Introduction to System Analysis and Design
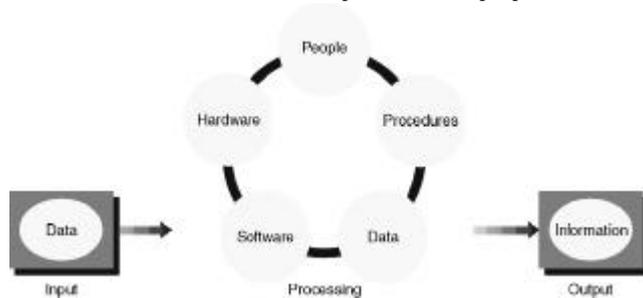
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Information Technology (IT)

- A combination of
  - ◆ Hardware
  - ◆ Software
  - ◆ Telecommunications systems
- Support business operations
- Improve productivity
- Help managers make decisions.

Information System

- An Information System has five key components: hardware, software, data, processes, and people.

Information System Components

- Hardware
  - ◆ Hardware refers to the physical layer of the information system.
- Software
  - ◆ Software consists of system software and application software.
- Data
  - ◆ An information system transforms data into useful information.

Information System Components

- Processes
  - Describe the tasks that users, managers, and IT staff members perform.
- People
  - Users, sometimes called end users, include employees, customers, vendors, and others who interact with an information system.

Business Process Modeling

- A business model graphically represents business functions that consist of business processes, such as sales, accounting, and purchasing, which perform specific tasks.

Types of Business Information System

- Enterprise Computing Systems
  - Enterprise computing refers to information systems that support company wide data management requirements.
- Transaction Processing Systems
  - Transaction Processing (TP) systems and Online Transaction Processing (OLTP) systems are called operational systems because they process data generated by day-to-day business operations.
- Business Support Systems
  - Business Support Systems (BSS) provide job-related information support to users at all levels of a company.
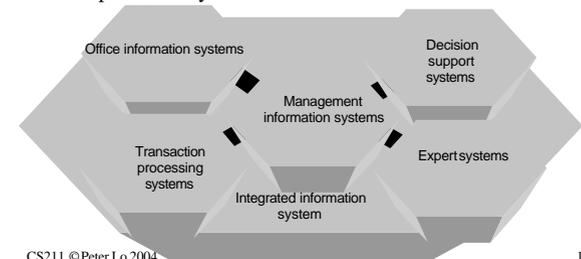
Types of Business Information System

- Knowledge Management Systems
  - Knowledge management systems are sometimes called expert systems because they simulate human reasoning by combining a knowledge base and inference rules that determine how the knowledge is applied.
- User Productivity Systems
  - User productivity systems provide employees at all organizational levels with a wide array of tools that can improve quality and job performance.

Types of Business Information System

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

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Information Systems Integration

- Systems that combine enterprise computing, transaction processing, business support, knowledge management, and user productivity features.

Office information systems • Decision support systems • Management information systems • Transaction processing systems • Expert systems • Integrated information system

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What are the Levels of Users?

Focus on the company's overall goals and objectives

EXECUTIVE MANAGEMENT (strategic decisions) — chief executive officer, chief information officer, president, vice president

Applies specific programs and plans necessary to meet the stated objectives

MIDDLE MANAGEMENT (tactical decisions) — personnel manager, director of public relations, purchasing manager

Involves day-to-day activities within the company

OPERATIONAL MANAGEMENT (operational decisions) — office manager, shop floor foreman, supervisor

Access information necessary to make decisions – a trend called empowering users

NONMANAGEMENT EMPLOYEES (on-the-job decisions) — accountant, engineer, secretary, order entry clerk

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Organizational Structure

- Top Management (Executive Management)
  - Top managers develop long-range plans that define the company's overall mission and goals. Focuses on issues that affect the company's future survival and growth, including long-term IT plans. Use information systems to set the company's course and direction.
- Middle Management
  - Middle managers focus their goals on a shorter time frame. Develop plans to achieve business objectives, delegate authority and responsibility to team leaders or supervisors and provide direction, necessary resources, and feedback on performance as tasks are completed.

Organizational Structure

- Lower Management (Operational Management)
  - Oversee operational employees and carry out day-to-day operational plans. Coordinate operational tasks, make necessary decisions, and ensure that the right tools, materials, and training are available.
- Operational Employees (Non-management Employees)
  - Primarily use Transaction Processing systems to enter and receive data.

Tools and Techniques

- Modeling
  - Modeling produces a graphical representation of a concept or process that systems developers can analyze, test, and modify.
    - Business model
    - Data model
    - Object model
    - Process model

Tools and Techniques

- Prototyping
  - Prototyping involves the creation of an early working version of the information system or its components.
  - Building a scaled-down working version of the system
  - Advantages:
    - Users are involved in design
    - Captures requirements in concrete form.

Computer-Aided Systems Engineering (CASE)

- Computer-aided systems engineering is a technique that uses powerful programs, called CASE tools, to help systems analysts develop and maintain information systems

Joint Application Development and Rapid Application Development

- Both approaches use teams composed of users, managers, and IT staff to complete projects.
- A variation on Joint Application Development (JAD), rapid application development (RAD) creates an application more quickly through such strategies as using fewer formal methodologies and reusing software components.

Joint Application Development (JAD)

- JAD is a methodology that involves the client or end user in the design and development of an application, through a succession of collaborative workshops called JAD sessions.
- Chuck Morris and Tony Crawford, both of IBM, developed JAD in the late 1970s and began teaching the approach through workshops in 1980.
- The JAD approach, in comparison with the more traditional practice, is thought to lead to faster development times and greater client satisfaction, because the client is involved throughout the development process. In comparison, in the traditional approach to systems development, the developer investigates the system requirements and develops an application, with client input consisting of a series of interviews.

Rapid Application Development (RAD)

- RAD is a concept that products can be developed faster and of higher quality through:
  - Gathering requirements using workshops or focus groups
  - Prototyping and early, reiterative user testing of designs
  - The re-use of software components
  - A rigidly paced schedule that defers design improvements to the next product version
  - Less formality in reviews and other team communication

Rapid Application Development (RAD)

- Some companies offer products that provide some or all of the tools for RAD software development.
- These products include requirements gathering tools, prototyping tools, computer-aided software engineering tools, language development environments such as those for the Java platform, groupware for communication among development members, and testing tools.
- RAD usually embraces object-oriented programming methodology, which inherently fosters software re-use. The most popular object-oriented programming languages, C++ and Java, are offered in visual programming packages often described as providing rapid application development.

Rapid Application Development

RAPID APPLICATION DEVELOPMENT USING ITERATIVE PROTOTYPING
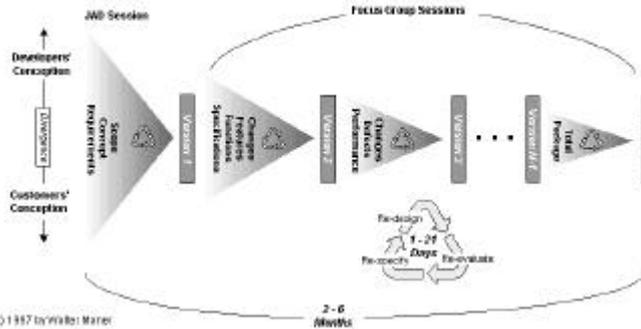
Systems Development Methodologies

- Structured Analysis
  - Structured analysis uses a series of phases, called the Systems Development Life Cycle (SDLC) to plan, analyze, design, implement, and support an information system.
- Object-Oriented Analysis
  - Object-oriented (OO) analysis combines data and the processes that act on the data into things called objects.
- Other Development Strategies
  - Example, Microsoft has developed an approach called Microsoft Solutions Framework (MSF) that documents the experience of its own IT teams.
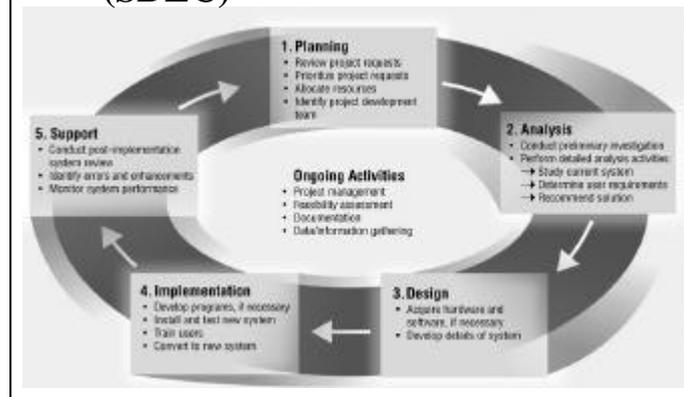

Systems Development Life Cycle

- Structured analysis uses a technique called the Systems Development Life Cycle (SDLC) to plan and manage the systems development process.
- The SDLC Model includes the following steps:
  - Systems planning
  - Systems analysis
  - Systems design
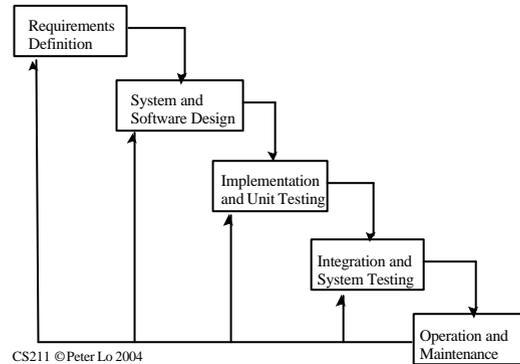 - Systems implementation
  - Systems operation and support

System Development Life Cycle (SDLC)

Waterfall Model

Waterfall Model

- The process model has 5 stages. After a stage is complete, it goes into next.
- The waterfall model is a documentation-driven model and offers a means of making the development process more visible.
- The waterfall model is a dynamic model, and the feedback loops play an important role.

Information Technology Department

- The Information Technology (IT) Department develops and maintains a company's information systems

Role of Systems Analyst

- A systems analyst investigates, analyses, designs, develops, installs, evaluates, and maintains a company's information systems.
  - Responsible for designing and developing information system
  - Liaison between users and IT professionals
  - Converts user requests into technical specifications