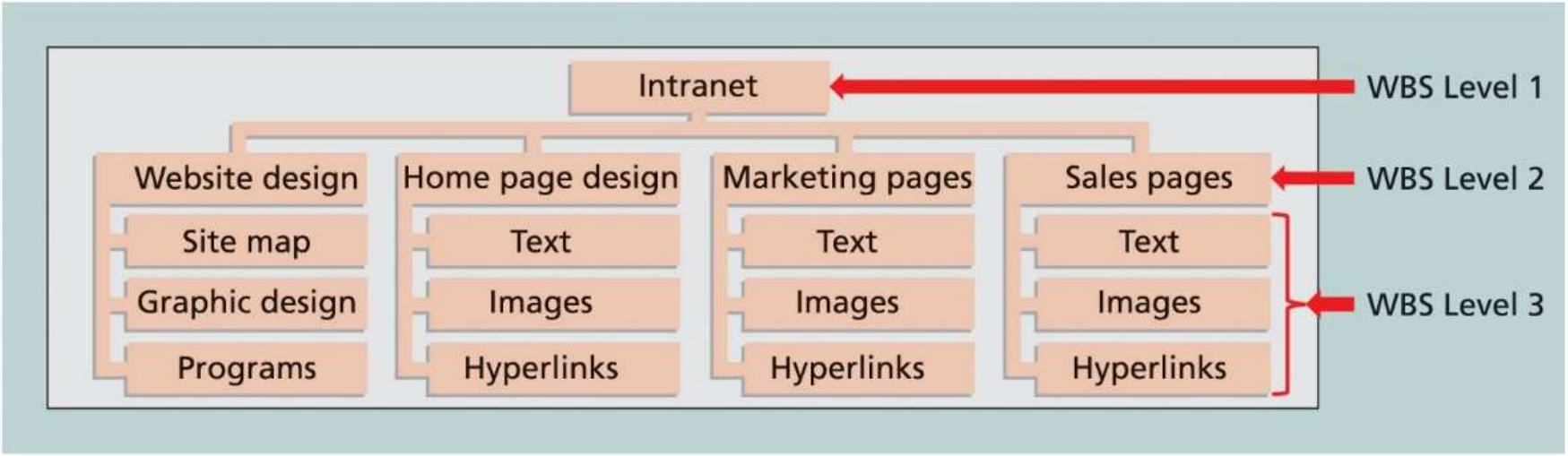
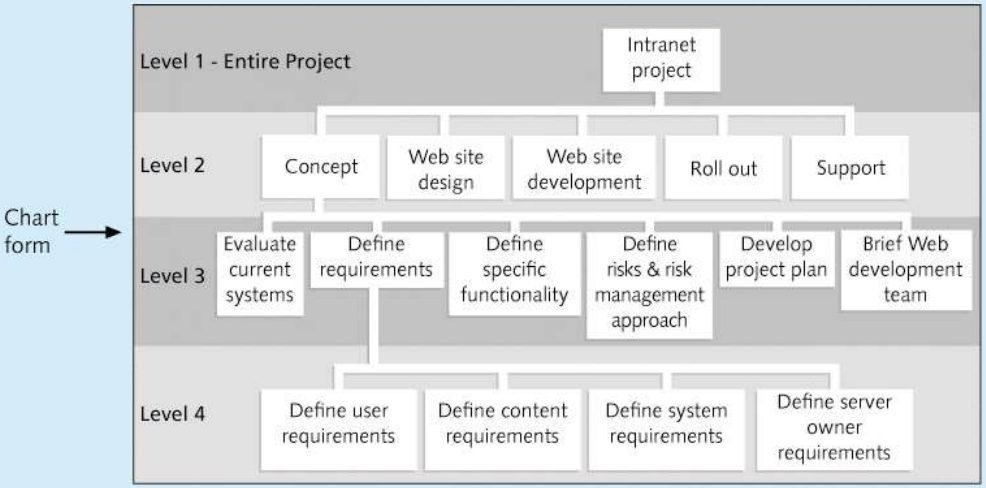


FIGURE 5-3 Sample intranet WBS organized by product

Creating the Work Breakdown Structure

Organized by phases



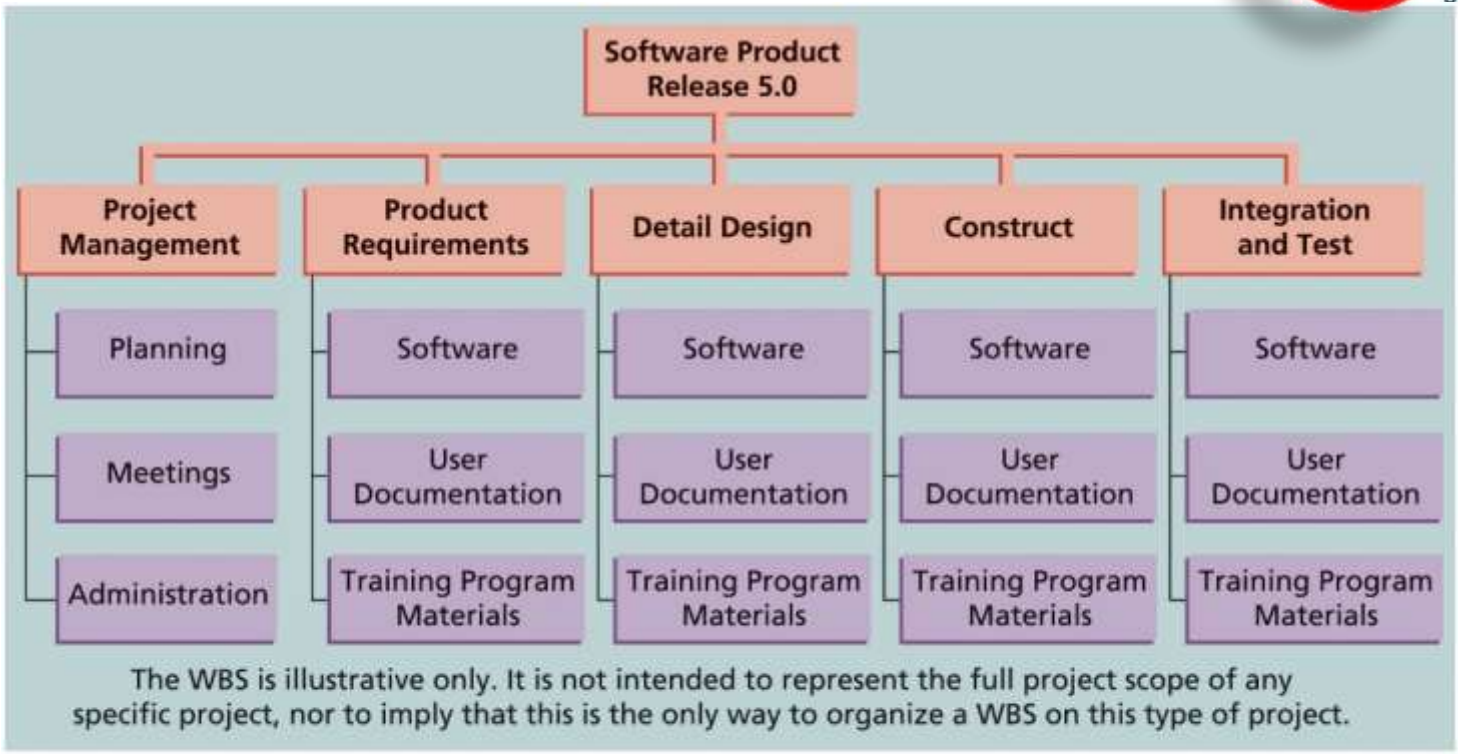
Tabular form with PMI numbering

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

Creating the Work Breakdown Structure

Organized by phases



The WBS is illustrative only. It is not intended to represent the full project scope of any specific project, nor to imply that this is the only way to organize a WBS on this type of project.

FIGURE 5-4 Sample intranet WBS organized by phase in chart and tabular form

Creating the Work Breakdown Structure

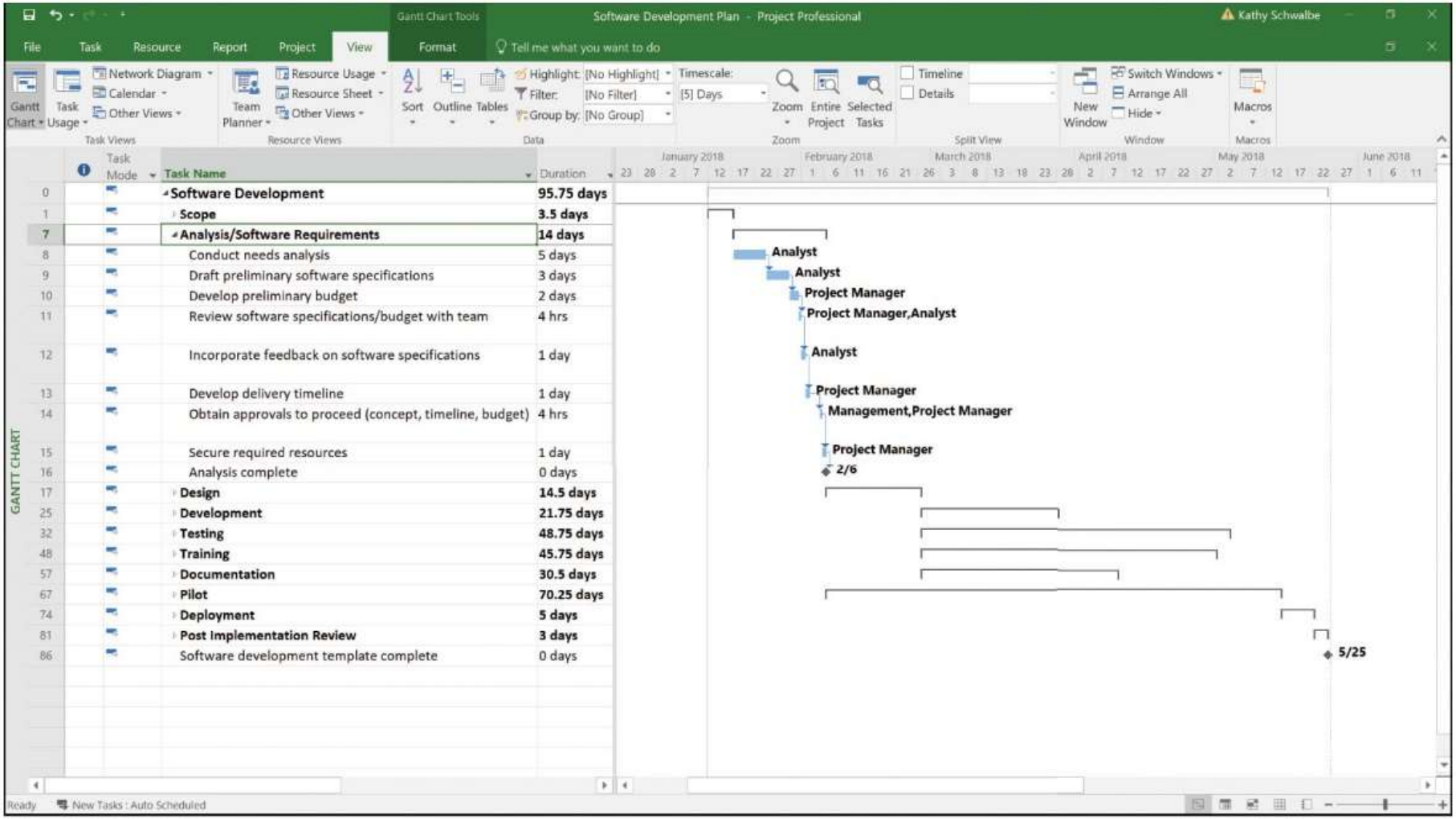


FIGURE 5-5 Software development project template from Microsoft Project 2016

Creating the Work Breakdown Structure

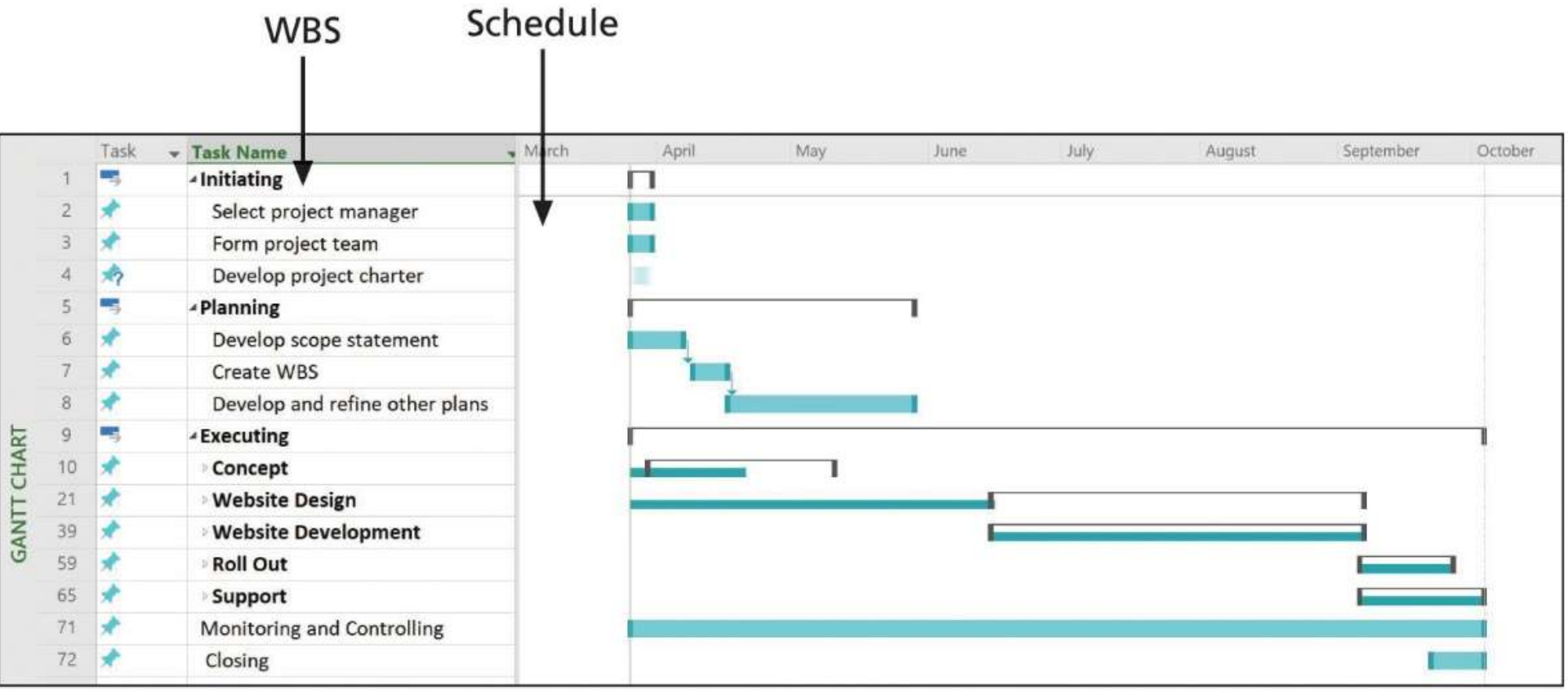


FIGURE 5-6 Website project Gantt chart organized by project management process groups

Organize project tasks according to Time Horizon

Creating the Work Breakdown Structure

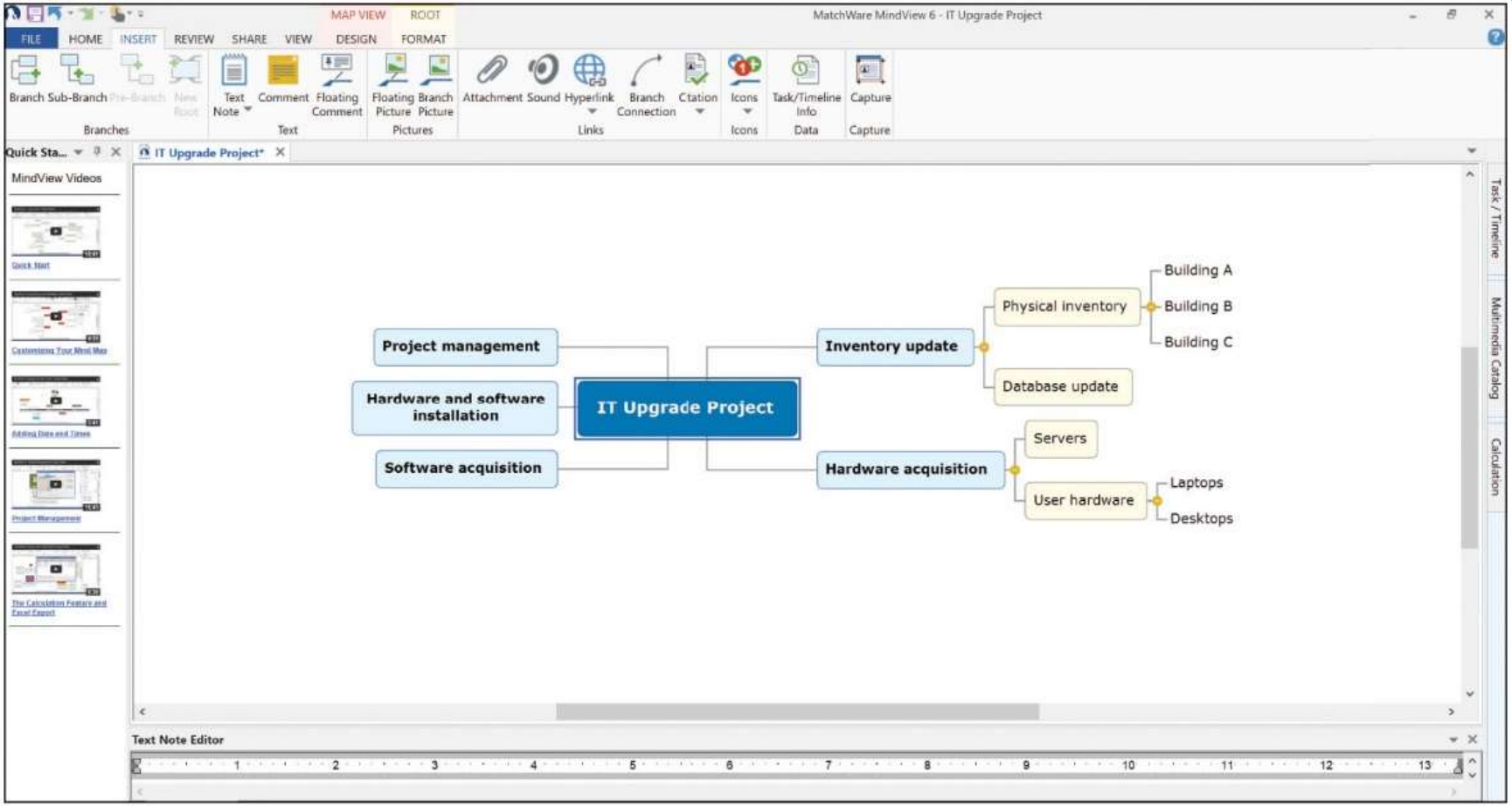
1.0 Software Product Release 5.0		
	1.1 Project Management	
		1.1.1 Planning
		1.1.2 Meetings
		1.1.3 Administration
	1.2 Product Requirements	
		1.2.1 Software
		1.2.2 User Documentation
		1.2.3 Training Program Materials
	1.3 Detail Design	
		1.3.1 Software
		1.3.2 User Documentation
		1.3.2 User Documentation
	1.4 Construct	
		1.4.1 Software
		1.4.2 User Documentation
		1.4.3 Training Program Materials
	1.5 Integration and Test	
		1.5.1 Software
		1.5.2 User Documentation
		1.5.3 Training Program Materials

Table 5-4 Tabular form of WBS

Creating the Work Breakdown Structure (7/9)

- *Approaches to developing work breakdown structures (WBS)*
  - *Using guidelines: some organizations, like the U.S. Department of Defense (DOD), provide guidelines for preparing WBSs*
  - *Analogy approach: review WBSs of similar projects and tailor to your project*
  - *Top-down approach: start with the largest items of the project and break them down*
  - *Bottom-up approach: start with the specific tasks*
  - *Mind mapping: uses branches radiating out from a core idea to structure thoughts and ideas*

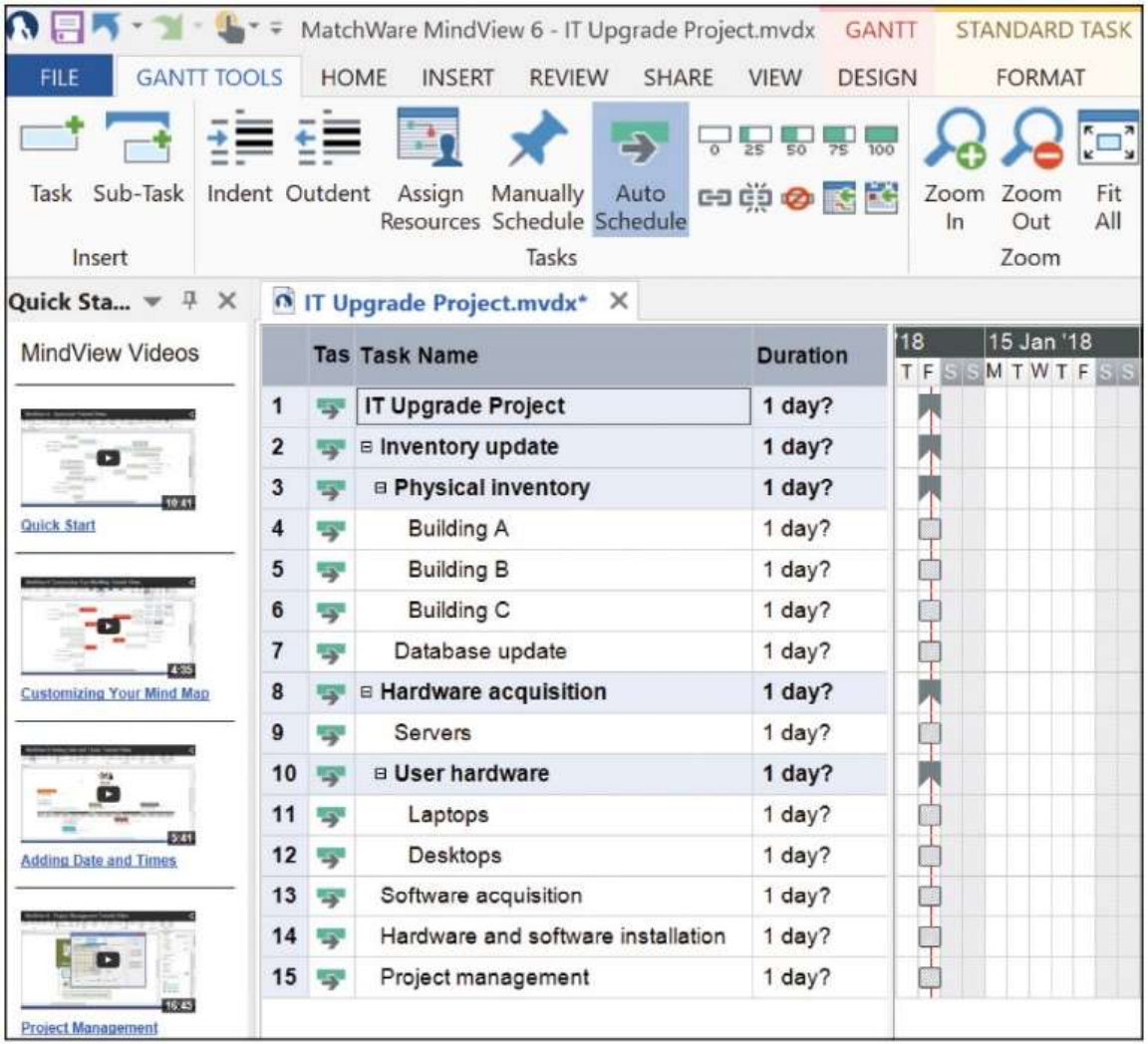
Creating the Work Breakdown Structure



Source: MatchWare MindView 6.0

FIGURE 5-7 Sample mind-mapping technique for creating a WBS

Creating the Work Breakdown Structure



Source: MatchWare MindView 6.0

FIGURE 5-8 Gantt chart with WBS generated from a mind map

Advice for Young Professionals

- *It is very difficult to create a good WBS*
  - *Attend meetings in your organization where teams work together*
  - *Ask to see WBSs for projects that have been completed or are in process*

  Conduct your own research to find examples of different WBSs

The WBS Dictionary (1/3)

- *Many WBS tasks are vague*
  - *WBS dictionary is a document that describes detailed information about each WBS item*
    - *Format of the WBS dictionary can vary based on project needs*

The WBS Dictionary (2/3)

WBS Dictionary Entry March 20
Project Title: Information Technology (IT) Upgrade Project
WBS Item Number: 2.2
WBS Item Name: Database Update
Description: The IT department maintains an online database of hardware and software on the corporate intranet. 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, Physical Inventory, and must precede WBS Item Number 3.0, Hardware and Software Acquisition.

Table 5-5 Sample WBS dictionary entry

The WBS Dictionary (3/3)

Advice for creating a WBS and WBS dictionary

- *Unit of work should appear at only one place in the WBS*
- *Work content of a WBS item is the sum of the WBS items below it*
- *WBS item is the responsibility of only one individual, even though many people may be working on it*
- *WBS must be consistent with the way work is going to be performed; it should serve the project team first, and other purposes only if practical*
- *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*
- *WBS must be a flexible tool to accommodate inevitable changes while maintaining control of the work content according to the scope statement*

5. Validating Scope

- *It is difficult to create a good project scope statement and WBS*
- *More difficult on IT projects to verify scope and minimize changes*
- *A major scope problem on IT projects is a lack of user involvement*
- *Failing to follow good PM processes and use off-the-shelf software*
- *Even when is it well defined, IT projects suffer from scope creep*
  - *Tendency for project scope to keep getting bigger and bigger*
- *Scope validation: formal acceptance of completed project deliverables*
  - *Achieved by customer inspection and sign-off on key deliverables*
  - *Inputs of scope validation: PM plan, project documents, verified deliverables, and work performance data*
  - *Tools of scope validation: inspection and decision-making methods.*

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 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*

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 website for its public transportation smart card; there were many problems in developing and implementing the smart card*

6. Controlling Scope

- *Scope control involves controlling changes to the project scope*
  - *Keeping project goals and business strategy in mind*
- *Goals of scope control*
  - Influence the **factors** that cause scope changes
  - Ensure changes are processed according to procedures developed as part of integrated change control
  - Manage changes when they occur
- *Variance is the difference between planned & 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 other aspects of projects

6.Controlling Scope

- *Suggestions for improving user input*
  - *Develop a good project selection process and insist sponsors are from the user organization*
  - *Place users on the project team*
  - *Conduct regular meetings with defined agendas*
  - *Deliver something to users and sponsors on a regular basis*
  - *Do not promise to deliver what the team cannot deliver in a particular time frame*
  - *Locate users with the developers*

6.Controlling Scope

- *Suggestions for reducing incomplete and changing requirements*
  - *Develop and follow a requirements management process*
  - *Employ 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*
  - *Provide adequate testing & conduct it thru the project life cycle*
  - *Review changes from a systems perspective*
  - *Emphasize completion dates to focus on most important matters*
  - *Allocate resources specifically for handling change requests*

Using Software to Assist in Project Scope Management

- *Word-processing software helps create several scope-related documents*
- *Spreadsheets or presentation software to develop various charts, graphs, and matrixes related to scope management*
- *Mind-mapping software can be useful in developing a WBS*
- *Communication software like e-mail and web-based applications can transmit project scope management information*
- *Project management software helps in creating a WBS; basis for creating a Gantt chart*
- *Specialized software is available to assist in project scope management*

Considerations for Agile/Adaptive Environments

- *Stakeholders define and approve the detailed scope before the start of an iteration producing a usable product at the end of each iteration*
  - *Detailed scope develops over time*
- *Agile approach provides several usable products during the project*

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*
    - *Define scope management*
    - *Collect requirements*
    - *Define scope*
    - *Create WBS*
    - *Validate scope*
    - *Control scope*