

Project Management: Lecture 4

Project Integration Management

What is Project Integration Management

- Project managers must coordinate all of the other knowledge areas throughout a project's life cycle
- Many new project managers have trouble looking at the “big picture” and want to focus on too many details.
- This integration ensures that all the elements of a project come together at the right times to complete a project successfully

What went wrong

- The Airbus A380 megajet project was two years behind schedule in Oct. 2006, causing Airbus' parent company to face an expected loss of \$6.1 billion over the next four years
- The project suffered from severe integration management problems, or “integration disintegration...”, when pre-assembled bundles containing hundreds of miles of cabin wiring were delivered from a German factory to the assembly line in France, workers discovered that the bundles, called harnesses, didn't fit properly into the plane.
- Assembly slowed to a near-standstill, as workers tried to pull the bundles apart and re-thread them through the fuselage. Now Airbus will have to go back to the drawing board and redesign the wiring system.”*

*Matlack, Carol. “First, Blame the Software,” BusinessWeek Online (October 5, 2006).

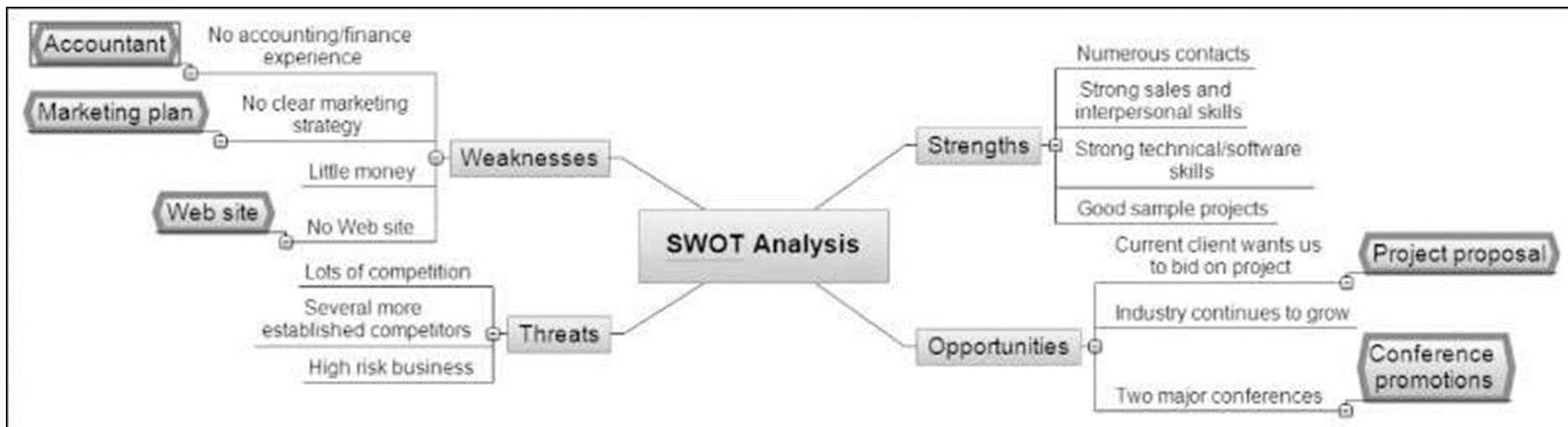
Solution: Project Integration Management

- Many people consider project integration management the key to overall project success.
- **Someone must take responsibility for coordinating all of the people, plans, and work required to complete a project.**
- Someone must **focus on the big picture of the project** and steer the project team toward successful completion.
- Someone must make the **final decisions when conflicts occur** among project goals or people.
- Someone must **communicate key project information to top management.**
- These **responsibilities belong to the project manager**, whose chief means for accomplishing all these tasks is project integration management.

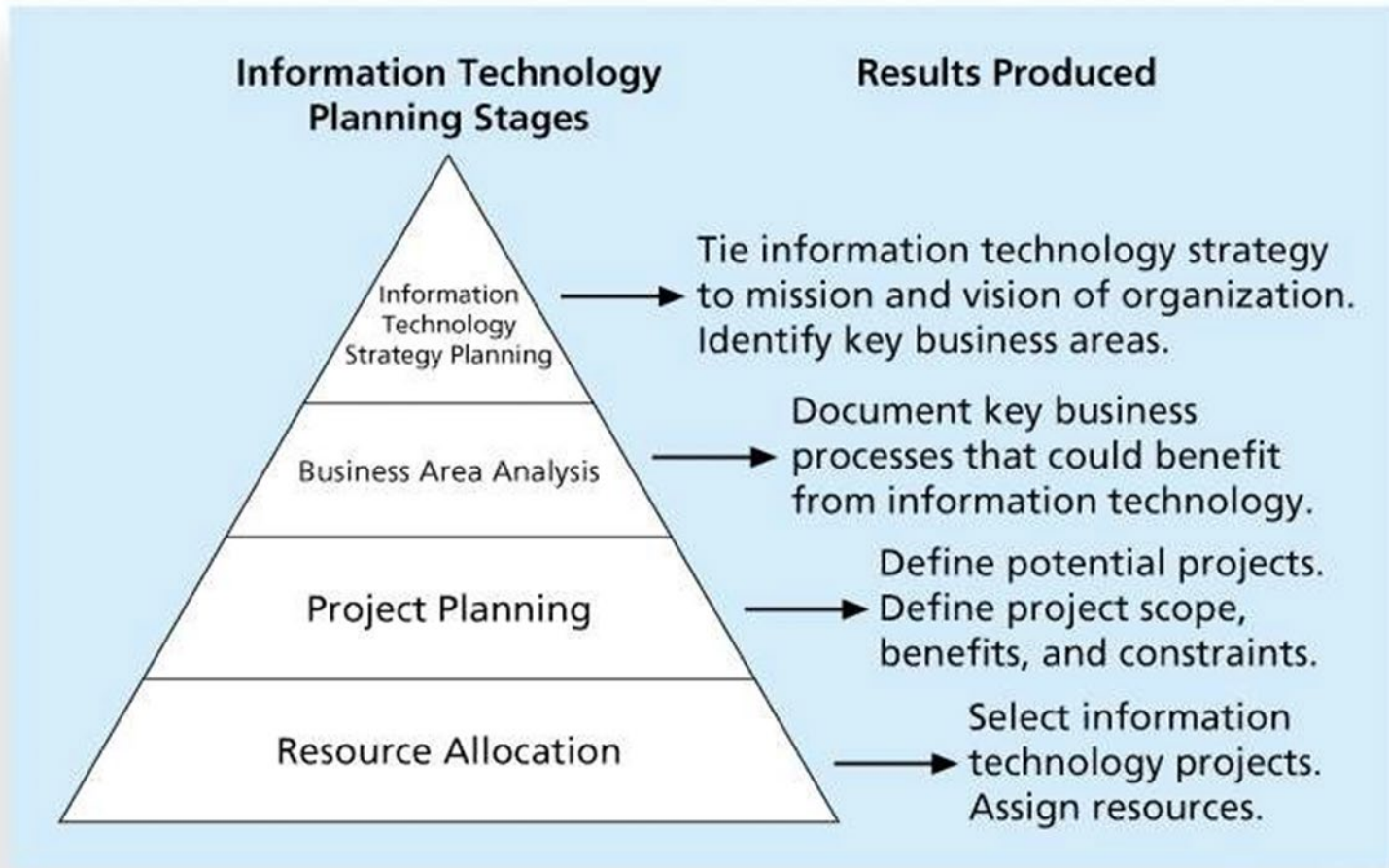
Strategic Planning and Project Selection

- Strategic planning involves determining long-term objectives, predicting future trends, and projecting the need for new products and services.
- Organizations often perform a SWOT analysis analyzing Strengths, Weaknesses, Opportunities, and Threats
- As part of strategic planning, organizations identify potential projects, use realistic methods to select which projects to work on, formalize project initiation by issuing a project charter

Mind Map of a SWOT Analysis to Help Identify Potential Projects



Information Technology Planning Process



Methods for selecting Projects

- There are usually more projects than available time and resources to implement them
- Methods for selecting projects include:
 - focusing on **broad organizational needs**
 - categorizing information technology projects
 - performing net present value or other financial analyses
 - using a weighted scoring model
 - implementing a balanced scorecard

Focusing on broad organizational needs

- It is often difficult to provide strong justification for many IT projects, but everyone agrees they have a high value
- Three important criteria for projects:
 - There is a need for the project
 - There are funds available
 - There's a strong will to make the project succeed

Categorizing IT Projects

- One categorization is whether the project addresses
 - a problem
 - an opportunity, or
 - a directive
- Another categorization is how long it will take to do and when it is needed
- Another is the overall priority of the project

Performing Financial Analysis

- Financial considerations are often an important consideration in selecting projects
- Three primary methods for determining the projected financial value of projects:
 - Net present value (NPV) analysis
 - Return on investment (ROI)
 - Payback analysis

Implementing balanced Score card

- Drs. Robert Kaplan and David Norton developed this approach to help select and manage projects that align with business strategy
- A balanced scorecard
 - is a methodology that converts an organization's value drivers, such as customer service, innovation, operational efficiency, and financial performance, to a series of defined metrics
- See www.balancedscorecard.org for more information

Weighted scoring model

- A weighted scoring model is a tool that provides a systematic process for selecting projects based on many criteria
 - Identify criteria important to the project selection process
 - Assign weights (percentages) to each criterion so they add up to 100%
 - Assign scores to each criterion for each project
 - Multiply the scores by the weights and get the total weighted scores
- The higher the weighted score, the better

	A	B	C	D	E	F
1	Criteria	Weight	Project 1	Project 2	Project 3	Project 4
2	Supports key business objectives	25%	90	90	50	20
3	Has strong internal sponsor	15%	70	90	50	20
4	Has strong customer support	15%	50	90	50	20
5	Uses realistic level of technology	10%	25	90	50	70
6	Can be implemented in one year or less	5%	20	20	50	90
7	Provides positive NPV	20%	50	70	50	50
8	Has low risk in meeting scope, time, and cost goals	10%	20	50	50	90
9	Weighted Project Scores	100%	56	78.5	50	41.5
10						
11						
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25						
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Project Integration Management Processes

- **Developing the project charter** involves working with stakeholders to create the document that formally authorizes a project—the charter.
- **Developing the project management plan** involves coordinating all planning efforts to create a consistent, coherent document—the project management plan.
- **Directing and managing project work** involves carrying out the project management plan by performing the activities included in it.
- **Monitoring and controlling project work** involves overseeing activities to meet the performance objectives of the project
- **Performing integrated change control** involves identifying, evaluating, and managing changes throughout the project life cycle.
- **Closing the project or phase** involves finalizing all activities to formally close the project or phase.

Project Integration Management Summary

Initiating

Process: **Develop project charter**

Output: Project charter

Planning

Process: **Develop project management plan**

Output: Project management plan

Executing

Process: **Direct and manage project work**

Outputs: Deliverables, work performance data, change requests, project management plan updates, project documents updates

Monitoring and Controlling

Process: **Monitor and control project work**

Outputs: Change requests, project management plan updates, project documents updates

Process: **Perform integrated change control**

Outputs: Approved change requests, change log, project management plan updates, project documents updates

Closing

Process: **Close project or phase**

Outputs: Final product, service, or result transition; organizational process assets updates

Project Start

Project Finish

Project Integration Management Overview

4.1 Develop Project Charter

- .1 Inputs
 - .1 Business documents
 - .2 Agreements
 - .3 Enterprise environmental factors
 - .4 Organizational process assets
- .2 Tools & Techniques
 - .1 Expert judgment
 - .2 Data gathering
 - .3 Interpersonal and team skills
 - .4 Meetings
- .3 Outputs
 - .1 Project charter
 - .2 Assumption log

4.2 Develop Project Management Plan

- .1 Inputs
 - .1 Project charter
 - .2 Outputs from other processes
 - .3 Enterprise environmental factors
 - .4 Organizational process assets
- .2 Tools & Techniques
 - .1 Expert judgment
 - .2 Data gathering
 - .3 Interpersonal and team skills
 - .4 Meetings
- .3 Outputs
 - .1 Project management plan

4.3 Direct and Manage Project Work

- .1 Inputs
 - .1 Project management plan
 - .2 Project documents
 - .3 Approved change requests
 - .4 Enterprise environmental factors
 - .5 Organizational process assets
- .2 Tools & Techniques
 - .1 Expert judgment
 - .2 Project management information system
 - .3 Meetings
- .3 Outputs
 - .1 Deliverables
 - .2 Work performance data
 - .3 Issue log
 - .4 Change requests
 - .5 Project management plan updates
 - .6 Project documents updates
 - .7 Organizational process assets updates

4.4 Manage Project Knowledge

- .1 Inputs
 - .1 Project management plan
 - .2 Project documents
 - .3 Deliverables
 - .4 Enterprise environmental factors
 - .5 Organizational process assets
- .2 Tools & Techniques
 - .1 Expert judgment
 - .2 Knowledge management
 - .3 Information management
 - .4 Interpersonal and team skills
- .3 Outputs
 - .1 Lessons learned register
 - .2 Project management plan updates
 - .3 Organizational process assets updates

Project Integration Management Overview

4.5 Monitor and Control Project Work

- .1 Inputs
 - .1 Project management plan
 - .2 Project documents
 - .3 Work performance information
 - .4 Agreements
 - .5 Enterprise environmental factors
 - .6 Organizational process assets
- .2 Tools & Techniques
 - .1 Expert judgment
 - .2 Data analysis
 - .3 Decision making
 - .4 Meetings
- .3 Outputs
 - .1 Work performance reports
 - .2 Change requests
 - .3 Project management plan updates
 - .4 Project documents updates

4.6 Perform Integrated Change Control

- .1 Inputs
 - .1 Project management plan
 - .2 Project documents
 - .3 Work performance reports
 - .4 Change requests
 - .5 Enterprise environmental factors
 - .6 Organizational process assets
- .2 Tools & Techniques
 - .1 Expert judgment
 - .2 Change control tools
 - .3 Data analysis
 - .4 Decision making
 - .5 Meetings
- .3 Outputs
 - .1 Approved change requests
 - .2 Project management plan updates
 - .3 Project documents updates

4.7 Close Project or Phase

- .1 Inputs
 - .1 Project charter
 - .2 Project management plan
 - .3 Project documents
 - .4 Accepted deliverables
 - .5 Business documents
 - .6 Agreements
 - .7 Procurement documentation
 - .8 Organizational process assets
- .2 Tools & Techniques
 - .1 Expert judgment
 - .2 Data analysis
 - .3 Meetings
- .3 Outputs
 - .1 Project documents updates
 - .2 Final product, service, or result transition
 - .3 Final report
 - .4 Organizational process assets updates

Step 1: Developing a Project Charter

- After deciding what project to work on, it is important to let the rest of the organization know
- **A project charter** is a document that formally recognizes the existence of a project and provides direction on the project's objectives and management
- Key project stakeholders should sign a project charter to acknowledge agreement on the need and intent of the project; a signed charter is a key output of project integration management

Inputs for Developing a Project Charter

- Benefits Management Plan
- A business case
- Agreements
- Enterprise environmental factors
- Organizational process assets, which include formal and informal plans, policies, procedures, guidelines, information systems, financial systems, management systems, lessons learned, and historical information

Output in Developing a Project Charter

- The two outputs of the process to develop a **project charter** are the charter itself and an **assumption log**.
- Although the format of project charters can vary tremendously, they should include at least the following basic information:
 - The project's title and date of authorization
 - The project manager's name and contact information
 - A summary schedule, including the planned start and finish dates; if a summary milestone schedule is available, it should also be included or referenced
 - A summary of the project's budget or reference to budgetary documents
 - A brief description of the project objectives, including the business need or other justification for authorizing the project
 - Project success criteria, including project approval requirements and who signs off on the project

Output in Developing a Project Charter

- A summary of the planned approach for managing the project, which should describe stakeholder needs and expectations, important assumptions, and constraints, and should refer to related documents, such as a communications management plan, as available
- A roles and responsibilities matrix
- A sign-off section for signatures of key project stakeholders
- A comments section in which stakeholders can provide important comments related to the project

Sample Project Charter

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

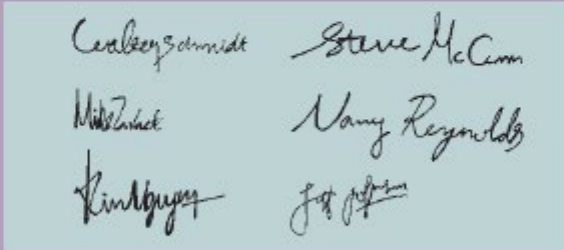
Project Objectives: Upgrade hardware and software for all employees (approximately 2,000) within nine months based on new corporate standards. See attached sheet describing the new standards. Upgrades may affect servers as well as associated network hardware and software.

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

Sample Project Charter

ROLES AND RESPONSIBILITIES		
Name	Role	Responsibility
Walter Schmidt	CEO	Project sponsor, monitor project
Mike Zwack	CIO	Monitor project, provide staff
Kim Nguyen	Project Manager	Plan and execute project
Jeff Johnson	Director of IT Operations	Mentor Kim
Nancy Reynolds	VP, Human Resources	Provide staff, issue memo to all employees about project
Steve McCann	Director of Purchasing	Assist in purchasing hardware and software
Sign-off: (Signatures of all the above stakeholders)		
		
Comments: (Handwritten or typed comments from above stakeholders, if applicable)		
<p>"This project must be done within 10 months at the absolute latest."—Mike Zwack, CIO</p> <p>"We are assuming that adequate staff will be available and committed to supporting this project. Some work must be done after hours to avoid work disruptions, and overtime will be provided."—Jeff Johnson and Kim Nguyen, IT department</p>		

Step 2: Developing a Project Management Plan

- A **project management plan** is a document used to coordinate all project planning documents and help guide a project's execution and control
- Plans created in the **other knowledge areas** are subsidiary parts of the overall project management plan
- Project management plans **should be dynamic, flexible, and receptive to change** when the environment or project changes.
- These plans should greatly assist the project manager in leading the project team and assessing project status.
- Just as **projects are unique, so are project plans.**
- For a small project involving a few people over a couple of months, a project charter, scope statement, and Gantt chart might be the only formal project planning documents needed; there would not be a need for a separate project management plan.
- A large project involving 100 people over three years would benefit from having a detailed project management plan and separate plans for each knowledge area. Because all project plans should help guide the completion of the particular project, they should be tailored as needed for each project.

Common Elements Of a Project Management Plan

- Introduction or overview of the project
- Description of how the project is organized
- Management and technical processes used on the project
- Work to be done, schedule, and budget information

Step 3: Directing and Managing Project Work

- Involves managing and performing the work described in the project management plan
- The majority of time and money is usually spent on execution
- The application area of the project directly affects project execution because the products of the project are produced during execution
- The project manager needs to focus on leading the project team and managing stakeholder relationships to execute the project management plan successfully. (covered in later lectures in detail)
- Project resource management, communications management, and stakeholder management are crucial to a project's success (covered in later lectures in detail)

Coordinating Planning and Execution

- Project planning and execution are intertwined and inseparable activities
- Those who will do the work should help to plan the work
- Project managers must solicit input from the team to develop realistic plans

Providing Strong Leadership and a supportive Culture

- Project managers must lead by example to demonstrate the importance of creating and then following good project plans
- Organizational culture can help project execution by
 - providing guidelines and templates
 - tracking performance based on plans
- Project managers may still need to break the rules to meet project goals, and senior managers must support those actions

Capitalizing on Product, Business and Application Area Knowledge

- It is often helpful for **IT project managers** to have **prior technical experience**
- **On small projects**, the project manager may be required to perform some of the **technical work** or mentor team members to complete the projects
- On large projects, the project manager must understand the business and application area of the project

Project Execution Tools and Techniques

- **Expert judgment:** Experts can help project managers and their teams make many decisions related to project execution
- **Meetings:** Meetings allow people to develop relationships, pick up on important body language or tone of voice, and have a dialogue to help resolve problems.
- **Project management information systems:** There are hundreds of project management software products available on the market today, and many organizations are moving toward powerful enterprise project management systems that are accessible via the Internet

Step 4: Managing Project Knowledge

PMI added this new process to the PMBOK® Guide in 2017 to highlight the importance of managing project knowledge.

There are two basic types of knowledge:

- 1. Explicit knowledge** : This type of knowledge can be easily explained using words, pictures, or numbers and is easy to communicate, store, and distribute. Examples include information found in textbooks and encyclopedias as well as project documents and plans.
- 2. Tacit knowledge** : Unlike explicit knowledge, tacit knowledge, sometimes called informal knowledge, is difficult to express and is highly personal. Examples include beliefs, insight, and experience. It is often shared through conversations and interactions between people. Many organizations set up programs like mentorships, communities of practice, or workshops to assist in passing on tacit knowledge.

Knowledge Management

- Knowledge management should be done before, during, and after projects are completed.
- One of the main outputs of managing project knowledge is a lessons-learned register.
- A lessons-learned register should document challenges, problems, realized risks and opportunities, and other content to assist in knowledge management on current and future projects.
- Contents can include a lessons learned ID, date identified, owner, name, category, situation, and recommendation.

Step 5: Monitoring and Controlling Project

- Monitoring project work includes collecting, measuring, and disseminating performance information.
- It also involves assessing measurements and analyzing trends to determine what process improvements can be made.
- The project team should continuously monitor project performance to assess the overall health of the project and identify areas that require special attention.
- The project management plan provides the baseline for identifying and controlling project changes.
- **A baseline** is a starting point, a measurement, or an observation that is documented so that it can be used for future comparison.

For example, the project management plan includes a section that describes the work to perform on a project. This section of the plan describes the key deliverables for the project, the products of the project, and quality requirements. The schedule section of the project management plan lists the planned dates for completing key deliverables, and the budget section of the plan provides the planned cost of these deliverables. The project team must focus on delivering the work as planned. If the project team or someone else causes changes during project execution, the team must revise the project management plan and have it approved by the project sponsor.

- Many people refer to different types of baselines, such as a cost baseline or schedule baseline, to describe different project goals more clearly and performance toward meeting them.

Step 6: Performing Integrated Change Control

- Integrated change control involves identifying, evaluating, and managing changes throughout the project life cycle.
- The three main objectives of integrated change control are as follows:
 - **Influencing the factors that create changes to ensure that changes are beneficial** : To ensure that changes are beneficial and that a project is successful, project managers and their teams must make trade-offs among key project dimensions, such as scope, time, cost, and quality.
 - **Determining that a change has occurred** : To determine that a change has occurred, the project manager must know the status of key project areas at all times. In addition, the project manager must communicate significant changes to top management and key stakeholders. Top management and other key stakeholders do not like surprises, especially ones that mean the project might produce less, take longer to complete, cost more than planned, or create products of lower quality.
 - **Managing actual changes as they occur** : Managing change is a key role of project managers and their teams. It is important that project managers exercise discipline in managing the project to help minimize the number of changes that occur.

Change Control in IT Projects

Former view: The project team should strive to do exactly what was planned on time and within budget

- **Problem:** Stakeholders rarely agreed up-front on the project scope, and time and cost estimates were inaccurate

Modern view: Project management is a process of constant communication and negotiation

- **Solution:** Changes are often beneficial, and the project team should plan for them

Summary

- Project integration management involves coordinating all of the other knowledge areas throughout a project's life cycle
- Main processes include
 - Develop the project charter
 - Develop the project management plan
 - Direct and manage project execution
 - Managing Project Knowledge
 - Monitor and control project work
 - Perform integrated change control
 - Close the project or phase

Project Management: Lecture 4

Part II: 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

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



Project Scope Management Overview

5.1 Plan Scope Management

- .1 Inputs
 - .1 Project management plan
 - .2 Project charter
 - .3 Enterprise environmental factors
 - .4 Organizational process assets
- .2 Tools & Techniques
 - .1 Expert judgment
 - .2 Meetings
- .3 Outputs
 - .1 Scope management plan
 - .2 Requirements management plan

5.4 Create WBS

- .1 Inputs
 - .1 Scope management plan
 - .2 Project scope statement
 - .3 Requirements documentation
 - .4 Enterprise environmental factors
 - .5 Organizational process assets
- .2 Tools & Techniques
 - .1 Decomposition
 - .2 Expert judgment
- .3 Outputs
 - .1 Scope baseline
 - .2 Project documents updates

5.2 Collect Requirements

- .1 Inputs
 - .1 Scope management plan
 - .2 Requirements management plan
 - .3 Stakeholder management plan
 - .4 Project charter
 - .5 Stakeholder register
- .2 Tools & Techniques
 - .1 Interviews
 - .2 Focus groups
 - .3 Facilitated workshops
 - .4 Group creativity techniques
 - .5 Group decision-making techniques
 - .6 Questionnaires and surveys
 - .7 Observations
 - .8 Prototypes
 - .9 Benchmarking
 - .10 Context diagrams
 - .11 Document analysis
- .3 Outputs
 - .1 Requirements documentation
 - .2 Requirements traceability matrix

5.5 Validate Scope

- .1 Inputs
 - .1 Project management plan
 - .2 Requirements documentation
 - .3 Requirements traceability matrix
 - .4 Verified deliverables
 - .5 Work performance data
- .2 Tools & Techniques
 - .1 Inspection
 - .2 Group decision-making techniques
- .3 Outputs
 - .1 Accepted deliverables
 - .2 Change requests
 - .3 Work performance information
 - .4 Project documents updates

5.3 Define Scope

- .1 Inputs
 - .1 Scope management plan
 - .2 Project charter
 - .3 Requirements documentation
 - .4 Organizational process assets
- .2 Tools & Techniques
 - .1 Expert judgment
 - .2 Product analysis
 - .3 Alternatives generation
 - .4 Facilitated workshops
- .3 Outputs
 - .1 Project scope statement
 - .2 Project documents updates

5.6 Control Scope

- .1 Inputs
 - .1 Project management plan
 - .2 Requirements documentation
 - .3 Requirements traceability matrix
 - .4 Work performance data
 - .5 Organizational process assets
- .2 Tools & Techniques
 - .1 Variance analysis
- .3 Outputs
 - .1 Work performance information
 - .2 Change requests
 - .3 Project management plan updates
 - .4 Project documents updates
 - .5 Organizational process assets updates

Project Scope Management Overview

Source: PMBOK Guide- Sixth Edition, Project Management Institute, Inc(2017)

Step 1: Planning Scope Management

- The first step in project scope management is planning how the scope will be managed throughout the life of the project.
- After reviewing the project management plan, project charter, enterprise environmental factors, and organizational process assets, the project team uses expert judgment, data analysis, 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
- **The scope management plan consist of the following 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

Another important output of planning scope management is the requirements management plan

Requirement Management Plan

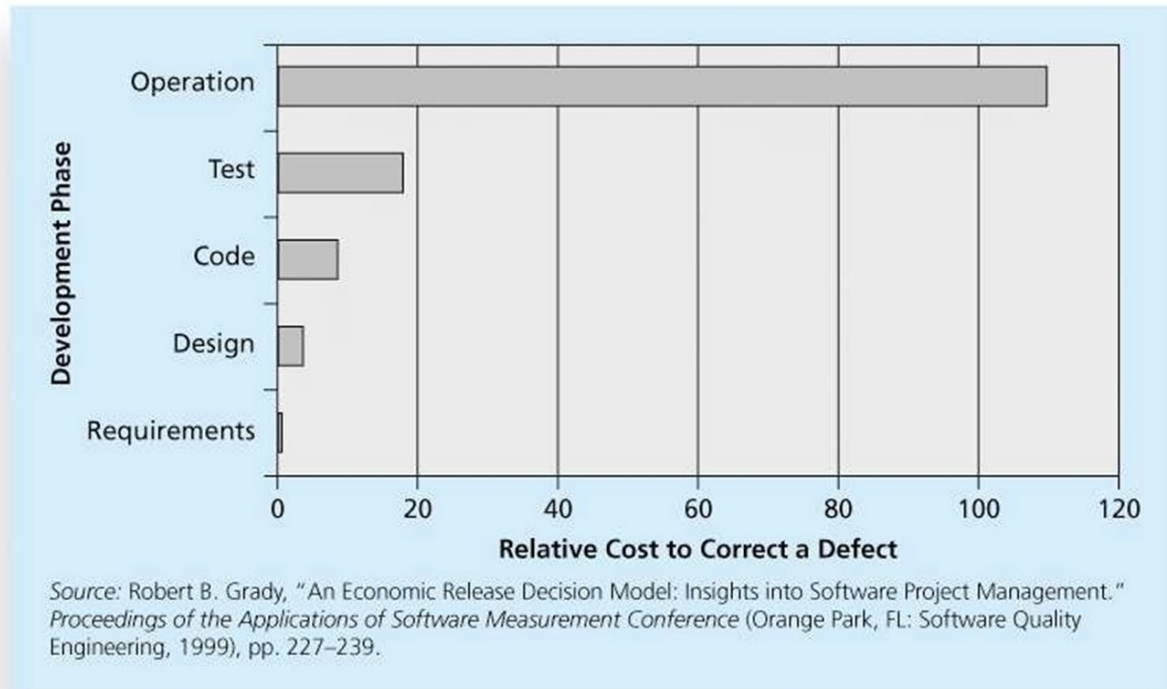
- The PMBOK® Guide, Fifth Edition, describes requirements as “conditions or capabilities that must be met by the project or present in the product, service, or result to satisfy an agreement or other formally imposed specification”
- The requirements management plan documents how project requirements will be analyzed, documented, and managed
- For some IT projects, it is helpful to divide requirements development into categories called **elicitation, analysis, specification, and validation**
- These steps include all the activities involved in gathering, evaluating, and documenting requirements for a software or software-containing product.

Requirement Management Plan

- .
- It is also important to **use an iterative approach** to defining requirements because they are often unclear early in a project
- The requirements management plan documents how project requirements will be analyzed, documented, and managed.
- A requirements management plan can include the following information:
 - How to plan, track, and report requirements activities
 - How to perform configuration management activities
 - How to prioritize requirements
 - How to use product metrics
 - How to trace and capture attributes of requirements

Step 2: Collecting Requirements

- The second step in project scope management is often the most difficult: collecting requirements.
- A major consequence of not defining requirements well is rework, which can consume up to half of project costs, especially for software development projects.



As illustrated in the above Figure, it costs much more (up to 30 times more) to correct a software defect in later development phases than to fix it in the requirements phase.

Methods of collecting Requirements

- Interviewing Stakeholders (expensive and time consuming)
- 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

The project's size, complexity, importance, and other factors affect how much effort is spent on collecting requirements.

It is important for a project team to decide how it will collect and manage requirements.

It is crucial to gather inputs from key stakeholders and align the scope with business strategy

Methods of collecting Requirements

- In addition to preparing requirements documentation as an output of collecting requirements, project teams often create a requirements traceability matrix.
- A requirements traceability matrix (RTM) is a table that lists requirements, their various attributes, and the status of the requirements to ensure that all are addressed.

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.

Step 3: Defining Scope

- **Good scope definition is very important to project success because it helps improve the accuracy of time, cost, and resource estimates**, it defines a baseline for performance measurement and project control, and it aids in communicating clear work responsibilities
- The main tools and techniques used in defining scope include expert judgment, data analysis, decision making, interpersonal and team skills, and product analysis.
- The main outputs of scope definition are the **project scope statement and project documents updates**.
- **Project scope statements should include at least a product scope description, product user acceptance criteria, and detailed information on all project deliverables.**

Step 3: Defining Scope

- 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.

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.

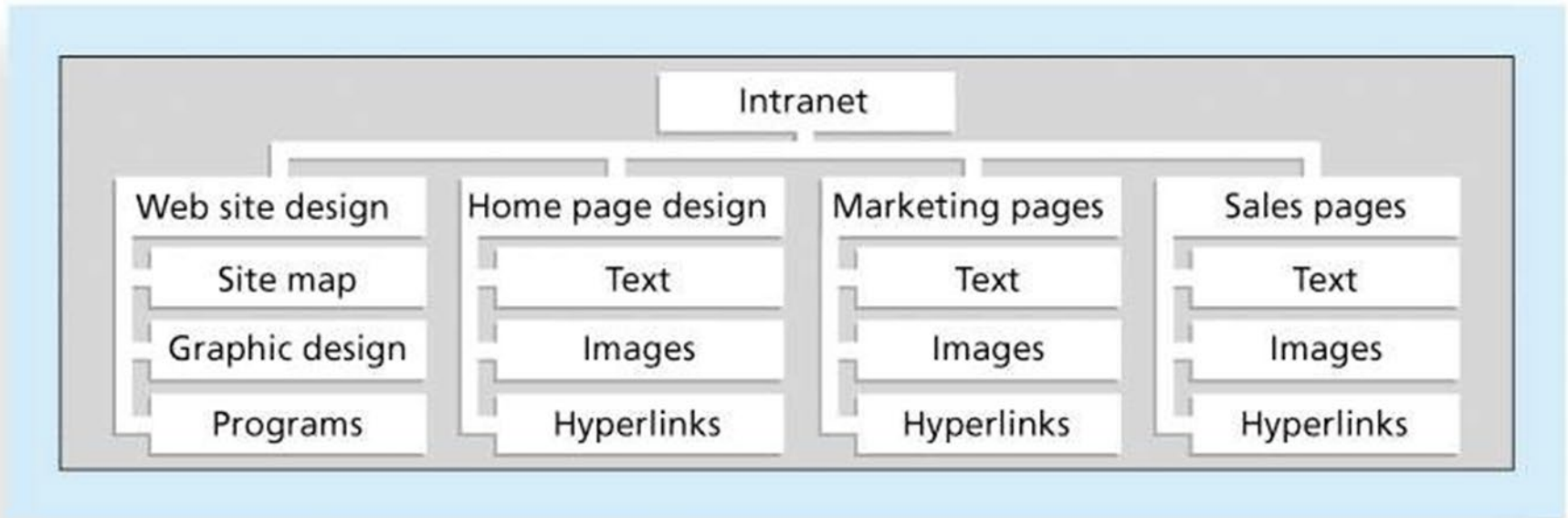
Step 4: Creating the Work Breakdown Structure

- After **collecting requirements and defining scope**, the next step in project scope management is to create a work breakdown structure.
- A **work breakdown structure (WBS)** is a deliverable-oriented grouping of the work involved in a project that defines its total scope.
- Because most projects involve many people and many different deliverables, it is important to organize and divide the work into logical parts based on how the work will be performed.
- **The WBS is a foundation document in project management** because it provides the basis for planning and managing project schedules, costs, resources, and changes.
- **Because the WBS defines the total scope of the project**, some project management experts believe that work should not be done on a project if it is not included in the WBS.
- Therefore, it is crucial to develop a complete WBS

Creating the Work Breakdown Structure

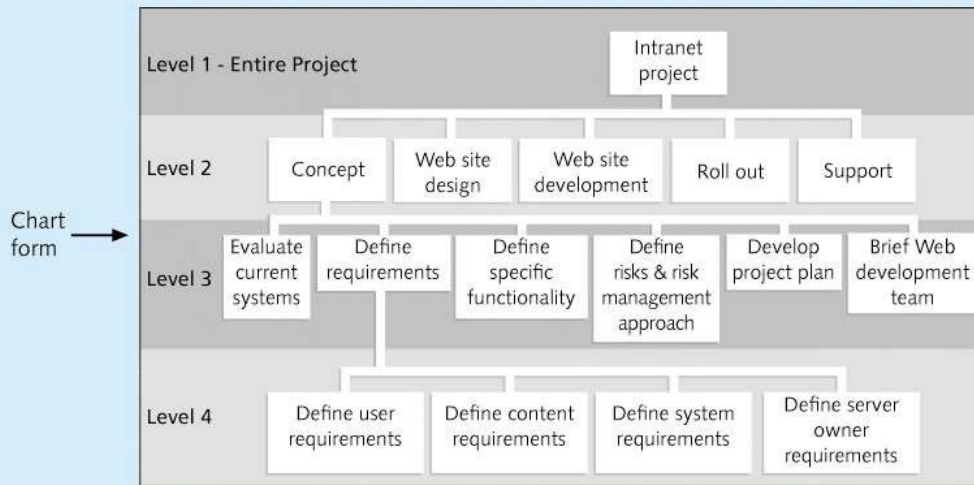
- The project **management plan, project documents, enterprise environmental factors, and organizational process assets** are the **primary inputs** for creating a WBS.
- In addition to expert judgment, the main **tool or technique** is **decomposition**—that is, subdividing project deliverables into smaller pieces.
- **The outputs** of the process of creating the WBS are the **scope baseline and project documents updates**.
- The scope baseline includes the approved project scope statement and its associated WBS and WBS dictionary
- A **work package** is a task at the lowest level of the WBS. A work package also represents the level of work that the project manager monitors and controls.
- You can think of work packages in terms of accountability and reporting.

Sample Intranet WBS Organised by Product



- The top box labeled Intranet represents the entire project, and it is called Level 1 of the WBS.
- In this example, the main products to be delivered are shown in Level 2, called website design, home page design, marketing pages, and sales pages.
- Below them are Level 3 items, such as site map, graphic design, and so on.

Sample Intranet WBS Organised by Phase

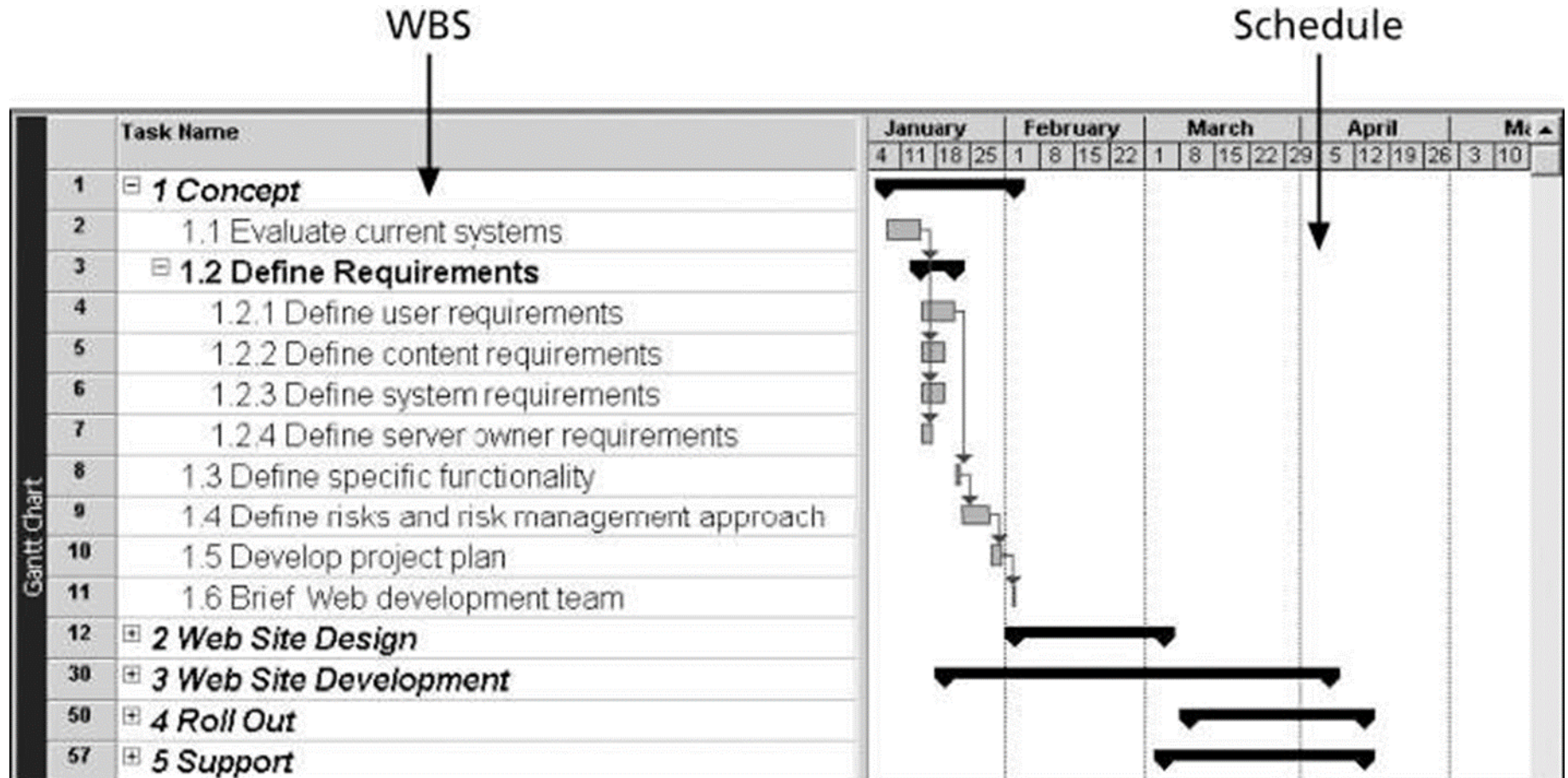


Tabular form with PMI numbering

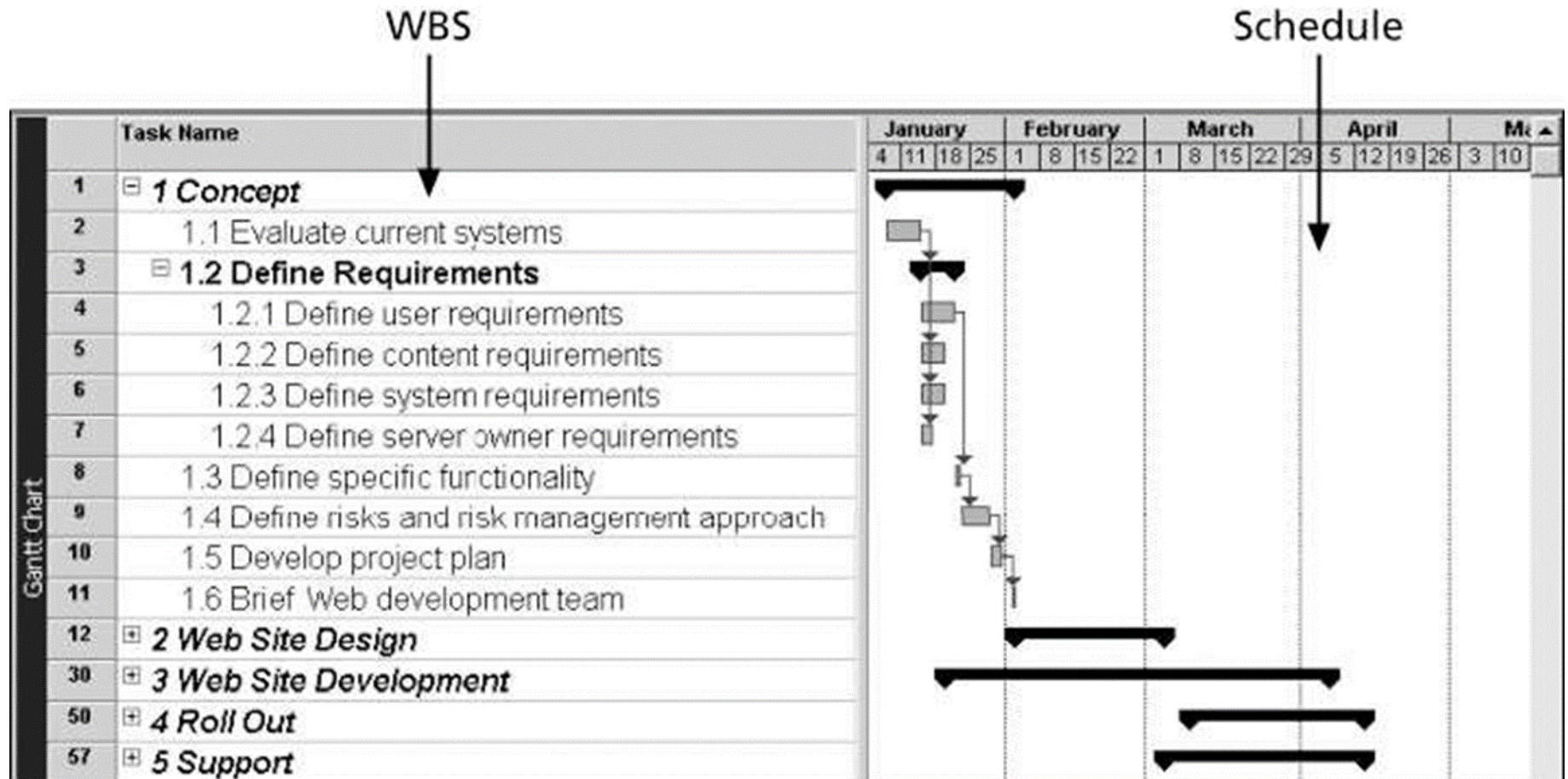
- 1.1 Concept
 - 1.1.1 Evaluate current systems
 - 1.1.2 Define requirements
 - 1.1.2.1 Define user requirements
 - 1.1.2.2 Define content requirements
 - 1.1.2.3 Define system requirements
 - 1.1.2.4 Define server owner requirements
 - 1.1.3 Define specific functionality
 - 1.1.4 Define risks and risk 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 shows a software product release project created by PMI.
- Notice that instead of showing product deliverables in Level 2, it is organized around deliverables for each project phase (product requirements, detail design, construct, and integration and test) as well as another Level 2 item for project management.
- Table shows this same WBS in a tabular or list format.

Sample Intranet WBS Gantt Chart in MS Project



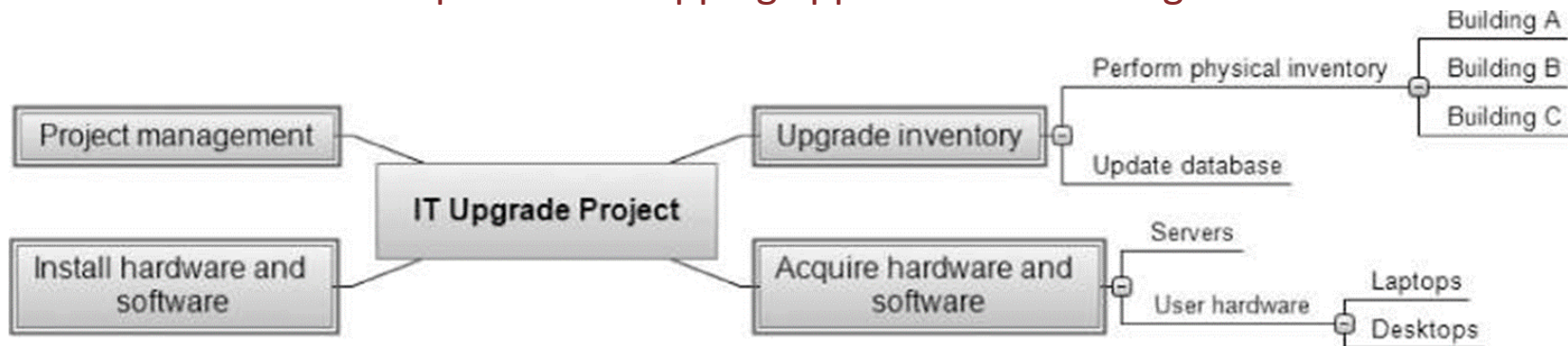
Sample Intranet WBS Gantt Chart organised by project management process group



Approaches to developing WBS

- **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

Sample Mind-Mapping approach for creating WBS



Source: MatchWare's MindView 4 Business Edition

The WBS Dictionary

- Many of the items listed on the sample WBSs are rather vague.
- What exactly does “Database update” mean, for example? The person responsible for this task might think that it does not need to be broken down any further, which could be fine.
- However, the task should be described in more detail so everyone has the same understanding of what it involves
- A WBS dictionary is a document that provides detailed information about each WBS item.

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
<p>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.</p>

Step 5: 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.
- Careful procedures must be developed to ensure that customers are getting what they want and that the project team has enough time and money to produce the desired products and services.
- Even when the project scope is fairly well defined, many IT projects suffer from **scope creep**—the tendency for project scope to keep getting bigger and bigger.
- There are many horror stories about IT projects failing due to problems such as scope creep.

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

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.
- There were many problems in developing and implementing the smart card

Step 6: 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 Practice for avoiding Scope problems

- **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
- **Involve users in project scope management.** Assign key users to the project team and give them ownership of requirements definition and scope verification
- **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
- **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

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



Thank you