Systems Analysis and Design 10th Edition

Chapter 1

Introduction to Systems Analysis and Design

Harry J. Rosenblatt. (2014). *Systems Analysis and Design, 10th Edition, International Edition.* Course Technology, Cengage Learning.

Chapter Objectives

- Describe the impact of information technology
- Define systems analysis and design and the role of a systems analyst
- Define an information system and describe its components
- Explain how to use business profiles and models
- Explain Internet business strategies and relationships, including B2C and B2B

Chapter Objectives (Cont.)

- Identify various types of information systems and explain who uses them
- Distinguish among structured analysis, object-oriented analysis, and agile methods
- Explain the waterfall model, and how it has evolved
- Discuss the role of the information technology department and the systems analysts who work there

Introduction

- Companies use information as a weapon in the battle to increase productivity, deliver quality products and services, maintain customer loyalty, and make sound decisions
- Information technology can mean the difference between success and failure

FIGURE 1-1 These headlines show the enormous impact of information technology on our lives.

What Is Information Technology?

- **Information Technology (IT)**
  - Combination of hardware and software products and services that companies use to manage, access, communicate, and share information
- **Welcome to the 21st Century: The IT Journey Continues**
  - Changes in the world
  - Changes in technology
  - Changes in client demand

Coming to work in 1953

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... and in 2013

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FIGURE 1-3 How times have changed!

What Is Information Technology?

(Cont.)

- **Systems Analysis and Design**
  - Step-by-step process for developing high-quality information systems
  - **What Does a Systems Analyst Do?**
    - Plan, develop, and maintain information systems
    - Also manages IT projects, including tasks, resources, schedules, and costs
    - Conducts meetings, delivers presentations, and writes memos, reports, and documentation

Information System Components

- A system is a set of related components that produces specific results
- Mission-critical systems are vital to a company's operations
- Information systems have five key components: hardware, software, data, processes, and people

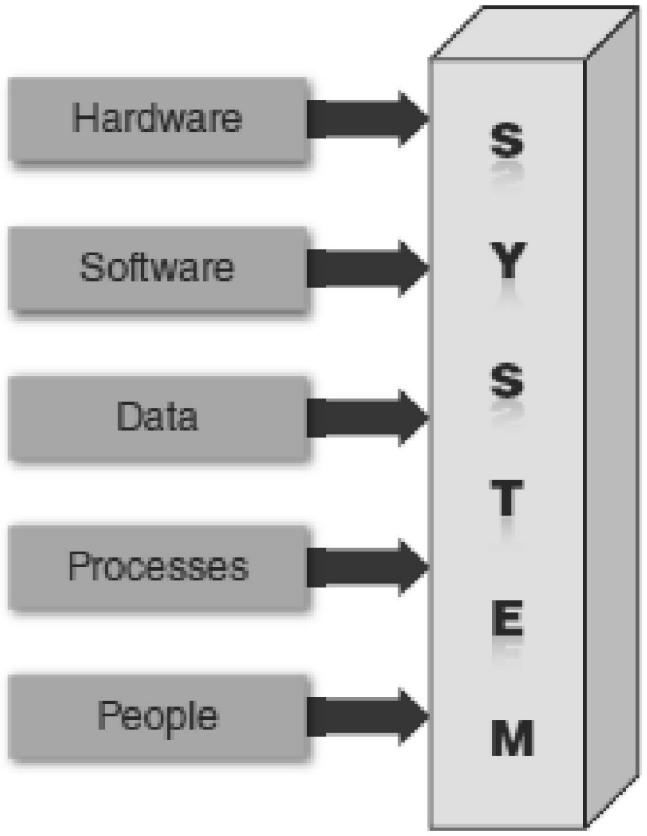


FIGURE 1-6 An information system needs these components.

Information System Components

(Cont.)

- Hardware
  - Is the physical layer of the information system
  - Moore's Law
- Software
  - System software
  - Application software
    - Horizontal system
    - Vertical system
    - Legacy systems

FIGURE 1-7 Server farms provide the enormous power and speed that modern IT systems need.

Information System Components

(Cont.)

- **Data**
  - Tables store data
  - Linked tables work together to supply data
- **Processes**
  - Describe the tasks and business functions that users, managers, and IT staff members perform to achieve specific results
- **People**
  - Stakeholders
  - Users or end users

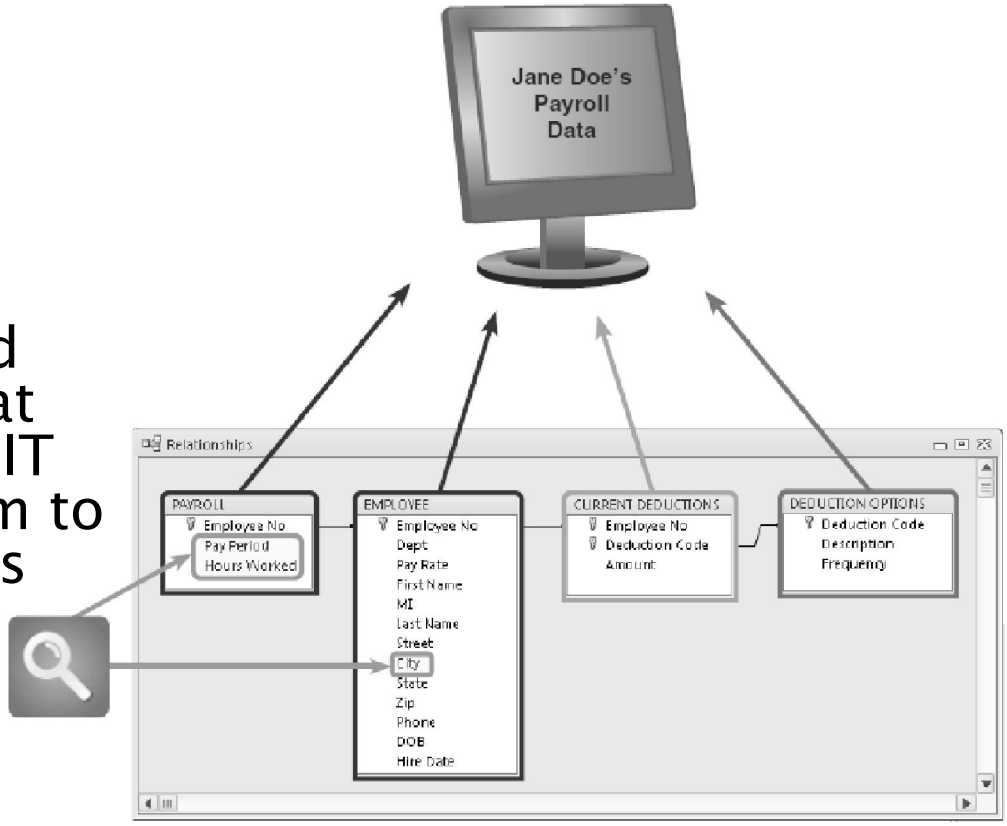


FIGURE 1-8 In a typical payroll system, data is stored in separate tables that are linked to form an overall database.

Business in the 21st Century

- Three major trends:
  - Rapidly increasing globalization
  - Technology integration for seamless information access
  - Rapid growth of cloud-based computing and services
- All trends are Internet-centric and driven by the immense power of the Web

Business in the 21st Century (Cont.)

- E-commerce or I-commerce
- B2C (Business-to-Consumer)
- B2B (Business-to-Business)
  - EDI
  - Supply chain management (SCM)
  - Supplier relationship management (SRM)
- **What's Next?**
  - Traditionally, IT companies were product-oriented or service-oriented
  - Today's IT companies offer a mix of products, services, and support

Business in the 21st Century (Cont.)

- Internet-dependent firms
  - Primary business depends on the Internet rather than a traditional business channel
- Brick-and-mortar firms
  - Have physical stores where customers can see and touch the products
  - Have expanded their Web-based marketing channels to increase sales and serve customers better
    - Combine convenience of online shopping and the alternative of hands-on purchasing
    - Lowe's, Costco, Target, and Wal-Mart are examples

Business in the 21st Century (Cont.)

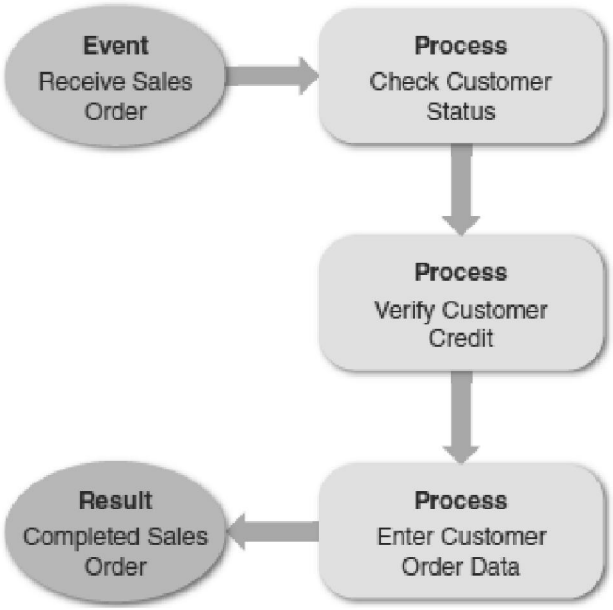
- The Web-based business model leveled the playing field for small firms that now can reach a global marketplace
- Discount coupon business gets a new life
  - eBay and Groupon
  - Firms now using global positioning system (GPS) coordinates to tempt buyers with nearby deals

Business in the 21st Century (Cont.)

- **Business Profiles**
  - Overview of a company's mission, functions, organization, products, services, customers, suppliers, competitors, constraints, and future direction
- **Business Processes**
  - Specific set of transactions, events, and results that can be described and documented
  - A **business process model (BPM)** graphically displays one or more business processes

Business in the 21st Century (Cont.)

FIGURE 1-14 A simple business model might consist of an event, three processes, and a result.



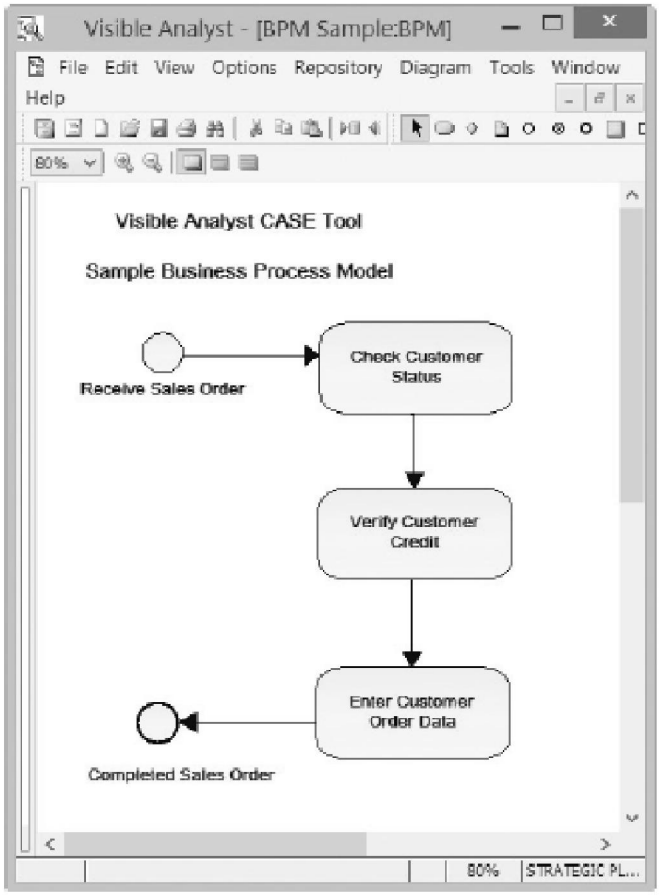


FIGURE 1-15 This sample uses business process modeling notation (BPMN) to represent the same events, processes, and workflow shown in Figure 1-14.

Business in the 21st Century (Cont.)

Business Information Systems

- The old way:
  - Administrative staff used office systems
  - Operational people used operational systems
  - Middle managers used decision support systems
  - Top managers used executive information systems
- The “now” way
  - All employees use office productivity systems
  - Operations users require decision support systems

Business in the 21st Century (Cont.)

- A new set of system definitions
  - Enterprise computing systems
  - Transaction processing systems
  - Business support systems
  - Knowledge management systems
  - User productivity systems

Business in the 21st Century (Cont.)

Enterprise Computing

- Information systems that support company-wide operations and data management requirements
- Examples:
  - Wal-Mart's inventory control system
  - Boeing's production control system
  - Hilton Hotels' reservation system

- Applications called enterprise resource planning (ERP) systems provide cost-effective support for users and managers throughout the company

Business in the 21st Century (Cont.)

Transaction Processing

- Transaction processing (TP) systems process data generated by day-to-day business operations Examples:
  - Customer order processing
  - Accounts receivable
  - Warranty claim processing
- A TP system verifies customer data, checks customer credit, checks stock status, posts to accounts receivable, adjusts inventory levels, and updates the sales file

FIGURE 1-17 A single sales transaction consists of six separate tasks, which the TP system processes as a group.

Business in the 21st Century (Cont.)

Business Support

- Provide job-related information support to users at all levels of a company
  - Can work hand-in-hand with a TP system
  - New development is RFID
- Radio frequency identification (RFID) technology uses high-frequency radio waves to track physical objects.

FIGURE 1-18 With an RFID tag, items can be tracked and monitored throughout the shipping process.

Business in the 21st Century (Cont.)

- **Knowledge Management**
  - Uses a large database called a knowledge base
  - Allows users to find information by entering keywords
  - Uses inference rules, which are logical rules that identify data patterns and relationships

Business in the 21st Century (Cont.)

- **User Productivity**
  - Technology that improves productivity
  - Groupware
- **Systems Integration**
  - Most large companies require systems that combine transaction processing, business support, knowledge management, and user productivity features

What Information Do Users Need?

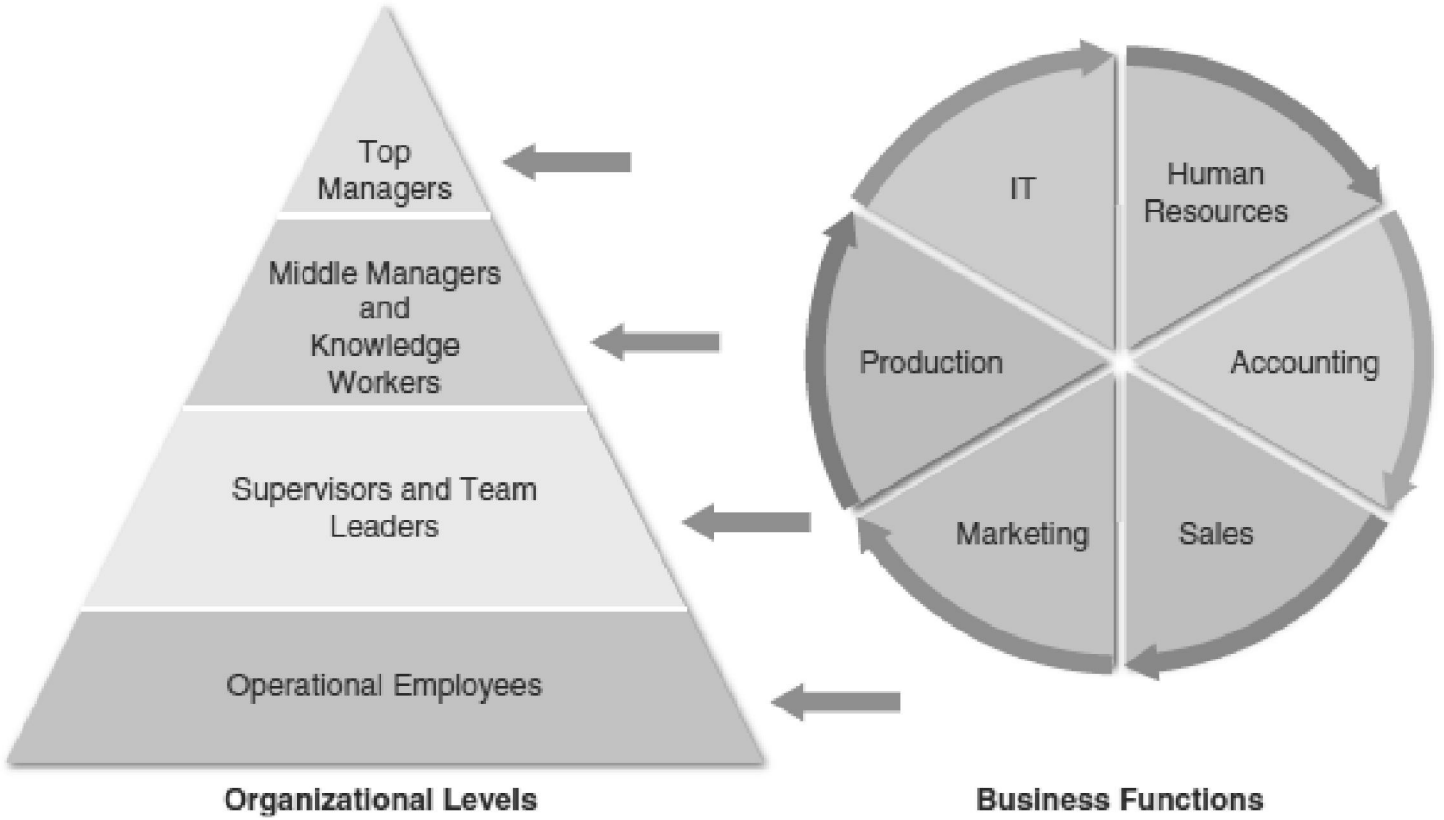


FIGURE 1-20 A typical organizational model identifies business functions and organizational levels.

What Information Do Users Need?

(Cont.)

- **Top Managers**
  - Develop long-range **strategic plans**, which define the company's overall mission and goals
  - Need information on economic forecasts, technology trends, competitive threats, and governmental issue
- **Middle Managers and Knowledge Workers**
  - Provide direction, necessary resources, and performance feedback to supervisors and team leaders
  - Need more detailed information than top managers

What Information Do Users Need?

(Cont.)

- **Supervisors and Team Leaders**
  - Oversee operational employees and carry out day-to-day functions
  - Need decision support information, knowledge management systems, and user productivity systems
- **Operational Employees**
  - Rely on TP systems to enter and receive data they need to perform their jobs
  - Need information to handle tasks and make decisions previously made by supervisors

Systems Development Tools

- Modeling
  - Business model
  - Requirements model
  - Data model
  - Object model
  - Network model
  - Process model

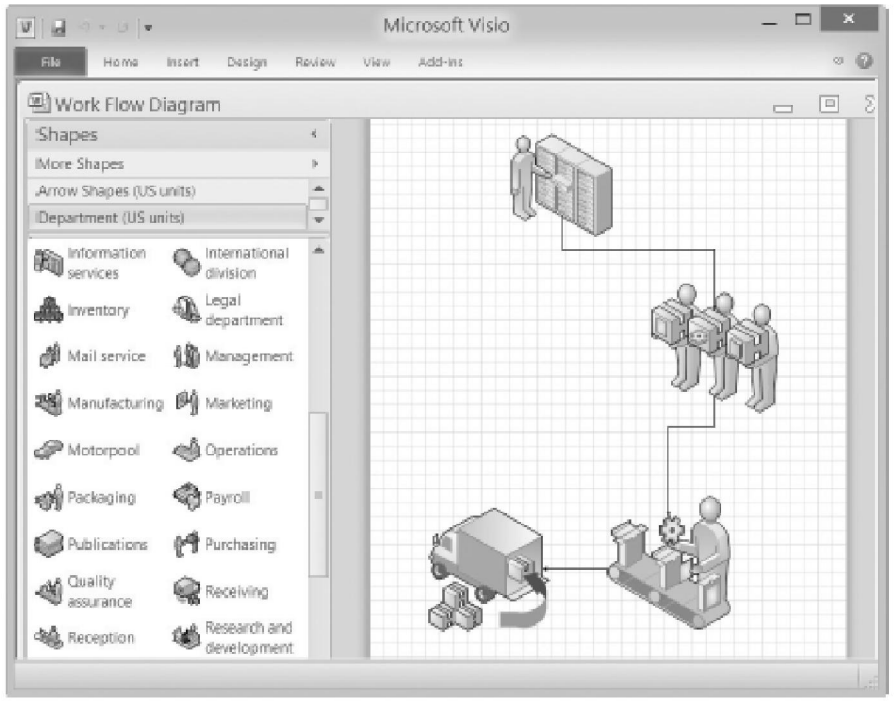


FIGURE 1-21 Microsoft Visio allows you to drag and drop various symbols and connect them to show a business process.

Systems Development Tools (Cont.)

- Prototyping
  - Early working version of an information system
  - Speeds up the development process significantly
  - Important decisions might be made too early, before business or IT issues are thoroughly understood
  - A prototype based on careful fact-finding and modeling techniques can be an extremely valuable tool

Systems Development Tools (Cont.)

- **Computer-Aided Systems Engineering (CASE) Tools**
  - Provide an overall framework for systems development and support a wide variety of design methodologies such as:
    - Structured analysis
    - Object-oriented analysis
  - Can generate program code, which speeds the implementation process

Systems Development Methods

- **Structured Analysis**
  - Traditional method for developing systems
  - Organized into phases
- **Object-Oriented Analysis**
  - More recent method for developing systems
  - Objects represent actual people, things, or events
- **Agile/Adaptive Methods**
  - Latest trend in software development
  - Team-based effort broken down into cycles

Systems Development Methods

(Cont.)

- **Structured Analysis**
  - Time-tested and easy to understand
  - Uses phases called the systems development life cycle (SDLC)
  - Predictive approach
  - Uses process models to describe a system graphically

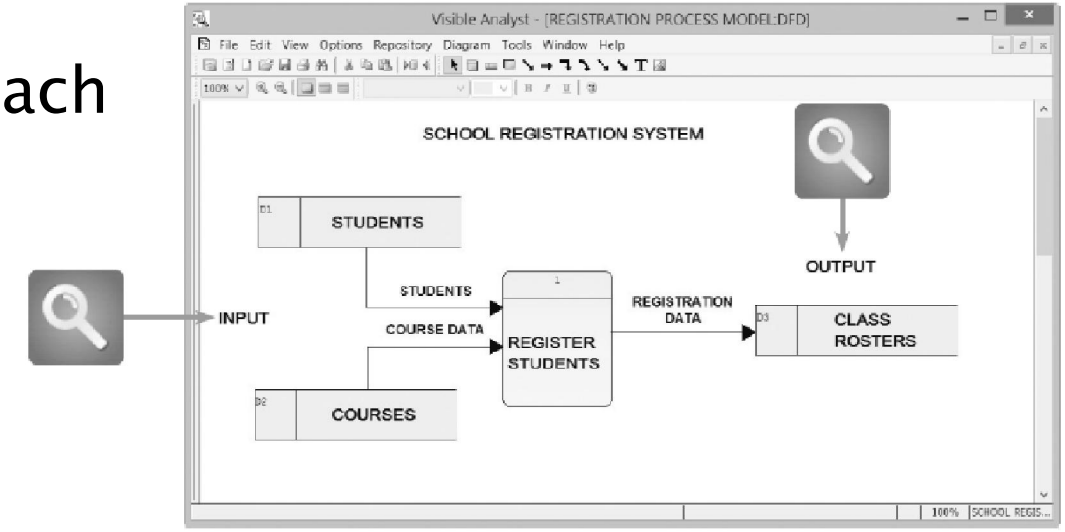


FIGURE 1-24 This Visible Analyst screen shows a process model for a school registration system. The REGISTER STUDENTS process accepts input data from two sources and transforms it into output data.

Systems Development Methods

(Cont.)

- The SDLC model usually includes five steps
  - Systems Planning
  - Systems Analysis
  - Systems Design
  - Systems Implementation
  - Systems Security and Support

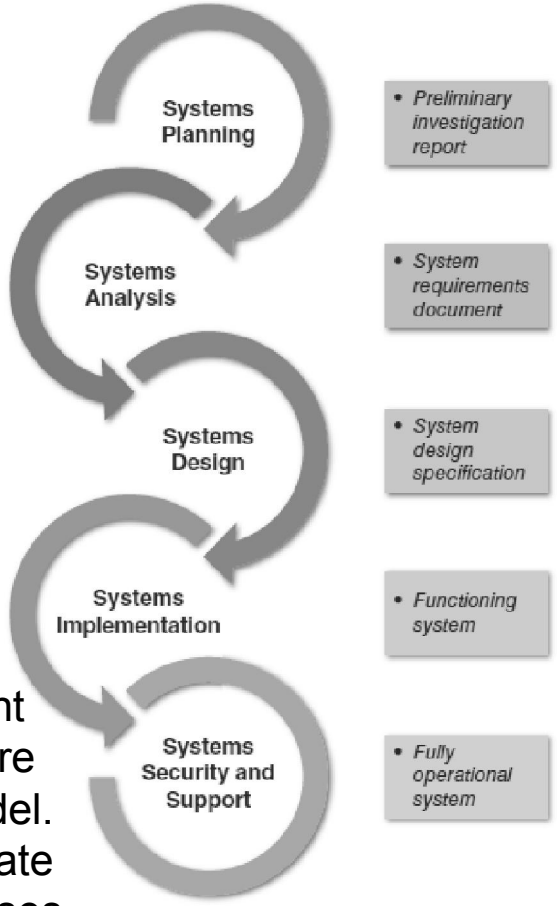


FIGURE 1-25 Development phases and deliverables are shown in the waterfall model. The circular symbols indicate interaction among the phases.

Systems Development Methods

(Cont.)

- **Systems Planning**
  - Systems request – begins the process and describes problems or desired changes
  - Purpose of this phase is to perform a preliminary investigation – a critical step
  - Key part of preliminary investigation is a feasibility study

Systems Development Methods

(Cont.)

- **Systems Analysis**
  - Build a logical model of the new system
  - Perform fact-finding techniques
  - Build business models, data and process models, and object models
  - Deliverable is the system requirements document

Systems Development Methods

(Cont.)

- **Systems Design**
  - Create a physical model that satisfies all documented requirements
  - Design user interface
  - Identify outputs, inputs, and processes
  - Deliverable is the system design specification
  - Management and user involvement is critical

Systems Development Methods

(Cont.)

- **Systems Implementation**
  - New system is constructed
  - Programs are written and tested
  - System is installed
  - Deliverable is a completely functioning and documented information system
- **Systems Support and Security**
  - A well-designed system must be secure, reliable, maintainable, and scalable
  - Most information systems need to be updated significantly or replaced after several years of operation

Systems Development Methods

(Cont.)

- **Object-Oriented Analysis**
  - Combines data and the processes that act on the data into things called objects
  - Objects are members of a class, which is a collection of similar objects
  - Built-in processes, called methods, can change an object's properties
  - O-O methodology provides easy transition to O-O programming languages like Java

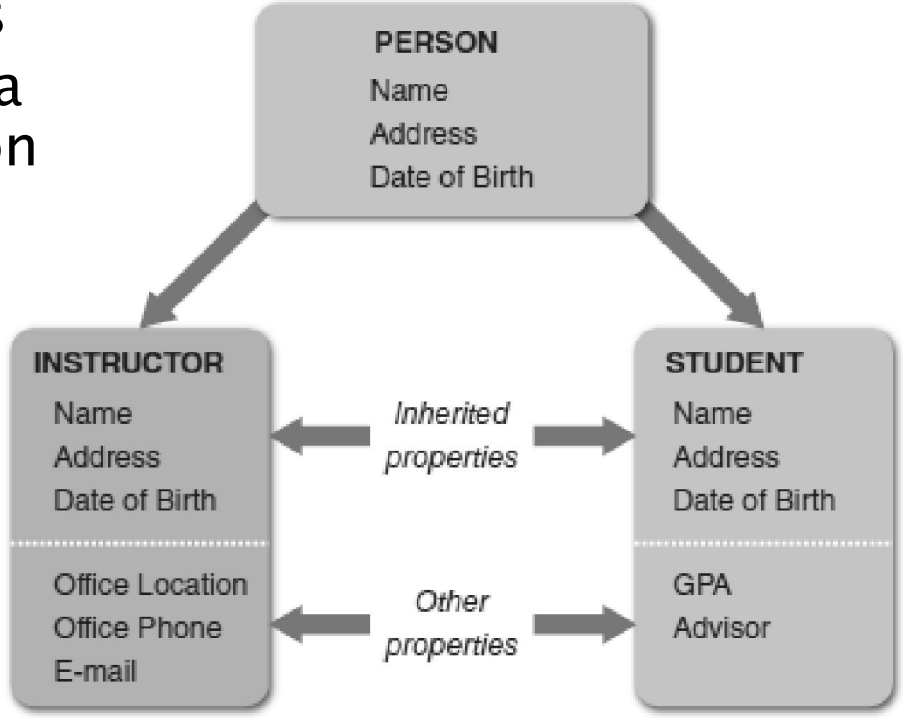


FIGURE 1-26 The PERSON class includes INSTRUCTOR and STUDENT objects, which have their own properties and inherited properties.

Systems Development Methods

(Cont.)

- **Agile Methods**
  - Newest development technique as systems are developed incrementally
  - A series of prototypes are built and adjusted to meet user requirements
  - As the process continues, developers revise, extend, and merge earlier versions into the final product
  - Agile method emphasizes continuous feedback
    - Iterative development
  - Agile community has published the Agile Manifesto
  - Spiral model

Systems Development Methods

(Cont.)

- Agile Methods
  - Agile process determines the end result
  - Other adaptive variations and related methods exist
  - Two examples are Scrum and Extreme Programming (XP)
  - Analysts should understand the pros and cons of any approach before selecting a development method

Systems Development Methods

(Cont.)

- Other Development Methods
  - Teams consists of IT staff, users, and managers
    - joint application development (JAD)
      - Focuses on team-based fact-finding
    - Rapid application development (RAD)
      - A compressed version of the entire development process

Systems Development Methods

(Cont.)

- Develop a project plan
- Involve users and listen carefully to them
- Use project management tools to identify tasks and milestones
- Develop accurate cost and benefit information
- Remain flexible

The Information Technology Department

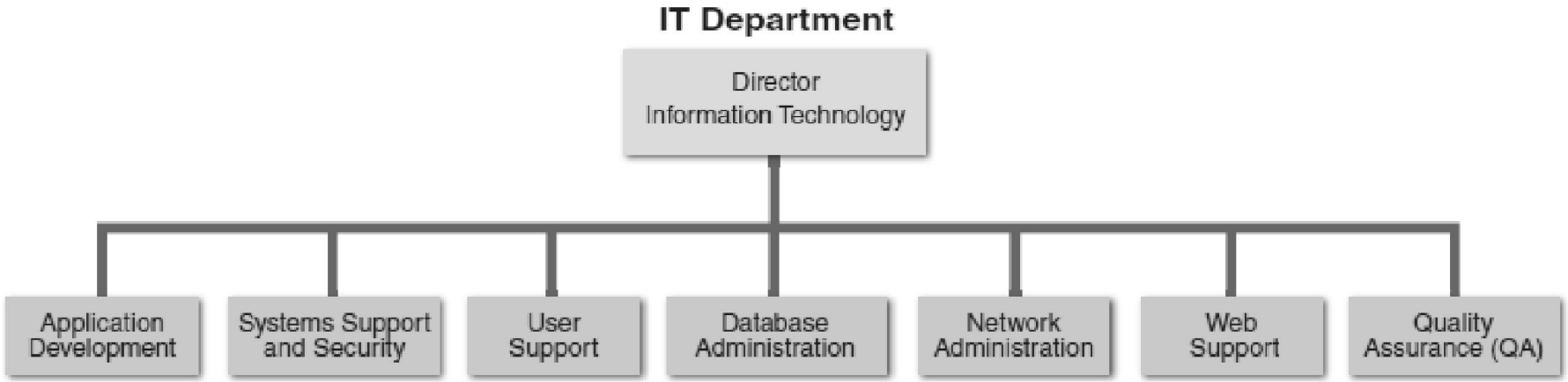


FIGURE 1-29 Depending on its size, an IT department might have separate organizational units for these functions, or they might be combined into a smaller number of teams.

The Information Technology Department

(Cont.)

Application Development

- Systems are developed by teams consisting of users, managers, and IT staff members

- Knowledge, Skills, and Education
  - Need technical knowledge, strong oral and written communication skills and analytic ability, an understanding of business operations, and critical thinking skills
- Certification
  - Important credential

The Information Technology Department

(Cont.)

Application Development

- Systems are developed by teams consisting of users, managers, and IT staff members

Systems Support and Security

- Provides vital protection and maintenance services

User Support

- Provides users with technical information, training, and productivity support

The Information Technology Department

(Cont.)

Database Administration

- Involves data design, management, security, backup, and access systems

Network Administration

- Includes hardware and software maintenance, support, and security

Web Support

- Web support specialists design and construct Web pages, monitor traffic, manage hardware and software, and link Web-based applications to the company's information systems

Quality Assurance

- Team that reviews and tests all applications and systems changes to verify specifications and software quality standards

The Systems Analyst

- **Role**
  - Analysts build a series of models, diagrams, and decision tables and uses other descriptive tools and techniques
  - An analyst's most valuable skill is the ability to listen
  - An effective analyst will involve users in every step of the development process
- **Knowledge, Skills, and Education**
  - Technical Knowledge
  - Communication Skills
  - Business Skills
  - Critical Thinking Skills
  - Education
  - Certification

The Systems Analyst (Cont.)

- **Career Opportunities**
  - Companies will need systems analysts to apply new information technology, and the explosion in e-commerce will fuel IT job growth
- What's important?
  - Job Titles
  - Company Organization
  - Company Size
  - Salary, Location and Future Growth
  - Corporate Culture

Chapter Summary

- IT refers to the combination of hardware and software resources that companies use to manage, access, communicate, and share information
- The essential components of an information system are hardware, software, data, processes, and people
- Successful companies offer a mix of products, technical and financial services, consulting, and customer support

Chapter Summary (Cont.)

- Information systems are identified as enterprise computing systems, transaction processing systems, business support systems, knowledge management systems, or user productivity systems
- Organization structure includes top managers, middle managers and knowledge workers, supervisors and team leaders

Chapter Summary (Cont.)

- The IT department develops, maintains, and operates a company's information systems
- Systems analysts need a combination of technical and business knowledge, analytical ability, and communication skills
- Systems analysts need to consider salary, location, and future growth potential when making a career decision