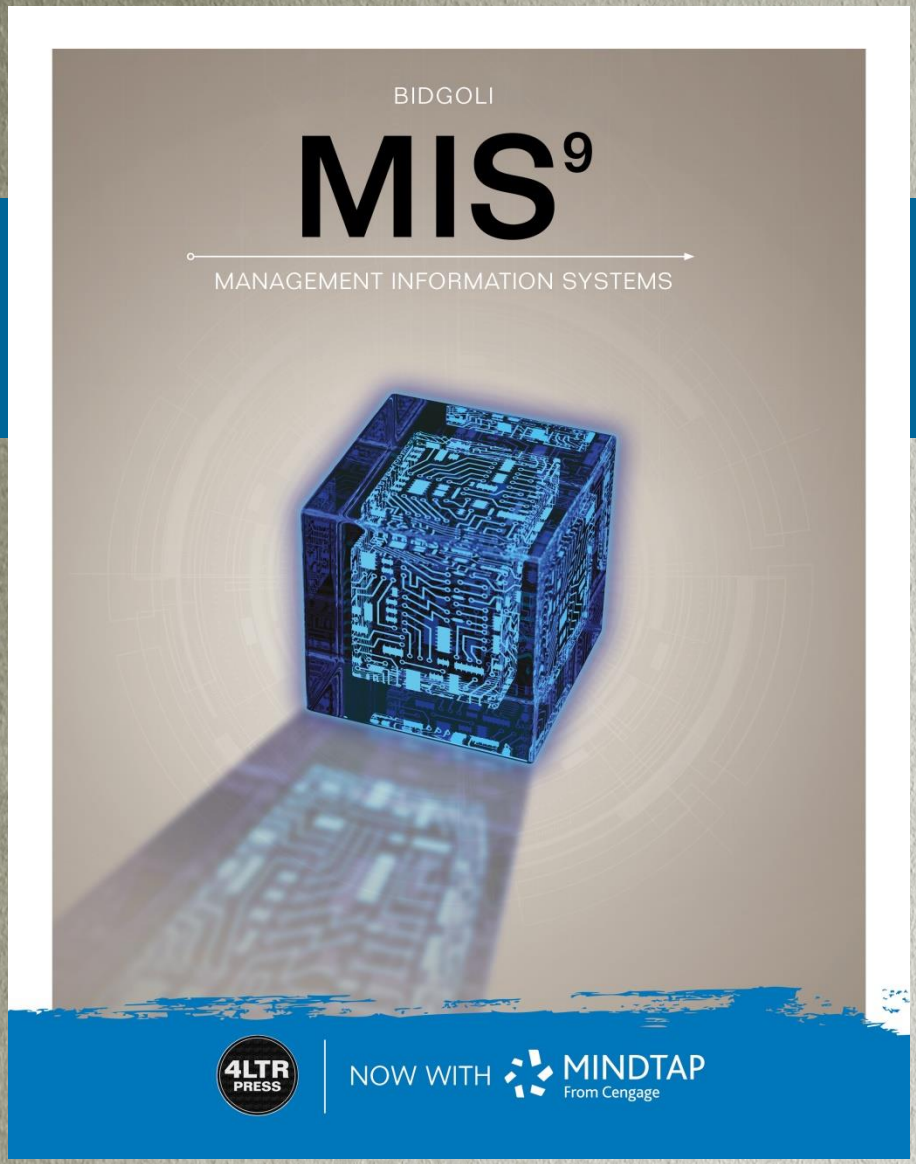


10

Building Successful Information Systems

Learning Objectives (1 of 2)

- Describe the systems development life cycle (SDLC) as a method for developing information systems
- Explain the tasks involved in the planning phase
- Explain the tasks involved in the requirements-gathering and analysis phase
- Explain the tasks involved in the design phase

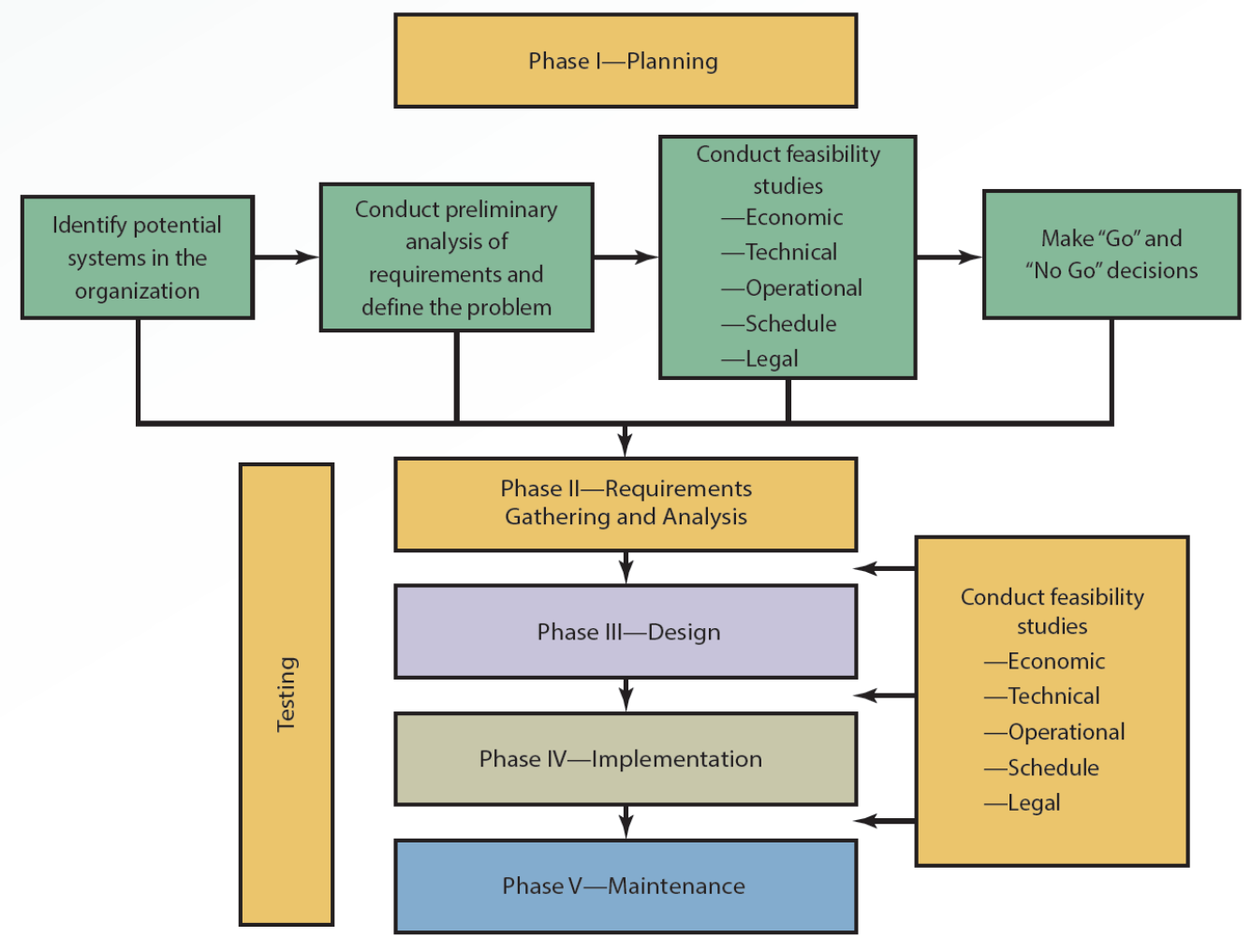
Learning Objectives (2 of 2)

- Explain the tasks involved in the implementation phase
- Explain the tasks involved in the maintenance phase
- Describe new trends in systems analysis and design, including service-oriented architecture, rapid application development, extreme programming, and agile methodology

Systems Development Life Cycle: An Overview

- Systems development life cycle (SDLC): series of well-defined phases performed in sequence
  - Serves as a framework for developing a system or project
  - Each phase's output becomes the input for the next phase
  - Suitable for an information system that needs to be designed from scratch

Exhibit 10.1 Phases of the SDLC



Phase 1: Planning (1 of 2)

- Systems designer must define the problem the organization faces
  - Problem can be identified internally and externally
- Analysts assess needs of the organization or a specific group of users
  - Organization's strategic goals
  - How proposed system can support goals
  - Factors critical to the system's success
  - Criteria for evaluating performance

Phase 1: Planning (2 of 2)

- Analysts must get feedback from users on the problem
  - At the end of the phase, users and top management should have a clear view of the why, who, when, and what of the problem

Formation of the Task Force (1 of 3)

- Should consist of representatives from:
  - Different departments
  - Systems analysts
  - Technical advisors
  - Top management
- Involves collecting user feedback and working toward getting users involved from the beginning

Formation of the Task Force (2 of 3)

- Internal users: employees who use the system regularly
  - Offer feedback on the system's strengths and weaknesses
- External users: not employees but do use the system
  - Customers, contractors, suppliers, and other business partners
  - Not part of the task force but their input is essential

Formation of the Task Force (3 of 3)

- Joint application design (JAD)
  - Collective activity involving users, top management, and IT professionals
  - Centered on a structured workshop where users and system professionals unite to develop an application
  - Helps ensure that collected requirements are not narrow and one-dimensional in focus

Feasibility Study

- Measure of how beneficial or practical an information system will be to an organization
  - Analysts investigate a proposed solution's feasibility
    - Determine how best to present the solution to management
  - Dimensions: economic, technical, operational, scheduling, and legal

Economic Feasibility (1 of 2)

- Assesses a system's costs and benefits
  - Tangible development and operating costs for the system have to be itemized
    - Leads to the creation of a budget
  - Tangible and intangible benefits have to be identified and measured
    - Challenge: accurately assessing intangible costs and benefits

Economic Feasibility (2 of 2)

- Cost-effectiveness analysis has to be conducted
  - Methods: payback, net present value (NPV), return on investment (ROI), and internal rate of return (IRR)
- Cost-benefit analysis (CBA) report
  - Used to sell the system to top management

Technical Feasibility

- Assessing whether the technology to support the new system is available or feasible to implement
  - Organizations that lack the expertise, time, or personnel to implement the new system might lack technical feasibility
    - Steps should be taken to address shortcomings and consider the new system

Operational Feasibility

- Measure of how well the proposed solution will work in the organization and how internal and external customers will react to it
  - Requires assessing the worth of implementing the information system

Scheduling Feasibility

- Concerned with whether the new system can be completed on time
  - Failure to deliver in time leads to loss of customers
    - Problem can be minimized by using project management tools

Legal Feasibility

- Concerned with legal issues
  - Addresses questions such as:
    - Will the system violate any legal issues in the country where it will be used?
    - Are there any political repercussions?
    - Is there any conflict between the proposed system and legal requirements?

Phase 2: Requirements-Gathering and Analysis (1 of 2)

- Analysts define the problem and generate alternatives for solving it
  - Team attempts to understand the requirements for the system
    - Analyzes requirements to determine the main problem with the current system or processes
    - Looks for ways to solve problems by designing the new system

Phase 2: Requirements-Gathering and Analysis (2 of 2)

- Analysis and design approaches
  - Structured systems analysis and design (SSAD)
    - Sequential approach that treats process and data independently
  - Object-oriented
    - Combines process and data analysis
- Models created during the analysis phase constitute design specifications

Exhibit 10.2 Data Flow Diagram for ABC's Inventory Management System

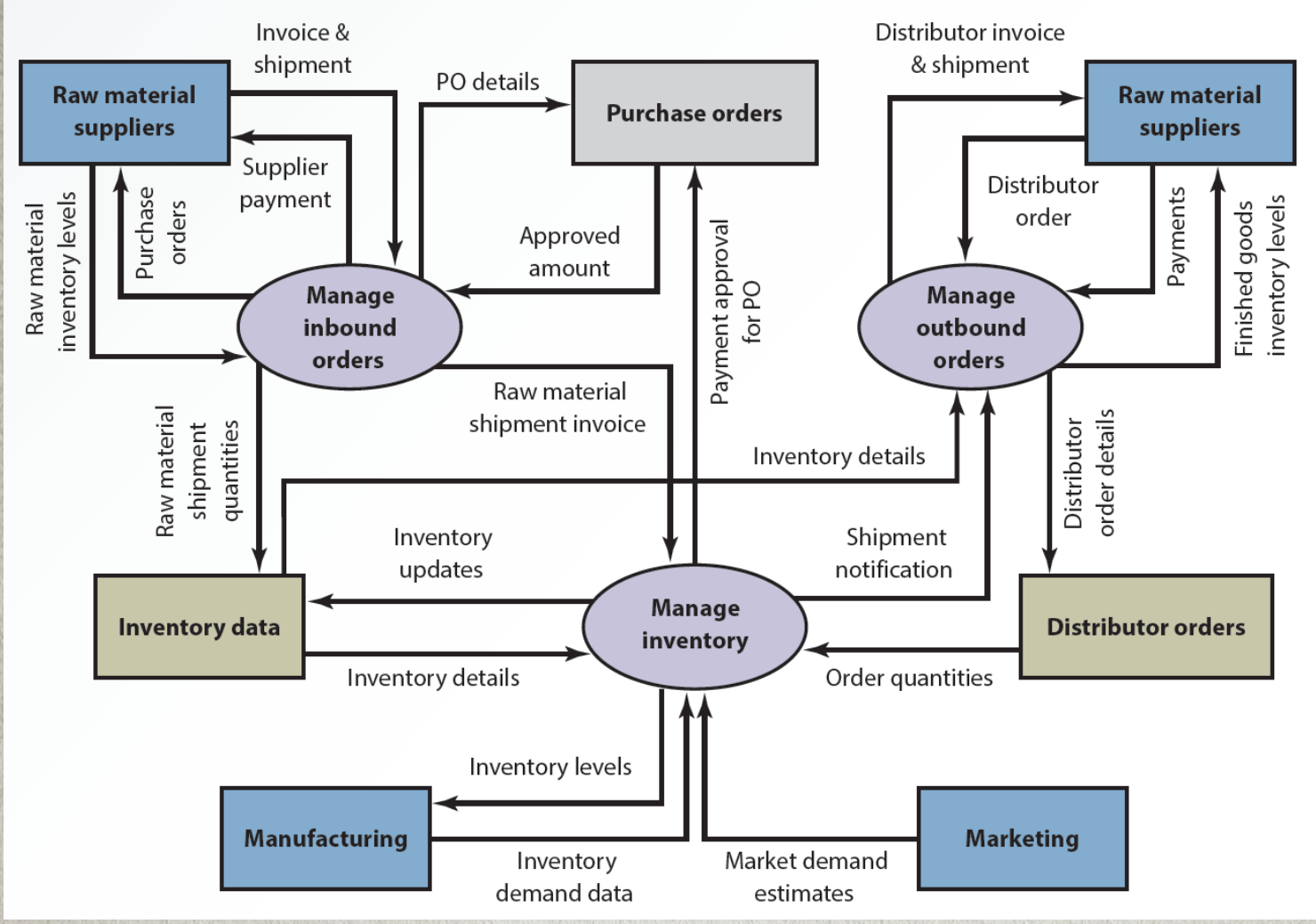
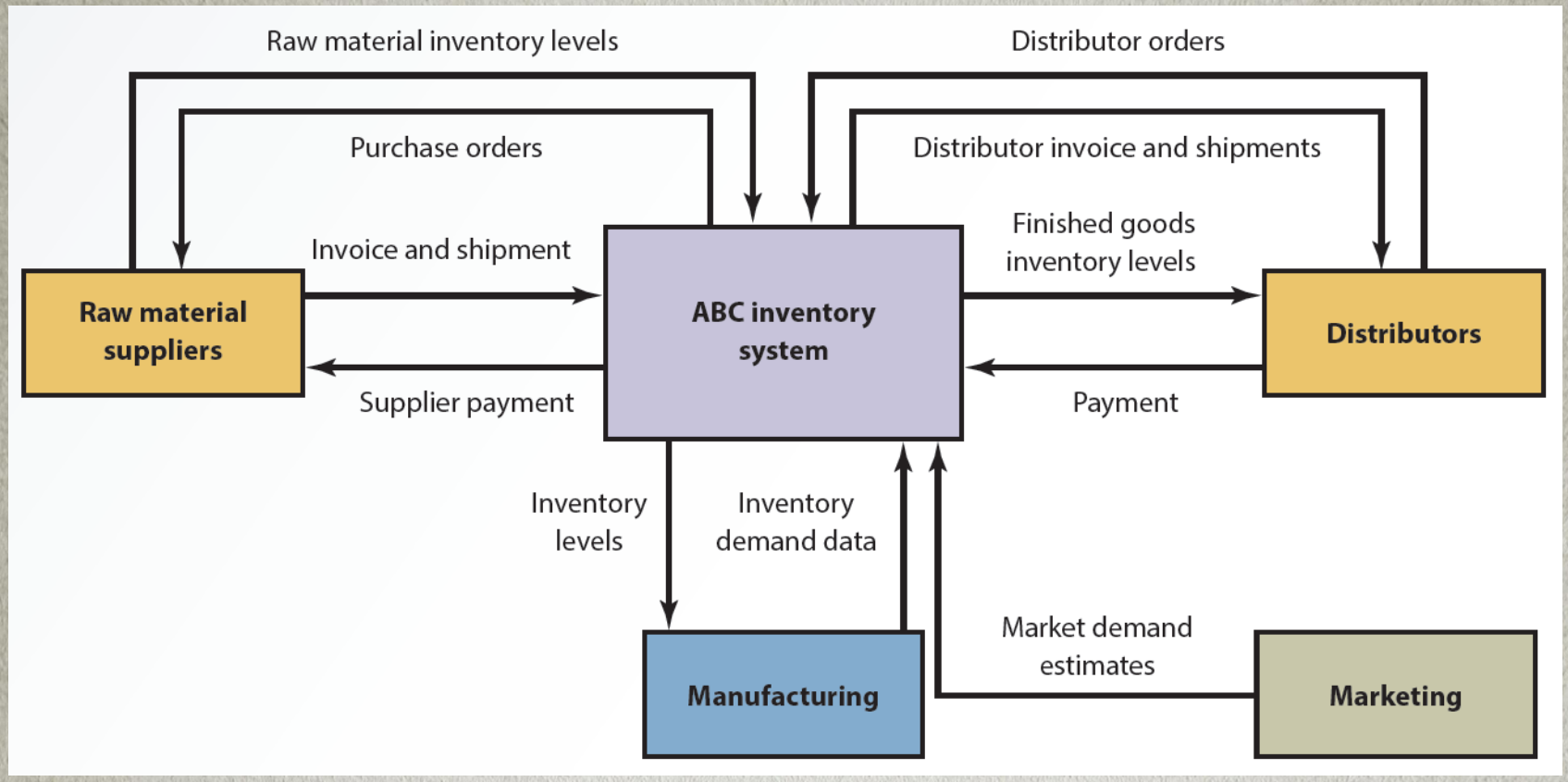


Exhibit 10.3 Context Diagram for ABC's Inventory Management System



Phase 3: Design (1 of 3)

- The most realistic solution that offers the highest payoff for the organization is chosen
  - Details of the proposed solution are outlined

Phase 3: Design (2 of 3)

- Document with exact specifications for implementing the system is drafted
  - Files and databases
  - Forms and reports
  - Documentation and procedures
  - Hardware and software
  - Networking components
  - General system specifications

Phase 3: Design (3 of 3)

- Consists of three parts
  - Conceptual design: overview of the system and does not include hardware or software choices
  - Logical design: makes conceptual design specific by indicating hardware and software
  - Physical design: created for specific platforms

Computer-Aided Systems Engineering (1 of 3)

- Computer-Aided Systems Engineering (CASE) tools automate parts of the application development process
  - Helpful for investigation and analysis in large-scale projects

Computer-Aided Systems Engineering (2 of 3)

- Help analysts:
  - Keep models consistent with each other
  - Document models with explanations and annotations
  - Ensure that models are created according to specific rules
  - Create a single repository of all models related to a single system
  - Track and manage design changes
  - Create multiple versions of the design

Computer-Aided Systems Engineering (3 of 3)

- CASE tools are similar to computer-aided design (CAD) tools
  - Capabilities vary; depend on the product
- Create output in the form of:
  - Specifications documents
  - Documentation of the analysis
  - Design specifications
  - Logical and physical design documents
  - Code modules

Prototyping (1 of 2)

- Small-scale version of the system is developed
  - Illustrates system benefits and allows users to offer feedback
- Purposes
  - Establishes system requirements
  - Determines a system's technical feasibility
  - Sells the proposed system to users and management using a selling prototype

Prototyping (2 of 2)

- Steps in prototyping
  - Define initial requirements
  - Develop the prototype
  - Review and evaluate the prototype
  - Revise the prototype

Prototyping Development Tools

- Development tools used in prototyping
  - Spreadsheet and database management packages
  - Visual Basic
  - CASE tools and third- and fourth-generation programming languages
  - User interface design tools

Advantages and Disadvantages of Prototyping (1 of 2)

- Advantages
  - Method for investigating an environment
  - Reduces the need to train information system users and costs
  - Increases the system's chance of success by encouraging users' involvement
  - Allows easy modification
  - Improves documentation and communication

Advantages and Disadvantages of Prototyping (2 of 2)

- Disadvantages
  - Requires excessive support and assistance from users and top management
  - May not reflect the final system's actual operation
  - Misleading; working prototype convinces the team that the final system will work

Phase 4: Implementation (1 of 3)

- Team configures the system and procures components for it
  - Tasks involved
    - Acquiring new equipment
    - Hiring and training new employees
    - Planning and designing physical layout
    - Coding and testing
    - Designing security measures and safeguards
    - Creating a disaster recovery plan

Phase 4: Implementation (2 of 3)

- Conversion options
  - Parallel: old and new systems run simultaneously for a short time to ensure the new system works correctly
  - Phased-in-phased-out: as each module of the new system is converted, the corresponding part of the old system is retired
    - Process continues until the entire system is operational

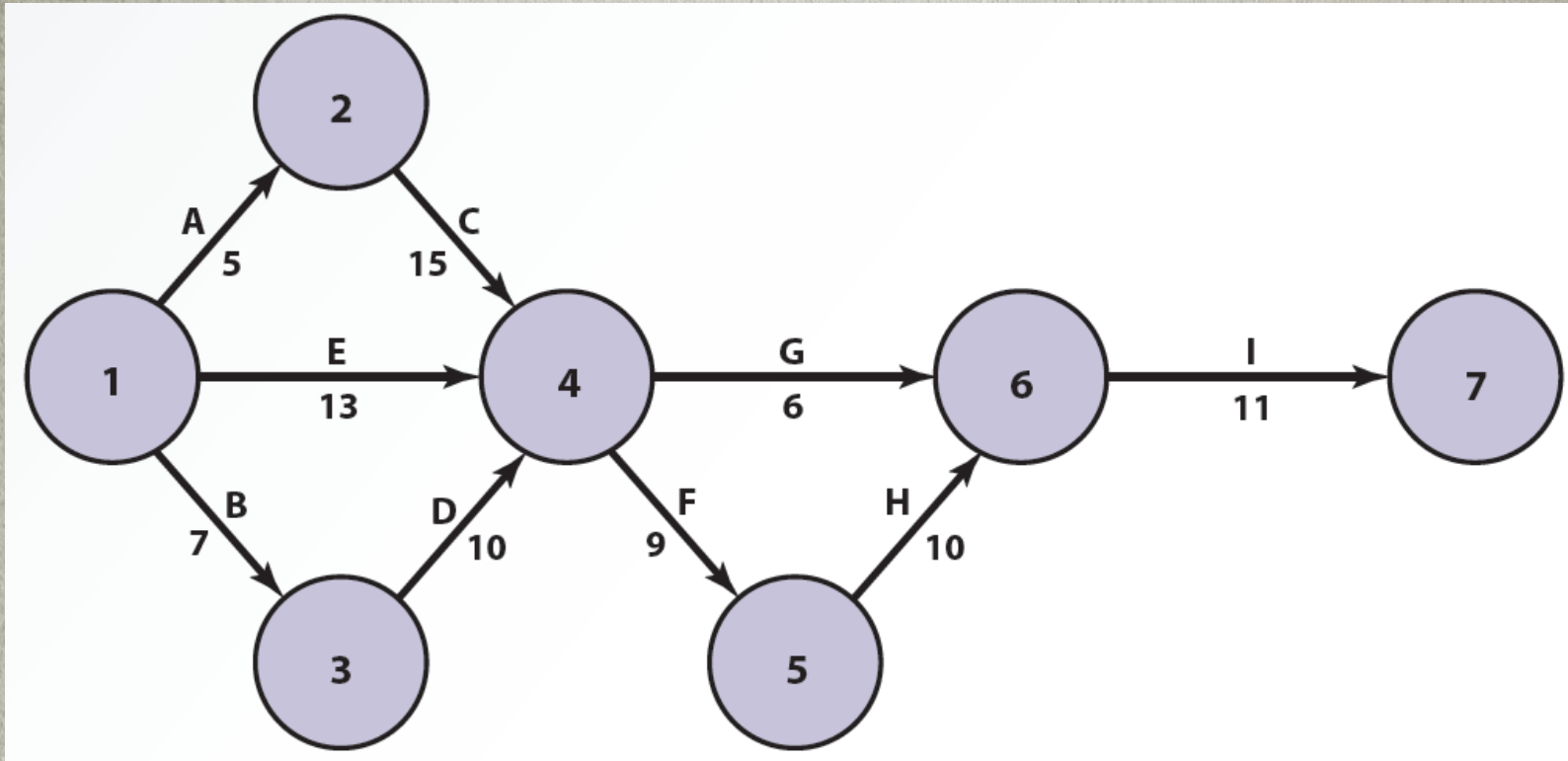
Phase 4: Implementation (3 of 3)

- Plunge (direct cutover): old system is stopped and the new system is implemented
- Pilot: analyst introduces the system in a limited area of the organization
  - Implemented in the rest of the organization in stages or all at once if the system works correctly

IT Project Management (1 of 2)

- Activities to plan, manage, and control information system creation and delivery
- Tools and techniques
  - Help solve scheduling problems, plan and set goals, and highlight potential bottlenecks
  - Project management software helps study cost, time, and impact of schedule changes
    - PERT (program evaluation review technique)
    - CPM (critical path method)

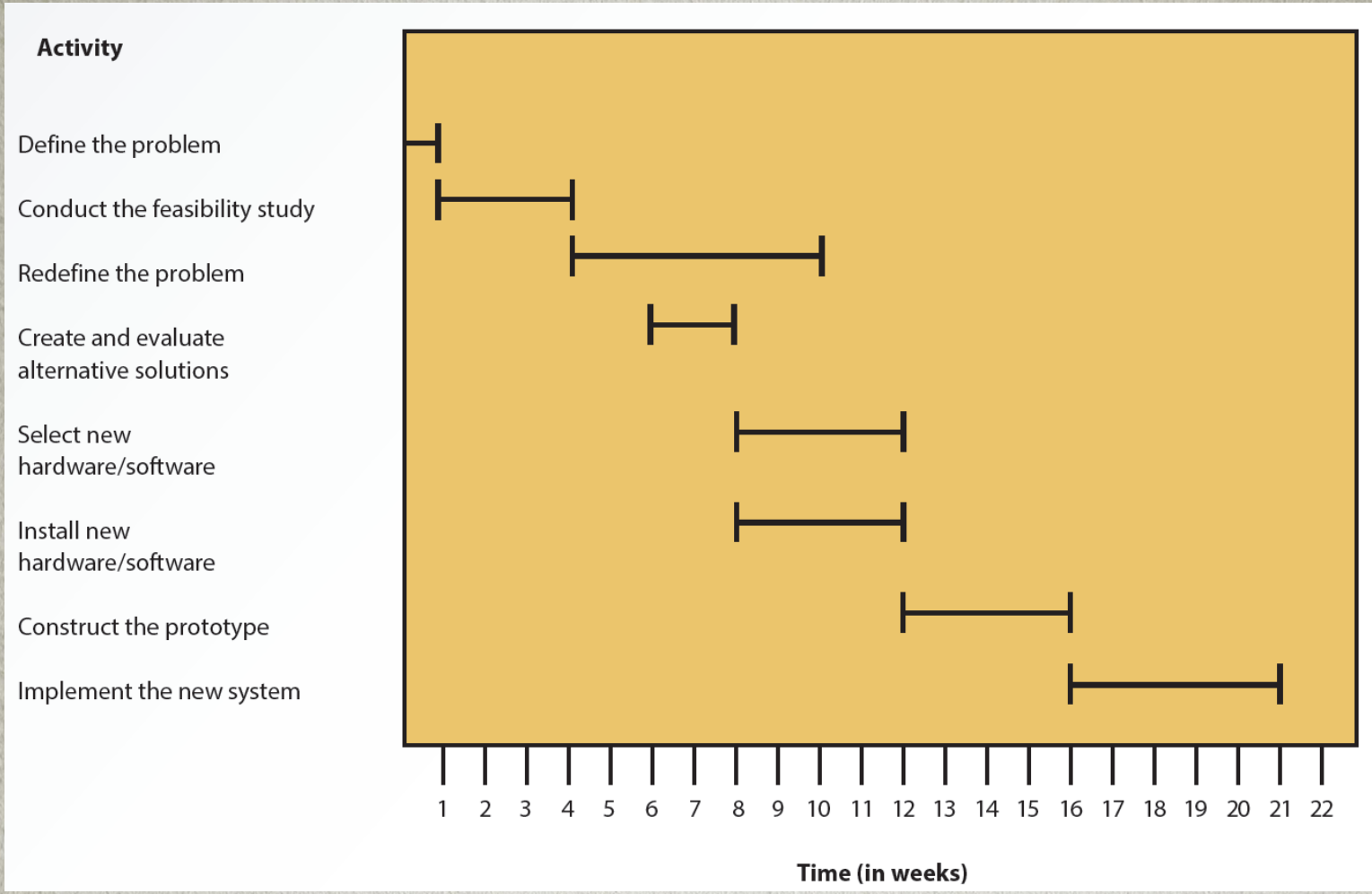
Exhibit 10.4 PERT Network



IT Project Management (2 of 2)

- Gantt chart
  - Constructed using the critical path
  - Allows the systems analyst to monitor the progress of the project
  - Helps detect delay in the daily operation of the project

Exhibit 10.5 Gantt Chart



Request for Proposal (1 of 3)

- Written document with detailed specifications
  - Used to request bids for equipment, supplies, or services from vendors
  - Contains information on functional, technical, and business requirements of the proposed information system

Request for Proposal (2 of 3)

- Advantages
  - All vendors get the same information and requirements, which aid in fair evaluation of bids
  - Useful to narrow down the list of prospective vendors
- Disadvantage
  - Time consuming

Request for Proposal (3 of 3)

- Request for information (RFI)
  - Alternative to an RFP
  - Screening document for gathering vendor information and narrowing the list of potential vendors
  - Helps manage selection of vendors by focusing on the project requirements crucial to selecting vendors

Implementation Alternatives

- The SDLC approach is sometimes called insourcing
  - Organization's team develops the system internally

Self-Sourcing (1 of 3)

- End users develop information systems with less or no formal assistance from the information systems (IS) team
  - Use off-the-shelf software to produce custom-built applications
  - Helps reduce the backlog in producing information systems
  - Improves flexibility in responding to users' information needs

Self-Sourcing (2 of 3)

- Disadvantages
  - Possible misuse of computing resources
  - Lack of access to crucial data
  - Lack of documentation
  - Inadequate security for the applications and systems
  - Applications may not be up to IS standards
  - Lack of support from top management
  - Lack of training for prospective users

Self-Sourcing (3 of 3)

- Organizations should develop guidelines for end users
  - Criteria for evaluating, approving or rejecting, and prioritizing projects
- Data administration should be enforced
  - Ensures integrity and reliability of information

Outsourcing (1 of 2)

- Organizations hire external vendors or consultants who specializes in providing development services
  - Crowdsourcing: process traditionally performed by employees or contractors to a crowd through an open call
- Outsourcing types
  - Onshore
  - Nearshore
  - Offshore

Outsourcing (2 of 2)

- Advantages
  - Less expensive
  - Quick delivery
  - Helps organizations concentrate on core functions and other projects
- Disadvantages
  - Loss of control
  - Dependency
  - Vulnerability of strategic information

Phase 5: Maintenance (1 of 2)

- Information system is operating
  - Enhancements and modifications to the system have been developed and tested
  - Hardware and software components have been added or replaced

Phase 5: Maintenance (2 of 2)

- Performance data and information is gathered and assessed
  - Feedback from users, customers, and other people affected by the new system is collected
- Corrective action is taken if the system's objectives are not being met

New Trends in Systems Analysis and Design

- SDLC model may be inappropriate if:
  - There is a lack of specifications
  - Input-output process cannot be identified completely
  - Problem is “ad hoc”
  - Users’ needs change constantly

Service-Oriented Architecture (1 of 2)

- Focuses on development, use, and reuse of small, self-contained blocks of codes
  - Attempts to solve software development issues by recognizing, accepting, and leveraging existing services

Service-Oriented Architecture (2 of 2)

- Blocks of codes are reused in different applications
  - Allow new business processes to be created from a pool of existing services
- Benefits
  - Reduced application development time
  - Greater flexibility
  - Improved return on investment

Rapid Application Development

- Concentrates on user involvement and continuous interaction between users and designers
  - Combines the planning and analysis phases to develop a prototype of the system
- Uses an iterative process
  - Design, development, and testing steps are repeated as needed based on feedback
- Problems: narrow focus and low quality

Extreme Programming (1 of 2)

- Method for developing software applications and IS projects
  - Project is divided into smaller functions
  - Developers cannot move to the next phase until the current phase is finished
  - Each function is developed step-by-step
- Advantages
  - Delivers the system to users as early as possible
  - Makes changes that the user suggests

Extreme Programming (2 of 2)

- Pair programming
  - Two programmers participate in one development effort at one workstation
  - Each programmer performs the action that the other is not currently doing
  - Helps in quick detection and correction of programming mistakes

Agile Methodology (1 of 2)

- Focuses on an incremental development process and timely delivery of working software
  - Less emphasis on team coding and more emphasis on limiting the project's scope
  - Sets a minimum number of requirements and turns them into a working product

Agile Methodology (2 of 2)

- Goals of the step-by-step approach
  - Respond to changing needs
  - Develop working, high-quality software
- Strives to deliver software quickly
  - Better meet customer needs

Summary (1 of 2)

- Systems development life cycle (SDLC) is a series of well-defined phases performed in sequence
  - Planning phase: forming a task force and conducting a feasibility study
  - Requirements-gathering and analysis phase: analysts define the problem and generate alternatives for solving it

Summary (2 of 2)

- Design phase: analysts choose a realistic solution that offers the highest payoff for the organization
  - Solution is transferred from paper to action in the implementing phase
- Maintenance phase: enhancements and modifications to the system are developed and tested