MIS

CHAPTER 10

BUILDING SUCCESSFUL INFORMATION SYSTEMS

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learning outcomes

LO1 Describe the systems development life cycle (SDLC) as a method for developing information systems.

LO2 Explain the tasks involved in the planning phase.

LO3 Explain the tasks involved in the requirements-gathering and analysis phase.

LO4 Explain the tasks involved in the design phase.

LO5 Explain the tasks involved in the implementation phase.

learning outcomes (cont'd.)

LO6 **Explain the tasks involved in the maintenance phase.**

LO7 **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

- System failure can happen for several reasons:
  - Missed deadlines
  - Users' needs that weren't met
  - Dissatisfied customers
  - Lack of support from top management
  - Going over budget, and so forth

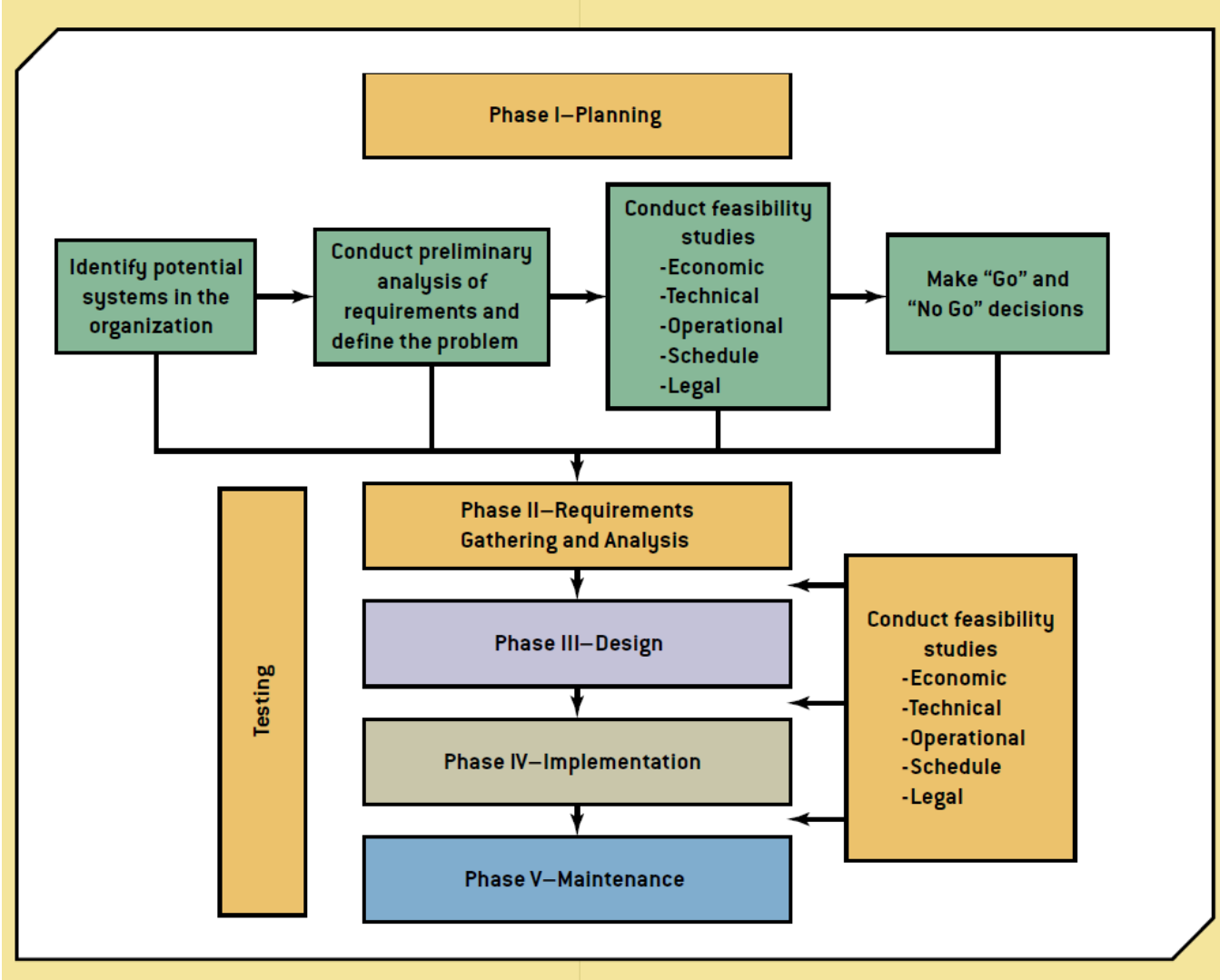
Systems Development Life Cycle: An Overview (cont'd.)

- **Systems development life cycle (SDLC)**
  - Also known as the "waterfall model"
  - Series of well-defined phases performed in sequence that serve as a framework for developing a system or project
  - Each phase's output (results) becomes the input for the next phase

Systems Development Life Cycle: An Overview (cont'd.)

- Systems planning
  - Evaluating all potential systems that need to be implemented
  - Preliminary analysis of requirements
- Feasibility study
  - Conducted for each system
  - Organization decides which ones are a priority
- Information system projects
  - Often an extension of existing systems or involve replacing an old technology with a new one

Phases of the SDLC



Phase 1: Planning

- One of the most crucial phases of the SDLC model
- Systems designer must understand and define the problem the organization faces
  - Problem can be identified internally or externally
- Analyst or team of analysts assesses the current and future needs of organization or a specific group of users

Phase 1: Planning (cont'd.)

- Questions:
  - Why is this information system being developed?
  - Who are the system's current and future users?
  - Is the system new or an upgrade or extension of an existing system?
  - Which functional areas (departments) will be using the system?

Phase 1: Planning (cont'd.)

- Analysts must examine:
  - Organization's strategic goals
  - How the proposed system can support these goals
  - Which factors are critical to the proposed system's success
  - Criteria for evaluating the proposed system's performance

Phase 1: Planning (cont'd.)

- Make sure users understand the four Ws:
  - Why
  - Who
  - When
  - What
- End result of this phase should give users and top management a clear view of:
  - What the problem is
  - How the information system will solve the problem

Phase 1: Planning (cont'd.)

- Example: ABC Furniture is planning for an information system to solve the problem of inaccurate inventory forecasts
  - Why
  - Who
  - When
  - What

Formation of the Task Force

- Consisting of representatives from different departments, systems analysts, technical advisors, and top management
- Team collects user feedback and tries to get users involved from the beginning
- **Internal users**
  - Employees who will use the system regularly
- **External users**
  - Include customers, contractors, suppliers, and other business partners

Formation of the Task Force (cont'd.)

- **Joint application design (JAD)**
  - Collective activity involving users and top management IT professionals
  - Centers on a structured workshop
  - Results in a final document containing definitions for data elements, workflows, screens, reports, and general system specifications

Feasibility Study

- Feasibility
  - Measure of how beneficial or practical an information system will be to an organization
  - Should be measured continuously throughout the SDLC process
- Usually has five major dimensions:
  - Economic, technical, operational, schedule, and legal

Economic Feasibility

- Assesses a system's costs and benefits
- Team tallies tangible development and operating costs for the system and compares them with expected financial benefits of the system
- Keep in mind that an information system project that's feasible at the outset could become unfeasible later

Economic Feasibility (cont'd.)

- Tangible benefits
  - Quantified in terms of monthly or annual savings
- Intangible benefits
  - Difficult to quantify in terms of dollar amounts
  - If they aren't at least identified, many information system projects can't be justified
- Cost-effectiveness analysis
  - Based on the concept that a dollar today is worth more than a dollar one year from now

Economic Feasibility (cont'd.)

- Most common analysis methods
  - Payback, net present value (NPV)
  - Return on investment (ROI)
  - Internal rate of return (IRR)
- Cost-benefit analysis (CBA) report
  - Used to sell the system to top management

Technical Feasibility

- Concerned with technology to be used in the system
- Team needs to assess whether technology to support the new system is available or feasible to implement
- Lack of technical feasibility
  - Can also stem from an organization lacking the expertise, time, or personnel to implement the new system

Operational Feasibility

- Measure of:
  - How well the proposed solution will work in the organization
  - How internal and external customers will react to it
- "Is the information system worth implementing?"

Schedule Feasibility

- Whether the new system can be completed on time
- If the new system can't be delivered in time
  - Loss of customers could force the organization out of business
- Problem of going over schedule
  - Common in the information systems field

Legal Feasibility

- Concerned with legal issues
- Typically addresses these questions:
  - Will the system violate any legal issues in the country where it will be used?
  - Are there any political repercussions of using the system?
  - Is there any conflict between the proposed system and legal requirements?
    - For example, does the system take the Information Privacy Act into account?

Phase 2: Requirements Gathering and Analysis

- **Requirements-gathering and analysis phase**
  - Analysts define the problem and generate alternatives for solving
- First step
  - Gathering requirements
  - Interviews, surveys, observations, JAD approach, etc.
- Team uses this information to determine:
  - What the new system should do (process analysis)
  - What data is needed for this process to be performed (data analysis)

Phase 2: Requirements Gathering and Analysis (cont'd.)

- Two major approaches for analysis and design of information systems:
  - Structured systems analysis and design (SSAD) approach
  - Object-oriented approach
- Use different tools for creating analysis models
- Models created during the analysis phase constitute the design specifications

Examples of Tools Used in SSAD Analysis Models

Table 10.1

Examples of tools used in SSAD analysis models

Modeling tool	What's analyzed	What it's used for
Data flow diagram (DFD)	Process analysis and design	Helps break down a complex process into simpler, more manageable, and more understandable subprocesses. Shows how data needed by each process flows between processes and what data is stored in the system. It also helps define the system's scope.
Flowchart	Process analysis	Illustrates the logical steps in a process but doesn't show data elements and associations. It can supplement a DFD and help analysts understand and document how a process works.
Context diagram	Process analysis and design	Shows a process at a more general level and is helpful for showing top management and the task force how a process works.
Conceptual data model (such as an entity relationship model)	Data analysis	Helps analysts understand the data requirements a system must meet by defining data elements and showing the associations between them.

A Data Flow Diagram for ABC's Inventory Management System

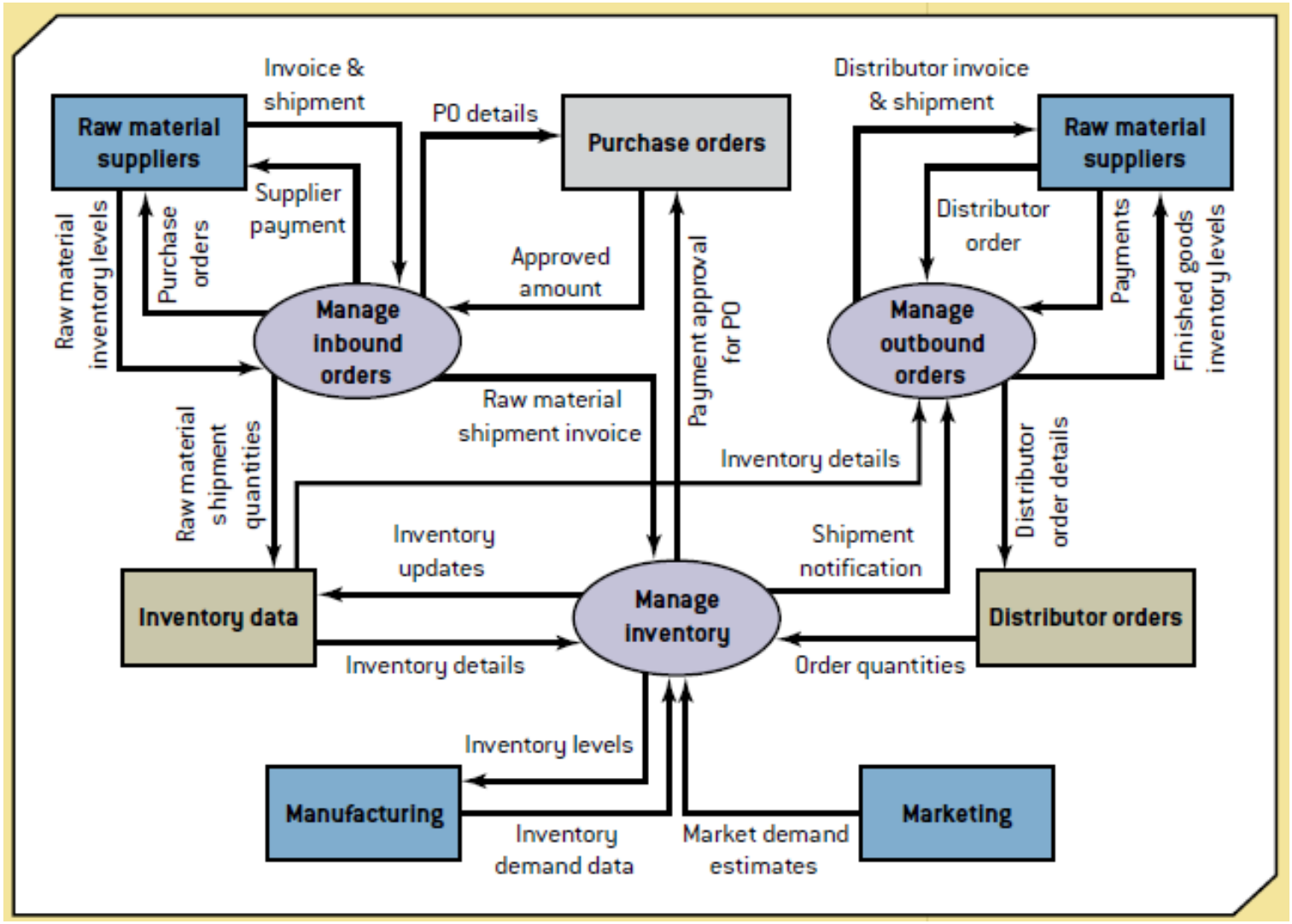
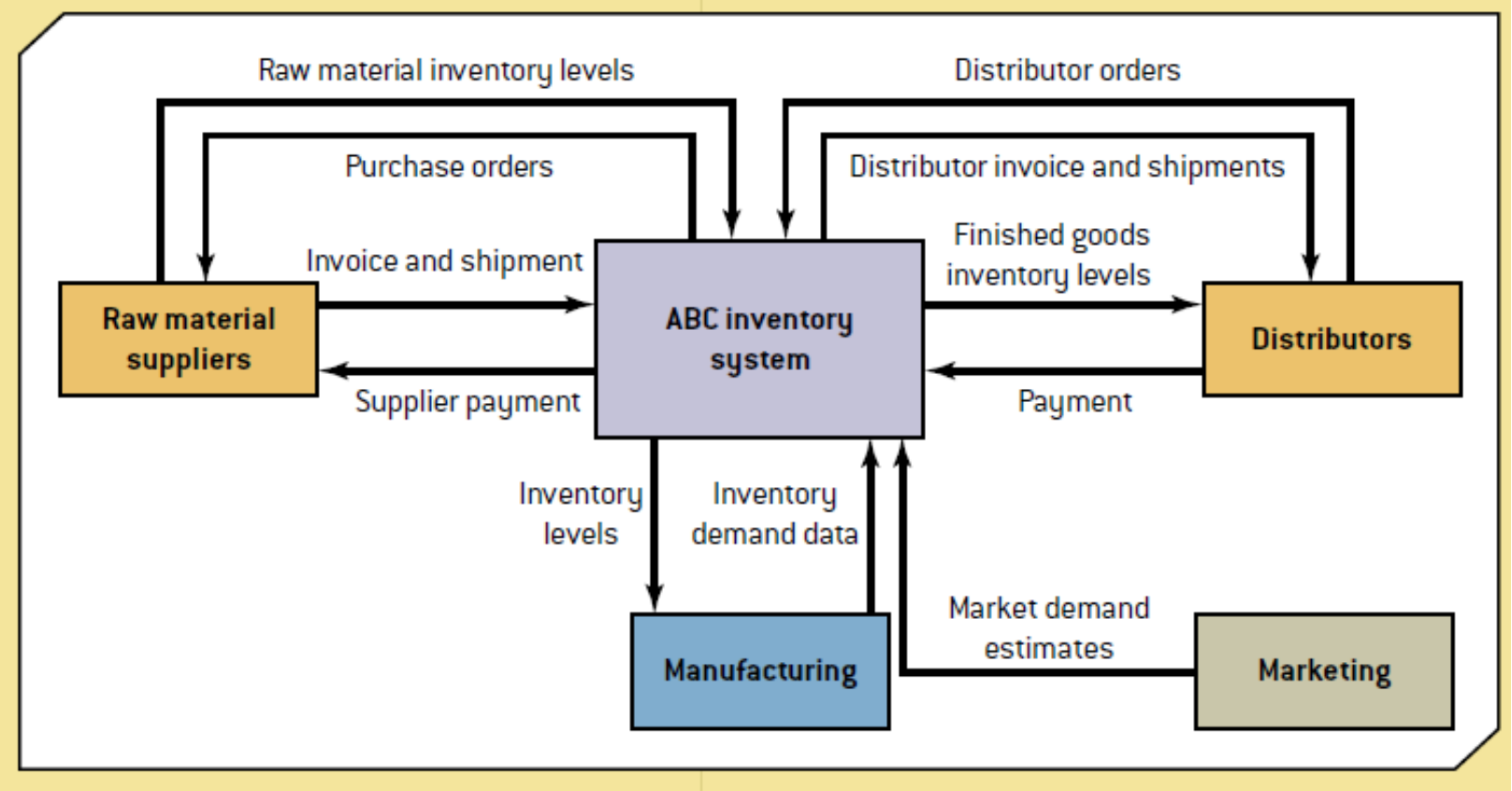


Exhibit 10.3 A Context Diagram for ABC's Inventory Management System



Phase 3: Design

- **Design phase**
  - Analysts choose the solution that's the most realistic and offers the highest payoff for the organization
- Output of this phase
  - Document with exact specifications for implementing the system
  - Includes files and databases, forms and reports, documentation, procedures, hardware and software, networking components, and general system specifications

Phase 3: Design (cont'd.)

- Design consists of three parts:
  - Conceptual design
  - Logical design
  - Physical design

Computer-Aided Systems Engineering

- **Computer-aided systems engineering (CASE) tools**
  - Automate parts of the application development process
- Benefits
- Capabilities
- Products:
  - CA Technologies ERwin Process Modeler, Oracle Designer, and Visible System Visible Analyst

Computer-Aided Systems Engineering (cont'd.)

- Outputs:
  - Specifications documents
  - Documentation of the analysis, including models and explanations
  - Design specifications with related documentation
  - Logical and physical design documents based on the conceptual design
  - Code modules that can be incorporated into the system

Prototyping

- Small-scale version of the system is developed
  - Large enough to illustrate the system's benefits
  - Allows users to offer feedback
- Prototypes are used for:
  - Gathering system requirements
  - Helping to determine system requirements
  - Determining a system's technical feasibility
  - Selling the proposed system to users and management

Prototyping (cont'd.)

- Steps:
  - Define the initial requirements
  - Develop the prototype
  - Review and evaluate the prototype
  - Revise the prototype
- Numerous prototyping development tools are available: e.g., spreadsheets
- Prototyping has advantages and disadvantages

Phase 4: Implementation

- **Implementation phase**
  - Solution is transferred from paper to action
  - Team configures the system and procures components for it
- Tasks
  - Acquiring new equipment
  - Hiring new employees
  - Training employees
  - Planning and designing the system's physical layout

Phase 4: Implementation (cont'd.)

- Coding
- Testing
- Designing security measures and safeguards
- Creating a disaster recovery plan

- Options for conversion:
  - **Parallel conversion**
  - **Phased-in-phased-out conversion**
  - **Plunge (direct cutover) conversion**
  - **Pilot conversion**

Request for Proposal

- Written document with detailed specifications
  - Used to request bids for equipment, supplies, or services from vendors
- Usually prepared during the implementation phase
- Advantage:
  - All vendors get the same information and requirements
- Disadvantage:
  - Time involved in writing and evaluating proposals

Request for Proposal (cont'd.)

- Free templates available for RFPs
- **Request for information (RFI)**
  - Screening document for gathering vendor information and narrowing the list of potential vendors

Implementation Alternatives

- **Insourcing**
  - Organization's team develops the system internally
- **Self-sourcing**
  - End users develop information systems with little or no formal assistance from the information systems team
  - Managers are concerned about end users' lack of adequate systems analysis and design background and loosening of system development standards

Implementation Alternatives (cont'd.)

- **Outsourcing**
  - Organization hires an external vendor or consultant who specializes in providing development services
  - Options:
    - Onshore
    - Nearshore
    - Offshore
  - Disadvantages of outsourcing:
    - Loss of control
    - Dependency
    - Vulnerability of strategic information

Phase 5: Maintenance

- Information system is operating
- Enhancements and modifications to the system have been developed and tested
- Hardware and software components have been added or replaced
- Team collects performance data and gathers information on whether the system is meeting its objectives
  - By talking with users, customers, and other people affected by the new system

New Trends in Systems Analysis and Design

- SDLC model might not be appropriate in these situations:
  - Lack of specifications
  - Input-output process can't be identified completely
  - Problem is "ad hoc"
  - Users' needs change constantly

Service-Oriented Architecture

- SOA focuses on the development, use, and reuse of small, self-contained blocks of codes (called services) to meet the software needs of an organization
- The fundamental principle behind SOA is that the "blocks of codes" can be reused in a variety of different applications, allowing new business processes to be created from a pool of existing services

Rapid Application Development

- Concentrates on user involvement and continuous interaction between users and designers
- Combines the planning and analysis phases into one phase
- Develops a prototype of the system
- Uses an iterative process
  - Repeats the design, development, and testing steps as needed, based on feedback from users

Extreme Programming

- Recent method for developing software applications and information system projects
- Divides a project into smaller functions
  - Developers can't go on to the next phase until the current phase is finished
- "Story" written on index cards
- **Pair programming**
  - Two programmers participate in one development effort at one workstation
- Major departure from traditional software development

Agile Methodology

- Similar to XP
- Less emphasis on team coding and more emphasis on limiting the project's scope
- Focuses on setting a minimum number of requirements and turning them into a working product
- Agile Alliance organization
  - Manifesto contains principles for this methodology

Summary

- SDLC phases:
  - Planning, requirements gathering and analysis, design, implementation, and maintenance
- CASE tools
- Prototyping
- RFP
- Self sourcing and outsourcing
- New trends in systems development