LEC # 03

SOFTWARE ENGINEERING

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System Development Life Cycle

"You've got to be very careful if you don't know where you're going, because you might not get there."

Yogi Berra

The System & its Purpose

- A system is defined as **a collection of related components that interact to perform a task in order to accomplish a goal.**
- A system may not work very well, but it is nevertheless a system. The point of system analysis is to find out how a system works and then take steps to make it better.

- An organization's computer-based information system consists of **hardware, software, people, procedures,** and **data,** as well as communication setups. These components work together to provide people with information for running the organization.

Types of Systems in an Organization

- Office Information systems
- Transaction processing systems
- Management information systems
- Decision support systems
- Executive support systems
- Expert Systems

Systems from a functional perspective

- **Sales and marketing systems**
- **Manufacturing and production systems**
- **Finance and accounting systems**
- **Human resources systems**

Participants in a Project/System

Participants in the project / system are of three types:

- **Users:** The system under discussion should always be developed in consultation with users, whether floor sweepers, research scientists, or customers. Indeed, if user involvement in analysis and design is inadequate, the system may fail for lack of acceptance.
- **Management:** Managers within the organization should also be consulted about the system.
- **Technical staff:** Members of the company 's information systems (IS) department, consisting of system analysis and programmers, need to be involved. For one thing , they may have to execute the project. Even if they don't, they will have to work with outside IS people contracted to do the job.

- A system analyst is an information specialist who performs systems analysis, design , and implementation. The analyst's job is to study the information and communications needs of an organization and determine what changes are required to deliver better information to the people who need it. Better information means information that is summarized in the acronym CART – complete, Accurate, relevant, and timely. Systems analyst achieves this goal through the problem solving method of systems analysis and design goals

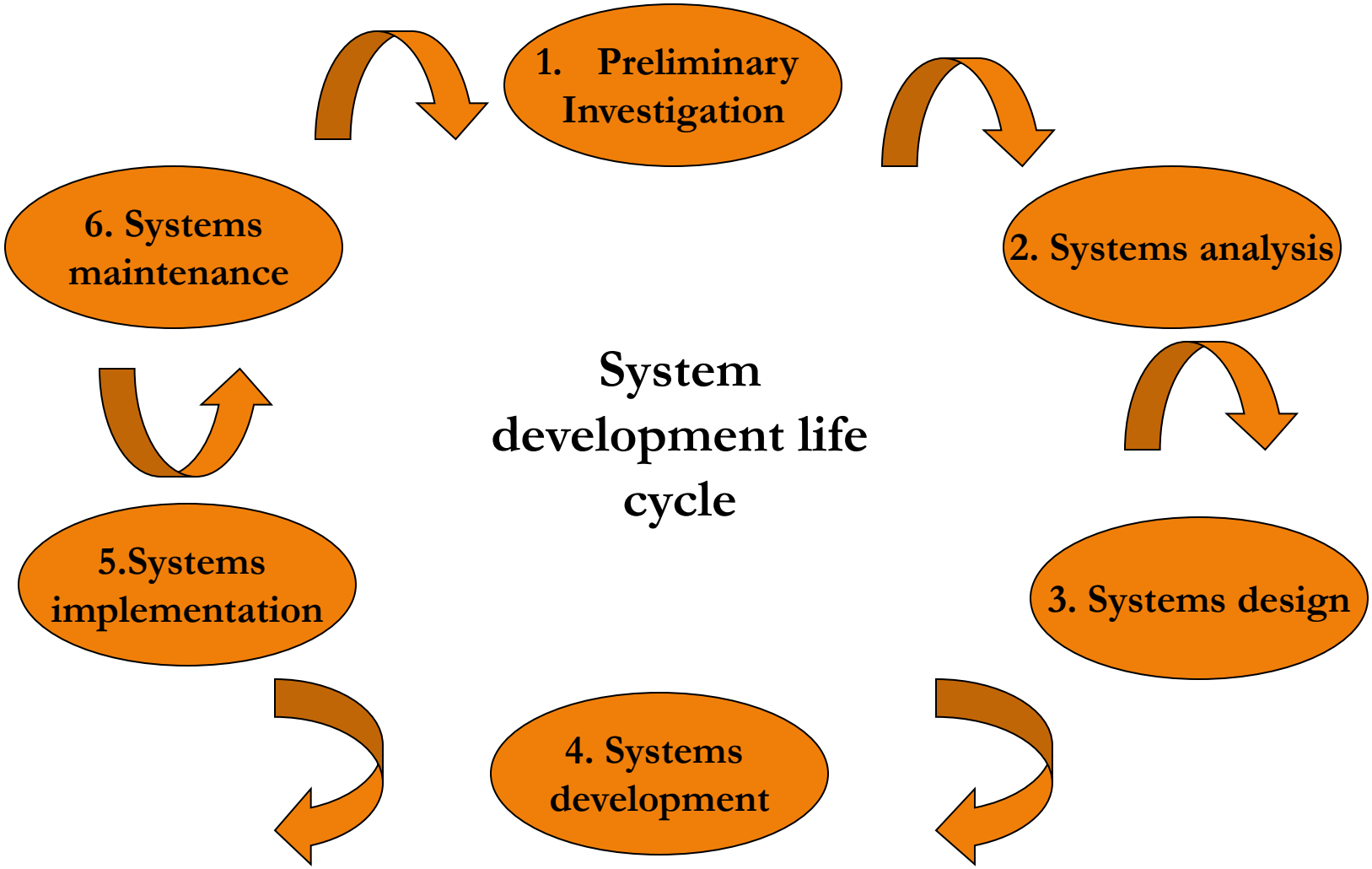
Software Development Life Cycle

- Software lifecycle:
  - Set of **activities** and their relationships to each other to support the development of a software system

- Typical Lifecycle questions:
  - Which activities should I select for the software project?
  - What are the dependencies between activities?
  - How should I schedule the activities?
  - What is the result of an activity

The Six Phases of Systems Analysis and Design

- System analysis and design is a six-phase problem solving procedure for examining an information system and improving it.
- The six phases make up what is called the systems development life cycle.
- Systems development life cycle is the step by step process that many organizations follow during systems analysis and design.


1. Preliminary Investigation
2. Systems analysis
3. Systems design
4. Systems development
5.Systems implementation
6. Systems maintenance
System development life cycle

The First Phase: Conduct Preliminary Investigation

The **objective** of this phase is to conduct a preliminary analysis, propose alternative solutions, describe costs and benefits, and submit a preliminary plan with recommendations.

1. **Conduct the preliminary Analysis**
2. **Propose alternative solutions**
3. **De scribe the costs and benefits**
4. **Submit a preliminary plan**

1. Conduct the preliminary Analysis

Find out

- What are the objectives of the organization
- The nature and the scope of the problem under study

2. Propose Alternative Solutions

- In delving into the organization's objectives and the specific problem, you may have already discovered some solutions. Other possible solutions can come from interviewing people inside organization, clients or customers affected by it, suppliers and consultants.
- With this data, you then have three choices,

  - **Leave the system as it is**
  - **Improve it**
  - **Develop a new system**

3. Describe the costs and benefits

- Whichever of the three alternatives is chosen, it will have costs and benefits. In this step you need to indicate what these are. Costs may depend on benefits, which may offer savings.

4. Submit a Preliminary Plan

- Now you have to wrap up with all your findings in a report. The readers of this report will be the executives who are in a position to decide in which direction to proceed- make no changes, change a little, or change a lot- and how much money to allow the project. You should describe the potential solutions, costs and benefits and indicate your recommendations.

Second Phase: Analysis of the System

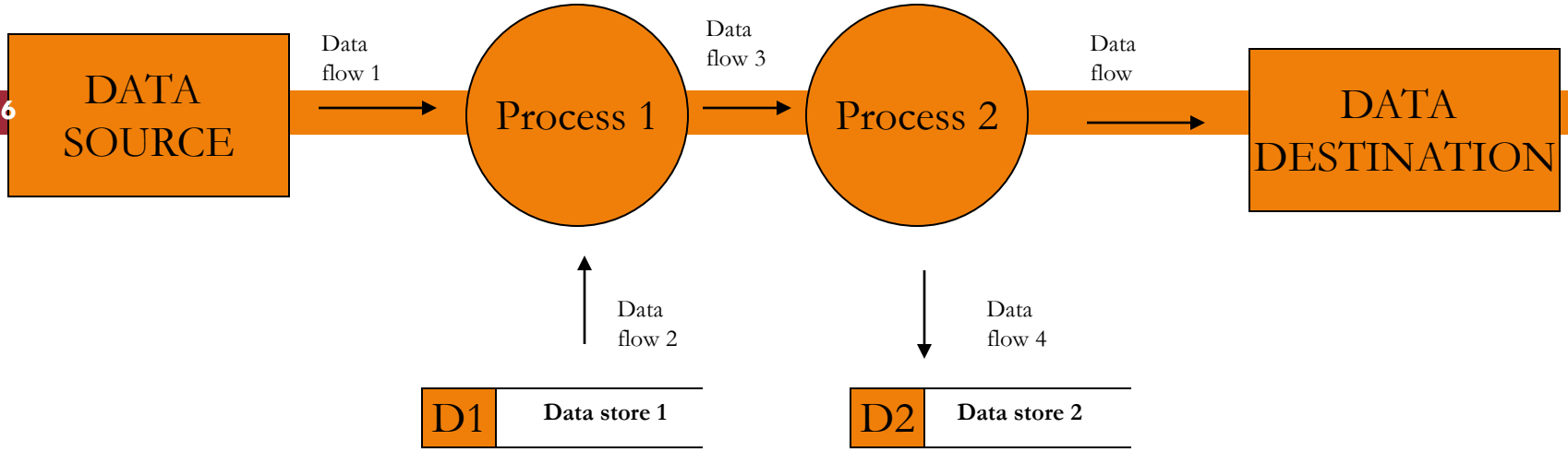
The objective of the phase 2, System s Analysis, is to gather data analyze the data and write a report. In this phase of SDLC, you will follow the course that the management indicated after reading the phase 1 feasibility report.

1. Gather Data

- In gathering data, you will review written documents, interview employees and managers, develop questionnaires, and observe people and processes at work

2. **Analyze the Data**

- Once the data has been gathered, you need to analyze it. Many analytical tools, modeling tools, are available. Modeling tools enable a systems analyst to present graphic, or pictorial, representation of a system.
- An example of a modeling tool is a data flow diagram, which graphically shows the flow of data through a system – that is essential processes of a system, along with inputs, outputs and files.
- CASE tools may also be used during the analysis phase, as well as in many other phases. Computer Aided Software Engineering tools are programs that automate various activities of the SDLC.

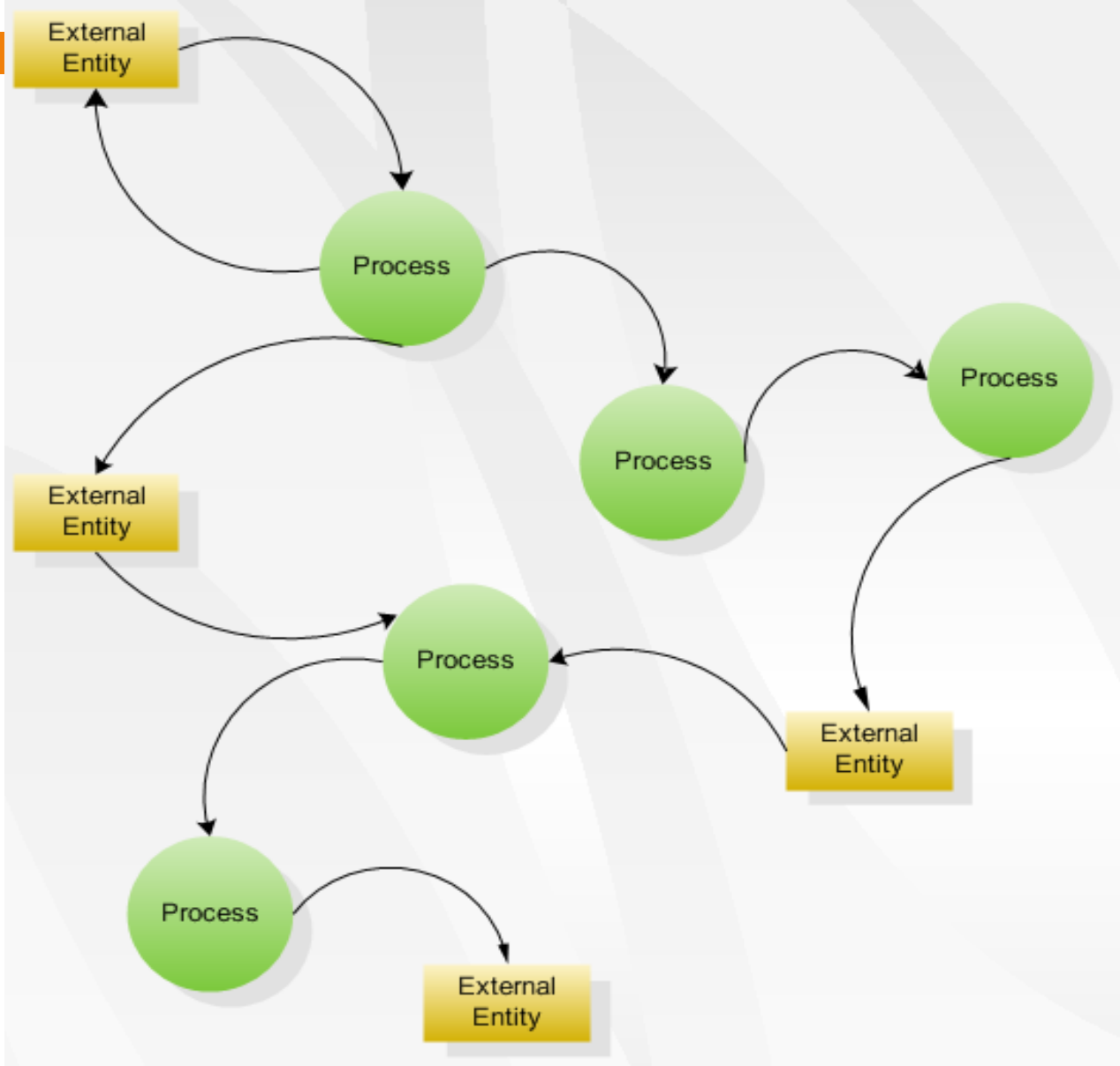


- This technology is intended to speed up the process of developing systems and to improve the quality of resulting systems. Such tools can generate and store diagrams, produce documentation, analyze data relationship, generate computer code, produce graphics, and provide project management functions.

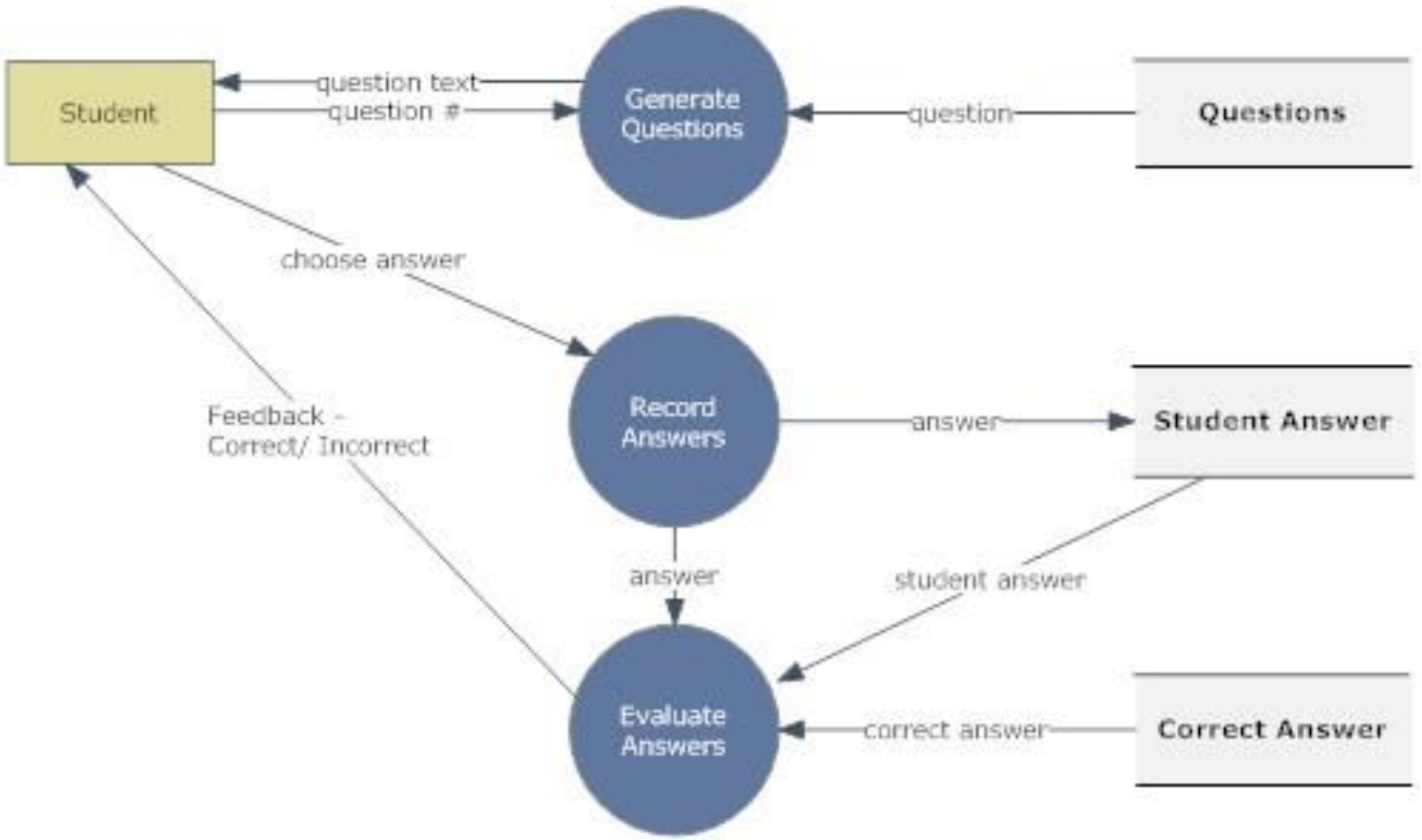
3. **Write a Report**

- Once you have complete the analysis, you need to document the phase. This report to management should have three parts.
- First it should explain how the existing system works.
- Second it should explain the problems with existing system.
- Finally it should describe the requirements for the new system and make recommendations on what to do next.
- At this point, not a lot of money will have been spent on the systems analysis and design project. If the costs of going forward seem prohibitive, this is a good time for the managers reading the report to call a halt. Otherwise you will be asked to move to phase 3.

Data Flow diagram (An example)



QUIZ SOFTWARE



The Third Phase: Design the System

- System design is to do a preliminary design and then a detail design and to write a report. You can say that at first we will create the rough draft and then the detailed design.

Do the Preliminary Design

- A preliminary design describes the general functional capabilities of a proposed information system. It reviews the system requirements and then consider the major components of the system. Usually several alternative systems (called candidates) are considered, and the costs and benefits of each are evaluated. Tools in the design phase may include CASE tools and project management software.

Prototyping is often done at this stage- Prototyping refers to using workstations, CASE tools, and bother software applications to build working models of system components so that they can be quickly tested and evaluated. Thus a prototype is a limited working system, or part of one, developed to test design concepts.

Do a detailed Design

- A detailed design describes how a proposed information system will deliver the general capabilities described in the preliminary design. The detailed design usually considers the following parts of the system in this order: output requirements, input requirements, storage requirements, and system controls and backup.

Write a Report

- All the work of the preliminary and detailed designs will end up in a large, detailed report. When you hand over this report to senior management , you will probably also make some sort of presentation or speech.

The Fourth Phase: Develop the system

Systems Development, the systems analyst or others in the organization develop or acquire the software and then test the system

1. **Develop or Acquire the Software**

During the design stage, the system analyst may have had to address what is called the "make-or-buy" decision, but the decision certainly cannot be avoided now. If you decide to create a new program, then the question is whether to use the organization's own staff programmers or to hire outside contract programmers (outsource it). Whichever way you go the task could take many months.

2. **Acquire Hardware**

- Once the software has been chosen, the hardware to run it must be acquired or upgraded,. It's possible your new system will not require any new hardware. It is also possible that the new hardware will cost millions of dollars and involve many items : microcomputers, mainframes, monitors, modems and many other devices.

3. **Testing**

- Unit Testing : Every component of the system is checked individually.
- System Testing: The performance and reliability of the whole system is checked.

Fifth Phase: Implement the System

System implementation involves converting to the new system and training the users of the organization to the system.

1. **Convert to the new System:**

Conversion to the new system can be implemented using following methodologies:

- **Direct implementation** (Stop using old system and start using new)
- **Parallel implementation (Simultaneously use both systems)**
- **Phase implementation (New system is implemented in phases)**
- **Pilot implementation (New system is verified by some users and it is proved to be reliable it is implemented in the organization.)**

- **Train the Users:**

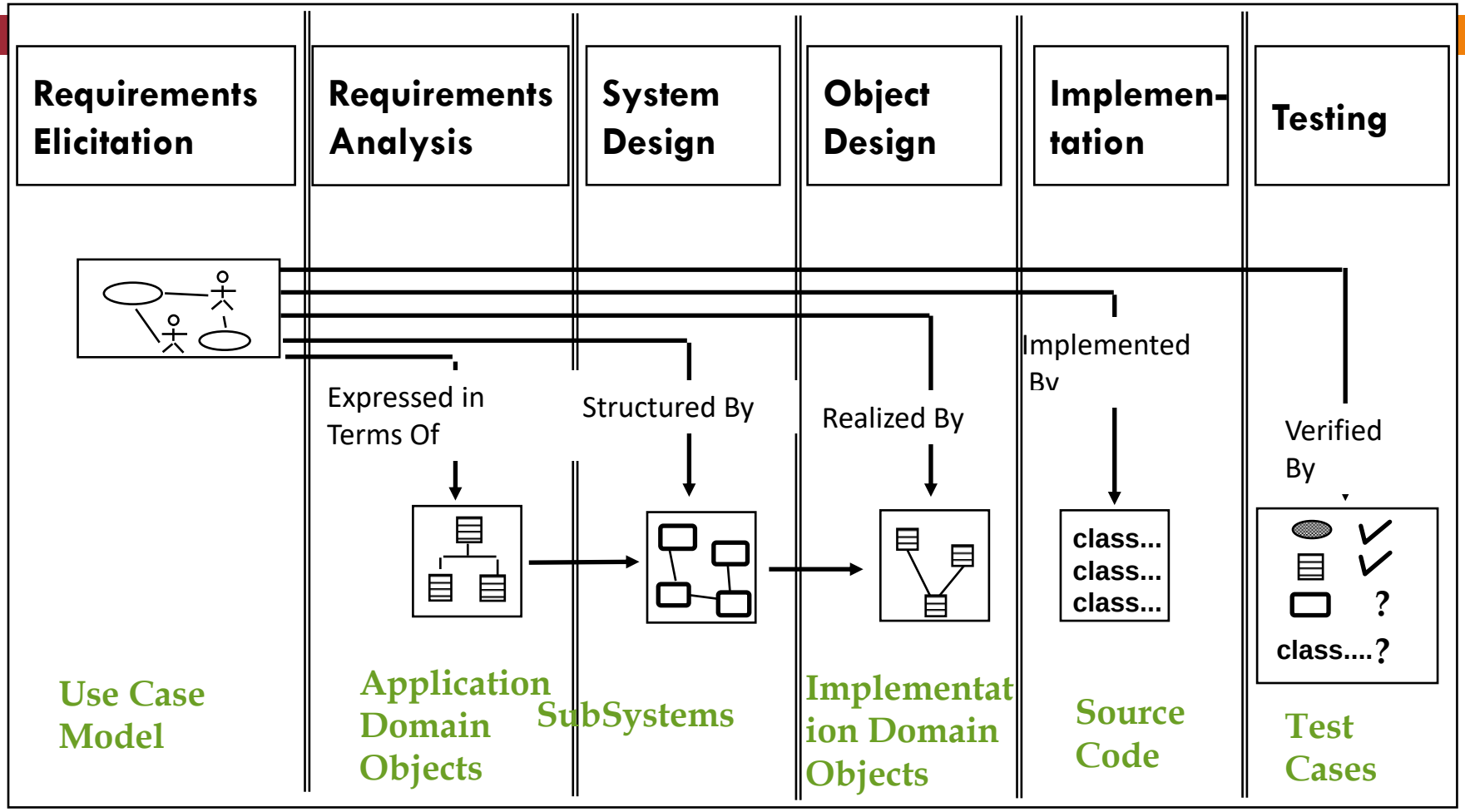
In the training session, users in organization are equipped with all the tools and techniques which are required to operate the new system. Various tools are available to familiarize users with the new system – from documentation to video tapes to live classes to one on one, side by side teacher-student training. Some times training is done by the organization's own staffers and sometimes it is contracted out.

The Sixth Phase: Maintain the system

- **System Maintenance**

System maintenance, adjusts and improves the system by having system audits and periodic evaluations and by making changes based on new conditions. It is a continuous phase.

Software Lifecycle Activities



Questions?