System Analysis and Design

Required Text Book

- Modern System Analysis & Design, 4th

  Jefferey A. Hoffer, Joey F. George and Joseph. S. Valacich

  Prentice-Hall, 2005

- System Analysis and Design Methods, 7th

  Jeffrey L. Whitten, Lonnie D. Bentley

  McGraw – Hill, 2007

Course Objective

- To provide you with new ways of looking at information in the world in order to solve business problems.
- To introduce you to concepts and methods of SAD.
- To describe the systems development life cycle (SDLC).
- To teach you effective methods for gathering essential information during system analysis.
- To teach you effective methods for designing systems to solve problems effectively using technology.

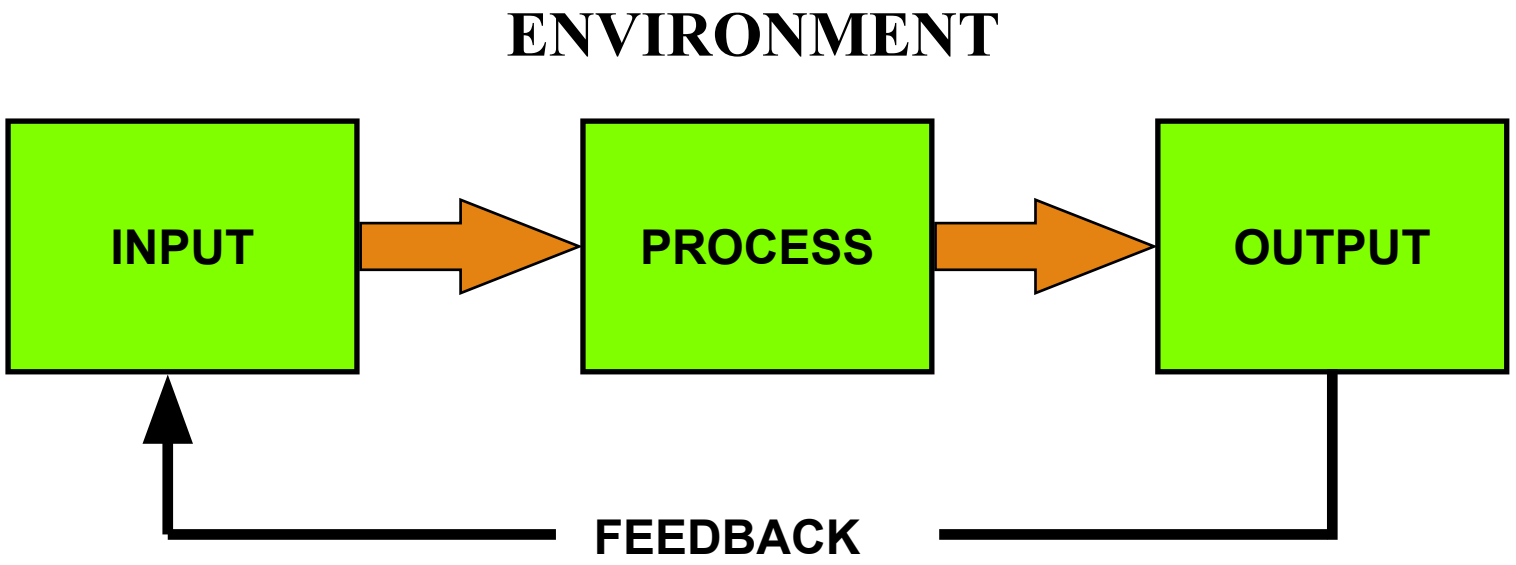
Chapter 1 - Introduction

Key ideas

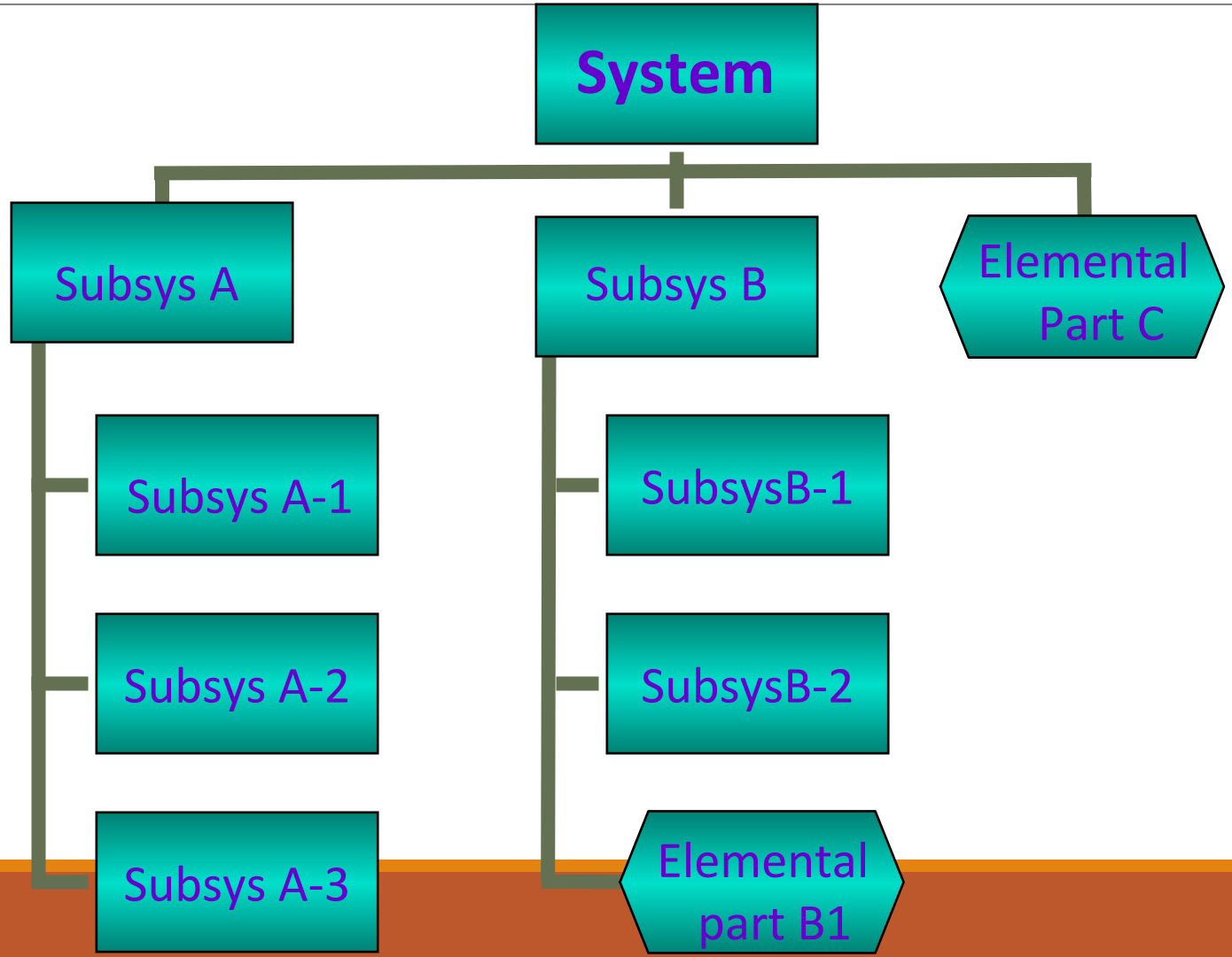
- Many failed systems were abandoned because analysts tried to build wonderful systems without understanding the organization.
- The primarily goal is to create value for the organization.

What is a system?

- A collection of parts that work together to achieve a goal/task
  - Examples
    - Solar system
    - Public transport system
    - Computer system
    - Information system
- A set of objects and relationships among the objects viewed as a whole and designed to achieve a purpose


ENVIRONMENT
INPUT
PROCESS
OUTPUT
FEEDBACK

Systems
Can Be Composed of Subsystems



What is a subsystem?

- A subsystem is simply a system within a system.
  - Example
    - Automobile is a system composed of subsystems:
      - Engine system
      - Body system
      - Frame system
    - Each of these subsystem is composed of sub-sub --systems.
      - Engine system: carburetor system, generator system, fuel system …

Bad system

- Fail to meet requirements
- Poor performance
- Poor reliability
- Lack of usability
- Example difficulties:
  - Not to schedule
  - Not to budget
  - Runaway = 100% over budget or schedule

Data and Information

- **Data** are raw facts about the organization and its business transactions. Most data items have little meaning and use by themselves.
- Data are a collection of items such as words, numbers, images, and sounds that are not organized and have little meaning individually.
- Data are raw facts about people, objects, and events in an organization.
- **Information**: Data that is organized

What is an Information System?

Interrelated components working together to

- Collect
- Process
- Store
- Disseminate information

to support decision making, control, analysis and visualization in an organization.

What is an Information System?

- a system that provides the information needed to accomplish the organization's tasks.
- a computer based information system uses computers to provide the needed information.

Information types

- Transaction Processing Systems (TPS)
- Management Information Systems (MIS)
- Decision Support Systems (DSS)
- Expert System and Artificial Intelligence (ES &AI)

Transaction Processing Systems (TPS)

- TPS are computerized information systems that were developed to automate the handling of data about business activities and transactions.
  - Data about each transaction are captured,
  - Transactions are verified and accepted/rejected,
  - Validation transactions are stored for later aggregation.
  - Report may be produced to provide summarization of the transactions.
  - Transaction may be moved from process to process in order to handle all aspects of the business activities.

Management Information Systems (MIS)

- Serves the functions of planning, controlling, and decision making by providing routine summary and exception reports.
- Takes the relatively raw data available through a TPS and converts them into a meaningful aggregated form that managers need to conduct their responsibilities.
- Developing an MIS calls for a good understanding of what kind of information managers require and how managers use information in their jobs.

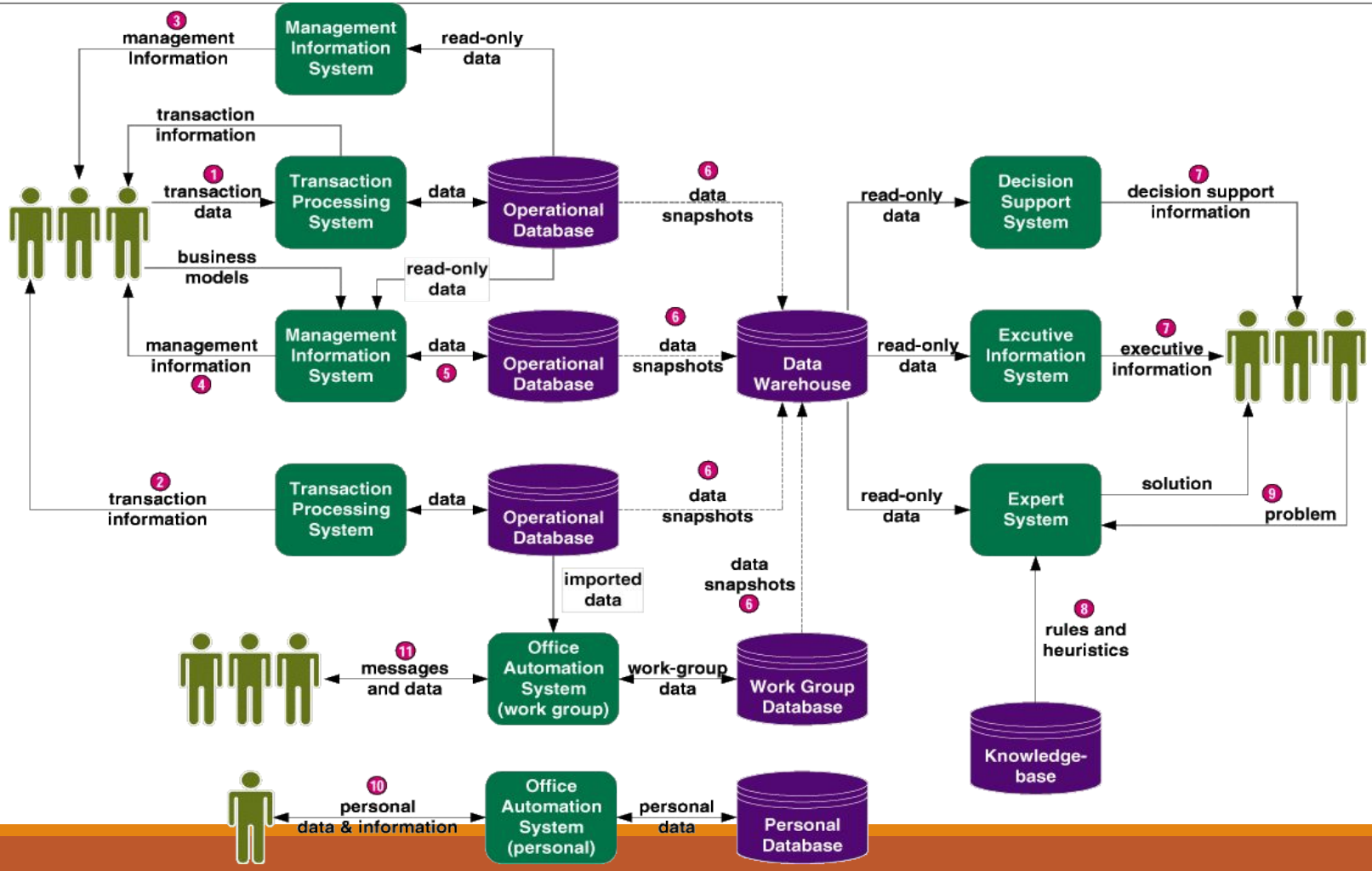
Decision Support systems (DSS)

- Combines data and sophisticated analytical models or data analysis tools to support semi-structured and unstructured decision making.
- A DSS is composed of a:
  - Database (may be extracted from a TPS/MIS).
  - Graphical/mathematical models for business process.
  - User interface that provides a way to communicate with DSS.

Expert System and Artificial Intelligence (ES & AI)

- Describes the way an expert would approach the problem. It attempts to codify and manipulate knowledge rather than information, (for example If .. Then rule)
- User communication with an ES via an interactive dialogue.
- The ES asks questions (that an expert would ask) and the end user supplies the answers.
- The answers are then used to determine which rules apply and the ES provides a recommendation based on the rule.

Information Systems Applications



Stakeholders

- Persons who have an interest in an existing or new information system.
- Stakeholders can be technical or nontechnical workers.

Stakeholders Classification

- IS manager
- Systems analysts in systems development
- Programmers in systems development
- End user in systems development
- Supporting End user development
- Business managers in systems development
- Other IS mangers/Technicians in system development

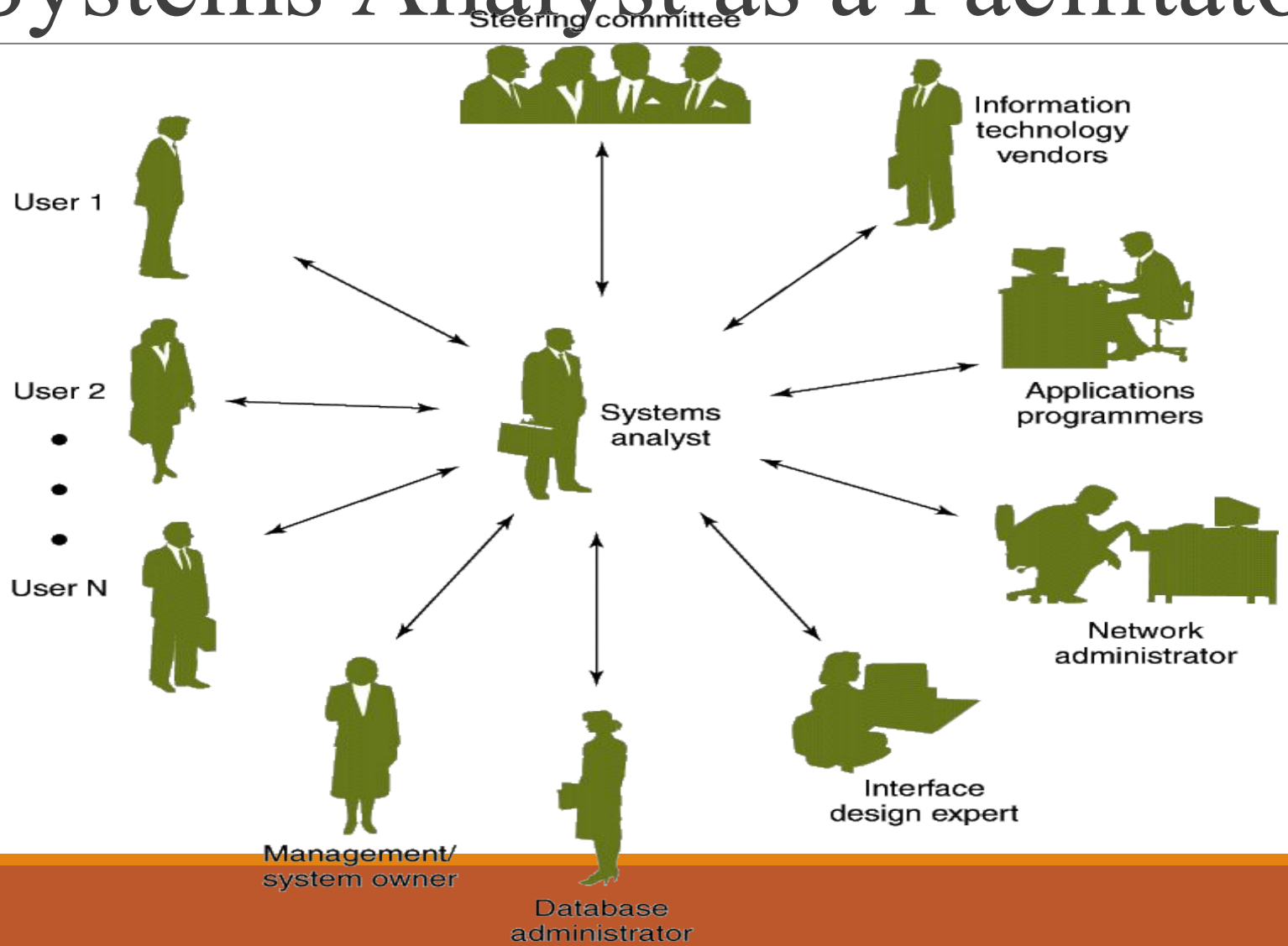
Systems Analysts

- The key individuals in the systems development process.
- A systems analyst studies the problems and needs of an organization to determine how people, data, processes, communications, and information technology can best accomplish improvements for the business.

Skills of a Successful Systems Analyst

- Analytical skills
  - Understanding of organizations.
  - Problem solving skills
  - System thinking
- Technical skills
  - Understanding of potential and limitations of technology.
- Managerial skills
  - Ability to manage projects, resources, risk and change
- Interpersonal skills
  - Effective written and oral communication skills

The Systems Analyst as a Facilitator



Skills Required by Systems Analysts

- Working knowledge of information technology
- Computer programming experience and expertise
- General business knowledge
- Problem-solving skills
- Interpersonal communication skills
- Interpersonal relations skills
- Character and ethics
- Systems analysis and design skills

Programmers in systems development

- Programmers convert the specifications given to them by the analysts into instructions the computer can understand.
- Coding: writing a computer program
- Code generators have been developed to generate code from specifications, saving an organization time and money.
- The aim of CASE tools (Computer-Aided Software Engineering) is to provide a variety of code generators that can automatically produce 90% or more from the system specifications normally given a programmer.

System Analysis and Design (SAD)

- Systems Analysis: understanding and specifying in detail what an information system should do.
- System Design: specifying in detail how the parts of an information system should be implemented.
- Analysis: defining the problem
  - From requirements to specification
- Design: solving the problem
  - From specification to implementation

Systems Development Life Cycle (SDLC)

- SDLC phases
  - 1-Project identification and selection
  - 2-Project initiation and planning
  - 3-Analysis
  - 4-Design
    - 4.1Logical design
    - 4.2Physical design
  - 5-Implementation
  - 6-Maintenance

Project identifying and selection

- This stage is critical to the success of the rest of the project.
- People
  - Users, analyst, system managers coordinating the project.
- Activities
  - Interviewing user management, summarizing the knowledge obtained estimating the scope of the project and documenting the result.
- Output
  - Feasibility report: problem definition and summarizing the objectives.

Project initiation and planning phase

- A detailed plan is developed for conducting the remaining phases of the SDLC for the propose system.
  - Detailed step – work plan - high level system requirement –assignment of team members.

Analysis phase

- Description of current system.
- Where problem and opportunities are with a general recommendation on how to fix, enhance or replace current system.
- There are six primary activities in this phase
  - Gather information.
  - Define system requirements.
  - Build prototypes for discovery of requirements .
  - Prioritize requirements.
  - Generate and evaluate alternatives.
  - Review recommendations with management.

Design phase

- The description of the recommended solution is converted into logical and then physical system specification.
- Logical design
  - The part of the design phase of the SDLC in which all functional feature of the system chosen for development in analysis are described independently of any computer platform.
- Physical design
  - The part of the design phase of the SDLC in which the logical specification of the system from logical design are transformed into technology specific details from which all programming and system construction can be accomplished.

Design phase

- Seven major activities must be done during design
  - Design and integrate the network.
  - Design the application architecture.
  - Design the user interfaces.
  - Design the system interfaces.
  - Design and integrate the databases.
  - Prototype for design details.
  - Design and integrate the system controls.

Implementation

- The fifth phase of the SDLC in which the information system is
  - Coded,
  - Tested,
  - Installed, and
  - Supported in the organization.
- Outputs
  - Code, documentation, training procedures and support capabilities.

Maintances

- The final phase of the SDLC in which the information system is systematically repaired and improved.
- New versions of releases of software with associated updates to documentation, training, and support.

Computer-Aided Systems Engineering (CASE tools)

- Software programs automate or support the drawing and analysis of system models and provide for the translation of system models into application programs.