

Chapter 5: Project Scope Management

Learning Objectives

- Understand the elements that make good project scope management important
- Describe the strategic planning process, apply different project selection methods, such as a net present value analysis, a weighted scoring model, and a balanced scorecard, and understand the importance of creating a project charter
- Explain the scope planning process and contents of a scope statement

Learning Objectives

- Discuss the scope definition process and construct a work breakdown structure using the analogy, top-down, bottom-up, and mind mapping approaches
- Understand the importance of scope verification and scope change control to avoid scope creep on information technology 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. It defines what is or is not to be done
- **Deliverables** are products produced as part of a project, such as hardware or software, planning documents, or meeting minutes
- The project team and stakeholders must have the same understanding of what products will be produced as a result of a project and how they'll be produced

Project Scope Management Processes

- Initiation: beginning a project or continuing to the next phase
- Scope planning: developing documents to provide the basis for future project decisions
- Scope definition: subdividing the major project deliverables into smaller, more manageable components
- Scope verification: formalizing acceptance of the project scope
- Scope change control: controlling changes to project scope

Project Initiation: Strategic Planning and Project Selection

- The first step in initiating projects is to look at the big picture or strategic plan of an organization
- Strategic planning involves determining long-term business objectives
- IT projects should support strategic and financial business objectives

Table 5-1. Why Firms Invest in Information Technology

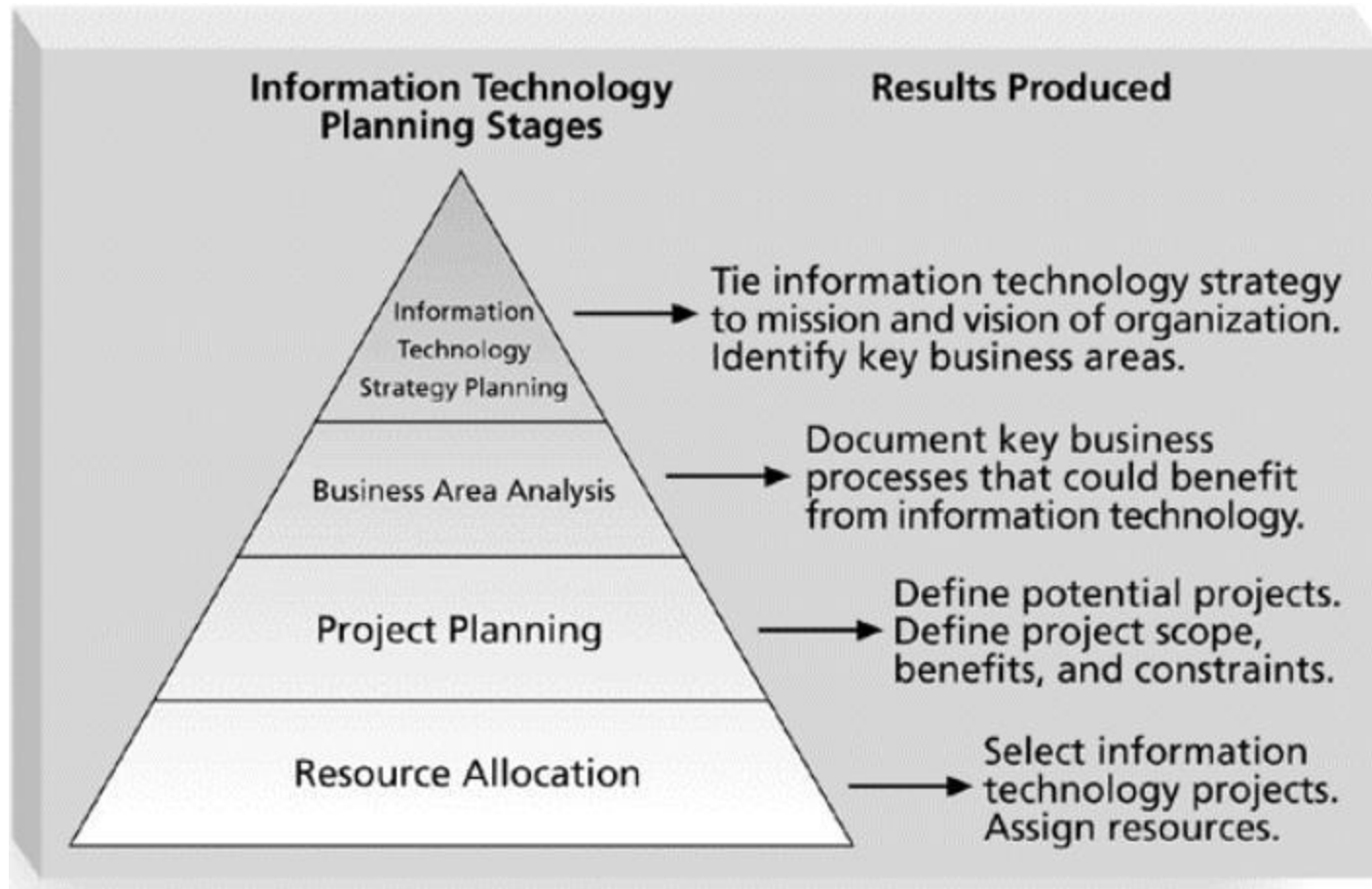
REASON FOR INVESTING IN INFORMATION TECHNOLOGY PROJECTS	RANK BASED ON OVERALL VALUE OF PROJECTS
Supports explicit business objectives	1
Has good internal rate of return (IRR)	2
Supports implicit business objectives	3
Has good net present value (NPV)	4
Has reasonable payback period	5
Used in response to competitive systems	6
Supports management decision making	7
Meets budgetary constraints	8
High probability of achieving benefits	9
Good accounting rate of return	10
High probability of completing project	11
Meets technical/system requirements	12
Supports legal/government requirement	13
Good profitability index	14
Introduces new technology	15

Bacon, James. The Use of Decision Criteria in Selecting Information Systems/Technology Investments, *MIS Quarterly*, Vol. 16, No. 3 (September 1992).

Identifying Potential Projects

- Many organizations follow a planning process for selecting IT projects
- First develop an IT strategic plan based on the organization's overall strategic plan
- Then perform a business area analysis
- Then define potential projects
- Then select IT projects and assign resources

Figure 5-1. Information Technology Planning Process



Methods for Selecting Projects

- There are usually more projects than available time and resources to implement them
- It is important to follow a logical process for selecting IT projects to work on
- Methods include:
 - focusing on broad needs
 - categorizing projects
 - performing 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
- “It is better to measure gold roughly than to count pennies precisely”
- 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
 - 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

Financial Analysis of Projects

- 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

Net Present Value Analysis

- Net present value (NPV) analysis is a method of calculating the expected net monetary gain or loss from a project by discounting all expected future cash inflows and outflows to the present point in time
- Projects with a positive NPV should be considered if financial value is a key criterion
- The higher the NPV, the better

Net Present Value Example

	A	B	C	D	E	F	G
1	Discount rate	10%					
2							
3	PROJECT 1	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
4	Benefits	\$0	\$2,000	\$3,000	\$4,000	\$5,000	\$14,000
5	Costs	\$5,000	\$1,000	\$1,000	\$1,000	\$1,000	\$9,000
6	Cash flow	(\$5,000)	\$1,000	\$2,000	\$3,000	\$4,000	\$5,000
7	NPV	\$2,316					
8		Formula =npv(b1,b6:f6)					
9							
10	PROJECT 2	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
11	Benefits	\$1,000	\$2,000	\$4,000	\$4,000	\$4,000	\$15,000
12	Costs	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$10,000
13	Cash flow	(\$1,000)	\$0	\$2,000	\$2,000	\$2,000	\$5,000
14	NPV	\$3,201					
15		Formula =npv(b1,b13:f13)					
16							
17	RECOMMEND PROJECT 2 BECAUSE IT HAS THE HIGHER NPV.						

Uses
Excel's
npv
function

Note
that
totals
are
equal,
but
NPVs
are
not.

Figure 5-2. Net Present Value Example

JWD Consulting NPV Example

Multiply
by the
discount
rate each
year, then
take cum.
benefits –
costs to
get NPV

Discount rate	8%					
Assume the project is completed in Year 0			Year			
	0	1	2	3	Total	
Costs	140,000	40,000	40,000	40,000		
Discount factor	1	0.93	0.86	0.79		
Discounted costs	140,000	37,200	34,400	31,600	243,200	
Benefits	0	200,000	200,000	200,000		
Discount factor	1	0.93	0.86	0.79		
Discounted benefits	0	186,000	172,000	158,000	516,000	
Discounted benefits - costs	(140,000)	148,800	137,600	126,400	272,800	← NPV
Cumulative benefits - costs	(140,000)	8,800	146,400	272,800		
ROI	→ 112%					
	Payback before Year 1					

Figure 5-3. JWD Consulting Net Present Value Example

NPV Calculations

- Determine estimated costs and benefits for the life of the project and the products it produces
- Determine the discount rate (check with your organization on what to use)
- Calculate the NPV (see text for details)
- Notes: Some organizations consider the investment year as year 0, while others start in year 1. Some people enter costs as negative numbers, while others do not. Check with your organization for their preferences.

Return on Investment

- Return on investment (ROI) is calculated by subtracting the project costs from the benefits and then dividing by the costs

$$\text{ROI} = (\text{total discounted benefits} - \text{total discounted costs}) / \text{discounted costs}$$

- The higher the ROI, the better
- Many organizations have a required rate of return or minimum acceptable rate of return on an investment
- Internal rate of return (IRR) can be calculated by setting the NPV to zero

Payback Analysis

- Another important financial consideration is payback analysis
- The payback period is the amount of time it will take to recoup, in the form of net cash inflows, the net dollars invested in a project
- Payback occurs when the cumulative discounted benefits and costs are greater than zero
- Many organizations want IT projects to have a fairly short payback period

Charting the Payback Period

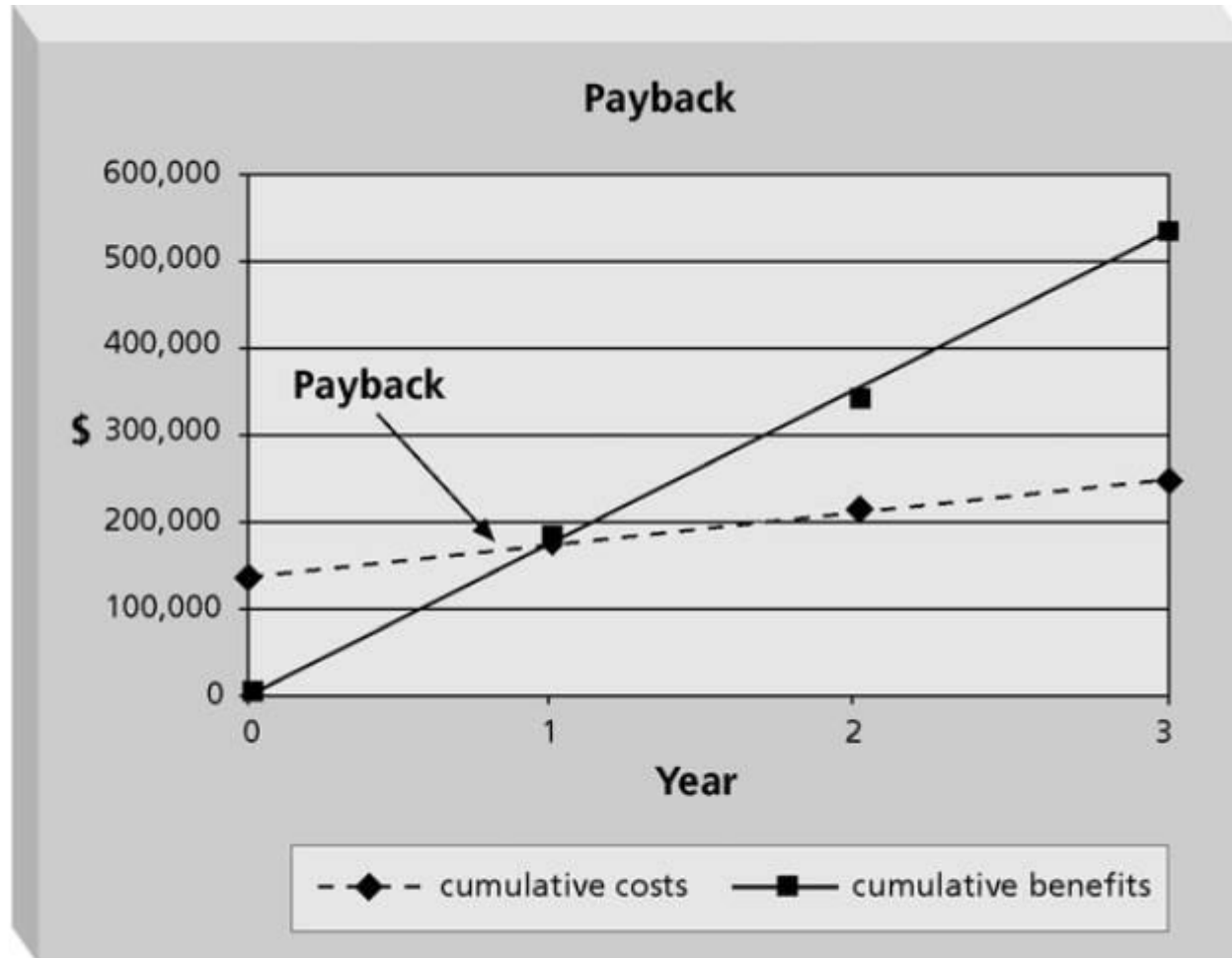


Figure 5-4. Charting the Payback Period

Weighted Scoring Model

- A weighted scoring model is a tool that provides a systematic process for selecting projects based on many criteria
 - First identify criteria important to the project selection process
 - Then assign weights (percentages) to each criterion so they add up to 100%
 - Then 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
- See “What Went Right?” for a description of how a mortgage finance agency uses a weighted scoring model for IT projects

Figure 5-5. Sample Weighted Scoring Model for Project Selection

	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	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



Implementing a Balanced Scorecard

- Drs. Robert Kaplan and David Norton developed this approach to help select and manage projects that align with business strategy
- A balanced scorecard 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

Project Charters

- After deciding what project to work on, it is important to formalize projects
- 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

Sample Project Charter

Table 5-2: Sample Project Charter

Project Title: Information Technology (IT) Upgrade Project

Project Start Date: March 4, 2005 **Projected Finish Date:** December 4, 2005

Project Manager: Kim Nguyen, 691-2784, *knguyen@abc.com*

Project Objectives: Upgrade hardware and software for all employees (approximately 2,000) within 9 months based on new corporate standards. See attached sheet describing the new standards. Upgrades may affect servers and midrange computers, as well as network hardware and software. Budgeted \$1,000,000 for hardware and software costs and \$500,000 for labor costs.

Approach:

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

ROLES AND RESPONSIBILITIES:

NAME	ROLE	RESPONSIBILITY
Walter Schmidt	CEO, Project Sponsor	Provide direction and funding
Mike Zwack	CIO	Monitor project, provide staff
Kim Nguyen	Project Manager	Plan and execute project
Jeff Johnson	Director of Information, Technology 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

Sample Project Charter

Table 5-2: Sample Project Charter (continued)

Sign-off: (Signatures of all the above stakeholders)

Walter Schmidt

Jeff Johnson

Mike Zwack

Nancy Reynolds

Kim Nguyen

Steve McCann

Comments: (Typed or handwritten comments from above stakeholders, if applicable)

"This project must be done within ten months at the absolute latest." Mike Zwack, CIO

"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, Information Technology Department

Scope Planning and the Scope Statement

- A scope statement is a document used to develop and confirm a common understanding of the project scope. It should include
 - a project justification
 - a brief description of the project's products
 - a summary of all project deliverables
 - a statement of what determines project success
- See the example scope statement in Chapter 3, pages 83-85

Scope Planning and the Work Breakdown Structure

- After completing scope planning, the next step is to further define the work by breaking it into manageable pieces
- Good scope definition
 - helps improve the accuracy of time, cost, and resource estimates
 - defines a baseline for performance measurement and project control
 - aids in communicating clear work responsibilities

The Work Breakdown Structure

- A work breakdown structure (WBS) is a deliverable-oriented grouping of the work involved in a project that defines the total scope of the project
- It is a foundation document in project management because it provides the basis for planning and managing project schedules, costs, and changes

Sample Intranet WBS Organized by Product

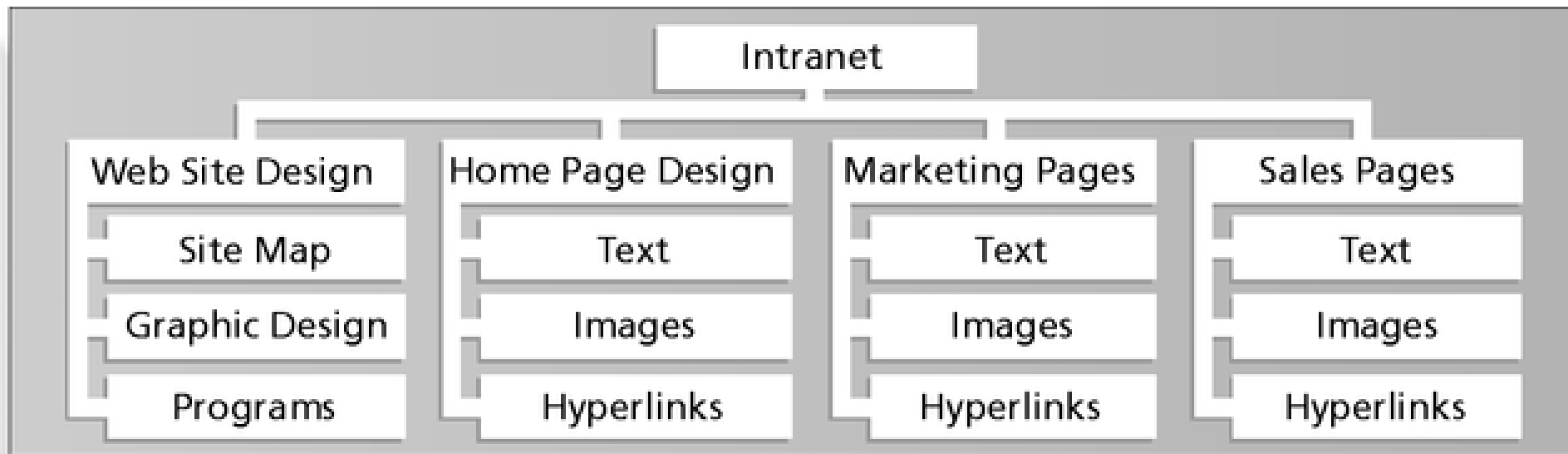


Figure 5-6. Sample Intranet WBS Organized by Product

Sample Intranet WBS Organized by Phase

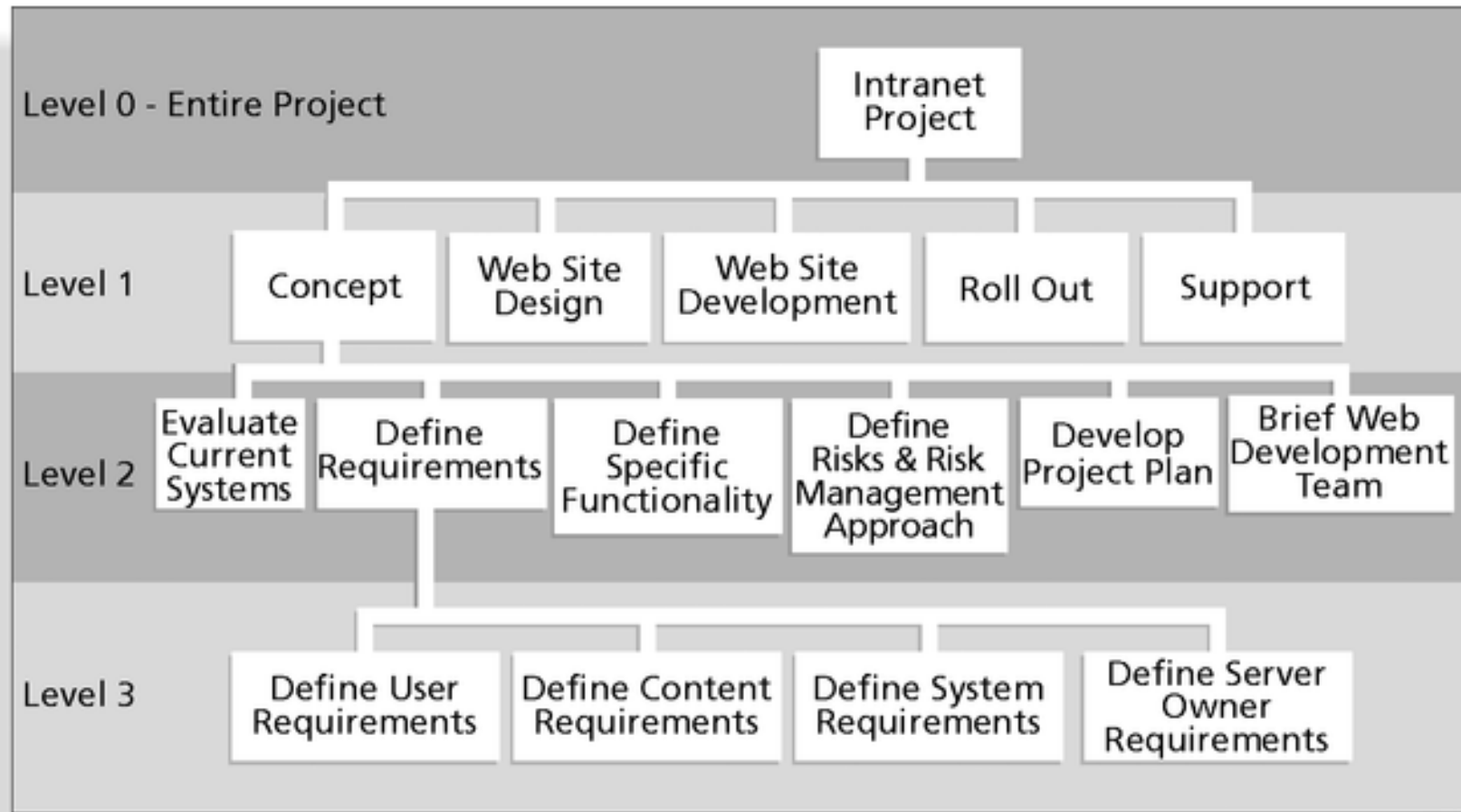


Figure 5-7. Sample Intranet WBS Organized by Phase

Table 5-3. Intranet WBS in Tabular Form

1.0 Concept

- 1.1 Evaluate current systems

- 1.2 Define Requirements

 - 1.2.1 Define user requirements

 - 1.2.2 Define content requirements

 - 1.2.3 Define system requirements

 - 1.2.4 Define server owner requirements

- 1.3 Define specific functionality

- 1.4 Define risks and risk management approach

- 1.5 Develop project plan

- 1.6 Brief Web development team

2.0 Web Site Design

3.0 Web Site Development

4.0 Roll Out

5.0 Support

Figure 5-8. Intranet WBS and Gantt Chart in Project 2000

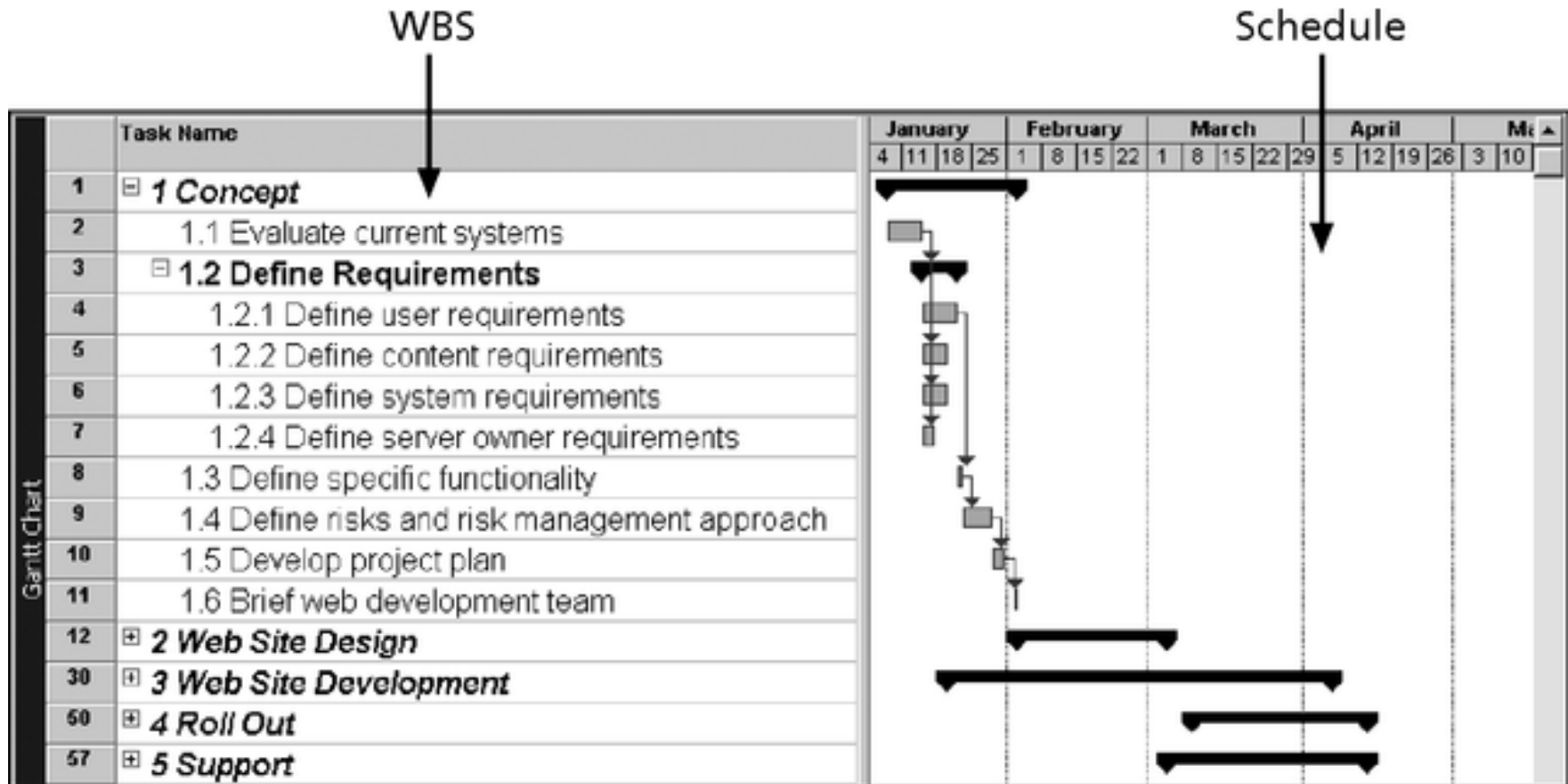


Figure 5-8. Intranet Gantt Chart in Microsoft Project

Figure 5-9. Intranet WBS and Gantt Chart Organized by Project Management Process Groups

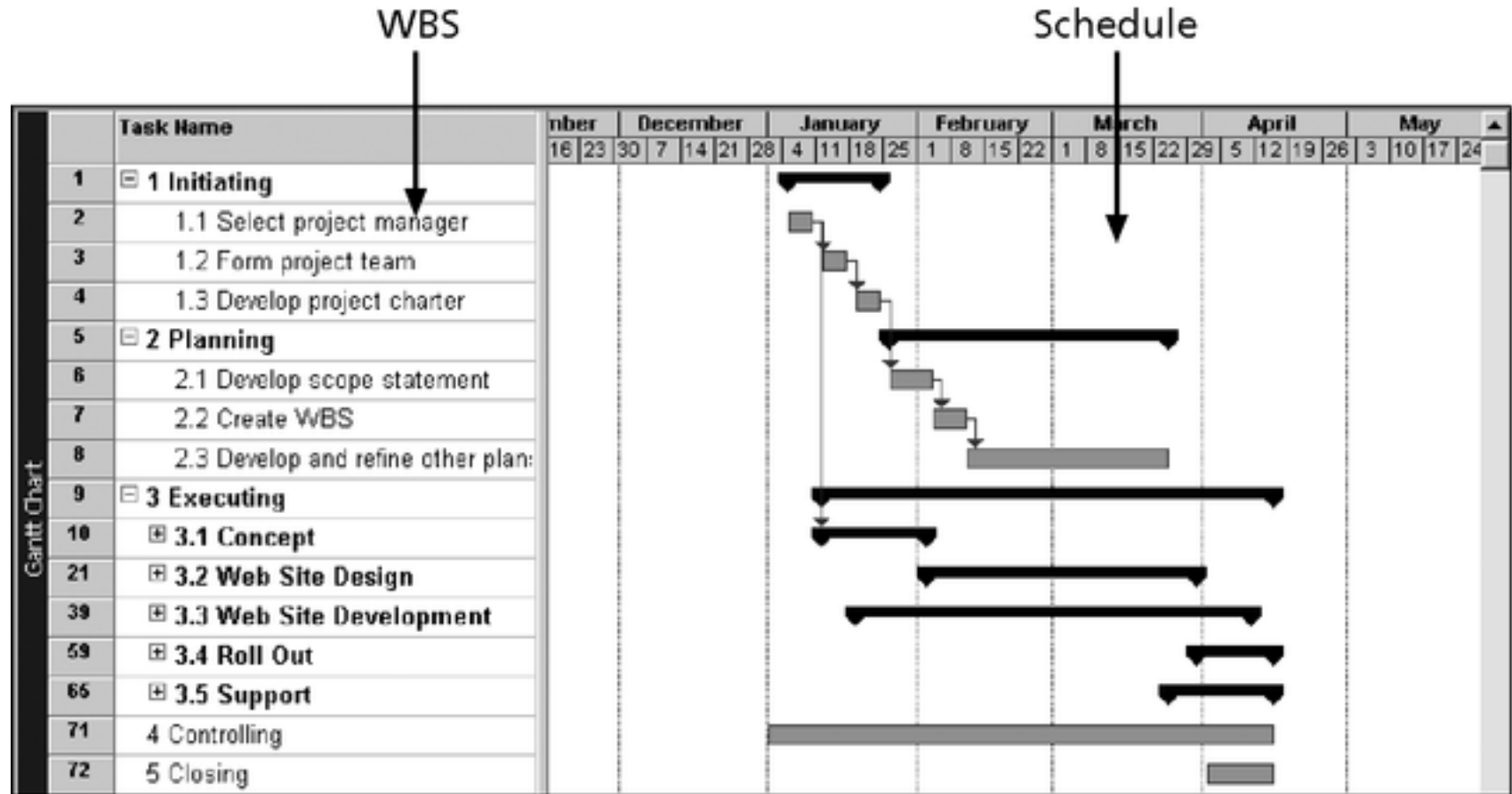


Figure 5-9. Intranet Gantt Chart Organized by Project Management Process Groups

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

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

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 detailed tasks and roll them up
- Mind-mapping approach: Write down tasks in a non-linear format and then create the WBS structure

Sample Mind-Mapping Approach

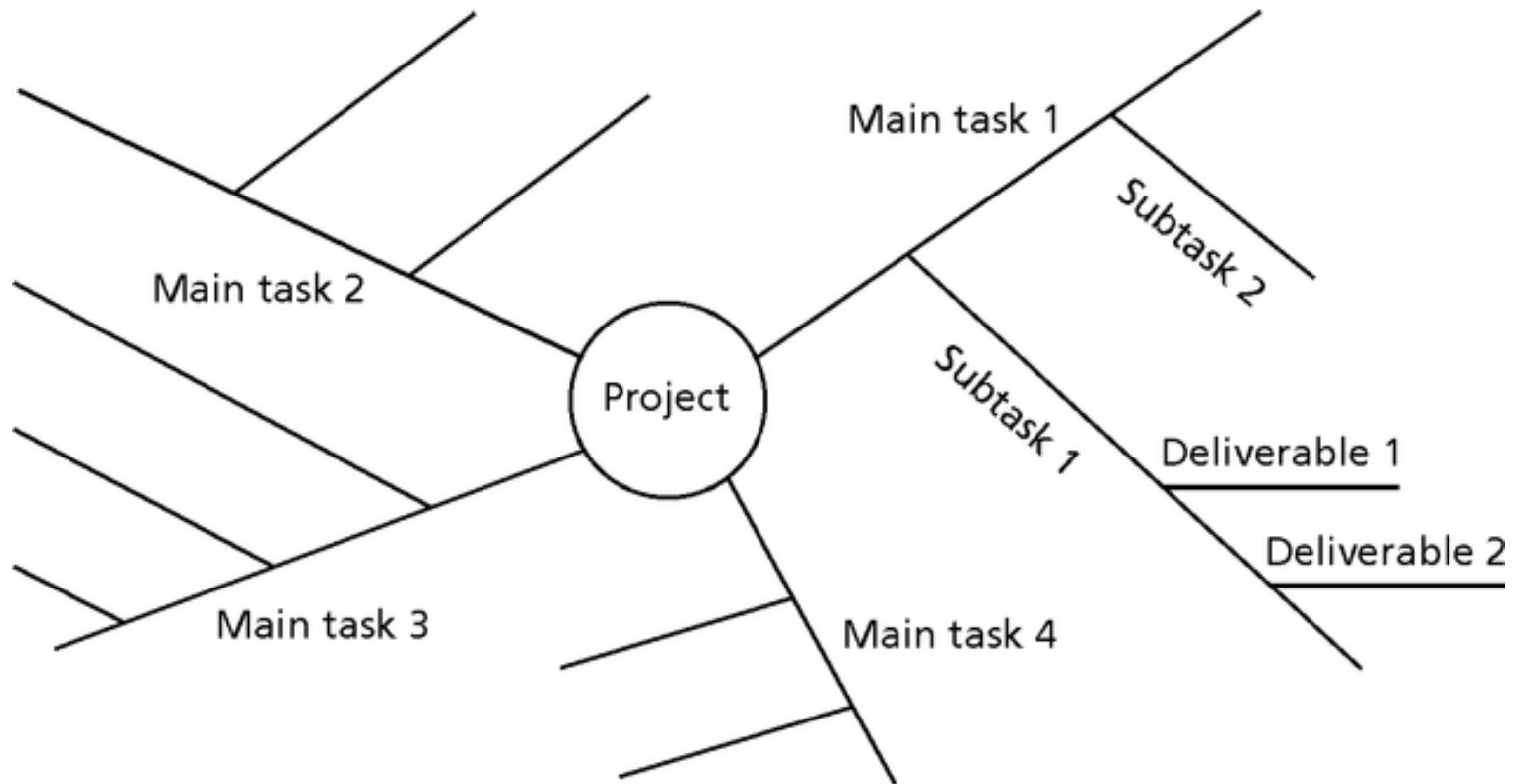


Figure 5-10. Sample Mind-Mapping Technique for Creating a WBS

Basic Principles for Creating WBSs*

1. A unit of work should appear at only one place in the WBS.
2. The work content of a WBS item is the sum of the WBS items below it.
3. A WBS item is the responsibility of only one individual, even though many people may be working on it.
4. 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.
5. Project team members should be involved in developing the WBS to ensure consistency and buy-in.
6. Each WBS item must be documented to ensure accurate understanding of the scope of work included and not included in that item.
7. 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.

*Cleland, David I. *Project Management: Strategic Design and Implementation*, 1994

Scope Verification and Scope Change Control

- 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
- Many IT projects suffer from scope creep and poor scope verification
 - FoxMeyer Drug filed for bankruptcy after scope creep on a robotic warehouse
 - Engineers at Grumman called a system “Naziware” and refused to use it
 - 21st Century Insurance Group wasted a lot of time and money on a project that could have used off-the-shelf components

Factors Causing IT Project Problems

Table 5-5: Factors Causing Information Technology Project Problems

FACTOR	RANK
Lack of user input	1
Incomplete requirements and specifications	2
Changing requirements and specifications	3
Lack of executive support	4
Technology incompetence	5
Lack of resources	6
Unrealistic expectations	7
Unclear objectives	8
Unrealistic time frames	9
New Technology	10

Johnson, Jim. "CHAOS: The Dollar Drain of Information Technology Project Failures," *Application Development Trends* (January 1995).

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
- Deliver something to users and sponsors on a regular basis
- Co-locate users with developers

Suggestions for Reducing Incomplete and Changing Requirements

- Develop and follow a requirements management process
- Use techniques like prototyping, use case modeling, and JAD to get more user involvement
- Put requirements in writing and keep them current
- 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, create weighted 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 for applying the balanced scorecard, creating mind maps, managing requirements, and so on