FIT2090
BUSINESS INFORMATION SYSTEMS AND PROCESSES

Lecture 9 Systems Acquisition and Development

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Reference: Chapter 12, Stair & Reynold, Cengage, 2016

Objectives

On completion of this lecture, you will be able to:

- Identify the pros and cons associated with both buying and building software
- Identify the advantages and disadvantages of the waterfall approach to system development
- Identify and state the goal of each of the six phases of the waterfall approach
- Identify and briefly describe the primary tools and techniques used during system development

Objectives

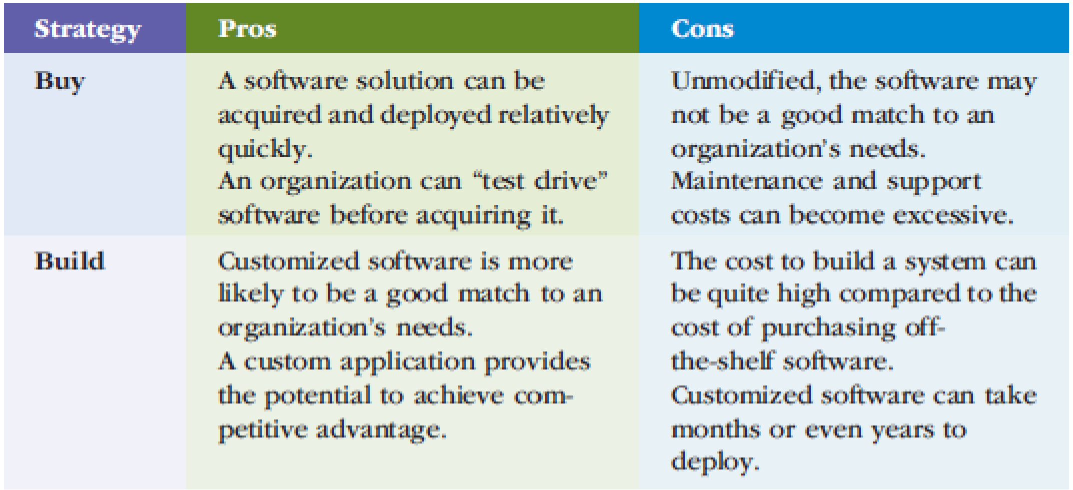
On completion of this lecture, you will be able (cont’d):

- Define five types of feasibility that must be assessed
- Identify the purpose and participants involved in various types of testing from unit testing to user acceptance testing
- Identify three approaches for system cutover
- Describe the agile development process
- Identify the advantages and disadvantages of the agile system development approach
- Discuss extreme programming (XP) and DevOps
- Outline a process for evaluation and selection of a software package
- Identify the key factors to be considered in selecting a software package

Buy Versus Build

- Buying off-the-shelf software is less risky and leads to quicker deployment
  - – Maintenance and support costs may become expensive
  - – Organizations can use several different approaches when developing their software
    - The waterfall and agile software development processes will be discussed next

TABLE 12.1 The pros and cons of buying versus building software



Strategy	Pros	Cons
Buy	A software solution can be acquired and deployed relatively quickly. An organization can "test drive" software before acquiring it.	Unmodified, the software may not be a good match to an organization's needs. Maintenance and support costs can become excessive.
Build	Customized software is more likely to be a good match to an organization's needs. A custom application provides the potential to achieve competitive advantage.	The cost to build a system can be quite high compared to the cost of purchasing off-the-shelf software. Customized software can take months or even years to deploy.

Waterfall System Development Process

- Waterfall system development process
  - A sequential, multistage system development process
  - Work on the next stage cannot begin until the results of the current stage are reviewed and approved or modified as necessary
- There are six phases:
  - Investigation
  - Analysis
  - Design
  - Construction
  - Integration
  - Testing and implementation

Waterfall System Development Process

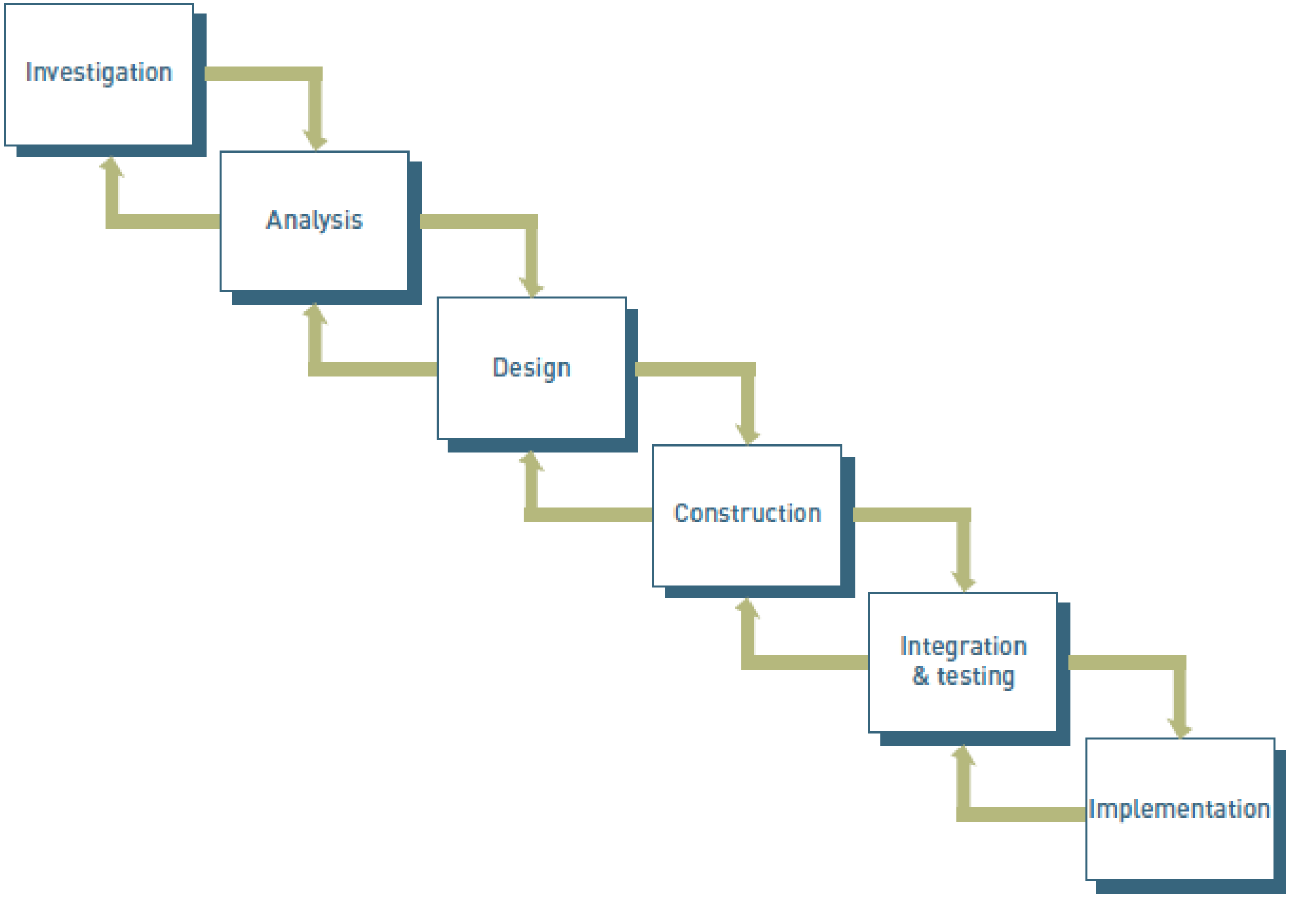


FIGURE 12.1

Waterfall system development process

Progress flows steadily downward (like a waterfall) through the various phases of development.

Waterfall System Development Process

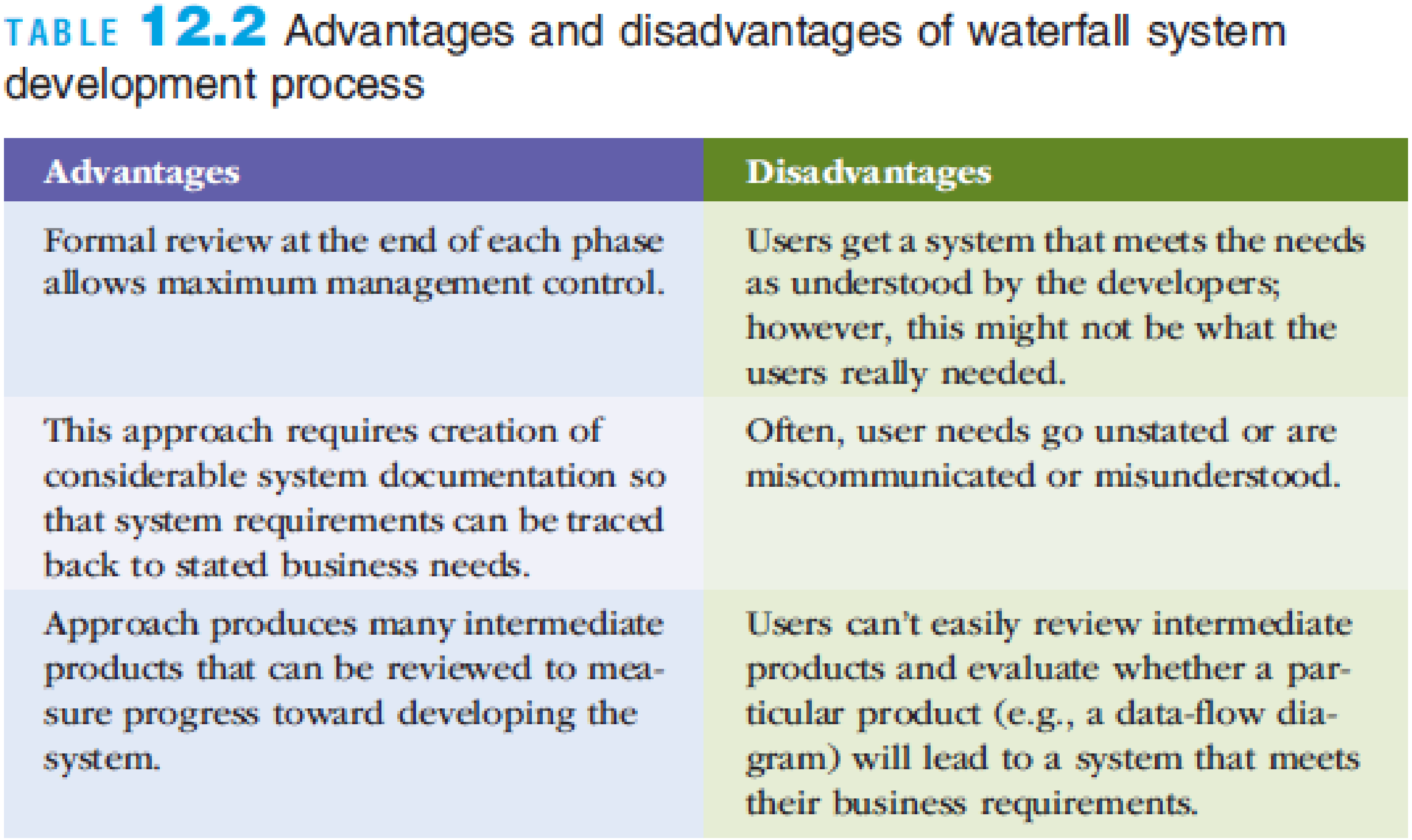


TABLE 12.2 Advantages and disadvantages of waterfall system development process

Advantages	Disadvantages
Formal review at the end of each phase allows maximum management control.	Users get a system that meets the needs as understood by the developers; however, this might not be what the users really needed.
This approach requires creation of considerable system documentation so that system requirements can be traced back to stated business needs.	Often, user needs go unstated or are miscommunicated or misunderstood.
Approach produces many intermediate products that can be reviewed to measure progress toward developing the system.	Users can't easily review intermediate products and evaluate whether a particular product (e.g., a data-flow diagram) will lead to a system that meets their business requirements.

System Investigation

- System investigation
  - Initial phase in the development of a new or modified business information system whose purpose is to gain a clear understanding of the specifics of the problem to solve or the opportunity to address
- Steps of the investigation phase
  1. Review systems investigation request
  2. Identify and recruit team leader and team members
  3. Develop budget and schedule for investigation
  4. Perform investigation
  5. Perform preliminary feasibility analysis
  6. Prepare draft of investigation report
  7. Review results of investigation with steering team

System Investigation

- Review System Investigation Request
  - A systems investigation request includes:
    - A preliminary statement of the problem or opportunity to be addressed
    - A brief discussion of how this effort aligns with previously defined company and organization objectives, goals, and strategies
    - Identification of the general areas of the business and business processes to be included in the scope of the study

System Investigation

- Identify and Recruit Team Leader and Team Members
  - A leader is identified and recruited after managers grant approval to initiate systems investigation
  - Investigation team members chosen next
  - Investigation team responsibilities
    - Gather and analyze data
    - Prepare an investigation phase report
    - Present results to the project steering team

System Investigation

- Develop Budget and Schedule for Investigation
  - The team develops a list of specific objectives and activities to accomplish along with a schedule for completing the work
  - The team establishes major milestones to help monitor progress
  - A budget is prepared including travel expenses and funds for consultants

System Investigation

- Perform Investigation
  - Refine the initial problem definition and scope described in the systems investigation request
  - Identify the high-level business requirements the system must meet
  - Identify any issues or risks associated with the project
- Joint Application Development
  - A structured meeting process that can accelerate and improve the efficiency and effectiveness of the investigation, analysis, and design phases of a systems development project
- Functional Decomposition
  - A technique used during the investigation, analysis, and design phases to define the business processes included within the scope of the system

System Investigation

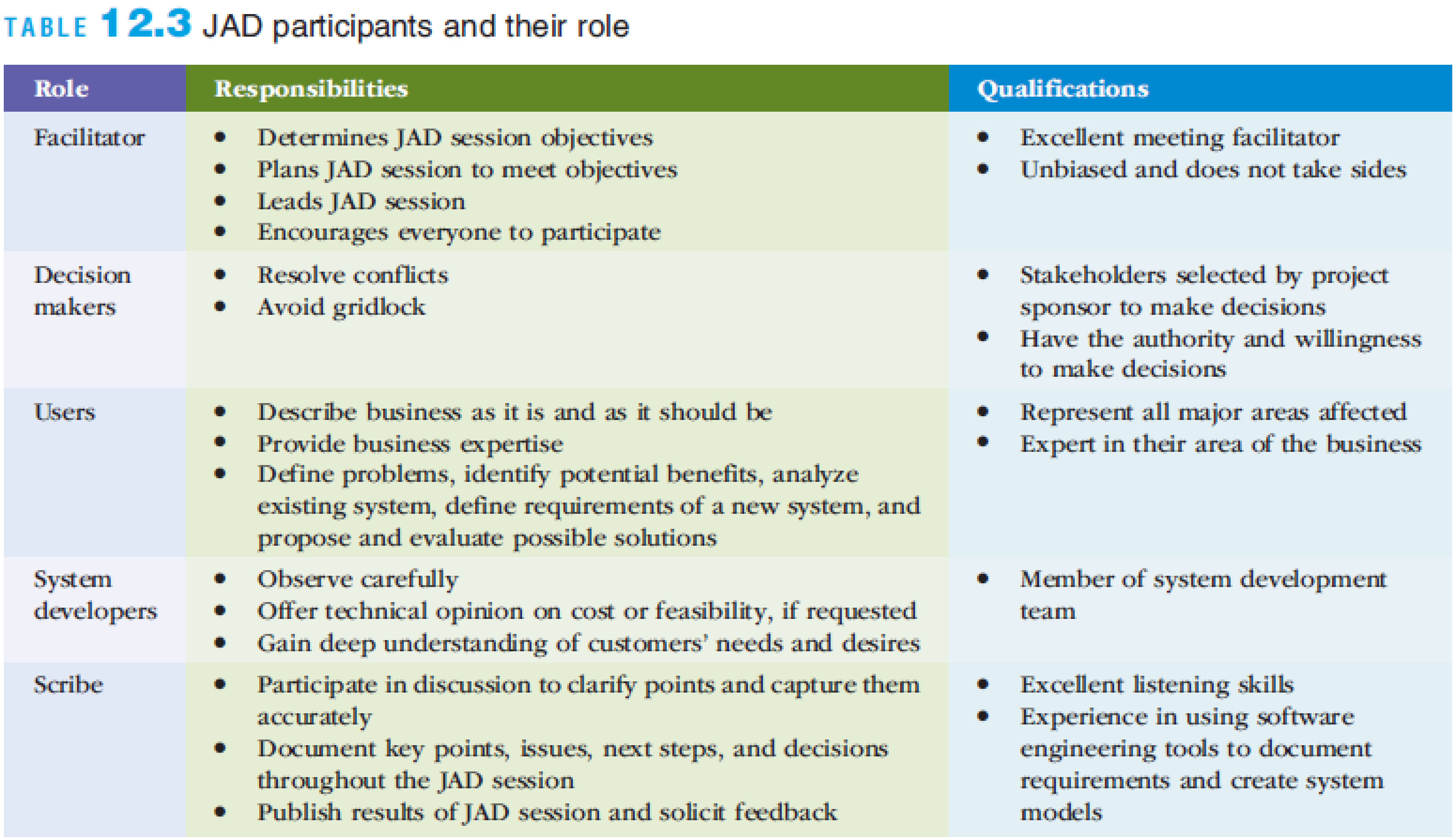


TABLE 12.3 JAD participants and their role

Role	Responsibilities	Qualifications
Facilitator	• Determines JAD session objectives • Plans JAD session to meet objectives • Leads JAD session • Encourages everyone to participate	• Excellent meeting facilitator • Unbiased and does not take sides
Decision makers	• Resolve conflicts • Avoid gridlock	• Stakeholders selected by project sponsor to make decisions • Have the authority and willingness to make decisions
Users	• Describe business as it is and as it should be • Provide business expertise • Define problems, identify potential benefits, analyze existing system, define requirements of a new system, and propose and evaluate possible solutions	• Represent all major areas affected • Expert in their area of the business
System developers	• Observe carefully • Offer technical opinion on cost or feasibility, if requested • Gain deep understanding of customers' needs and desires	• Member of system development team
Scribe	• Participate in discussion to clarify points and capture them accurately • Document key points, issues, next steps, and decisions throughout the JAD session • Publish results of JAD session and solicit feedback	• Excellent listening skills • Experience in using software engineering tools to document requirements and create system models

System Investigation

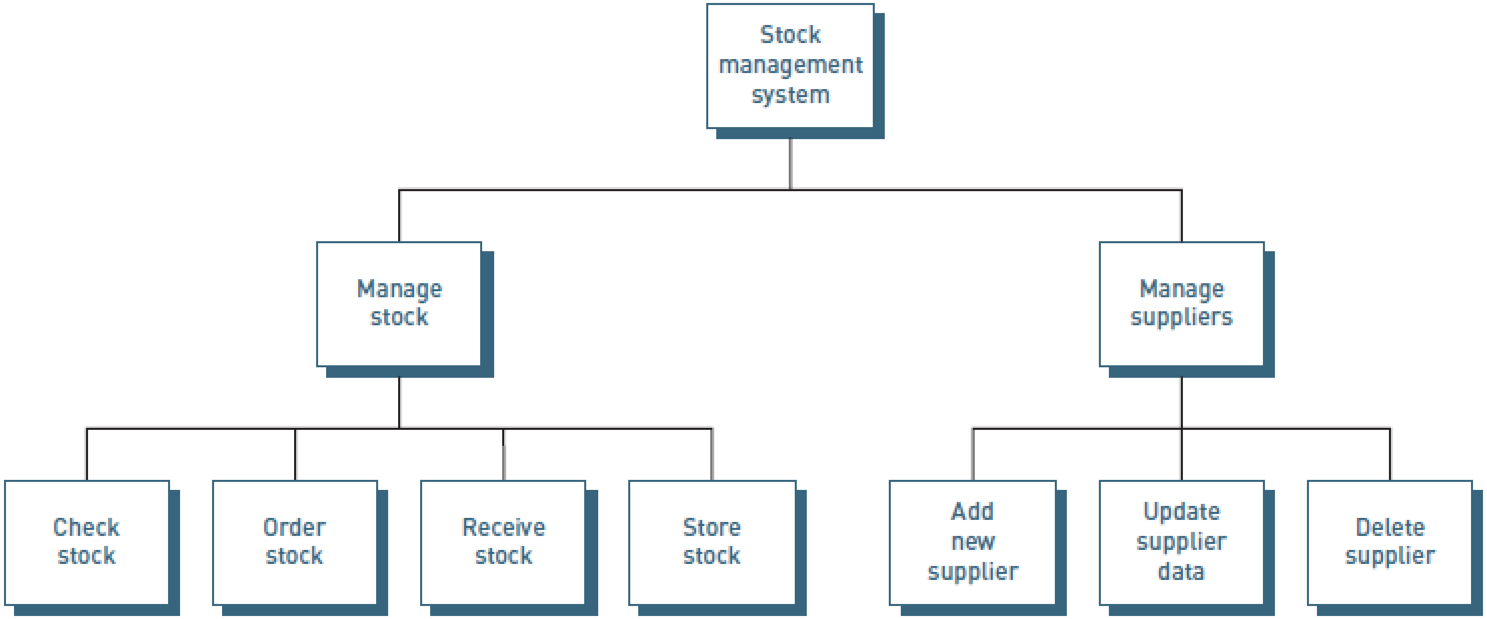


FIGURE 12.3

Functional decomposition chart

Functional decomposition is used to define the scope of the system.

System Investigation

- Perform Preliminary Feasibility Analysis
  - Components of the feasibility analysis
    - Technical feasibility: examines whether a project is feasible within the current limits of available technology
    - Economic feasibility: determines whether the expected benefits associated with the project outweigh the expected costs sufficiently to make the project financially attractive
    - Legal feasibility: the process of determining whether laws or regulations may prevent or limit a system development project
    - Operational feasibility: the process of determining how a system will be accepted by people and how well it will meet various system performance expectations
    - Schedule feasibility: the process of determining whether a project can be completed within a desired time frame

System Investigation

- Prepare Draft of Investigation Report
  - A systems investigation report that summarizes the results of the systems investigation and recommends a course of action
  - Possible actions
    - Continue on into systems analysis
    - Modify the project in some manner and perhaps repeat the systems investigation
    - Drop the project altogether

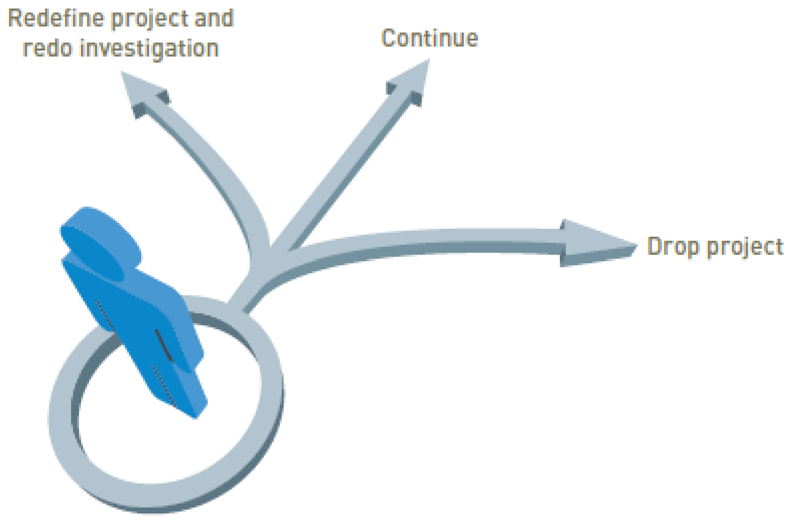


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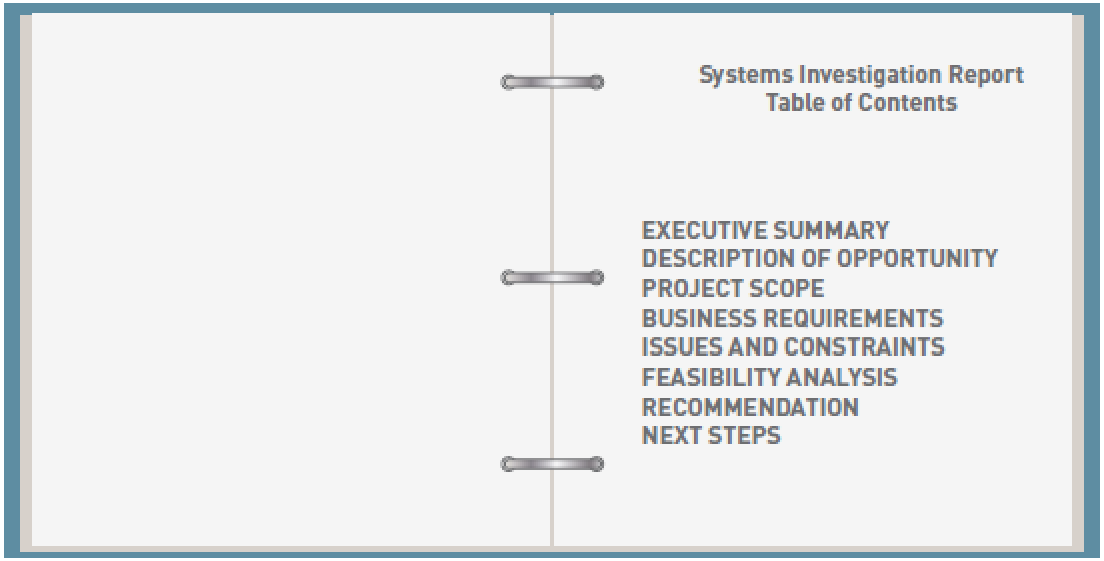
FIGURE 12.4

System investigation recommendation

The system investigation report summarizes the results of the system investigation and recommends a course of action.

System Investigation



Systems Investigation Report
Table of Contents

EXECUTIVE SUMMARY
DESCRIPTION OF OPPORTUNITY
PROJECT SCOPE
BUSINESS REQUIREMENTS
ISSUES AND CONSTRAINTS
FEASIBILITY ANALYSIS
RECOMMENDATION
NEXT STEPS

FIGURE 12.5

Table of contents for a system investigation report

A typical system investigation report begins with an executive summary and ends with a list of next steps.

System Investigation

- Review Results of Investigation with Steering Team
  - The systems investigation report is reviewed with the steering team to gain their input and counsel
  - Input is used to finalize the systems investigation report

System Analysis

- The overall emphasis of system analysis is on:
  - Gathering data on the existing system
  - Determining requirements for the new system
  - Considering alternatives within identified constraints
  - Investigating the feasibility of alternative solutions

Steps in the systems analysis phase

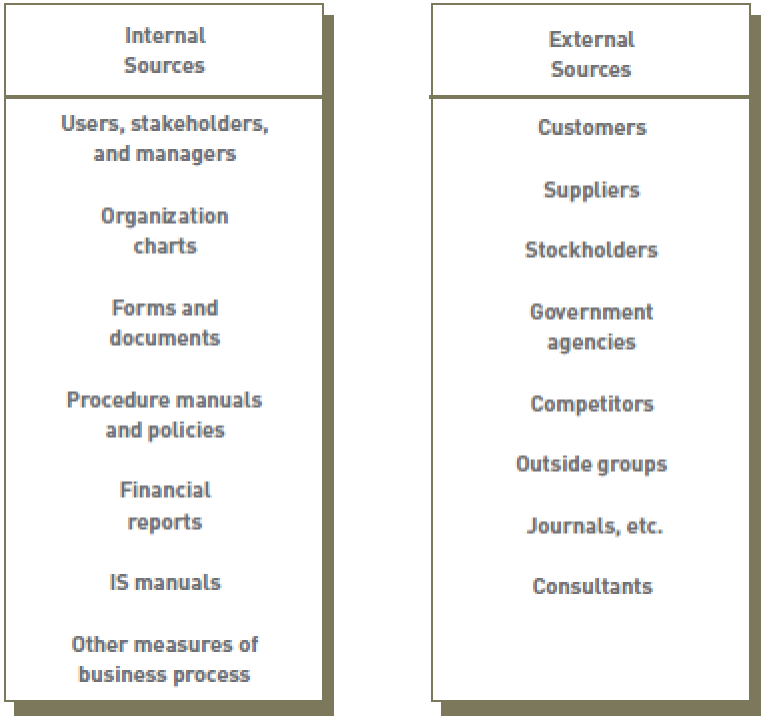
1. Identify and recruit team leader and team members
2. Develop budget and schedule for systems analysis activities
3. Study existing system
4. Develop prioritized set of requirements
5. Identify and evaluate alternative solutions
6. Perform feasibility analysis
7. Prepare draft of systems analysis report
8. Review results of systems analysis with steering team

System Analysis

- Identify and Recruit Team Leader and Team Members
  - Some members of the original investigation team participating in the systems analysis provide project continuity
- Develop Budget and Schedule for System Analysis Activities
  - The team develops a list of specific objectives and activities required to complete the systems analysis is developed along with a schedule
  - The team establishes major milestones to track progress
  - A budget is prepared including travel expenses and funds for outside resources

System Analysis

- Study Existing System
  - Identify the strengths and weaknesses of the existing system
  - Examine current inputs, outputs, processes, security and controls, and system performance
  - Data collection methods
    - JAD sessions
    - Direct observation
    - Surveys



Internal Sources

- Users, stakeholders, and managers
- Organization charts
- Forms and documents
- Procedure manuals and policies
- Financial reports
- IS manuals
- Other measures of business process

External Sources

- Customers
- Suppliers
- Stockholders
- Government agencies
- Competitors
- Outside groups
- Journals, etc.
- Consultants

FIGURE 12.6

Internal and external sources of data for system analysis

JAD sessions, direct observation, and surveys are often used to uncover data from the various sources.

System Analysis

- Develop Prioritized Set of Requirements
  - Priority categories
    - Critical
    - Medium priority
    - Low priority
  - JAD sessions provide an effective way to define system requirements
    - Ask managers to produce a list of critical success factors (CSFs)
  - Processes must be further defined and individuals/organizations responsible for process steps identified
  - Data-flow diagrams (DFDs) provide a model of a proposed new system

System Analysis

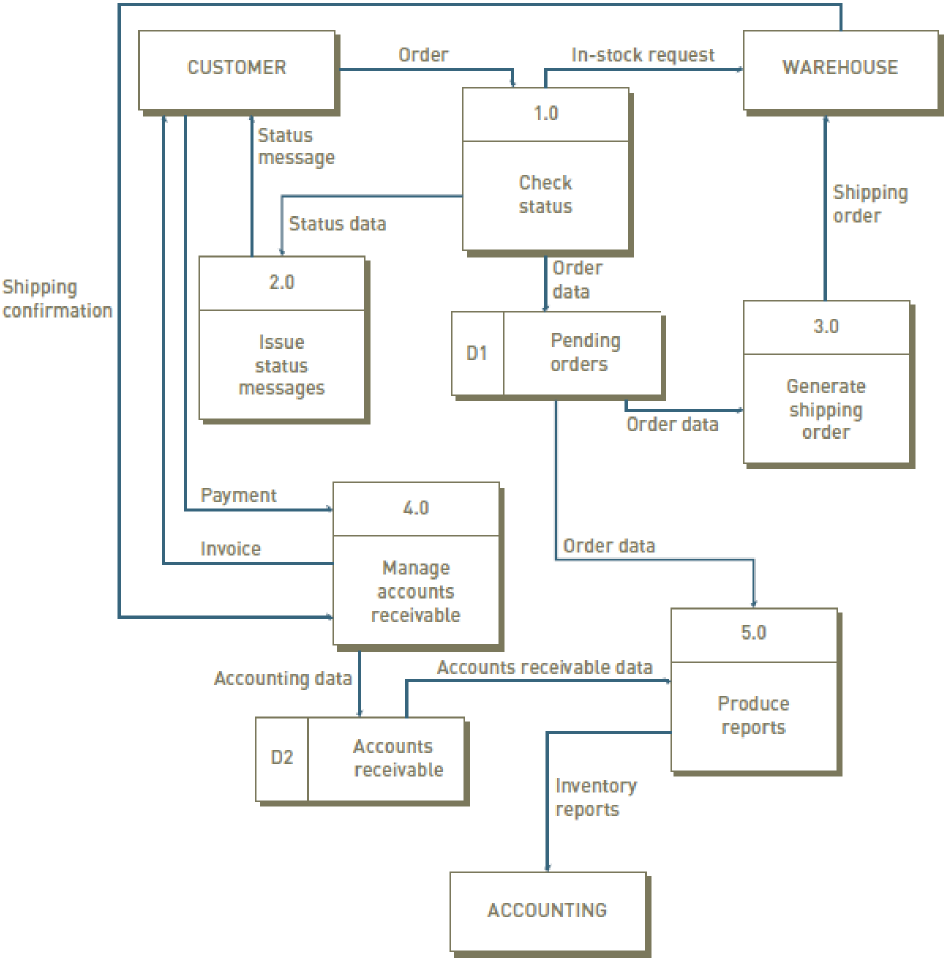


FIGURE 12.8

Data-flow diagram

A data-flow diagram documents the processes of the current system or provides a model of a proposed new system.

System Analysis

- Develop Prioritized Set of Requirements (cont’d)
  - Data modeling defines:
    - Databases the system will draw from
    - New databases the system will create
  - Entity-relationship (ER) diagrams show logical relationships among data entities

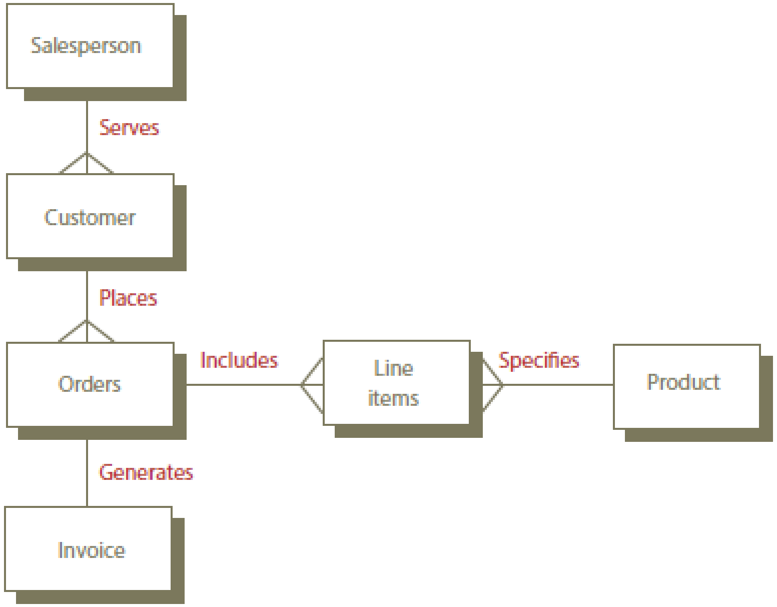


FIGURE 12.9

Entity-relationship (ER) diagram for a customer order database

Development of ER diagrams helps ensure that the logical structure of application programs is consistent with the data relationships in the database.

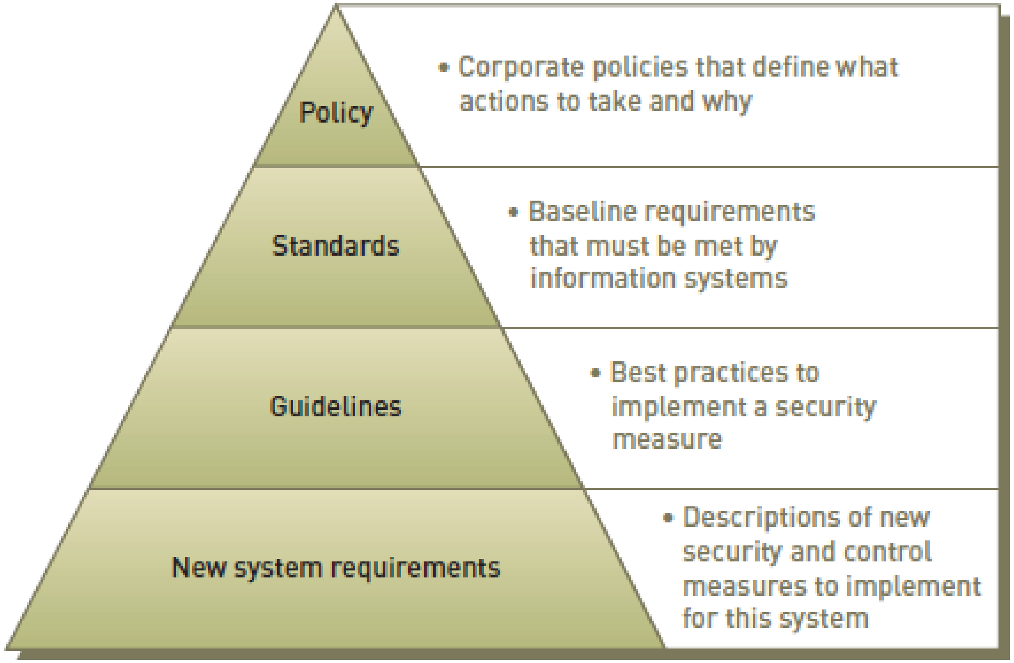
System Analysis

- Develop Prioritized Set of Requirements (cont'd)
  - Security and Control

FIGURE 12.10

Context for new system security and control requirements

New system security and control requirements must be developed within the organization's existing policies, standards, and guidelines.



Policy
• Corporate policies that define what actions to take and why
Standards
• Baseline requirements that must be met by information systems
Guidelines
• Best practices to implement a security measure
New system requirements
• Descriptions of new security and control measures to implement for this system

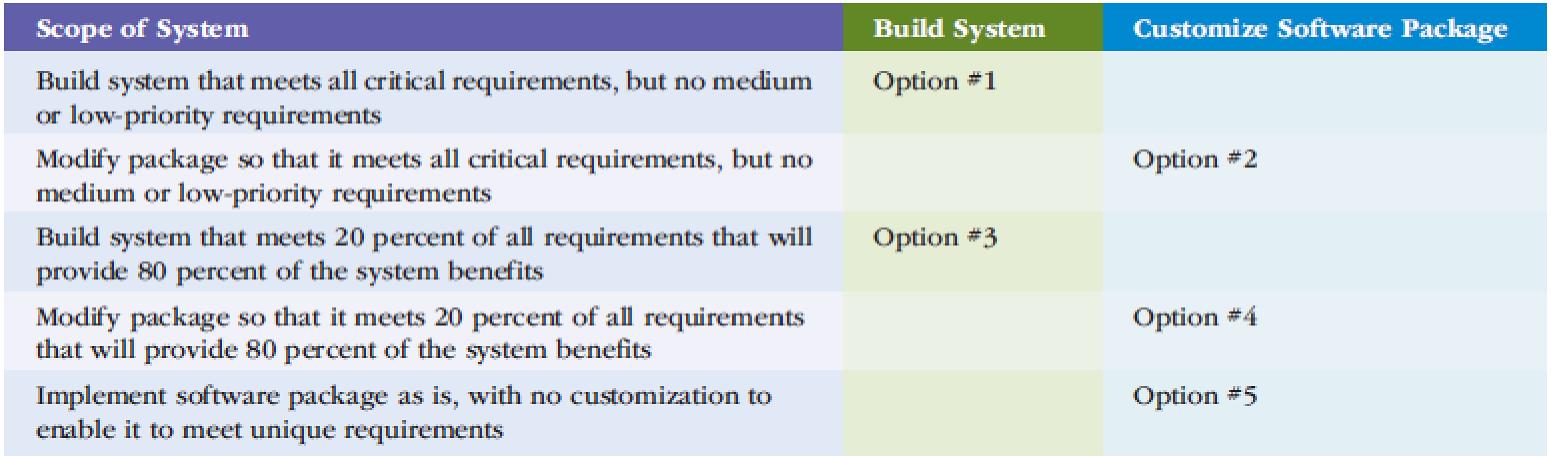
System Analysis

- Develop Prioritized Set of Requirements (cont’d)
  - System Performance
    - Factors in determining system performance
    - Timeliness of output
    - Ease of use
    - Scalability
    - System response time
    - Availability
    - Reliability

System Analysis

- Identify and Evaluate Alternative Solutions
  - The analysis team must think creatively and consider several system solution options
  - Pareto principle (80–20 rule): An observation that for many events, roughly 80 percent of the effects come from 20 percent of the causes

TABLE 12.5 Additional candidates for system analysis



Scope of System	Build System	Customize Software Package
Build system that meets all critical requirements, but no medium or low-priority requirements	Option #1	
Modify package so that it meets all critical requirements, but no medium or low-priority requirements		Option #2
Build system that meets 20 percent of all requirements that will provide 80 percent of the system benefits	Option #3	
Modify package so that it meets 20 percent of all requirements that will provide 80 percent of the system benefits		Option #4
Implement software package as is, with no customization to enable it to meet unique requirements		Option #5

System Analysis

- Perform Feasibility Analysis
  - An in-depth feasibility analysis is done for each of the candidate solutions the team wants to consider
- Prepare Draft of System Analysis Report
  - Systems analysis concludes with a formal systems analysis report summarizing the findings of this phase of the project
- Review Results of System Analysis with Steering Team
  - The systems analysis report is presented to the project steering team with a recommendation to stop, revise, or go forward with the systems development project
  - The project sponsor and the steering team must formally approve of any changes

System Analysis

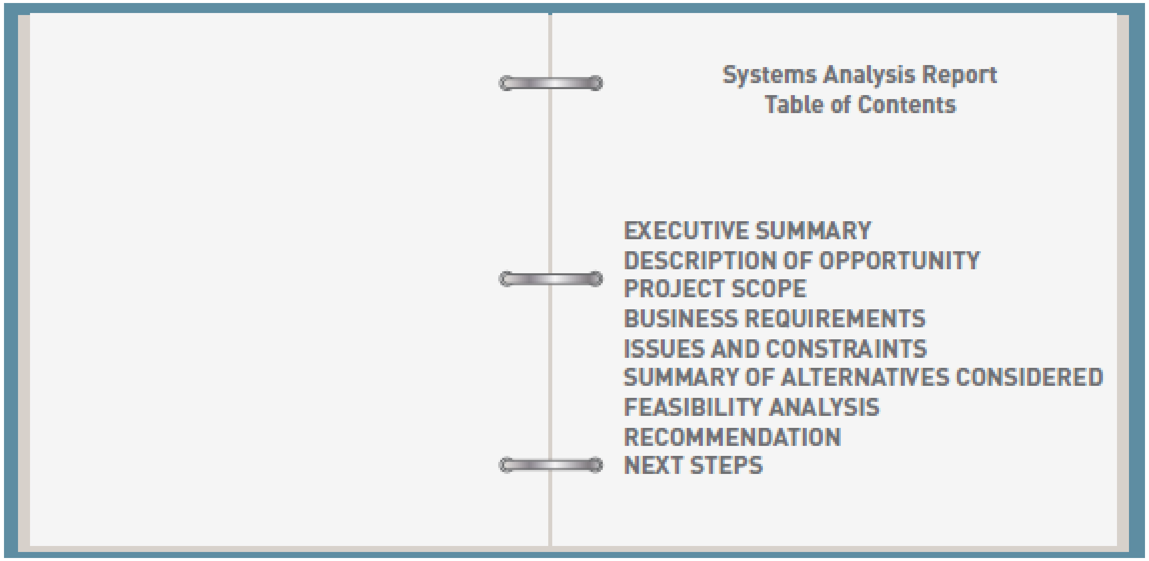


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FIGURE 12.11

Typical table of contents for a report on an existing system

The system analysis report is a more complete and detailed version of the system investigation report.

System Design

System design creates a complete set of technical specifications that can be used to construct the information system

Steps in the systems design phase

1. Identify and recruit team leader and team members
2. Develop schedule and budget for systems design activities
3. Design user interface
4. Design system security and controls
5. Design disaster recovery plan
6. Design database
7. Perform feasibility analysis
8. Prepare draft of systems design report
9. Review results of systems design with steering team

System Design

- Identify and Recruit Team Leader and Team Members
  - Some members of the systems analysis team participating in the systems design ensure project continuity
- Develop Schedule and Budget for System Design Activities
  - The systems design team develops a list of specific objectives and activities required to complete the systems design
  - The group prepares a budget for completing the systems design

System Design

- Design User Interface
  - How the user experiences the information system determines whether the system will be accepted and used
  - User interface design integrates concepts and methods from computer science, graphics design, and psychology to build interfaces that are accessible, easy to use, and efficient

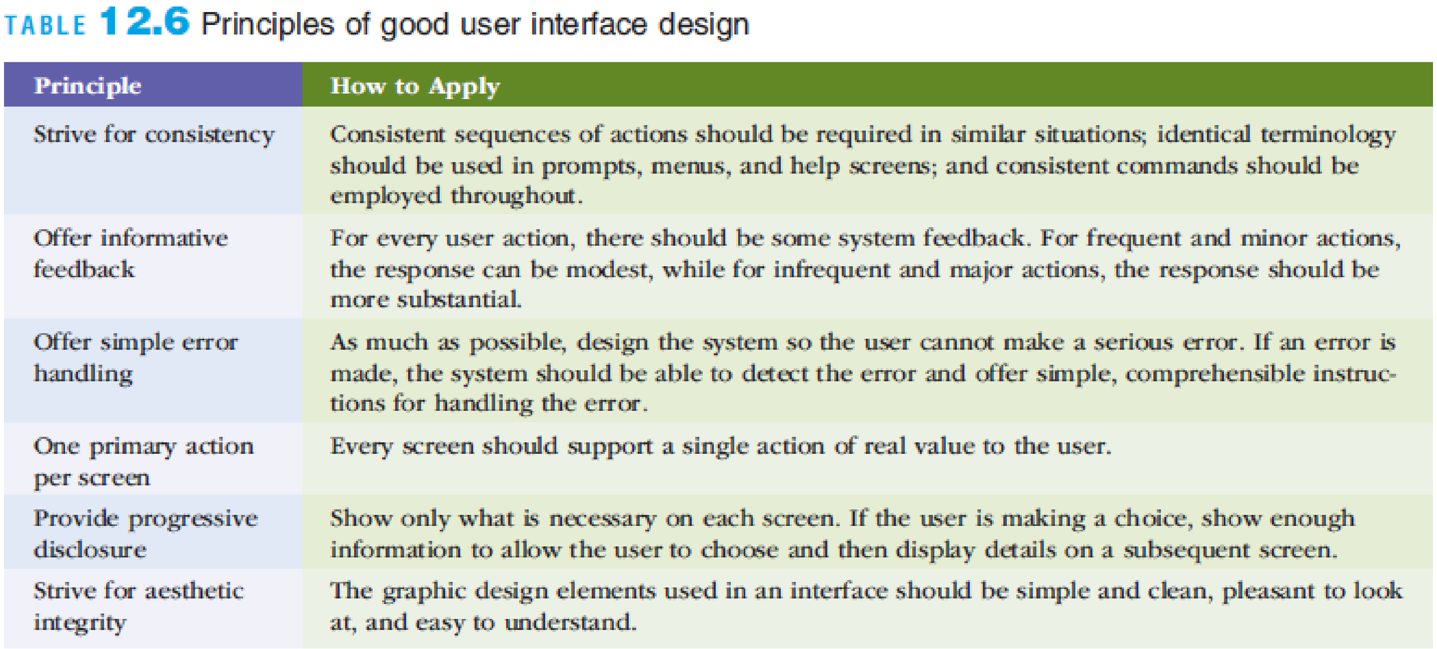


TABLE 12.6 Principles of good user interface design

Principle	How to Apply
Strive for consistency	Consistent sequences of actions should be required in similar situations; identical terminology should be used in prompts, menus, and help screens; and consistent commands should be employed throughout.
Offer informative feedback	For every user action, there should be some system feedback. For frequent and minor actions, the response can be modest, while for infrequent and major actions, the response should be more substantial.
Offer simple error handling	As much as possible, design the system so the user cannot make a serious error. If an error is made, the system should be able to detect the error and offer simple, comprehensible instructions for handling the error.
One primary action per screen	Every screen should support a single action of real value to the user.
Provide progressive disclosure	Show only what is necessary on each screen. If the user is making a choice, show enough information to allow the user to choose and then display details on a subsequent screen.
Strive for aesthetic integrity	The graphic design elements used in an interface should be simple and clean, pleasant to look at, and easy to understand.

System Design

- Design System Security and Controls
  - Specific system security and controls must be developed for all aspects of the information system
    - Hardware
    - Software
    - Database systems
    - Telecommunications
    - Internet operations

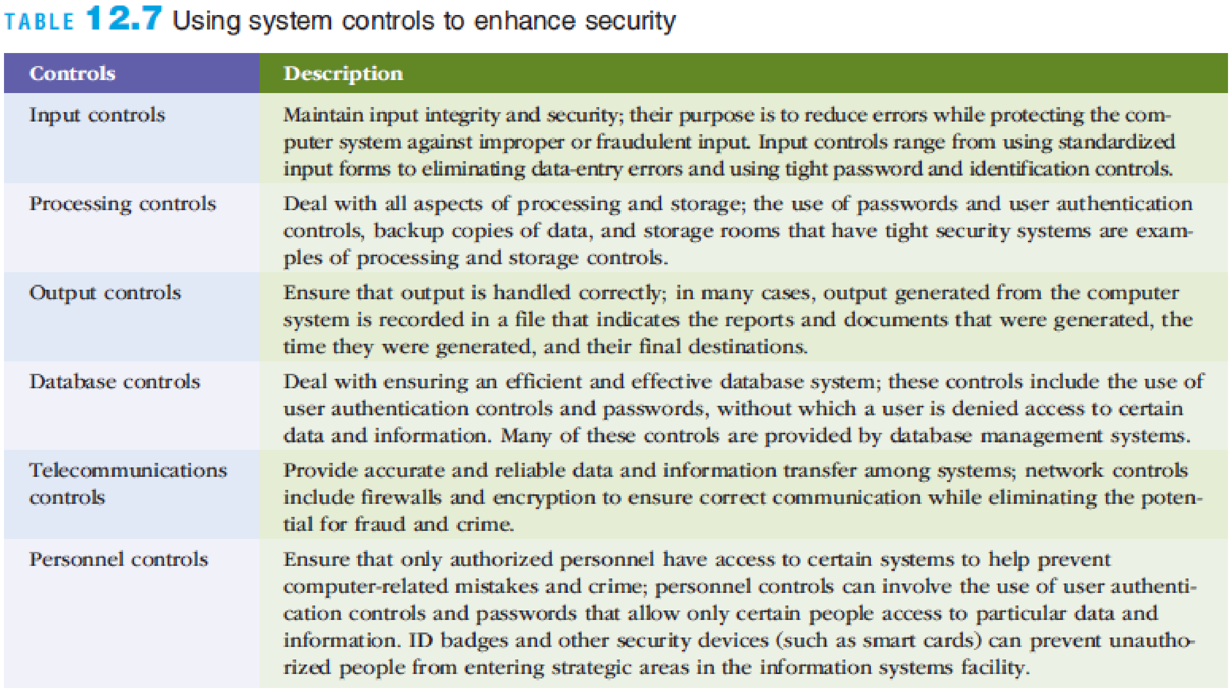


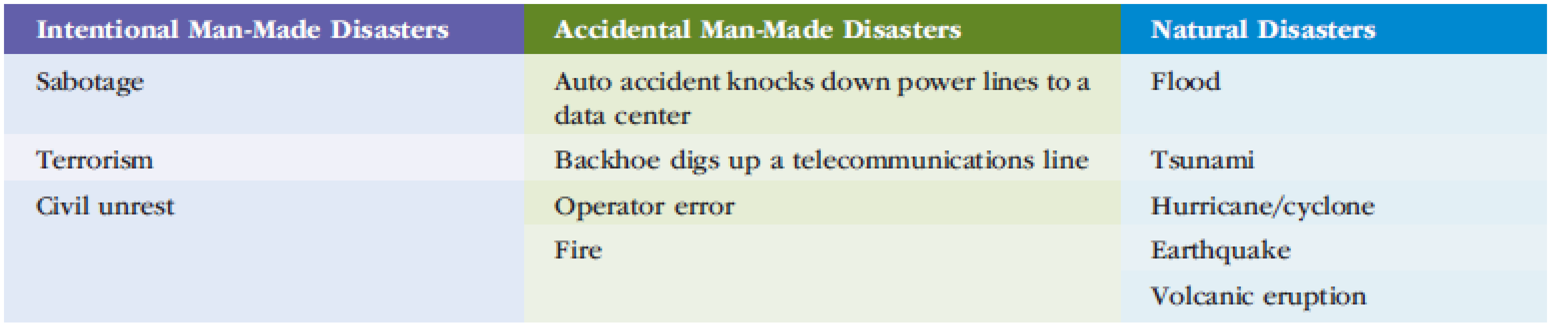
TABLE 12.7 Using system controls to enhance security

Controls	Description
Input controls	Maintain input integrity and security; their purpose is to reduce errors while protecting the computer system against improper or fraudulent input. Input controls range from using standardized input forms to eliminating data-entry errors and using tight password and identification controls.
Processing controls	Deal with all aspects of processing and storage; the use of passwords and user authentication controls, backup copies of data, and storage rooms that have tight security systems are examples of processing and storage controls.
Output controls	Ensure that output is handled correctly; in many cases, output generated from the computer system is recorded in a file that indicates the reports and documents that were generated, the time they were generated, and their final destinations.
Database controls	Deal with ensuring an efficient and effective database system; these controls include the use of user authentication controls and passwords, without which a user is denied access to certain data and information. Many of these controls are provided by database management systems.
Telecommunications controls	Provide accurate and reliable data and information transfer among systems; network controls include firewalls and encryption to ensure correct communication while eliminating the potential for fraud and crime.
Personnel controls	Ensure that only authorized personnel have access to certain systems to help prevent computer-related mistakes and crime; personnel controls can involve the use of user authentication controls and passwords that allow only certain people access to particular data and information. ID badges and other security devices (such as smart cards) can prevent unauthorized people from entering strategic areas in the information systems facility.

System Design

- Design Disaster Recovery Plan
  - Disaster recovery plan
    - A documented process to recover an organization's business information system assets including hardware, software, data, networks, and facilities in the event of a disaster
  - Mission-critical processes play a pivotal role in an organization's continued operations and goal attainment

TABLE 12.8 Various disasters can disrupt business operations



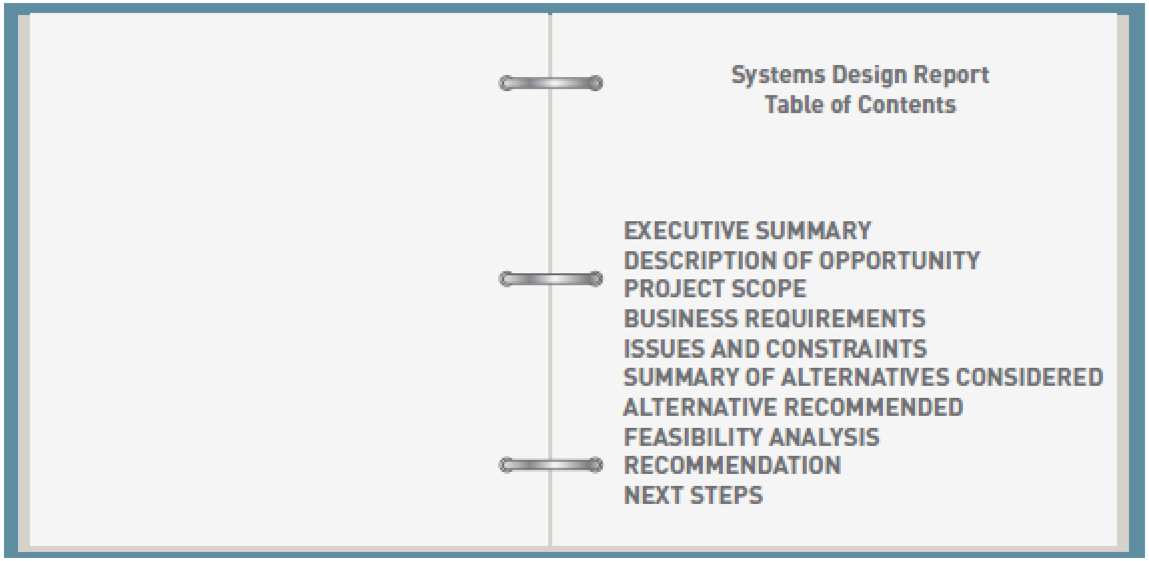
Intentional Man-Made Disasters	Accidental Man-Made Disasters	Natural Disasters
Sabotage	Auto accident knocks down power lines to a data center	Flood
Terrorism	Backhoe digs up a telecommunications line	Tsunami
Civil unrest	Operator error	Hurricane/cyclone
	Fire	Earthquake
		Volcanic eruption

System Design

- Design Database
  - Steps in designing a database
    - A schema and is entered into the DBMS using a data definition language
    - A data dictionary is established
  - Choose a vendor
    - Final evaluation begins with a detailed investigation of the contenders' proposals
    - Vendors should make a final presentation including a performance evaluation test
- Perform Feasibility Analysis
  - Reassess the technical, economic, legal, operational, and schedule feasibility based on results of system design findings

System Design

- Prepare Draft of System Design Report
  - Systems design concludes with a formal systems design report summarizing the findings of this phase of the project



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FEASIBILITY ANALYSIS
RECOMMENDATION
NEXT STEPS

FIGURE 12.13

Typical table of contents for a system design report

The system design report is a more complete and detailed version of the system investigation report.

System Design

- Review Results of System Design with Steering Team
  - The systems design report is presented to the project steering team with a recommendation to stop, revise, or go forward with the systems development project
  - At the end of the design phase, organizations employing the waterfall system development process freeze the scope and the user and business requirements
    - Any potential changes must go through a formal scope change process

Construction

- System construction converts the system design into an operational system
- Steps of the system construction phase
  - Code software components
  - Create and load data
  - Perform unit testing

Construction

- Code Software Components
  - – Software tools used to generate program source code
    - Template-driven code generators
    - Screen painters
    - Menu-creation software
    - Report generator software
  - – Technical and user documentation are required

Construction

- Create and Load Data
  - This step involves making sure that all files and databases are populated and ready to be used with the new information system
  - It may be necessary to write a program:
    - To read the old data files from several sources
    - To reformat the data to be compatible with the new system
    - Merge data sources together

Construction

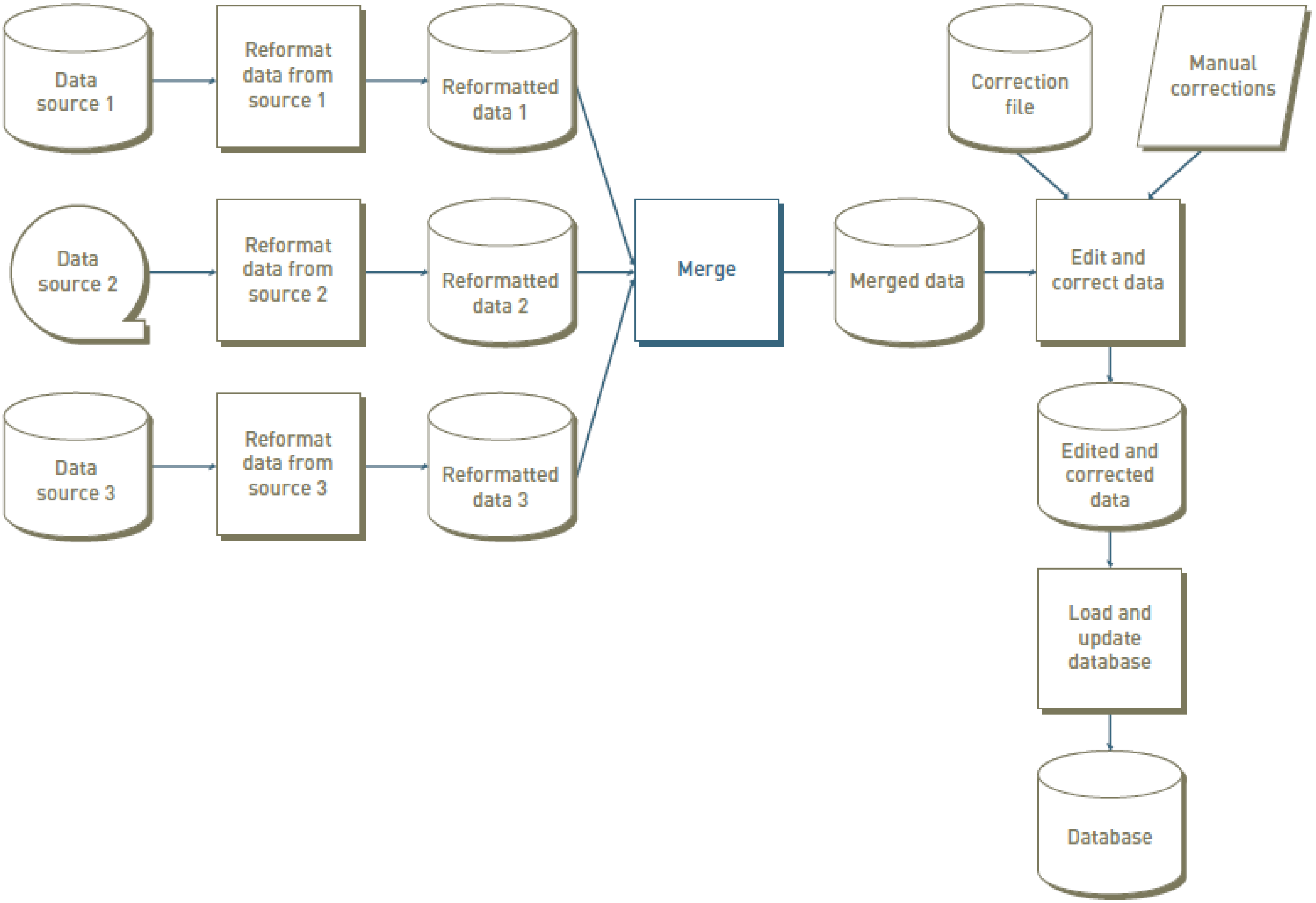


FIGURE 12.14

Database preparation tasks

Creating and loading a new database can take considerable resources.

Construction

- Perform Unit Testing
  - Unit testing: testing that ideally forces an individual program to execute all of its various functions and user features
  - Each program is also tested with abnormal input to determine how it will handle erroneous input

Integration and Testing

- Types of testing
  - Integration testing
  - System testing
  - Volume testing
  - User acceptance testing
- Integration testing
  - Involves linking all of the individual components together and testing them as a group to uncover any defects between individual components
- System testing
  - Testing the complete, integrated system to validate that the information system meets all specified requirements

Integration and Testing

- Volume testing
  - Involves evaluating the performance of the information system under varying yet realistic work volume and operating conditions
  - Goals of volume testing are to:
    - Determine the work load at which systems performance begins to degrade
    - Eliminate issues that prevent the system from reaching its required performance
- User Acceptance Testing
  - UAT is testing performed by trained system users to verify that the system can complete required tasks in a real-world operating environment and perform according to the system design specifications

Integration and Testing

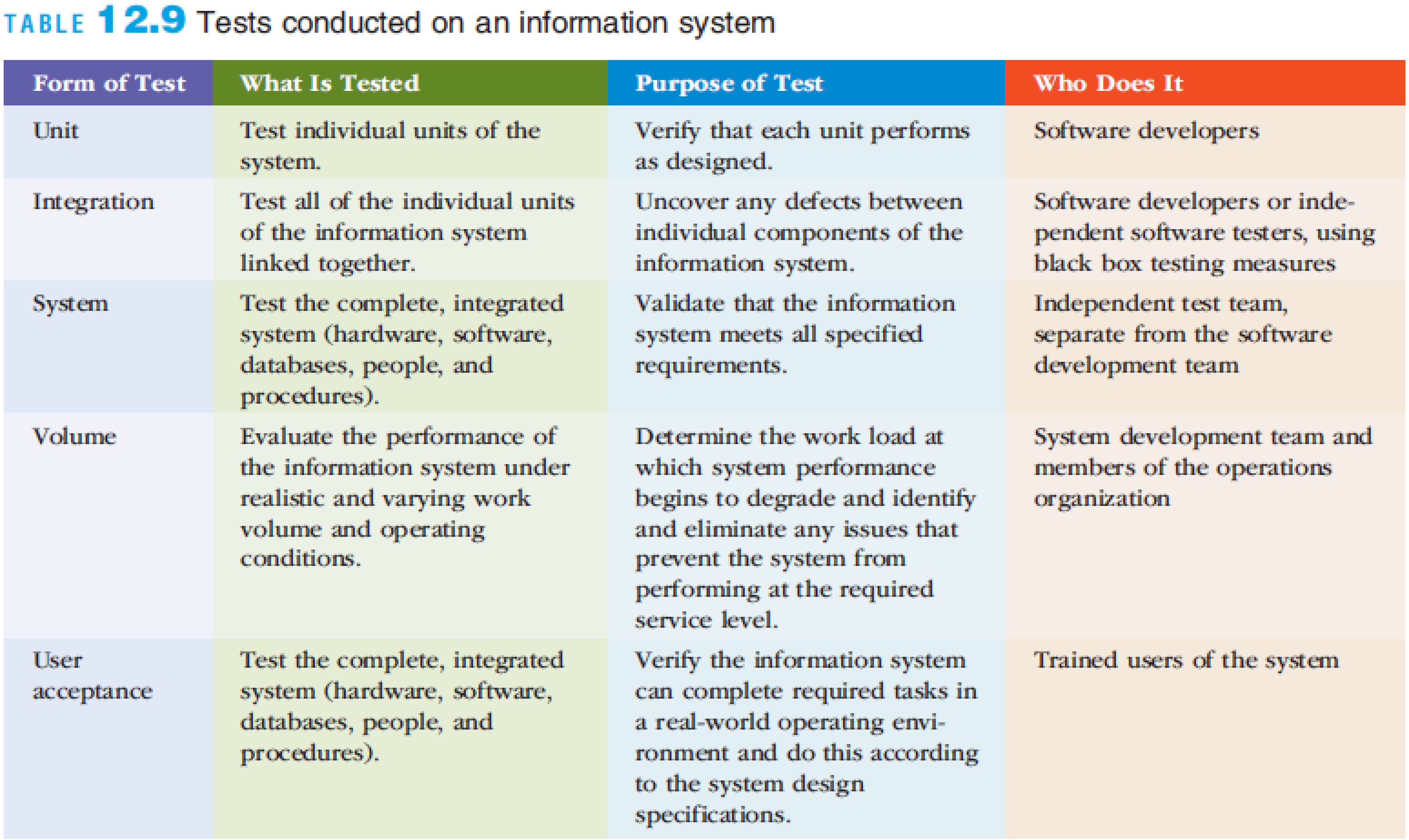


TABLE 12.9 Tests conducted on an information system

Form of Test	What Is Tested	Purpose of Test	Who Does It
Unit	Test individual units of the system.	Verify that each unit performs as designed.	Software developers
Integration	Test all of the individual units of the information system linked together.	Uncover any defects between individual components of the information system.	Software developers or independent software testers, using black box testing measures
System	Test the complete, integrated system (hardware, software, databases, people, and procedures).	Validate that the information system meets all specified requirements.	Independent test team, separate from the software development team
Volume	Evaluate the performance of the information system under realistic and varying work volume and operating conditions.	Determine the work load at which system performance begins to degrade and identify and eliminate any issues that prevent the system from performing at the required service level.	System development team and members of the operations organization
User acceptance	Test the complete, integrated system (hardware, software, databases, people, and procedures).	Verify the information system can complete required tasks in a real-world operating environment and do this according to the system design specifications.	Trained users of the system

Implementation

- Steps involved in implementation
  - User preparation
  - Site preparation
  - Installation
  - Cutover
- User preparation
  - User preparation is the process of readying managers, decision makers, employees, other users, and stakeholders to accept and use the new system
  - Successfully introducing an information system requires a mix of organizational change skills and technical skills
  - User training is very important

Implementation

- Site Preparation
  - Site preparation for a small system can be as simple as rearranging the furniture in an office to make room for a computer
  - A large system might require special wiring, air conditioning, or construction
  - Sufficient lead time should be built into the schedule to allow for site preparation
- Installation
  - Installation is the process of physically placing the computer equipment on the site and making it operational

Implementation

- Cutover
  - Cutover is the process of switching from an old information system to a replacement system
  - Direct conversion (also called plunge or direct cutover) is a high-risk approach
  - The phase-in approach (piecemeal approach) involves slowly phasing the new system's components as the old system's components are phased out
  - Pilot start-up: running a complete new system for only one group of users
  - Parallel start-up: running both the old and new systems and comparing outputs

Implementation

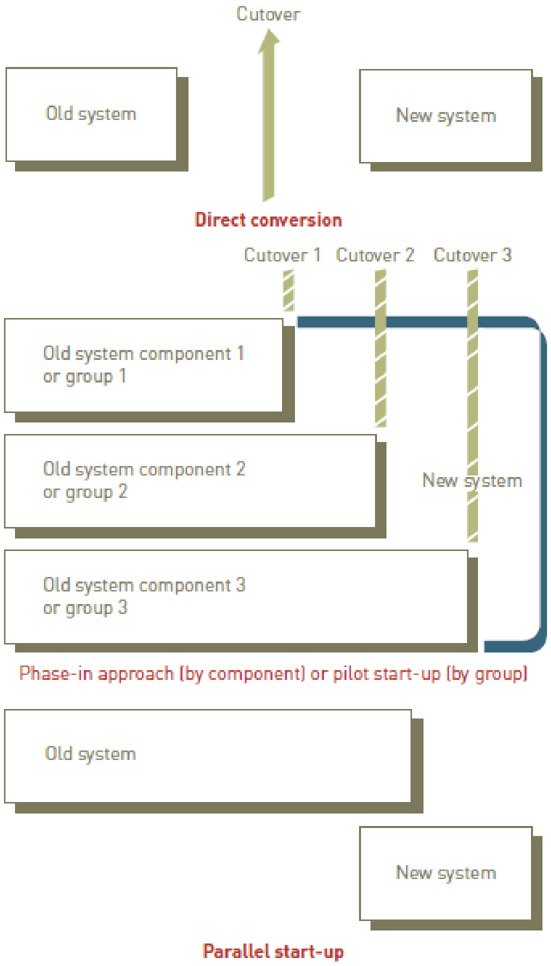

Cutover
Old system
New system
Direct conversion
Cutover 1
Cutover 2
Cutover 3
Old system component 1 or group 1
Old system component 2 or group 2
Old system component 3 or group 3
New system
Phase-in approach (by component) or pilot start-up (by group)
Old system
New system
Parallel start-up

FIGURE 12.15

System cutover strategies

Cutover can be through direct conversion, phase-in approach, pilot start-up, or parallel start-up.

System Operation and Maintenance

- Steps of the operation and maintenance phase
  - Operation
  - Maintenance
  - Disposal
- Operation
  - Systems operation involves using the new or modified system under all kinds of operating conditions
  - Getting the most out of the new system is the most important aspect of operation
  - A formal help desk is beneficial for employees and customers
  - Monitoring involves measuring system performance by tracking:
    - The number of errors encountered, the amount of memory required, the amount of processing or CPU time needed, etc.
  - Systems review: the process of analyzing systems to make sure they are operating as intended

System Operation and Maintenance

- Maintenance
  - Systems maintenance: a stage of systems development that involves changing and enhancing the system to make it more useful in achieving user and organizational goals
  - Reasons for program maintenance
    - Poor system performance
    - Changes in business processes
    - Changes in the needs of system stakeholders, users, and managers
    - Bugs or errors in the program
    - Technical and hardware problems
    - Corporate mergers and acquisitions
    - Changes in government regulations
    - Changes in the operating system or hardware on which the application runs

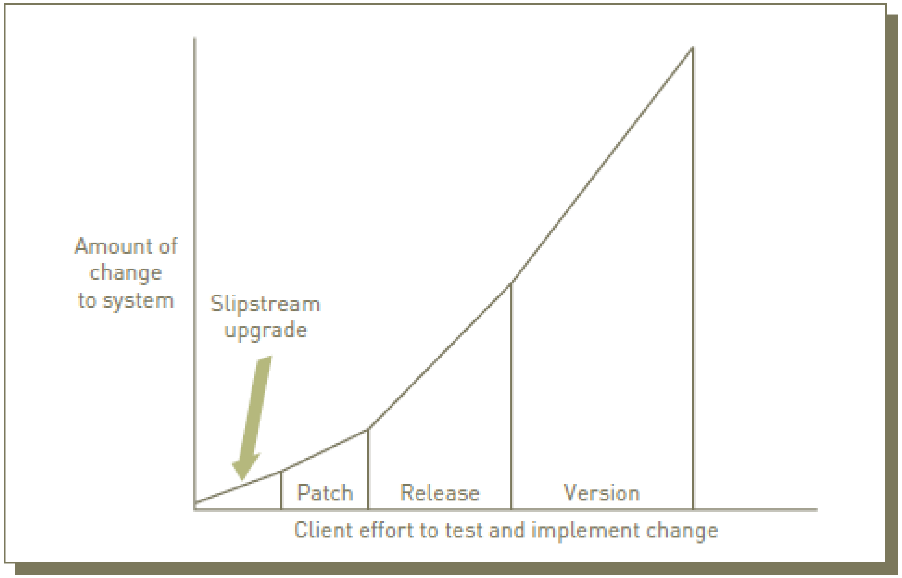
System Operation and Maintenance

- Maintenance (cont'd)
  - Four accepted categories signify the amount of change involved in maintenance
    - Slipstream upgrade: a minor upgrade; a code adjustment or minor bug
    - Patch: a minor change to make a correction or make a small enhancement
    - Release: a significant program change; software documentation changes are required
    - Version: a major program change

FIGURE 12.16

System-maintenance efforts

This chart shows the relative amount of change and effort associated to test and implement slipstream upgrades, patches, releases, and versions.



System Operation and Maintenance

- Disposal
  - System disposal involves those activities ensuring the orderly dissolution of the system
  - Steps involved in system disposal
    - Communicate intent: all key stakeholders should be notified months in advance of the actual shutdown
    - Terminate contracts: contact vendors well in advance to avoid penalty fees
    - Make backups of data: follow the organization’s record management policies
    - Delete sensitive data: wipe hard drives need to be wiped several times or physically destroy hard drives
    - Dispose of hardware: discard in an environmentally friendly manner

Agile Development

- An iterative system development process that develops the system in “sprint” increments lasting from two weeks to two months
  - Concentrates on maximizing the team’s ability to deliver quickly and respond to emerging requirements
- Scrum: a method to keep the agile system development effort focused and moving quickly
  - The scrum master coordinates all activities
- Extreme programming (XP) promotes incremental development of a system using short development cycles to:
  - Improve productivity
  - Accommodate new customer requirements

Agile Development

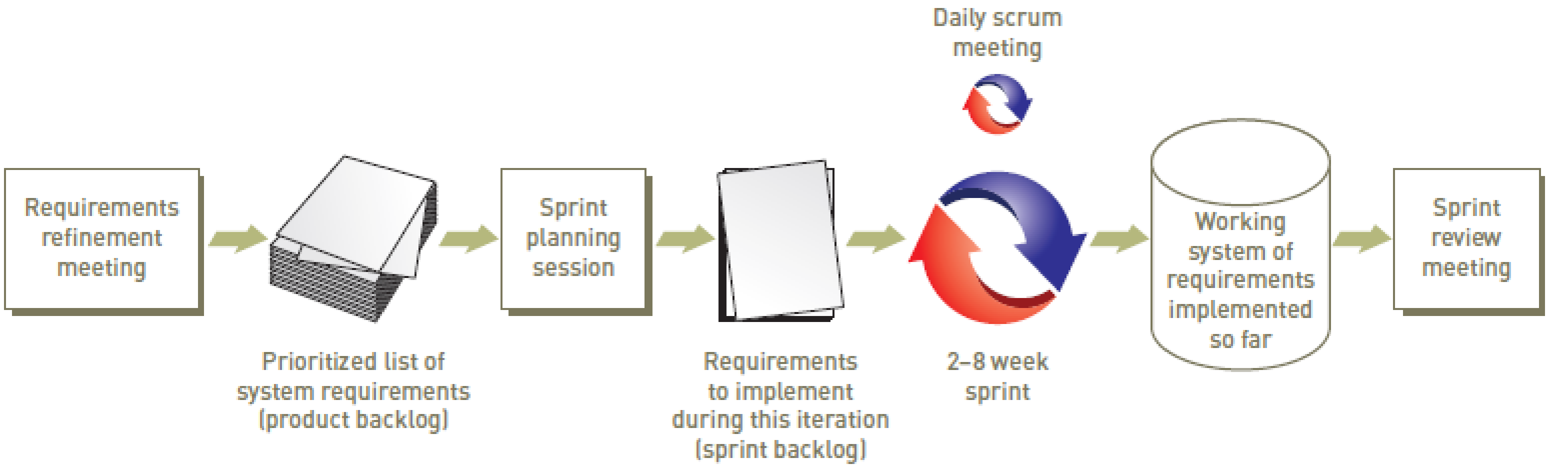

Daily scrum meeting
Requirements refinement meeting
Sprint planning session
Working system of requirements implemented so far
Sprint review meeting
Prioritized list of system requirements (product backlog)
Requirements to implement during this iteration (sprint backlog)
2–8 week sprint

FIGURE 12.17

The Scrum agile software development process

The Scrum agile approach develops a system in sprint increments lasting from two weeks to two months.

Agile Development

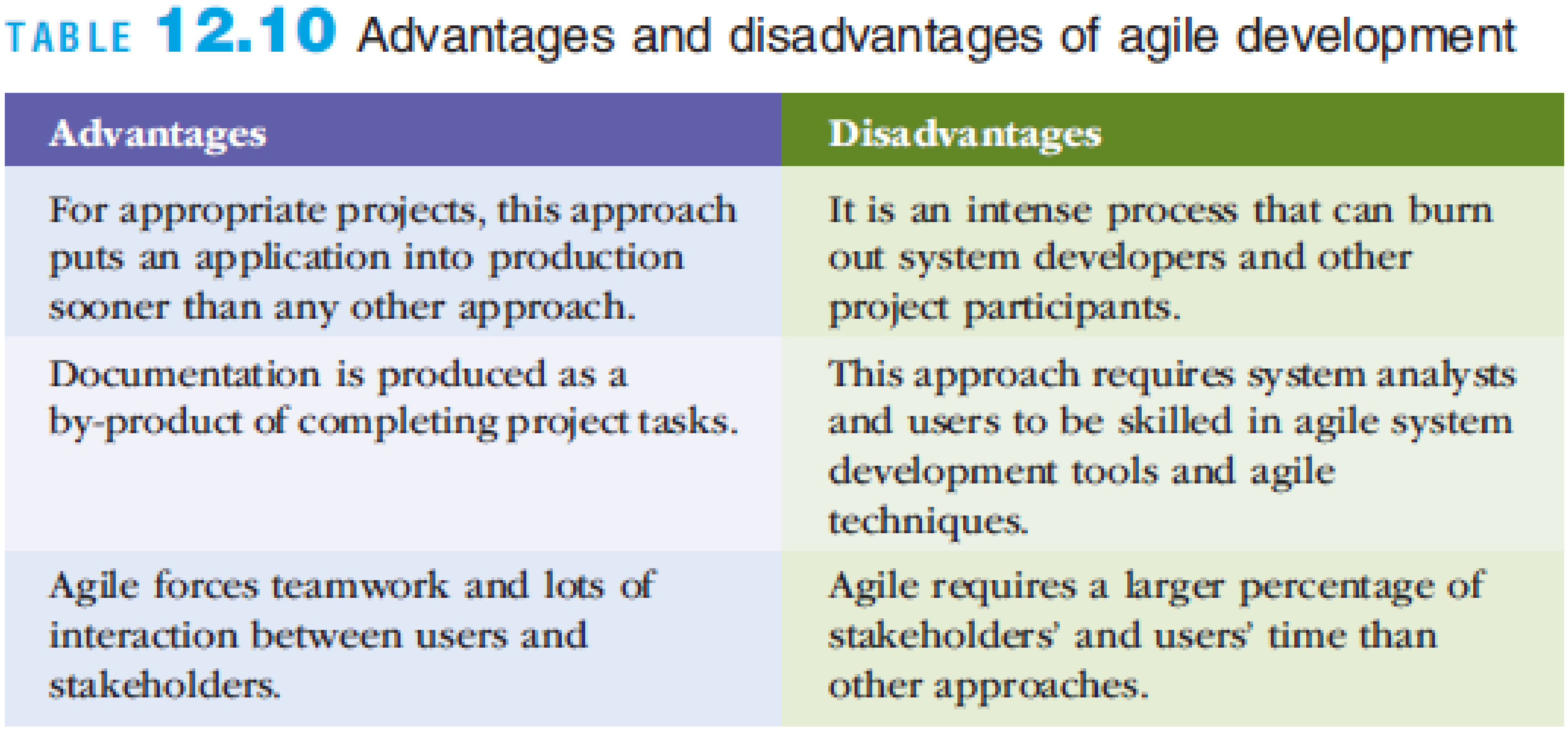


TABLE 12.10 Advantages and disadvantages of agile development

Advantages	Disadvantages
For appropriate projects, this approach puts an application into production sooner than any other approach.	It is an intense process that can burn out system developers and other project participants.
Documentation is produced as a by-product of completing project tasks.	This approach requires system analysts and users to be skilled in agile system development tools and agile techniques.
Agile forces teamwork and lots of interaction between users and stakeholders.	Agile requires a larger percentage of stakeholders' and users' time than other approaches.

Agile Development

- DevOps: the practice of blending the tasks performed by the development staff and the IT operations groups to enable faster and more reliable software releases
  - Being used as part of a continuous development strategy, in which releases are launched daily

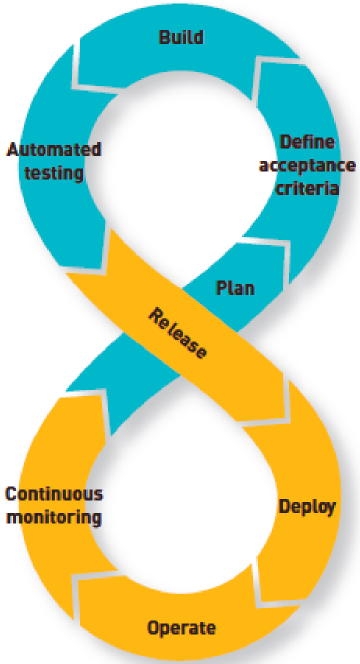


FIGURE 12.18
DevOps is part of a continuous deployment strategy in which releases can be launched daily

DevOps blends tasks performed by development staff and IT operations groups.

Source: Chris Haddad, "Overcome DevOps Adoption Barriers to Accelerate Software Delivery," Tech Well Insights, May 8, 2015, *www.techwell.com/techwell-insights/2015/05/overcome-devops-adoption-barriers-accelerate-software-delivery.*

Agile Development

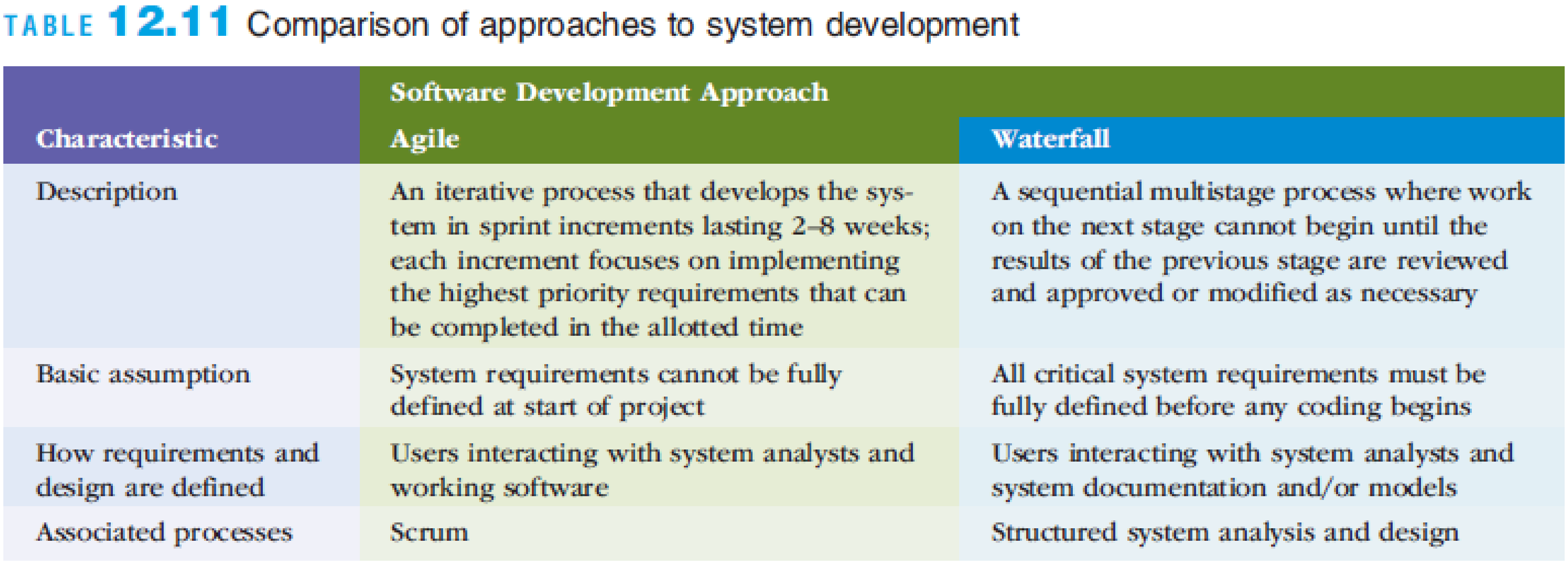


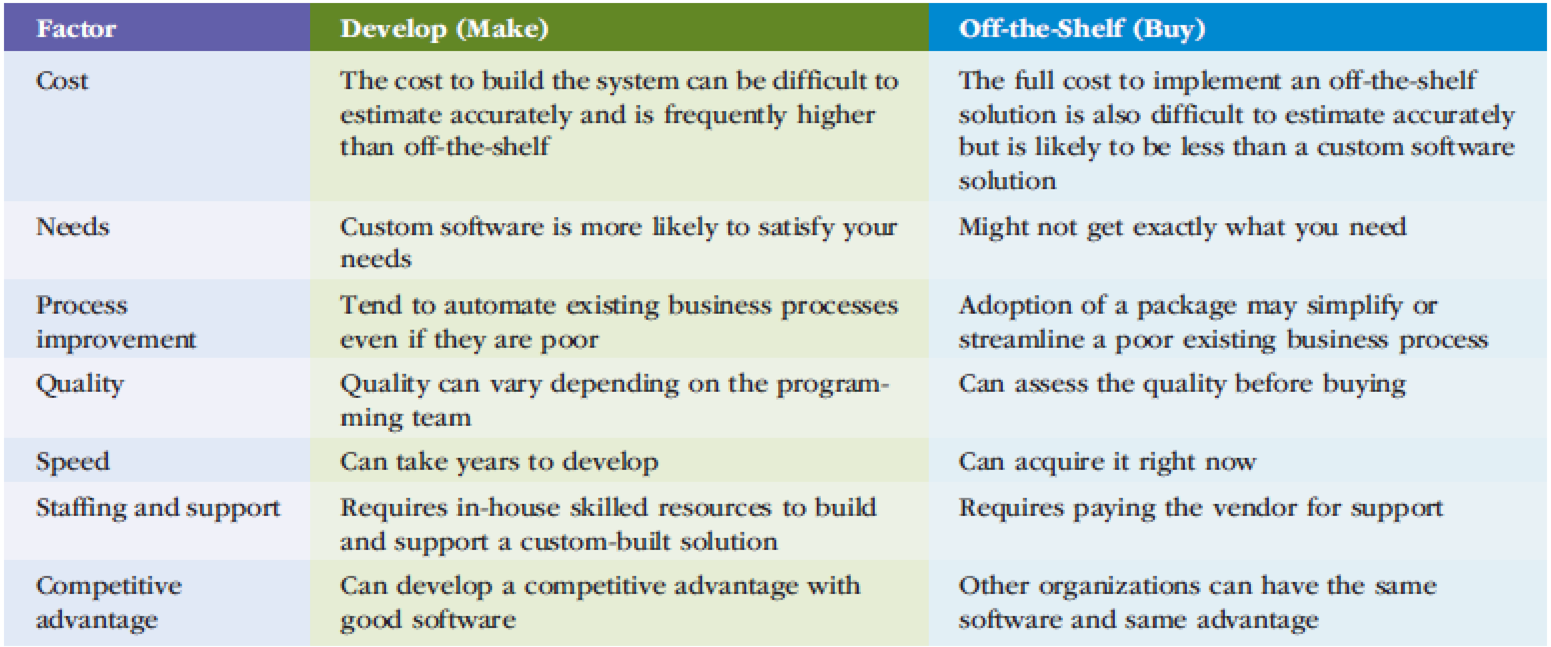
TABLE 12.11 Comparison of approaches to system development

	Software Development Approach	
Characteristic	**Agile**	**Waterfall**
Description	An iterative process that develops the system in sprint increments lasting 2–8 weeks; each increment focuses on implementing the highest priority requirements that can be completed in the allotted time	A sequential multistage process where work on the next stage cannot begin until the results of the previous stage are reviewed and approved or modified as necessary
Basic assumption	System requirements cannot be fully defined at start of project	All critical system requirements must be fully defined before any coding begins
How requirements and design are defined	Users interacting with system analysts and working software	Users interacting with system analysts and system documentation and/or models
Associated processes	Scrum	Structured system analysis and design

Buying Off-the-Shelf Software

- Today, most organizations purchase or rent software they need
- Software applications can vary from an unmodified, commercial off-the-shelf (COTS) software package to a custom, written-from-scratch program

TABLE 12.12 Comparison of developed and off-the-shelf software



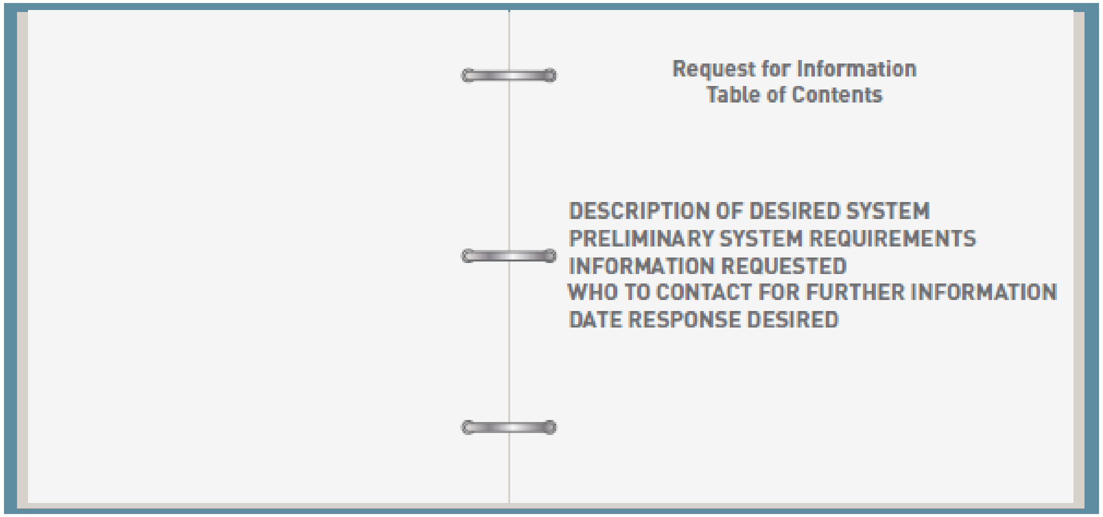
Factor	Develop (Make)	Off-the-Shelf (Buy)
Cost	The cost to build the system can be difficult to estimate accurately and is frequently higher than off-the-shelf	The full cost to implement an off-the-shelf solution is also difficult to estimate accurately but is likely to be less than a custom software solution
Needs	Custom software is more likely to satisfy your needs	Might not get exactly what you need
Process improvement	Tend to automate existing business processes even if they are poor	Adoption of a package may simplify or streamline a poor existing business process
Quality	Quality can vary depending on the programming team	Can assess the quality before buying
Speed	Can take years to develop	Can acquire it right now
Staffing and support	Requires in-house skilled resources to build and support a custom-built solution	Requires paying the vendor for support
Competitive advantage	Can develop a competitive advantage with good software	Other organizations can have the same software and same advantage

Package Evaluation Phase

- Steps in the Package Evaluation Phase include:
  1. Identify potential solutions
  2. Select top contenders
  3. Research top contenders
  4. Perform final evaluation of leading solutions
  5. Make selection
  6. Finalize contract

Package Evaluation Phase

- Identify Potential Solutions
  - Project team should make a preliminary assessment of the software marketplace to determine whether existing packages can meet the organization’s needs
  - Request for information (RFI) is a document that outlines an organization’s needs and requests vendors to respond with information about if and how they can meet those needs



Request for Information
Table of Contents

DESCRIPTION OF DESIRED SYSTEM
PRELIMINARY SYSTEM REQUIREMENTS
INFORMATION REQUESTED
WHO TO CONTACT FOR FURTHER INFORMATION
DATE RESPONSE DESIRED

FIGURE 12.20

Recommended table of contents for a request for information

The RFI outlines the desired system and its requirements, identifying key pieces of data that the software vendor must include in the proposal.

Package Evaluation Phase

- Select Top Contenders
  - Project team will review information provided by vendors in response to the RFI
  - Selection will be made based on:
    - How well the vendor’s software appears to meet the organization’s needs
    - Preliminary cost and timing estimates
    - Information gleaned from references
    - How easy the vendor has been to work with so far

Package Evaluation Phase

- Research Top Contenders
  - Begins with a detailed investigation as well as in-depth discussions with two or three customers of each contender
  - Contenders should be asked to make a final presentation and demonstrate their solution using a performance evaluation test
    - Conducted in a computing environment, with a workload that matches intended operating conditions

Package Evaluation Phase

- Make Selection
  - Weigh factors such as:
    - How well the vendor’s solution matches the needs of the users and business
    - The amount of effort required to integrate the new software with existing software
    - Results of the performance evaluation test
    - Relative costs (including any software modifications) and benefits
    - The technical, economic, legal, operational, and schedule feasibility
    - Input from legal and purchasing resources on the legal and financial viability of the contender
    - Feedback from customers on how well the software performs as well as on the quality of the support provided by the vendor

Finalize Contract

- Develop a fair contract when acquiring new computer hardware or software
- Allow at least two months for review and negotiation of a final contract
- Take special precautions in signing contracts with the service provider of cloud-computing or software-as-a-service
- Contract should have provisions for:
  - Monitoring system modification quality and progress
  - Ownership and property rights of the new or modified system
  - Contingency provisions in case something doesn’t work as expected
  - Dispute resolution if something goes wrong

Integration and Testing

- Types of testing
  - Integration testing
  - System testing
  - Volume testing
  - User acceptance testing

Implementation

- Key implementation tasks include:
  - Use data-flow diagrams to map current business processes and requirements to the software, and identify any gaps that must be filled by changing current processes or by modifying the software.
  - Install the software and configure all of its capabilities and options to meet the project requirements.
  - Customize any aspects of the solution needed for the organization.
  - Integrate existing software with the new software.
  - Train end users.
  - Test the software to ensure that it meets all processes and requirements.
  - Convert historical data from the old software so that it can be used by the new software.
  - Roll out the new software to users in a live work environment.
  - Provide for ongoing end-user support and training.

Summary

- Organizations can obtain software using one of two basic approaches: buy or build
- A system under development following the waterfall approach moves from one phase to the next, with a management review at the end of each phase
- Agile development is an iterative system development process that develops a system in “sprint” increments lasting from two weeks to two months
- When buying off-the-shelf software, the effort required to modify the software package as well as existing software so that they work well together must be taken into account as a major factor in selecting the final vendor and software