



# Project Management

Systems Analysis and Design, 8e  
Kendall & Kendall

# Learning Objectives

- Understand how projects are initiated and selected, define a business problem, and determine the feasibility of a proposed project.
- Inventory and appraise current and proposed hardware and software and the way it supports human interactions with technology.
- Evaluate software by addressing the tradeoffs among creating custom software, purchasing COTS software, and outsourcing to an application service provider.
- Forecast and analyze tangible and intangible costs and benefits.
- Plan a project by identifying activities and scheduling them.
- Manage team members and analysis and design activities so that the project objectives are met while the project remains on schedule.
- Professionally write and present an effective systems proposal, concentrating on both content and design.



# Project Management Fundamentals

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- Project initiation
- Determining project feasibility
- Activity planning and control
- Project scheduling
- Managing systems analysis team members

# Major Topics

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- Project initiation
- Determining feasibility
- Determining resources
- Activity planning and control
  - Gantt charts
  - PERT diagrams
- Managing analysis and design activities
- The agile approach

# Project Initiation

- Problems in the organization
  - Problems that lend themselves to systems solutions
- Opportunities for improvement
  - Caused through upgrading, altering, or installing new systems

# Checking Output, Observing Employee Behavior, and Listening to Feedback Are all Ways to Help the Analyst Pinpoint Systems Problems and Opportunities (Figure 3.1)

To Identify Problems	Look for These Specific Signs:
Check output against performance criteria.	<ul style="list-style-type: none"><li>• Too many errors</li><li>• Work completed slowly</li><li>• Work done incorrectly</li><li>• Work done incompletely</li><li>• Work not done at all</li></ul>
Observe behavior of employees.	<ul style="list-style-type: none"><li>• High absenteeism</li><li>• High job dissatisfaction</li><li>• High job turnover</li></ul>
Listen to external feedback from: Vendors. Customers. Suppliers.	<ul style="list-style-type: none"><li>• Complaints</li><li>• Suggestions for improvement</li><li>• Loss of sales</li><li>• Lower sales</li></ul>

# Problem Definition

- Problem statement
  - Paragraph or two stating the problem or opportunity
- Issues
  - Independent pieces pertaining to the problem or opportunity
- Objectives
  - Goals that match the issues point-by-point
- Requirements
  - The things that must be accomplished along with the possible solutions, and constraints, that limit the development of the system
- Use the problem definition to create a preliminary test plan.



# Problem Definition Steps

- Find a number of points that may be included in one issue.
- State the objective.
- Determine the relative importance of the issues or objectives.
- Identify which objectives are most critical.



# Selection Of Projects

- Backing from management
- Appropriate timing of project commitment
- Possibility of improving attainment of organizational goals
- Practical in terms of resources for the system analyst and organization
- Worthwhile project compared with other ways the organization could invest resources



# Selection of Projects: Improving Attainment of Organizational Goals

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- Improving corporate profits
- Supporting the competitive strategy of the organization
- Improving cooperation with vendors and partners
- Improving internal operations support
- Improving internal decision support so that decisions are more effective
- Improving customer service
- Increasing employee morale

# Defining Objectives

Many possible objectives exist including:

- Speeding up a process
- Streamlining a process
- Combining processes
- Reducing errors in input
- Reducing redundant storage
- Reducing redundant output
- Improving system and subsystem integration

# Determining Feasibility

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- Defining objectives
- Determining resources
  - Operationally
  - Technically
  - Economically

# The Three Key Elements of Feasibility Include Technical, Economic, and Operational Feasibility (Figure 3.3)

## The Three Key Elements of Feasibility

### Technical Feasibility

Add on to present system

Technology available to meet users' needs

### Economic Feasibility

Systems analysts' time

Cost of systems study

Cost of employees' time for study

Estimated cost of hardware

Cost of packaged software or software development

### Operational Feasibility

Whether the system will operate when installed

Whether the system will be used

# Technical Feasibility

- Can current technical resources be upgraded or added to in a manner that fulfills the request under consideration?
- If not, is there technology in existence that meets the specifications?

# Economic Feasibility

- Economic feasibility determines whether value of the investment exceeds the time and cost.
- Includes:
  - Analyst and analyst team time
  - Business employee time
  - Hardware
  - Software
  - Software development



# Operational Feasibility

- Operational feasibility determines if the human resources are available to operate the system once it has been installed.
- Users that do not want a new system may prevent it from becoming operationally feasible.

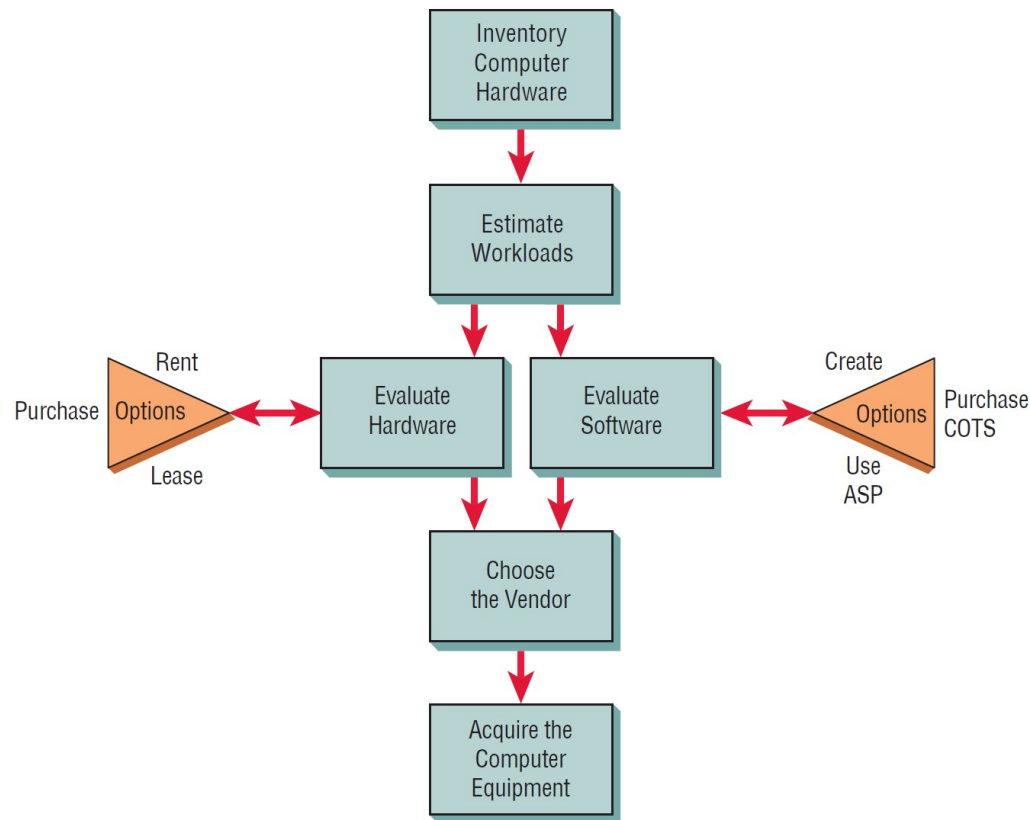


# Ascertaining Hardware and Software Needs

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- Steps used to determine hardware and software needs:
  - Inventory computer hardware currently available
  - Estimate current and future system workloads
  - Evaluate available hardware and software
  - Choose the vendor
  - Acquire the computer equipment

# Steps in Choosing Hardware and Software (Figure 3.4)



# Inventorying Computer Hardware

- Type of equipment
- Operation status of the equipment
- Estimated age of equipment
- Projected life of equipment
- Physical location of equipment
- Department or person responsible for equipment
- Financial arrangement for equipment

# Estimating Workloads

- Systems analysts formulate numbers that represent both current and projected workloads for the system so that any hardware obtained will possess the capability to handle current and future workloads.

# Comparisons of Workloads between Existing and Proposed Systems (Figure 3.5 )

	Existing System	Proposed System
Task	Compare performance of distribution warehouses by running the summary program.	Compare performance of distribution warehouses on the Web-based dashboard.
Method	Computer programs are run when needed; processing is done from the workstation.	Updates occur immediately; processing is done online.
Personnel	Distribution manager	Distribution manager
When and how	Daily: Enter shipments on Excel spreadsheet; verify accuracy of spreadsheet manually; and then write files to backup media. Monthly: Run program that summarizes daily records and prints report; get report and make evaluations.	Daily: Enter shipments on the Web-based system using drop-down boxes. Data are automatically backed up to remote location. Monthly: Compare warehouses online using the performance dashboard; print only if needed.
Human time requirements	Daily: 20 minutes Monthly: 30 minutes	Daily: 10 minutes Monthly: 10 minutes
Computer time requirements	Daily: 20 minutes Monthly: 30 minutes	Daily: 10 minutes Monthly: 10 minutes

# Evaluating Hardware

- Time required for average transactions
- Total volume capacity of the system
- Idle time of the CPU or network
- Size of memory provided





# People that Evaluate Hardware

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- Management
- Users
- Systems analysts



# Acquisition of Computer Equipment

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- Purchasing
- Leasing
- Rental

# Purchasing, Leasing, and Renting Advantages and Disadvantages (Figure 3.6)

	Advantages	Disadvantages
<b>Buying</b>	<ul style="list-style-type: none"><li>• Cheaper than leasing or renting over the long run</li><li>• Ability to change system</li><li>• Provides tax advantages of accelerated depreciation</li><li>• Full control</li></ul>	<ul style="list-style-type: none"><li>• Initial cost is high</li><li>• Risk of obsolescence</li><li>• Risk of being stuck if choice was wrong</li><li>• Full responsibility</li></ul>
<b>Leasing</b>	<ul style="list-style-type: none"><li>• No capital is tied up</li><li>• No financing is required</li><li>• Leases are lower than rental payments</li></ul>	<ul style="list-style-type: none"><li>• Company doesn't own the system when lease expires</li><li>• Usually a heavy penalty for terminating the lease</li><li>• Leases are more expensive than buying</li></ul>
<b>Renting</b>	<ul style="list-style-type: none"><li>• No capital is tied up</li><li>• No financing is required</li><li>• Easy to change systems</li><li>• Maintenance and insurance are usually included</li></ul>	<ul style="list-style-type: none"><li>• Company doesn't own the computer</li><li>• Cost is very high because vendor assumes the risk (most expensive option)</li></ul>



# Evaluating Vendor Support

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- Hardware support
- Software support
- Installation and training support
- Maintenance support

# Evaluating Vendor Support (Figure 3.8)

Vendor Services	Specifics Vendors Typically Offer
Hardware Support	Full line of hardware Quality products Warranty
Software Support	Complete software needs Custom programming Warranty
Installation and Training	Commitment to schedule In-house training Technical assistance
Maintenance	Routine maintenance procedures Specified response time in emergencies Equipment loan while repair is being done

# Other Considerations

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- Possibility of adding on to the system
- Interfacing with equipment from other vendors
- Adding more memory
- Corporate stability of the vendor

# Software Alternatives

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- Created custom software
- Purchased as COTS (commercial off-the-shelf) software
- Provided by an application service provider (ASP)



# Software Alternatives (Figure 3.9)

	Advantages	Disadvantages
<b>Creating Custom Software</b>	<ul style="list-style-type: none"> <li>• Specific response to specialized business needs</li> <li>• Innovation may give firm a competitive advantage</li> <li>• In-house staff available to maintain software</li> <li>• Pride of ownership</li> </ul>	<ul style="list-style-type: none"> <li>• May be significantly higher initial cost compared to COTS software or ASP</li> <li>• Necessity of hiring or working with a development team</li> <li>• Ongoing maintenance</li> </ul>
<b>Purchasing COTS Packages</b>	<ul style="list-style-type: none"> <li>• Refined in the commercial world</li> <li>• Increased reliability</li> <li>• Increased functionality</li> <li>• Often lower initial cost</li> <li>• Already in use by other firms</li> <li>• Help and training comes with software</li> </ul>	<ul style="list-style-type: none"> <li>• Programming focused; not business focused</li> <li>• Must live with the existing features</li> <li>• Limited customization</li> <li>• Uncertain financial future of vendor</li> <li>• Less ownership and commitment</li> </ul>
<b>Using an ASP</b>	<ul style="list-style-type: none"> <li>• Organizations that do not specialize in information systems can focus on what they do best (their strategic mission)</li> <li>• There is no need to hire, train, or retain a large IT staff</li> <li>• There is no expenditure of employee time on nonessential IT tasks</li> </ul>	<ul style="list-style-type: none"> <li>• Loss of control of data, systems, IT employees, and schedules</li> <li>• Concern over the financial viability and long-run stability of the ASP</li> <li>• Security, confidentiality, and privacy concerns</li> <li>• Loss of potential strategic corporate advantage regarding innovativeness of applications</li> </ul>



# Software Evaluation

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- Performance effectiveness
- Performance efficiency
- Ease of use
- Flexibility
- Quality of documentation
- Manufacturer support

# Guidelines for Evaluating Software (Figure 3.10)

Software Requirements	Specific Software Features
<b>Performance Effectiveness</b>	Able to perform all required tasks Able to perform all tasks desired Well-designed display screens Adequate capacity
<b>Performance Efficiency</b>	Fast response time Efficient input Efficient output Efficient storage of data Efficient backup
<b>Ease of use</b>	Satisfactory user interface Help menus available “Read Me” files for last-minute changes Flexible interface Adequate feedback Good error recovery
<b>Flexibility</b>	Options for input Options for output Usable with other software
<b>Quality of Documentation</b>	Good organization Adequate online tutorial Web site with FAQ
<b>Manufacturer Support</b>	Technical support hotline Newsletter/email Web site with downloadable product updates

# Activity Planning and Control

- Planning includes:
  - Selecting a systems analysis team
  - Estimating time required to complete each task
  - Scheduling the project
- Control includes:
  - Comparing the plan for the project with its actual evolution
  - Taking appropriate action to expedite or reschedule activities



# Identifying and Forecasting Costs and Benefits

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- Judgment methods
  - Estimates from the sales force
  - Surveys to estimate customer demand
  - Delphi studies
  - Creating scenarios
  - Drawing historical analogies

# Identifying and Forecasting Costs and Benefits (Continued)

- If historical data are available
  - Conditional:
    - There is an association among variables in the model.
  - Unconditional:
    - Do not need to find or identify any relationships.

# Estimation of Trends

- Graphical judgment
- Moving averages



# Identifying Benefits and Costs

- Tangible benefits are advantages measurable in dollars through the use of the information system.
- Intangible benefits are difficult to measure.
- Tangible costs are accurately projected by the systems analyst and accounting personnel.
- Intangible costs are difficult to estimate and may not be known.

# Tangible Benefits

- Advantages measurable in dollars that accrue to the organization through the use of the information system
- Examples:
  - Increase in the speed of processing
  - Access to otherwise inaccessible information
  - Access to information on a more timely basis
  - The advantage of the computer's superior calculating power
  - Decreases in the amount of employee time needed to complete specific tasks

# Intangible Benefits

- Intangible benefits are benefits from use of the information system that are difficult to measure.
- Examples:
  - Improving the decision-making process
  - Enhancing accuracy
  - Becoming more competitive in customer service
  - Maintaining a good business image
  - Increasing job satisfaction

# Tangible Costs

- Those that can be accurately projected by systems analysts and the business' accounting personnel
- Examples:
  - Cost of equipment
  - Cost of resources
  - Cost of systems analysts' time
  - Cost of programmers' time
  - Employees' salaries

# Intangible Costs

- Those that are difficult to estimate and may not be known
- Examples:
  - Losing a competitive edge
  - Losing the reputation of being first
  - Declining company image
  - Ineffective decision making

# Comparing Costs and Benefits

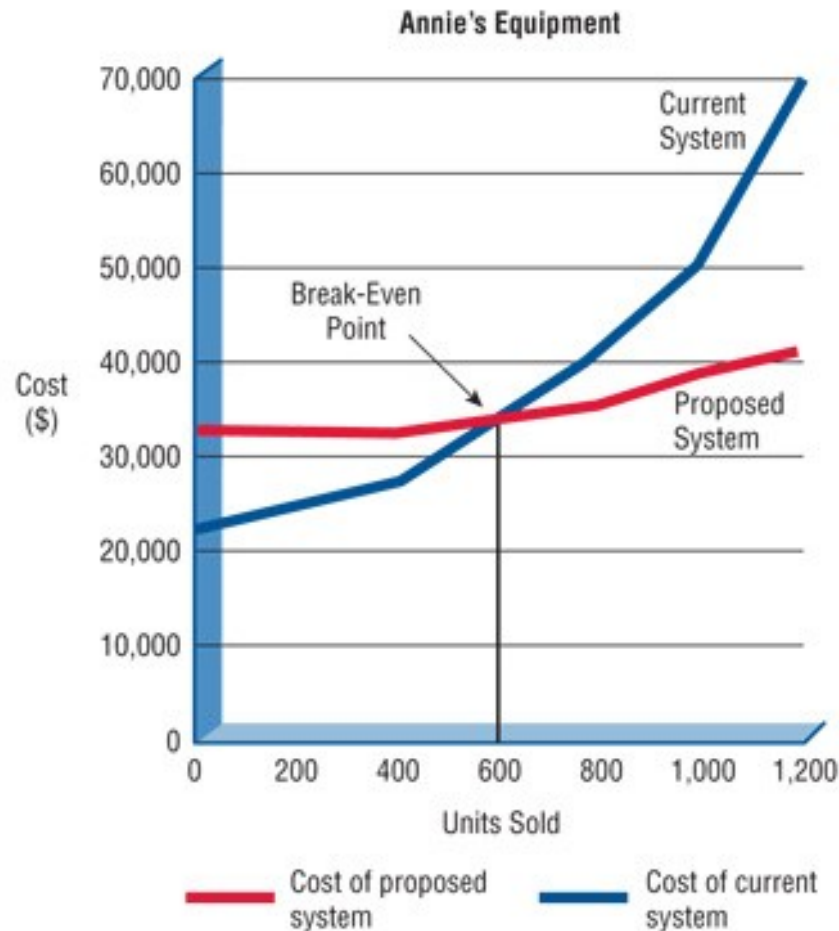
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- Break-even analysis
- Payback
- Cash-flow analysis
- Present value analysis

# Break-Even Analysis

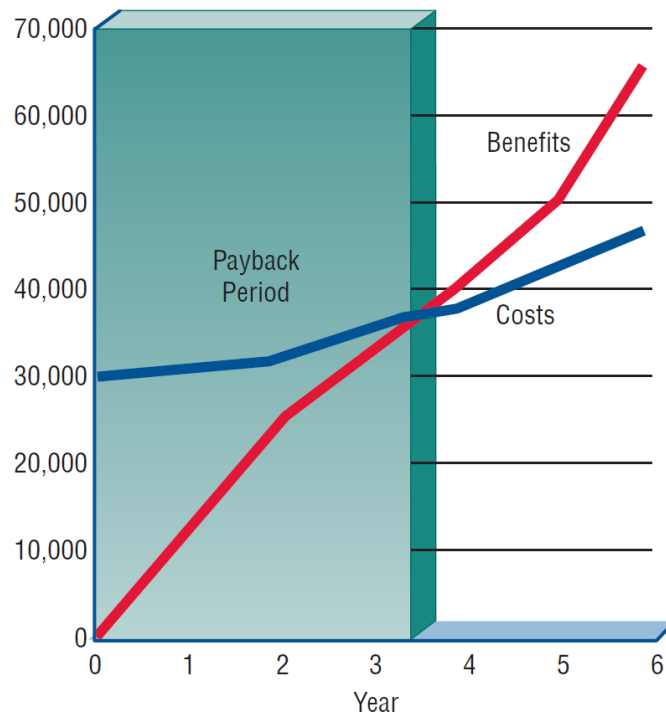
- The point at which the total cost of the current system and the proposed system intersect
- Useful when a business is growing and volume is a key variable in costs
- Disadvantage:
  - Benefits are assumed to remain the same
- Advantage:
  - Can determine how long it will take for the benefits of the system to pay back the costs of developing it

# Break-Even Analysis (Figure 3.11)





# Break-Even Analysis Showing a Payback Period of Three and a Half Years (Figure 3.12)



— Cumulative benefits from proposed system  
— Cumulative costs of proposed system

Year	Cost (\$)	Cumulative Costs (\$)	Benefits (\$)	Cumulative Benefits (\$)
0	30,000	30,000	0	0
1	1,000	31,000	12,000	12,000
2	2,000	33,000	12,000	24,000
3	2,000	35,000	8,000	32,000
4	3,000	38,000	8,000	40,000
5	4,000	42,000	10,000	50,000
6	4,000	46,000	15,000	65,000

# Cash-Flow Analysis

- Examines the direction, size, and pattern of cash flow that is associated with the proposed information system
- Determines when cash outlays and revenues will occur for both; not only for the initial purchase, but over the life of the information system

# Cash-Flow Analysis for the Computerized Mail-Addressing System (Figure 3.13)

	Year 1				Year 2
	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1
<b>Revenue</b>	\$5,000	\$20,000	\$24,960	\$31,270	\$39,020
<b>Costs</b>					
Software development	10,000	5,000			
Personnel	8,000	8,400	8,800	9,260	9,700
Training	3,000	6,000			
Equipment lease	4,000	4,000	4,000	4,000	4,000
Supplies	1,000	2,000	2,370	2,990	3,730
Maintenance	0	2,000	2,200	2,420	2,660
<b>Total Costs</b>	26,000	27,400	17,370	18,670	20,090
<b>Cash Flow</b>	-21,000	-7,400	7,590	12,600	18,930
<b>Cumulative Cash Flow</b>	-21,000	-28,400	-20,810	-8,210	10,720

# Present Value Analysis

- Way to assess all the economic outlays and revenues of the information system over its economic life, and to compare costs today with future costs and today's benefits with future benefits
- Presents the time value of the investment in the information system as well as the cash flow

# Present Value Analysis (Figure 3.15)

- Taking into account present value, the conclusion is that the costs are greater than the benefits.
- The discount rate,  $i$ , is assumed to be .12 in calculating the multipliers in this table.

	Year						
	1	2	3	4	5	6	Total
<b>Costs</b>	\$40,000	42,000	44,100	46,300	48,600	51,000	
<b>Multiplier</b>	.89	.80	.71	.64	.57	.51	
<b>Present Value of Costs</b>	35,600	33,600	31,311	29,632	27,702	26,010	183,855
<b>Benefits</b>	\$25,000	31,200	39,000	48,700	60,800	76,000	
<b>Multiplier</b>	.89	.80	.71	.64	.57	.51	
<b>Present Value of Benefits</b>	22,250	24,960	27,690	31,168	34,656	38,760	179,484

# Guidelines for Analysis

- Use break-even analysis if the project needs to be justified in terms of cost, not benefits.
- Use payback when the improved tangible benefits form a convincing argument for the proposed system.
- Use cash-flow analysis when the project is expensive, relative to the size of the company.
- Use present value when the payback period is long or when the cost of borrowing money is high.

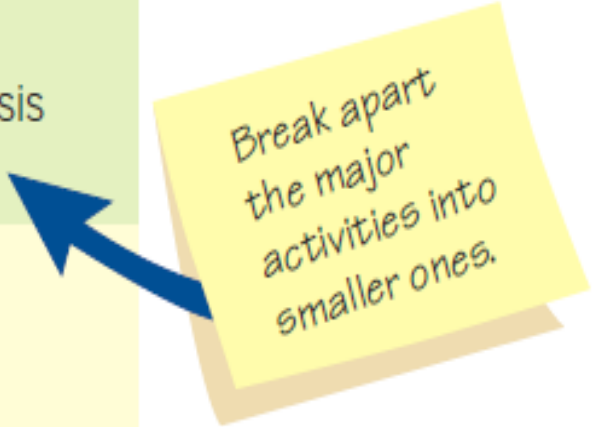
# Estimating Time

- Project is broken down into phases.
- Further project is broken down into tasks or activities.
- Finally project is broken down into steps or even smaller units.
- Time is estimated for each task or activity.
- Most likely, pessimistic and optimistic estimates for time may be used.



# Beginning to Plan a Project by Breaking it into Three Major Activities (Figure 3.16)

Phase	Activity
Analysis	Data gathering Data flow and decision analysis Proposal preparation
Design	Data entry design Input design Output design Data organization
Implementation	Implementation Evaluation

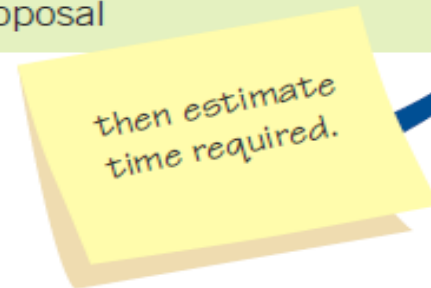
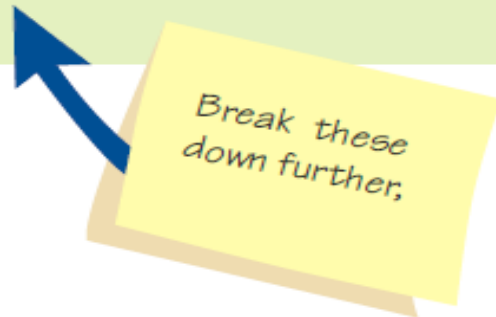


Break apart  
the major  
activities into  
smaller ones.



## Refining the Planning and Scheduling of Analysis Activities by Adding Detailed Tasks and Establishing the Time Required to Complete the Tasks (Figure 3.17)

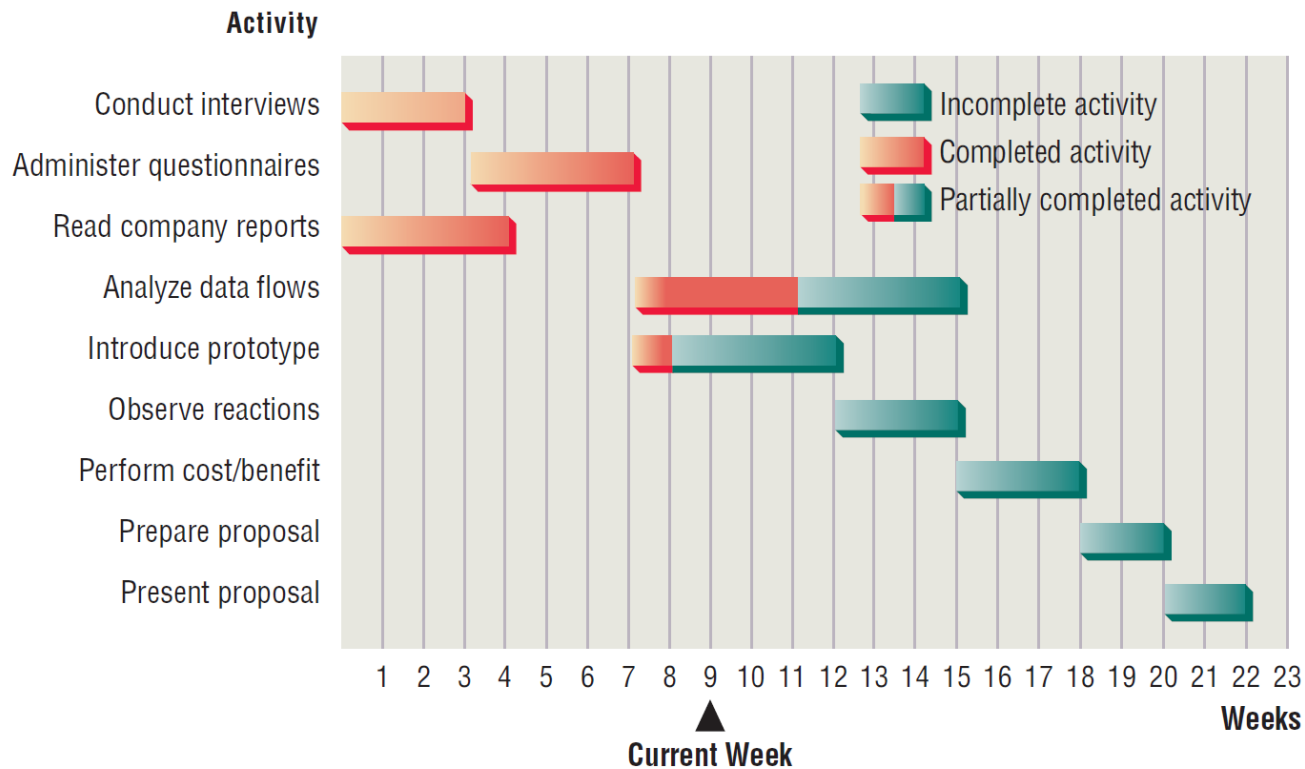
Activity	Detailed Activity	Weeks Required
Data gathering	Conduct interviews	3
	Administer questionnaires	4
	Read company reports	4
	Introduce prototype	5
	Observe reactions to prototype	3
Data flow and decision analysis	Analyze data flow	8
Proposal preparation	Perform cost-benefit analysis	3
	Prepare proposal	2
	Present proposal	2



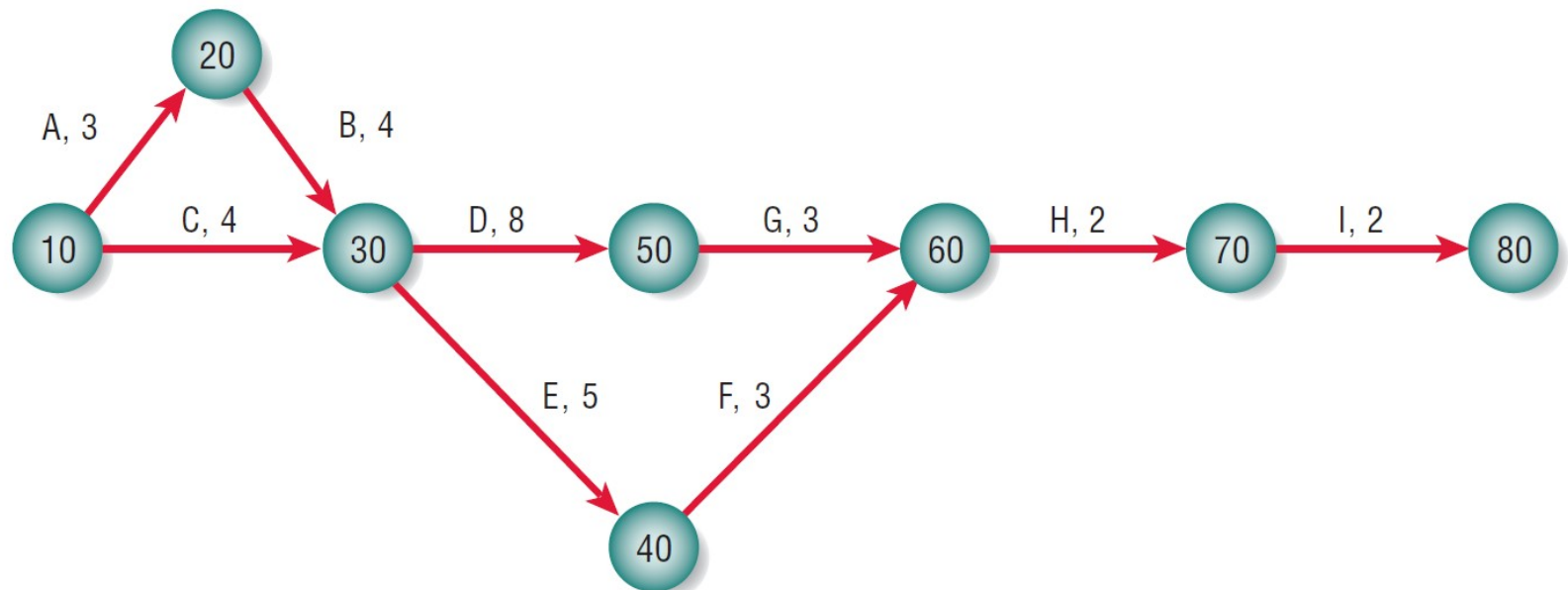
# Project Scheduling

- Gantt Charts
  - Simple
  - Lends itself to end user communication
  - Drawn to scale
- PERT diagrams
  - Useful when activities can be done in parallel

# Using a Two-Dimensional Gantt Chart for Planning Activities that Can Be Accomplished in Parallel (Figure 3.18)



# A Completed PERT Diagram for the Analysis Phase of a Systems Project (Figure 3.22)



# PERT Diagram Advantages

- Easy identification of the order of precedence
- Easy identification of the critical path and thus critical activities
- Easy determination of slack time

# Project Due Dates

- Estimating models
  - Costar
  - Construx
- Function point analysis
  - Helps the analyst quantitatively estimate the overall length of software development efforts



# Managing Analysis and Design Activities

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- Team management
  - Assembling a team
  - Team communication strategies
  - Project productivity goals
  - Team member motivation



# Assembling a Team

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- Shared value of team work
- Good work ethic
- Honesty
- Competency
- Readiness to take on leadership based on expertise
- Motivation
- Enthusiasm for the project
- Trust of teammates





# Communication Strategies

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- Teams often have two leaders:
  - Task leader: leads members to accomplish tasks
  - Socioemotional leader: concerned with social relationships
- The systems analyst must manage:
  - Team members
  - Their activities
  - Their time and resources



# Project Productivity Goals and Motivation

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- Successful projects require that reasonable productivity goals for tangible outputs and process activities be set.
- Goal-setting helps to motivate team members.



# Ecommerce Project Management

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Ecommerce and traditional software project management differences:

- The data used by ecommerce systems is scattered across the organization.
- Ecommerce systems need a staff with a wide variety of skills.
- Partnerships must be built externally and internally well ahead of implementation.
- Security is of utmost importance.



# Project Charter

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- Describes in a written document what the expected results of the systems project are and the time frame for delivery



# Project Charter Clarifies these Questions

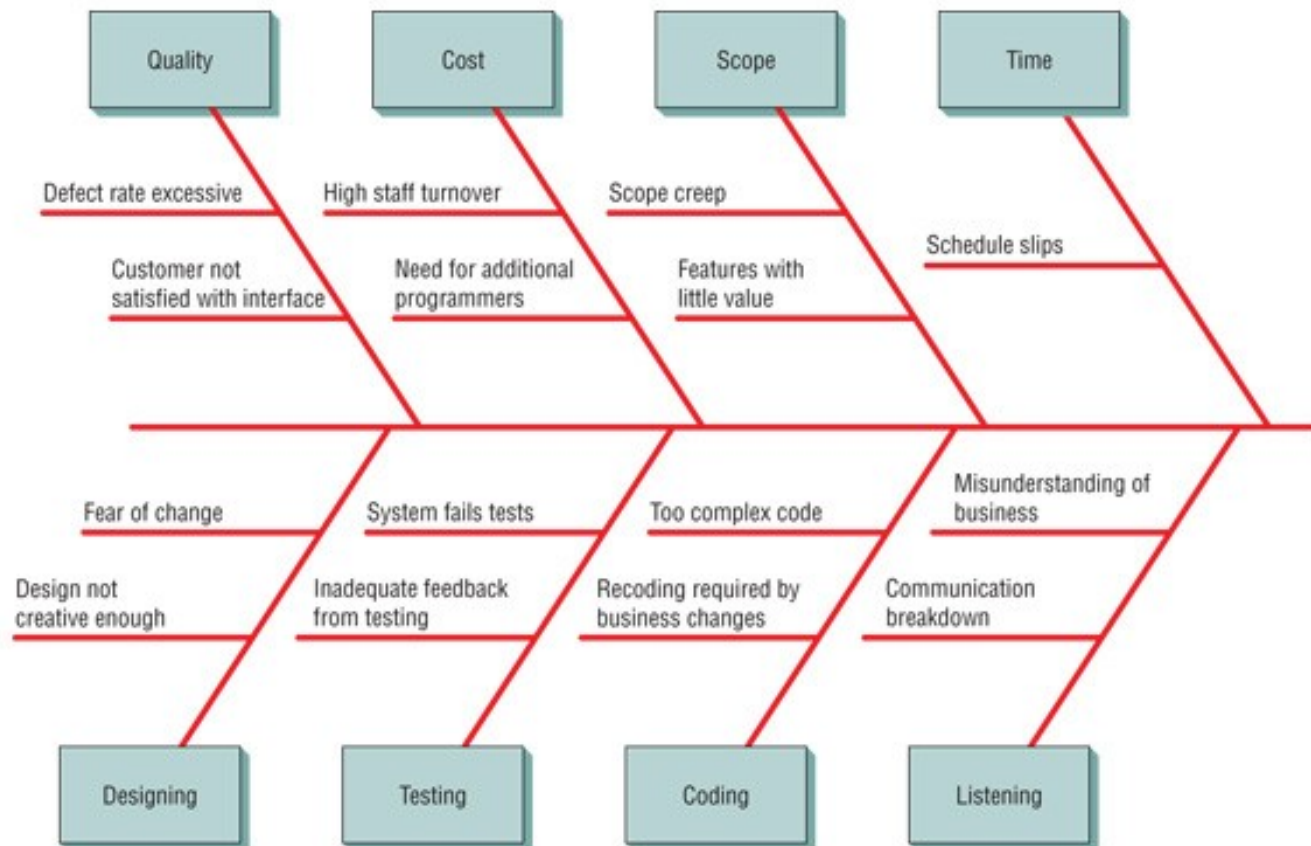
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- What does the user expect of the project?
- What is the scope of the project?
- What analysis methods will the analyst use to interact with users?
- Who are the key participants?
- What are the project deliverables?
- Who will evaluate the system and how will they evaluate it?
- What is the estimated project timeline?
- Who will train the users?
- Who will maintain the system?

# Project Failures

- Project failures may be prevented by:
  - Training
  - Experience
  - Learning why other projects have failed
- Fishbone diagram systematically lists all of the possible problems that can occur

# Fishbone Diagram (Figure 3.23)



# The Systems Proposal

- Cover letter
- Title page of project
- Table of contents
- Executive summary
- Outline of systems study with appropriate documentation
- Detailed results of the systems study
- Systems alternatives
- Systems analysts recommendations
- Summary
- Appendices





# Using Figures for Effective Communication

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- Effective use of tables
- Effective use of graphs

# Effective Use of Tables

- Integrate into the body of the proposal
- Try to fit the entire table vertically on a single page.
- Number and title the table at the top of the page.
- Label each row and column.
- Use a boxed table if room permits.
- Use footnotes if necessary to explain detailed information contained in the table.

# Effective Use of Graphs

- Choose a style of graph that communicates your intended meaning well.
- Integrate the graph into the body of the proposal.
- Give the graph a sequential figure number and a meaningful title.
- Label each axis, and any lines, columns, bars, or pieces of the pie on the graph.
- Include a key to indicate differently colored lines, shaded bars, or crosshatched areas.

# Summary

- Project management fundamentals
  - Project initiation
  - Determining project feasibility
  - Activity planning and control
  - Project scheduling
  - Managing systems analysis team members
- Problem definition
  - Issues of the present system
  - The objective for each issue
  - The requirements that must be included in all proposed systems

# Summary (Continued)

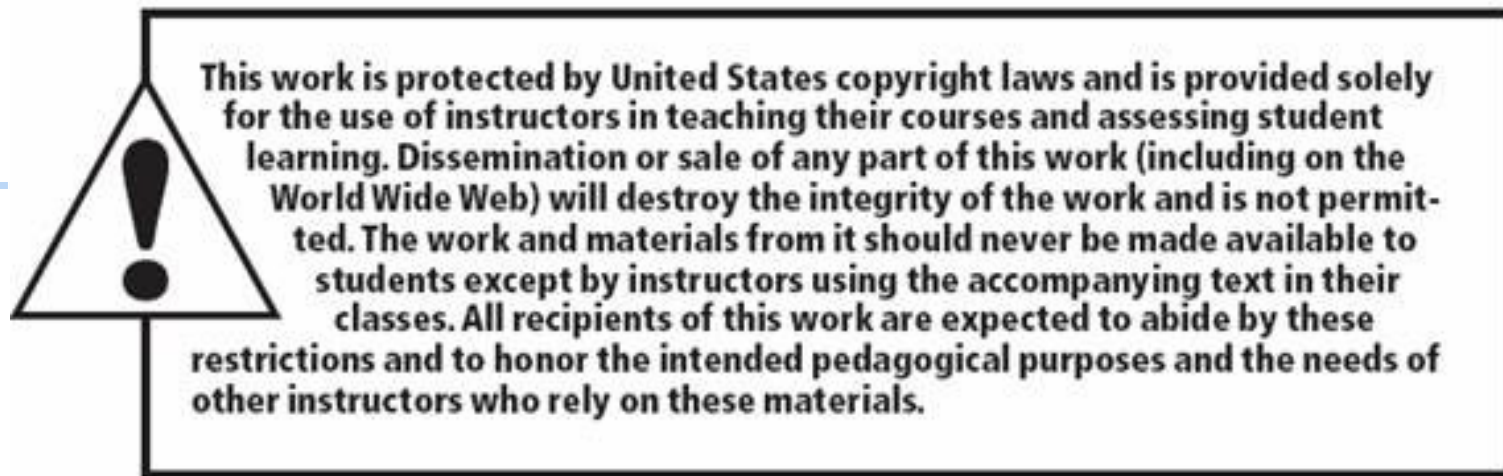
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- Project selection
  - Backed by management
  - Commitment of resources
  - Attains goals
  - Practical
  - Important
- Feasibility
  - Operational
  - Technical
  - Economic

# Summary (Continued)

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- Acquiring hardware and software
- Project planning
  - Gantt charts
  - PERT
  - Function point analysis
- Team management
- Ecommerce projects
- Preparing a system proposal



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