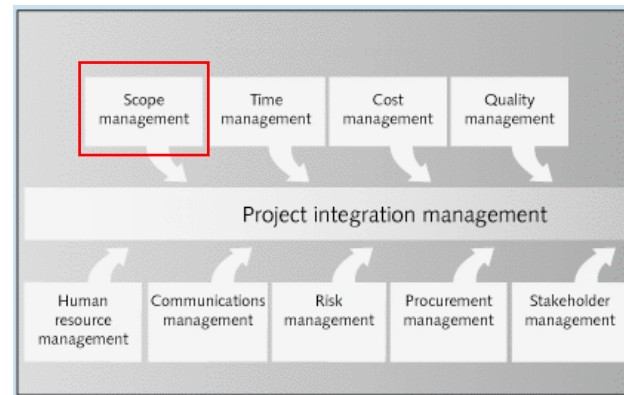


Project Scope Management



What is Project Scope Management?

- ▶ The project team and the stakeholders need to have the same understanding of what products the project will produce

“Projects don't usually fail at the end, they fail at the beginning”
- ▶ A deliverable is a product produced as part of a project, such as hardware or software, documents, or reports
- ▶ Project Scope Management includes the processes involved in defining and controlling what features the product must have, what work is included in a project, what will be delivered
- ▶ The key to successfully completing a project is efficient scope management that affects balancing of the project triangle



Scope Management process

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

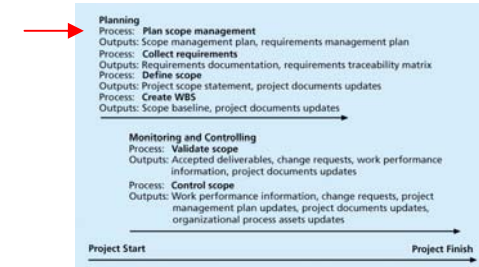
Project Start

Project Finish

Planning Scope Management

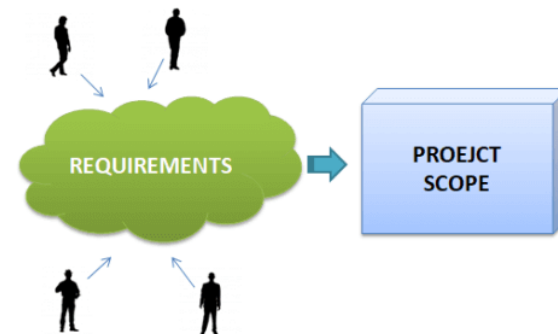
The project team uses expert judgment and meetings to develop two important plans:

1. Scope Management Plan explaining how the scope will be managed
 - How to prepare a project scope statement (templates, company policy,...)
 - How to create a Work Breakdown Structure (WBS)
 - How to maintain and approve the WBS during the project
 - How to control changes to the project scope
 - How to obtain formal acceptance of the completed project deliverables
2. Requirements Management Plan
 - How to describe requirements
 - How to collect and analyze requirements
 - How to priorities requirements
 - How to track changes of requirements



Planning Scope Management

- ▶ Scope Management Plan or Requirements Management Plan may not be helpful because of confusion on the difference between project scope and requirements
 - Requirements are features that you intend to implement
 - Scope refers to all the work need to be done to implement features
 - The project scope depends on the collected requirements
 - The project requirements and scope definitions are not competing. The client usually explains requirements and the project manager then determines the project scope.



Requirements Management Plan

- ▶ The PMBOK Guide 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 describes how project requirements will be
 - collected and analyzed
 - documented
 - managed
- ▶ Managing project requirements is an ongoing process because customers are often tempted to change requirements via the back door when the project gets underway

Collecting Requirements

- ▶ The second step in Project Scope Management
- ▶ For many IT projects, it is helpful to divide requirements into two categories
 - Functional requirements
 - describe how a product must behave, its features and response to user input
 - Technical requirements
 - Hardware platform, OS, performance, reliability
- ▶ Don't wait for a complete list. Use an iterative approach to defining requirements since they are often unclear early in IT projects. This must be reflected in the Requirements Management Plan and be clear to the client.

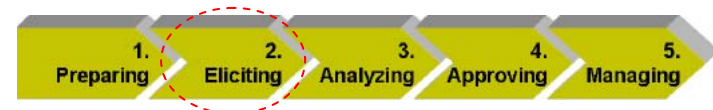
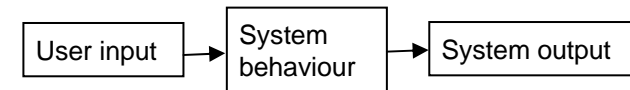
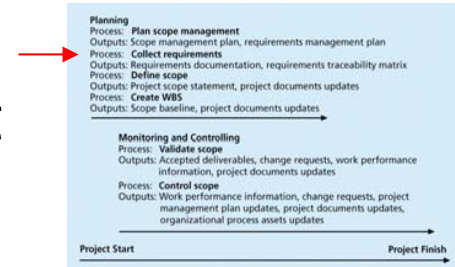
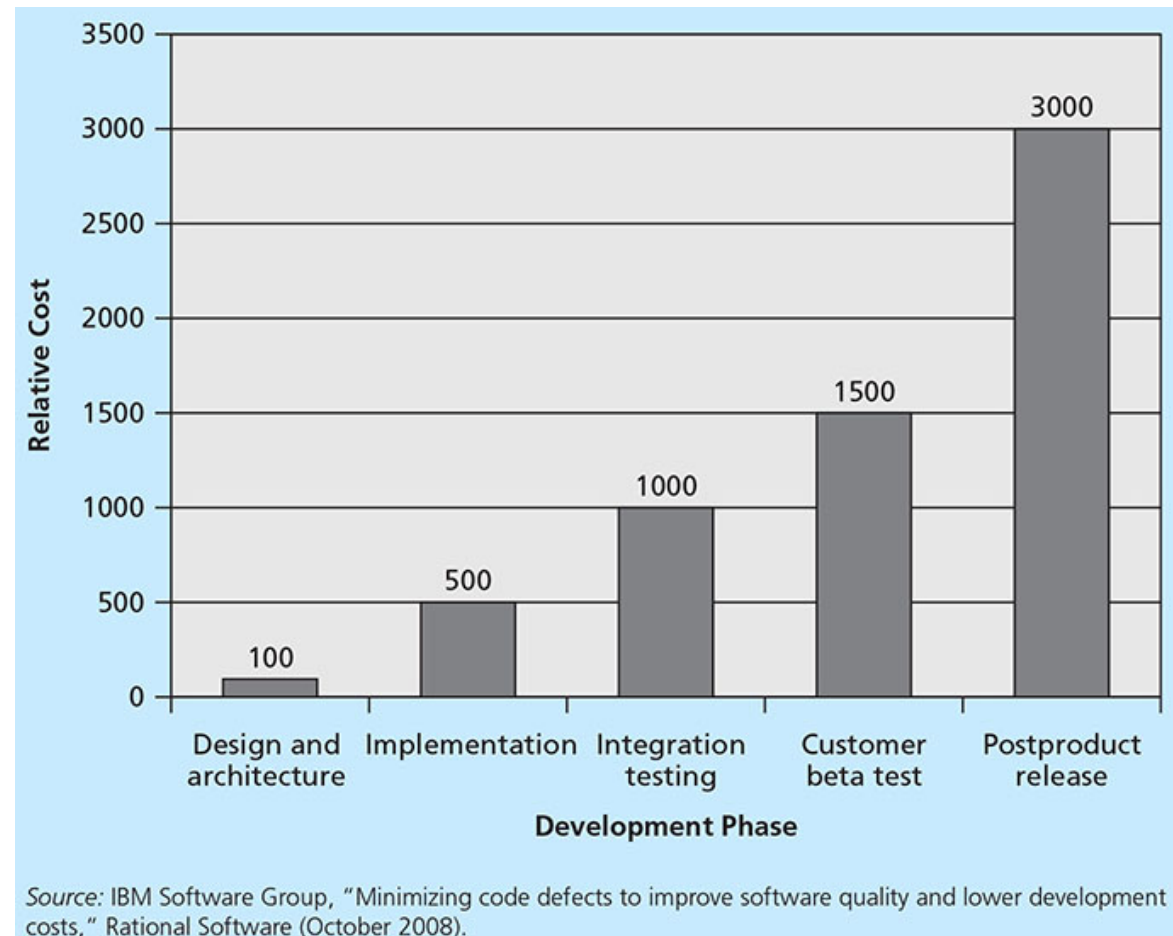


Figure 5-2. Relative Cost to Correct a Software Requirement Defect

- ▶ Iterative approach to defining requirements should have certain constraints
- ▶ It is more expensive to make corrections in software products in later project phases than in the requirement collection phase
- ▶ If managed poorly:
 - deliverables can be rejected
 - the system may never be used



Methods for Collecting Requirements

- ▶ Interviewing to understand real needs of clients
- ▶ Focus groups
- ▶ Using group creativity and decision-making techniques
- ▶ Questionnaires and surveys
- ▶ Observation of the business workflow
- ▶ Prototyping and demonstration of a prototype to the client
- ▶ Benchmarking to obtain ideas by comparing functionality of the future system and the existing one



Before you get down to collecting requirements you need to review the Requirements Management Plan and make sure you'll get all relevant stakeholders involved

Analysing and Approving Requirements

- ▶ Prioritize requirements to select which requirements implementation effort will focus most
- ▶ Verify requirements to ensure that they are clear, complete, not ambiguous and not contradictory
- ▶ Validate requirements to ensure that all requirements are linked to project goals
- ▶ Identify assumptions and constraints (business, technical)

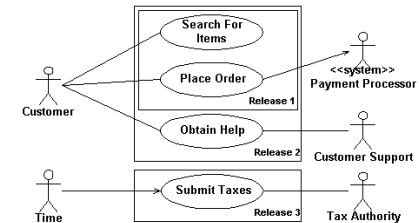


- ▶ Approving involves communicating and obtaining a formal approval of the requirements by stakeholders who have the appropriate authority



Requirements: Practical tips

- ▶ Do not combine two requirements into one
- ▶ Make each requirement description complete and accurate. Use pictures and screen layouts.
- ▶ UML Use Cases help to clarify functional requirements. Human languages are ambiguous.
- ▶ Map all requirements to the project objectives
- ▶ Don't make description of requirements ambiguous deliberately to add “flexibility” to the project
- ▶ Document all constraints which affect some of the project requirements
- ▶ Document all the assumptions and explain them to the client
- ▶ Ensure that requirements are measurable when its practical
- ▶ Make sure that project staff and the client actually read a list of requirements that may be quite long

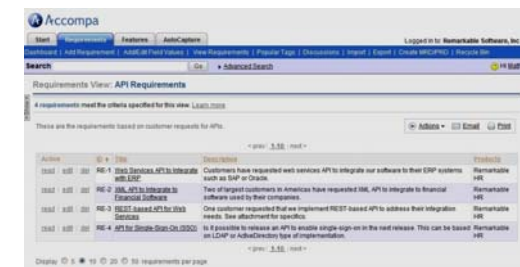


Statistics on Requirements for Software Projects (2011 Survey)*

- ▶ 88% of the software projects involved enhancing existing products instead of creating new ones
- ▶ 73% of respondents said that gaining clear understanding of what customers wanted was very challenging
- ▶ 70% of respondents spent at least 10% of project time managing changes of requirements
- ▶ 75% percent of software development teams had to deal with lists of 100+ requirements

*John Simpson, “*The State of Requirements Management*”, 2011

- ▶ Although MS Excel and Word are commonly used for managing requirements, using specialized tools may be more efficient



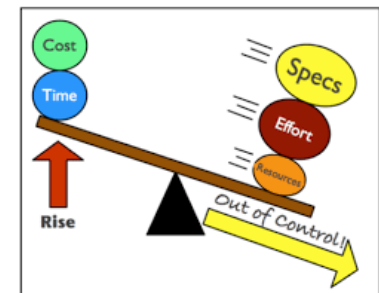
The screenshot shows the Accompa web application interface for managing requirements. It features a search bar, navigation tabs, and a table of requirements. The table has columns for ID, Status, Description, and Remarks. The requirements listed are related to API integrations with SAP and Oracle systems.

ID	Status	Description	Remarks
REQ-1	Open	Integrate our software with SAP	Customers have requested with services API to integrate our software to their ERP systems such as SAP or Oracle
REQ-2	Open	Integrate our software with Oracle	Two of largest customers in Americas have requested Oracle API to integrate to financial software used by their companies
REQ-3	Open	Implement REST based API for Data Collection	One customer requested that we implement REST based API to address their integration needs. See attachment for specifics
REQ-4	Open	API for Single Sign-On (SSO)	It is possible to release an API to enable single sign-on in the next release. This can be based on OAuth or ActiveDirectory type of implementation

Requirement Creep

- ▶ When a new project requirement is added, it may cause revision and changes of other requirements and even adding new features
- ▶ Feature creep happens when you accept changes without considering how they will affect other requirements
- ▶ Changes can gather their own momentum building up exponentially
- ▶ When you accept even a small change just to make your client happy without analysing how it may affect the project, you can make the client very angry when you cannot deliver the product

Make sure you have a good Requirements Management Plan and strictly follow it



Functional and Technical Specifications

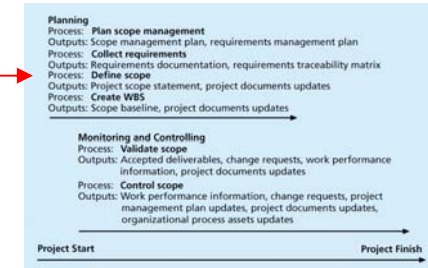
- ▶ Approved functional and technical requirements are recorded in the Functional and Technical Requirements Document (or Specification)
 - ▶ Functional Specifications define the requirements from a user's perspective
 - ▶ The Functional Requirements Specification is written in a way to be easily interpreted by all relevant stakeholders
 - ▶ Requirements typically beginning with the phrase “The system shall . . .”
 - ▶ Functional requirements do not address “how” requirements will be implemented
 - ▶ Different companies use different templates
- Functional and Technical Specs can be separate documents

Requirements Traceability Matrix

- ▶ Functional Specification is used to guide the system design process
- ▶ To facilitate system testing, a Requirements Traceability Matrix (RTM) document that complements the Functional Specification may be created
- ▶ Helps to create test cases
- ▶ Identify different requirements that affect the same product attributes
- ▶ Summarizes the status of requirements

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.

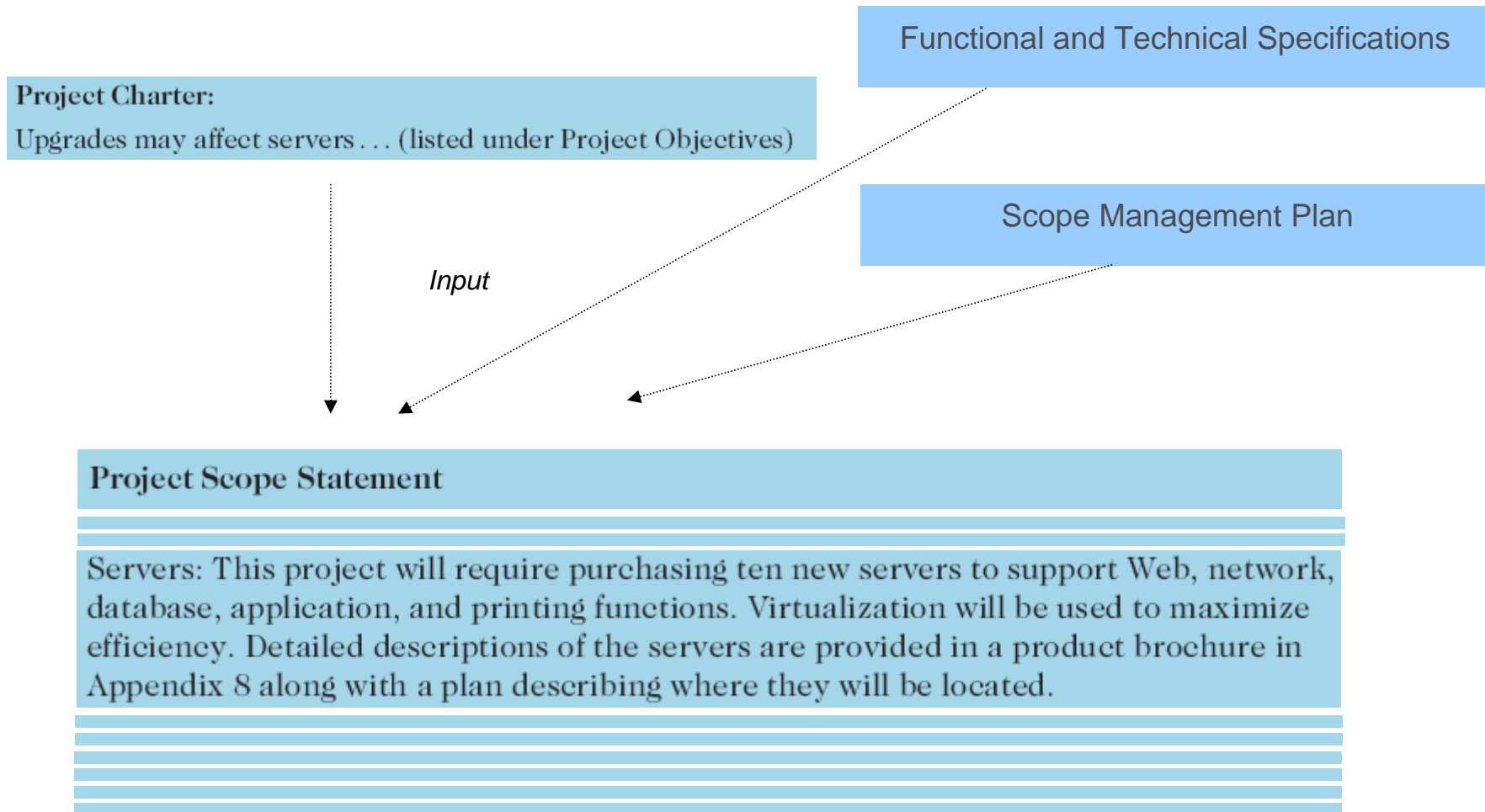
Defining Scope



- ▶ Project scope defines the work that needs to be done to implement a system according to the project requirements
- ▶ It's an important step toward establishing a project timeline and allocating project resources
- ▶ Commonly used tools to describe the project scope are Project Scope Statement, Work Breakdown Structure and Work Breakdown Dictionary
- ▶ Project Scope Statement includes
 - a product scope description
 - a list of project deliverables
 - product user acceptance criteria
 - project boundaries, constraints and assumptions

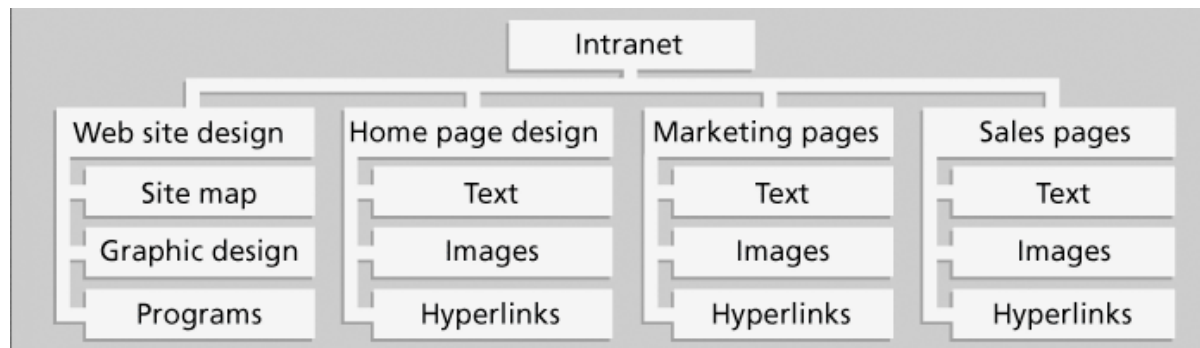
PROJECT SCOPE STATEMENT	
Project Title: PATHWAYS INITIATIVE	Date Prepared: 9/1/2016
Product Scope Description Pathways will develop and implement course maps for all certificates and degrees with the objective of preventing students from taking courses that do not transfer or prepare them for a career. Further, we will analyze and design student support processes and areas that increase students' ability to successfully navigate their way through their educational experience.	
Project Deliverables <ul style="list-style-type: none"> • Create Transfer Pathways maps for all viable degrees and Career Pathways maps for all viable certificates • Create Student intake and support systems that have well-defined Pathways to student completion of educational goals • Develop Student-centered classrooms with classroom content driven by Student Learning Outcomes (SLOs) and not textbooks 	
Project Acceptance Criteria <ul style="list-style-type: none"> • Successful implementation of Degree/Certificate maps • Successful implementation of Student Support maps • Initial reduction in average credit hours for degree or certificate of 5% • Initial increase in completion rates of 5% 	
Project Exclusions Since Student Success is the most important value of San Jacinto College and all areas of the College have a direct or indirect effect on student success, all employees will be expected to support Pathways with their time and expertise. Some work will be occurring concurrently and will complement Pathways development, such as: <ul style="list-style-type: none"> • SACJSCC ten-year reaffirmation of accreditation • Open Educational Resources textbook review and selection 	
Project Constraints <ul style="list-style-type: none"> • Pathways work should follow the Values of San Jacinto College • Transfer/Career Pathways should follow THECB and other regulatory board requirements • Pathways should be implemented by fall 2018 with review and necessary modifications in the 2018-2019 academic year • Budget • Time/resources/personnel limitations 	

Defining Scope



Creating the Work Breakdown Structure (WBS)

- ▶ Decomposition is subdividing project work into smaller tasks
- ▶ A WBS is grouping of all tasks in a project produced after decomposition
- ▶ WBS can be displayed as a chart



- ▶ WBS is a foundation document that provides the basis for planning and managing project schedules, costs, resources, and changes
- ▶ The scope baseline includes the approved Project Scope Statement and its associated WBS and WBS dictionary

Figure 5-4. Sample Intranet WBS Organized by Phase

- ▶ Project planning may become more convenient when the WBS reflects relationship between tasks/subtasks and project phases
- ▶ Tasks that are decomposed into subtasks are called Summary Tasks
- ▶ The most common representation of WBS is tabular with PMI numbering (used in MS Project)

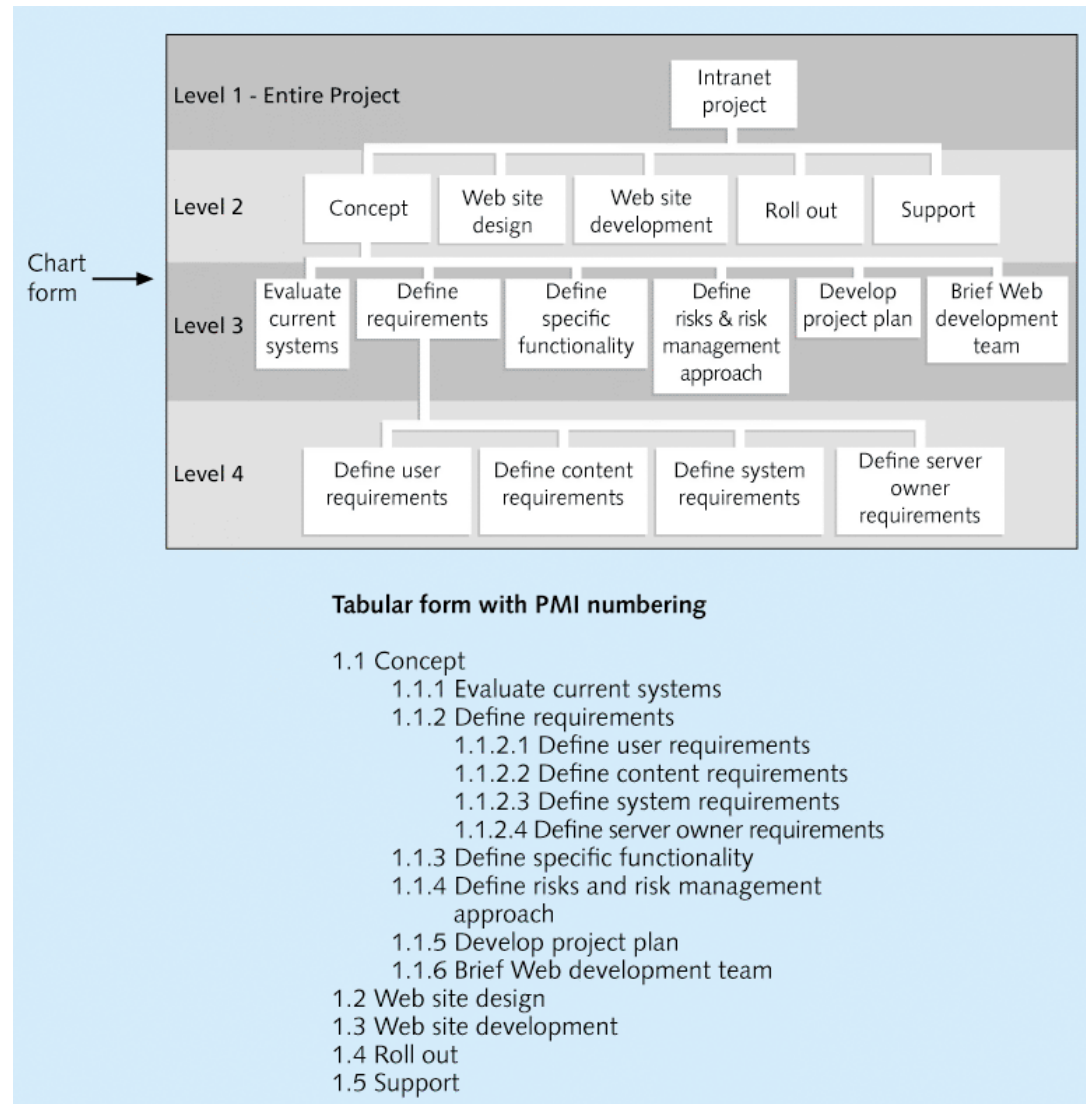
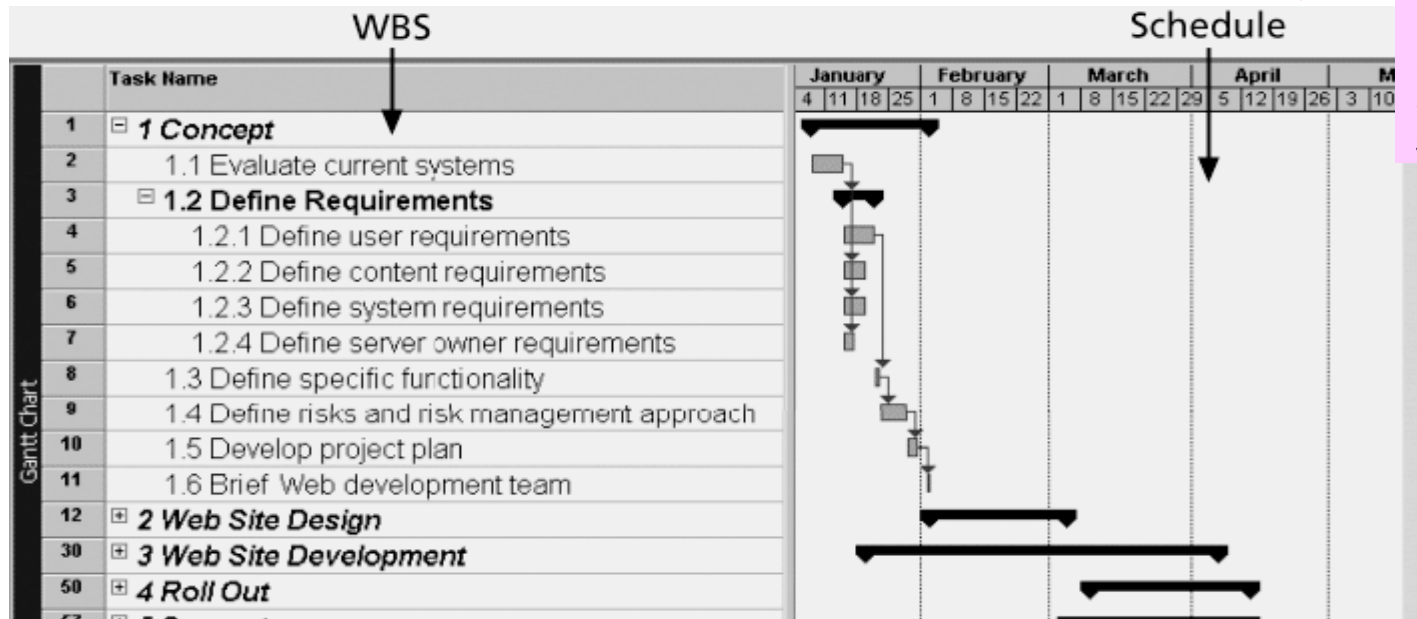


Figure 5-5. Intranet WBS and Gantt Chart in Microsoft Project



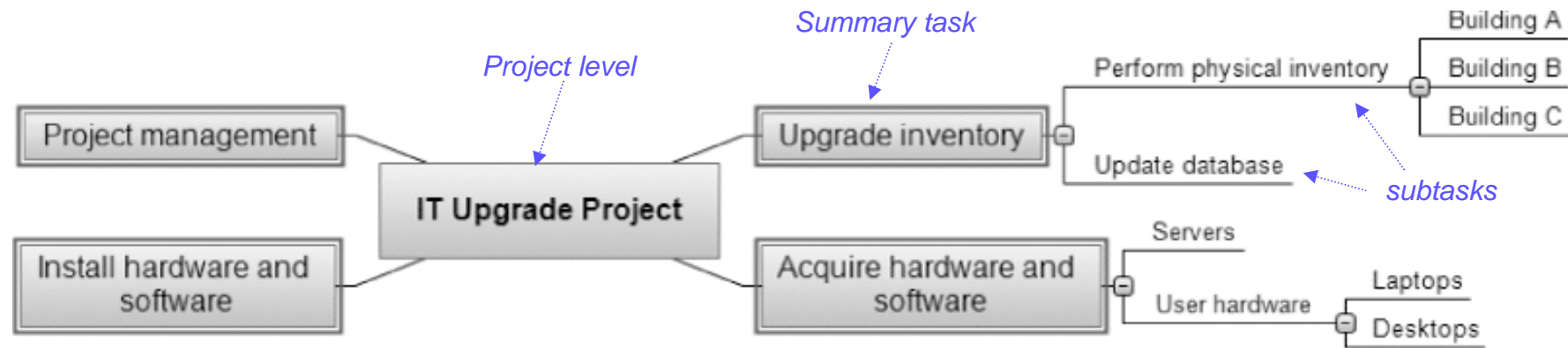
Although Schedule is related to Time Management, it helps to create a good WBS

- ▶ Usually, project managers start with adding top levels of the WBS
- ▶ Accurate Scope Management is difficult without Time Management
- ▶ Duration of a summary task is determined by duration of its tasks and subtasks and relationship between them
- ▶ Even experienced managers should involve the team into WBS review

Approaches to Developing WBSs

- ▶ In general, it's very difficult to create a good WBS
- ▶ There are several common ways for preparing WBS
 - Using guidelines: Some companies, provide guidelines and templates for preparing WBS
 - 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 making them summary tasks and then break them down
 - The bottom-up approach: Start with the low level tasks identified by team members and add these task into summary tasks
 - Mind-mapping approach: Mind mapping is a technique that helps to facilitate contribution of all team members
- ▶ A scope baseline is the Scope Statement, WBS and WBS dictionary that you create before the project execution begins

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

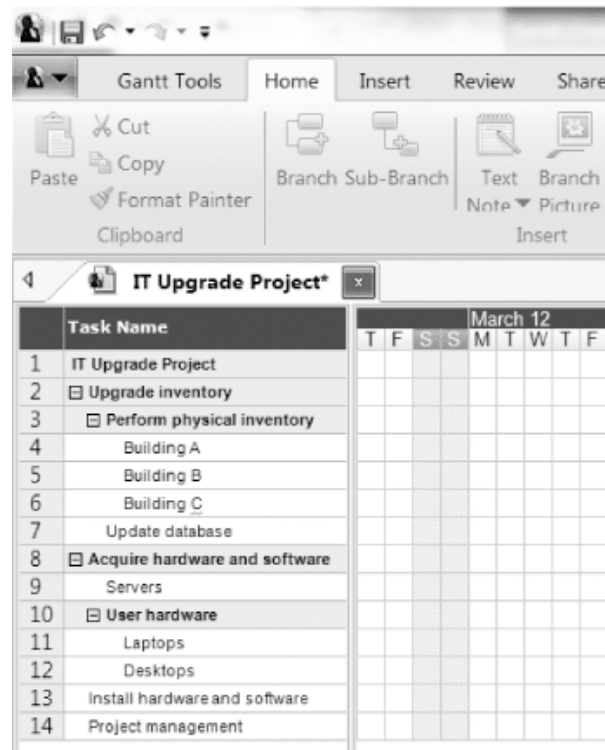


Source: MatchWare's MindView 4 Business Edition

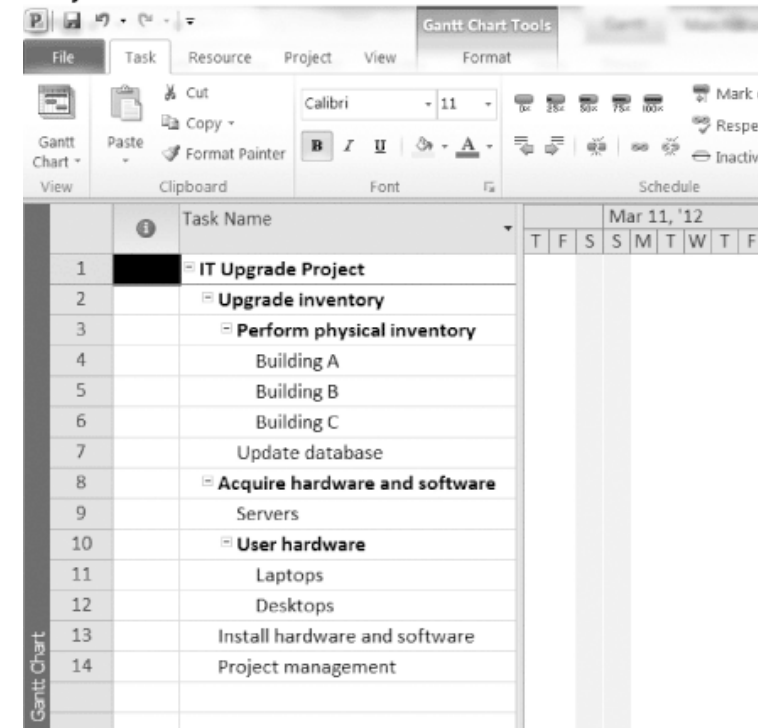
- ▶ Mind mapping is a technique that uses branches radiating out from a core idea to structure thoughts and ideas (also used for SWOT analysis)
- ▶ Convenient for project meetings and brainstorming sessions
- ▶ MidView Business Edition can efficiently facilitate the process

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

MindView 4.0 Gantt Chart



Project 2010 Gantt Chart



- ▶ MidView Business Edition can convert mind maps into Gantt Charts
- ▶ Mind maps can be imported into MS project and displayed as tables and Gantt Charts

The WBS Dictionary and Scope Baseline

- ▶ Many WBS tasks are vague and must be elaborated so project teams understand what to do and can help to estimate how long it will take
- ▶ A WBS Dictionary is a document that describes detailed information about each WBS item
- ▶ Changes in baseline WBS Dictionary are inevitable as it must be reviewed when requirements change (version control)

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.

Validating Scope

- ▶ It is very difficult to create a good scope statement and WBS for IT projects
- ▶ It is even more difficult to verify IT project scope, minimize scope changes and handle scope creep
- ▶ Scope validation involves formal acceptance of the completed project deliverables
- ▶ Acceptance is often achieved by a customer inspection/evaluation and then sign-off on key deliverables
 - accepted deliverables
 - requirements change requests
 - Update relevant project documents



Controlling Scope

- ▶ Scope control involves controlling inevitable changes to the project scope
- ▶ Goals of scope control are to
 - influence the factors that cause scope changes
 - assure changes are processed according to Scope Management Plan
 - manage changes timely
- ▶ Variance is the difference between planned and actual performance

