## Modern Systems Analysis and Design

### The Systems Development Environment

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## Learning Objectives

- ✓Define information systems analysis and design
- ✓Discuss the modern approach to systems analysis and design
- ✓Describe the organizational roles involved in information systems development

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## Learning Objectives

- ✓Describe four types of information systems:
  - ✓Transaction Processing Systems (TPS)
  - ✓Management Information Systems (MIS)
  - ✓Decision Support Systems (DSS)
  - ✓Expert Systems (ES)
- ✓Describe the information systems development life cycle (SDLC)

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## Learning Objectives

- ✓Discuss alternatives to the systems development life cycle
- ✓Discuss the role of computer-aided software engineering (CASE) tools in systems development

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## Introduction

- Information Systems Analysis and Design
  - Complex process whereby computer-based information systems are developed and maintained
- Application Software
  - Result of systems analysis and design
  - Designed to support specific organizational functions or processes

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## Introduction

- Software engineering processes have been developed to assist in analysis and design
  - Methodologies
    - Comprehensive, multi-step approaches to systems development
  - Techniques
    - Processes that are followed to ensure that work is well thought-out, complete and comprehensible to others on the project team
  - Tools
    - Computer programs to assist in application of techniques to the analysis and design process

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## Introduction

- Information Systems Analysis and Design
  - A method used by companies to create and maintain systems that perform basic business functions
  - Main goal is to improve employee efficiency by applying software solutions to key business tasks
  - A structured approach must be used in order to ensure success

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## Introduction

- Systems Analyst performs analysis and design based upon:
  - Understanding of organization's objectives, structure and processes
  - Knowledge of how to exploit information technology for advantage

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## Software Engineering Process

- A process used to create an information system
- Consists of:
  - Methodologies
    - A sequence of step-by-step approaches that help develop the information system
  - Techniques
    - Processes that the analyst follows to ensure thorough, complete and comprehensive analysis and design
  - Tools
    - Computer programs that aid in applying techniques

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## Data and Processes

- Three key components of an information system
  - Data
  - Data Flows
  - Processing Logic
- Data vs. Information
  - Data
    - Raw facts
  - Information
    - Derived from data
    - Organized in a manner that humans can understand.

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## Data and Processes

- Data
  - Understanding the source and use of data is key to good system design
  - Various techniques are used to describe data and the relationship amongst data
- Data Flows
  - Groups of data that move and flow through the system

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## Data and Processes

- Data Flows (Continued)
  - Include description of sources and destination for each data flow
- Processing Logic
  - Describe steps that transform data and events that trigger the steps

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## Approaches to Systems Development

- Process-Oriented Approach
  - Focus is on flow, use and transformation of data in an information system
  - Involves creating graphical representations such as data flow diagrams and charts
  - Data are tracked from sources, through intermediate steps and to final destinations
  - Natural structure of data is not specified
  - Disadvantage: data files are tied to specific applications

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## Approaches to Systems Development

- Data-Oriented Approach
  - Depicts ideal organization of data, independent of where and how data are used
  - Data model describes kinds of data and business relationships among the data
  - Business rules depict how organization captures and processes the data

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## Databases and Application Independence

- Database
  - Shared collection of logically related data
  - Organized to facilitate capture, storage and retrieval by multiple users
  - Centrally managed
  - Designed around subjects
    - Customers
    - Suppliers
- Application Independence
  - Separation of data and definition of data from applications

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## Organizational Responsibilities in Systems Development

- Systems Analysts work in teams
  - Project Based
  - Includes
    - IS Manager
    - Programmers
    - Users
    - Other specialists
  - Characteristics of Successful Teams
    - Diversity of backgrounds
    - Tolerance of diversity
    - Clear and complete communication
    - Trust
    - Mutual Respect
    - Reward structure that promotes shared responsibility

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## Organizational Responsibilities in Systems Development

- IS Manager
  - May have a direct role in systems development if the project is small
  - Typically involved in allocating resources to and overseeing system development projects.
- Systems Analyst
  - Key individuals in the systems development process

## Organizational Responsibilities in Systems Development

- Skills of a Successful Systems Analyst
  - Analytical
    - Understanding of organizations
    - Problem solving skills
    - System thinking
      - Ability to see organizations and information systems as systems
  - Technical
    - Understanding of potential and limitations of technology
  - Management
    - Ability to manage projects, resources, risk and change
  - Interpersonal
    - Effective written and oral communication skills

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## Organizational Responsibilities in Systems Development

- Programmers
  - Convert specifications into instructions that the computer understands
  - Write documentation and testing programs
- Business Managers
  - Have power to fund projects and allocate resources
  - Set general requirements and constraints for projects

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## Organizational Responsibilities in Systems Development

- Other IS Managers/Technicians
  - Database Administrator
    - Involved in design, development and maintenance of databases
  - Network and telecommunications experts
    - Develop systems involving data and/or voice communications
  - Human Factors Specialists
    - Involved in training users and writing documentation
  - Internal Auditors
    - Ensure that required controls are built into the system

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## Types of Information Systems and Systems Development

- Transaction Processing Systems (TPS)
  - Automate handling of data about business activities (transactions)
- Management Information Systems (MIS)
  - Converts raw data from transaction processing system into meaningful form
- Decision Support Systems (DSS)
  - Designed to help decision makers
  - Provides interactive environment for decision making

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## Types of Information Systems and Systems Development

- Expert Systems (ES)
  - Replicates decision making process
  - Knowledge representation describes the way an expert would approach the problem

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## Systems Development Life Cycle

- System Development Methodology
  - Standard process followed in an organization
  - Consists of:
    - Analysis
    - Design
    - Implementation
    - Maintenance

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## Systems Development Life Cycle

- Series of steps used to manage the phases of development for an information system
- Consists of six phases:
  - Project Identification and Selection
  - Project Initiation and Planning
  - Analysis
  - Design
  - Implementation
  - Maintenance

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## Systems Development Life Cycle

- Phases are not necessarily sequential
- Each phase has a specific outcome and deliverable
- Individual companies use customized life cycles

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## Phases of the Systems Development Life Cycle

- Project Identification and Selection
  - Two Main Activities
    - Identification of need
    - Prioritization and translation of need into a development schedule
  - Helps organization to determine whether or not resources should be dedicated to a project.
- Project Initiation and Planning
  - Two Activities
    - Formal preliminary investigation of the problem at hand
    - Presentation of reasons why system should or should not be developed by the organization

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## Systems Development Life Cycle

- Analysis
  - Study of current procedures and information systems
    - Determine requirements
      - Study current system
      - Structure requirements and eliminate redundancies
    - Generate alternative designs
    - Compare alternatives
    - Recommend best alternative

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## Systems Development Life Cycle

- Design
  - Logical Design
    - Concentrates on business aspects of the system
  - Physical Design
    - Technical specifications
- Implementation
  - Implementation
    - Hardware and software installation
    - Programming
    - User Training
    - Documentation

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## Systems Development Life Cycle

- Maintenance
  - System changed to reflect changing conditions
  - System obsolescence

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## Approaches to Development

- Prototyping
  - Building a scaled-down working version of the system
  - Advantages:
    - Users are involved in design
    - Captures requirements in concrete form
- Rapid Application Development (RAD)
  - Utilizes prototyping to delay producing system design until after user requirements are clear

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## Improving IS Development Productivity

- Computer-aided software engineering (CASE) tools
  - Facilitate creation of a central repository for system descriptions and specifications

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## Summary

- Information systems analysis and design
  - Process of developing and maintaining an information system
- Modern approach to systems analysis
  - Process-Oriented
  - Data-Oriented

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## Summary

- Four types of information systems
  - Transaction Processing (TPS)
  - Management Information Systems (MIS)
  - Decision Support (DSS)
  - Expert Systems (ES)

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## Summary

- Systems Development Life Cycle (SDLC)
  - Project Identification and Selection
  - Project Initiation and Planning
  - Analysis
  - Design
  - Implementation
  - Maintenance

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## Summary

- Alternatives to Systems Development Life Cycle
  - Prototyping
  - Rapid Application Development (RAD)
- Computer-aided software engineering (CASE) tools

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