SYSTEM LIFE CYCLE

WHAT IS A SYSTEM?

A system is a set of interconnecting parts together with the interconnections.

A system may have many sub-systems or may itself be part of a larger system.

Every system has a life-cycle i.e. it goes through various phases from the initial idea to the point of being a functioning system. Figure 1 shows the phases in the life-cycle of a computer system.

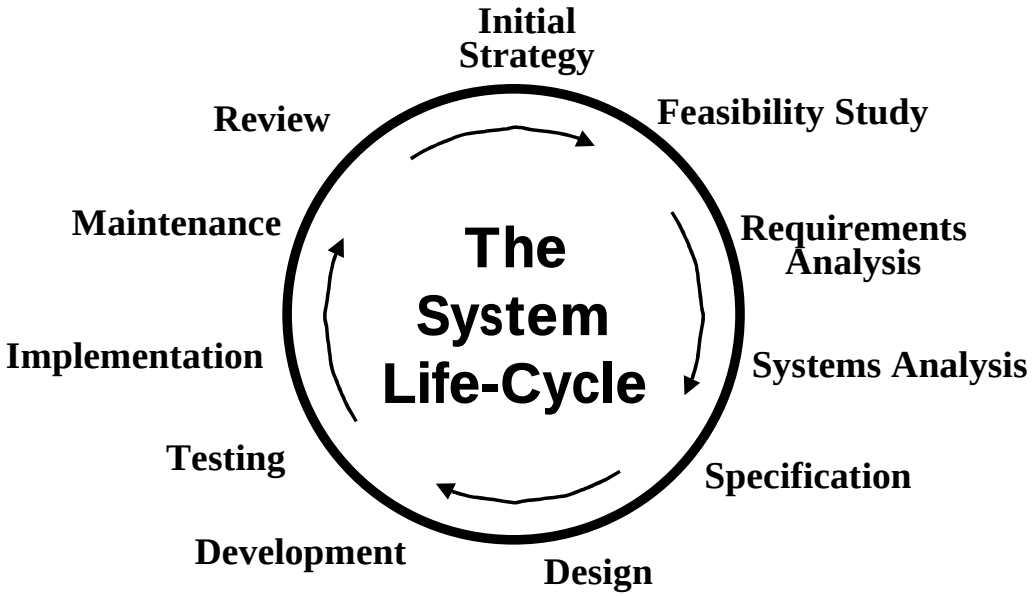

Figure 1

While the phases do logically follow on after each other it is an oversimplification to see the life-cycle as distinct step **after** step development. It is important to understand that system work is iterative i.e. a step may need to be repeated. The main reason for this is that while a system is being developed changes may occur in an organisation's policy and/or in the requirements for the new system, thereby necessitating a mini-cycle of analysis and design for the new requirement.

Each phase in the life-cycle is now described in more detail.

FEASIBILITY STUDY

The initial idea involves selecting the application to be studied and drawing up terms of reference. The terms of reference state the objectives and scope of the study, how long it should take and how results should be presented. They are normally drawn up by senior management. Very often terms of reference are not formally drawn up but obviously the person carrying out the study must be given direction on the objectives and scope of the study.

The study must present to management the technical and organisational feasibility of continuing with the project. Given the technology which is available today almost any project is, strictly speaking, feasible. The study must show whether the development would be **justified** in economic and organisational terms.

An analyst carries out the study by doing a preliminary investigation and analysis. He/she conducts a series of brief fact-finding interviews and makes judgements on the probable scale of the system required and what it would do.

The feasibility study report must indicate whether the undertaking of the project is justified and give information on a broad basis of the organisational implications, the possible equipment requirements and - most important - details of expected benefits and time and cost estimates.

Feasibility studies are not carried out for all proposed developments. For many smaller projects this phase is omitted.

SYSTEMS ANALYSIS

In this phase the analyst has three major activities to carry out:

* Investigation
* Analysis of findings
* Documentation

These will be discussed in more detail in a later session.

If a Feasibility Study Report has been done this will be a major input to the analysis phase. Terms of reference may be required in addition to or instead of the Feasibility Report.

The analyst may repeat some of the tasks carried out during the feasibility study but in a far more thorough and detailed manner.

The major output from the analysis phase is the System Specification. This specification must give precise details of **what** the new system is required to do, without saying **how** it is to be done i.e. it should provide a **logical** model of the new system.

The specification, agreed with the users, will be the basis for the designer's work.

SYSTEMS DESIGN

The Design phase is concerned with **how** the requirements of the new system can be carried out i.e. how the **logical** model can be implemented as a **physical** computer system.

There are usually several options. The designer develops a number of preliminary system designs and tests them against the design criteria. The system which comes closest to meeting the

requirements with the most cost-effective use of equipment and personnel resources is the one which will be developed. The choice between various system designs is made by the users, to whom the designer presents the options and gives expert advice.

Once the overall design is agreed, detailed design work begins. The Design Phase is therefore in two stages - as shown in Figure 2. The detailed design output from this stage includes system structure charts, input and output specifications, file layouts, control, audit and recovery procedures and program module specifications.

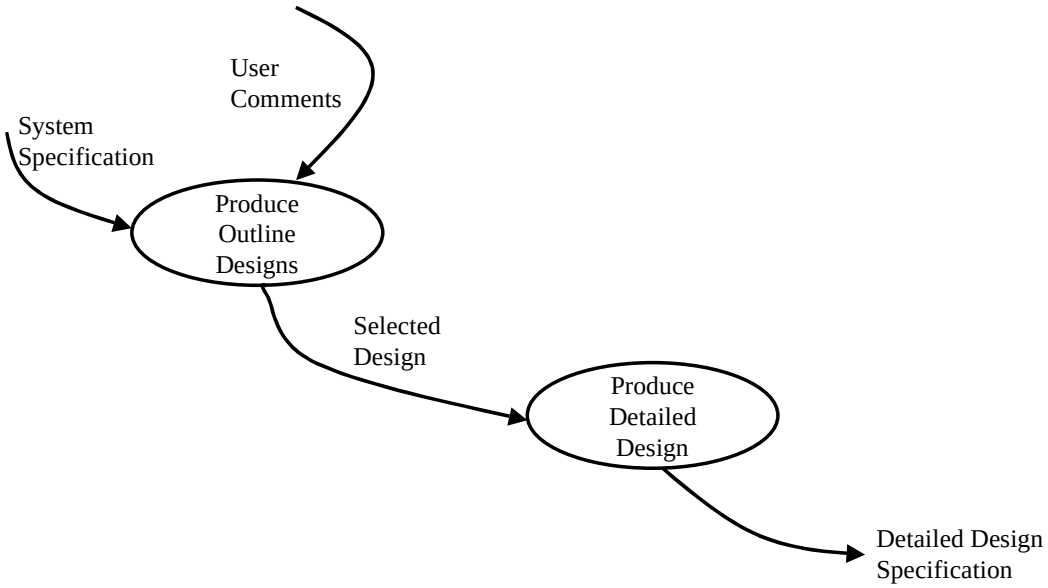

Figure 2

SYSTEM DEVELOPMENT

This phase involves the structuring, coding and testing of the program modules. Each unit is tested to ensure that it meets the requirements of the module specification.

TESTING

Various levels of testing are necessary. As well as testing individual programs as units **suite testing** or link testing must be done to ensure that programs work properly together e.g. that one program passes data in the expected format to another program.

The whole system must then be **system tested** to ensure that it performs according to the design specification. Recovery procedures must be tested as well as procedures for normal operation.

User Acceptance Testing is carried out by the users, usually in stages i.e. when a group of programs has been system tested it is passed to the appropriate users so that they can test and sign them off as being acceptable.

CONVERSION AND IMPLEMENTATION

When testing has been completed to the user's satisfaction the system or parts of it are 'implemented'/'cutover'/'put into production' i.e. the users begin using the system to carry out their business activities.

There are various approaches to implementing systems, the major choice usually being between (a) **phased** implementation i.e. stand alone subsets of the system implemented over a period of time, or (b) implementation of all the major functions at the same time - often referred to as the 'Big Bang' approach.

The approach chosen depends on the nature of the system and the business environment.

Conversion

Some systems will required special programs or subsystems to cater for conversion form the old systems to the new e.g. in a stock system provision must be made for taking on the stock balances as the new system goes into production.

MAINTENANCE

Once the system has become a production system maintenance is required to ensure that it operates satisfactorily.

Maintenance should include regular system reviews and evaluation, once a system has been operating for a period of time. This is done in order to assess whether it is achieving its objectives, to identify any aspects which may be improved and to identify any aspects which may be improved and to identify any operational problems.

On-going maintenance work is of two types:

* implementation of enhancements.
* urgent elimination of any errors.

Requests for enhancements often arise from system reviews.

Effective maintenance requires careful documentation and tight controls for implementing amendments and for releasing new/amended programs to the users.