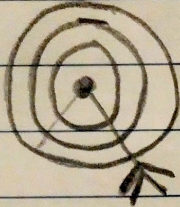


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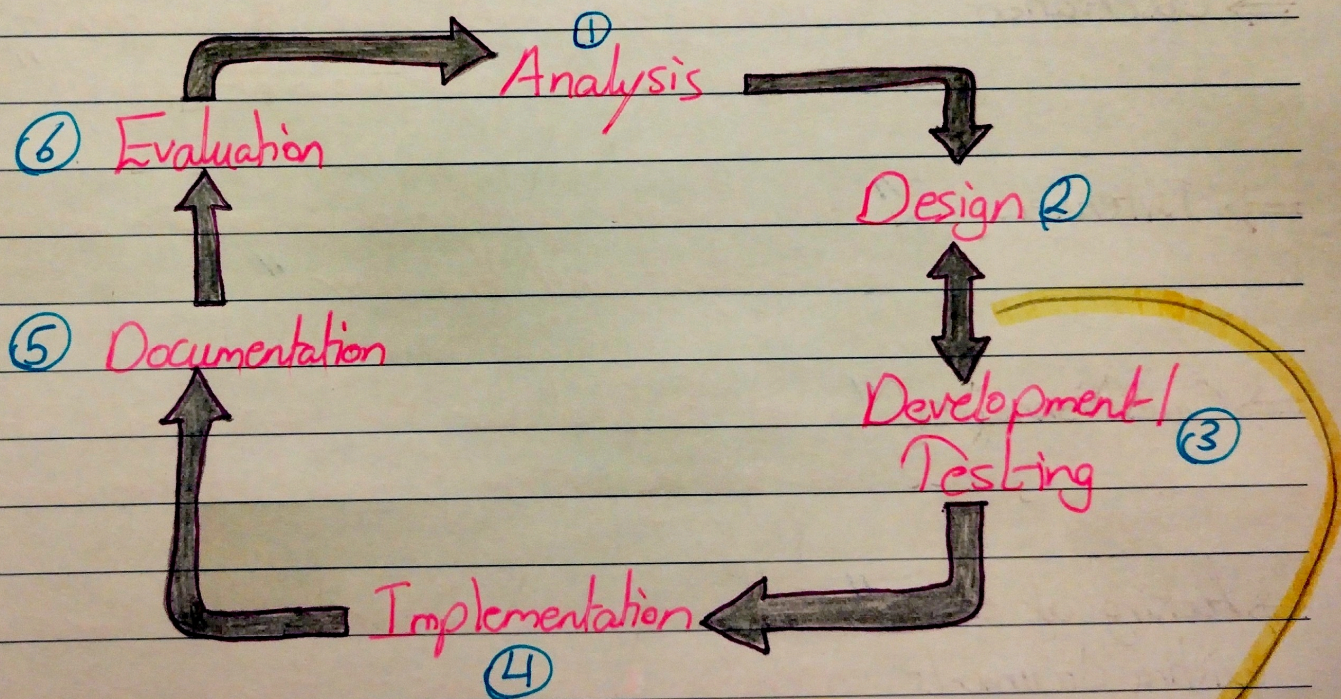
Chapter Seven $\Rightarrow$ The Systems Life Cycle

Objectives:



* Consider the stages and processes involved when replacing computer systems

- Analysis stage
- Design stage
- Development & Testing stage
- Implementation Stage
- Documentation Stage
- Evaluation Stage.



This is a two-way process, may need to redesign solution several times

Analysis:-

- Research the current system
- Identify input & output
- What are the current processes
- Problems with current system
- Requirements for the new system
- Identify hardware & software for the new system

1] Analyse the current system $\Rightarrow$ we use four methods to research the current system.

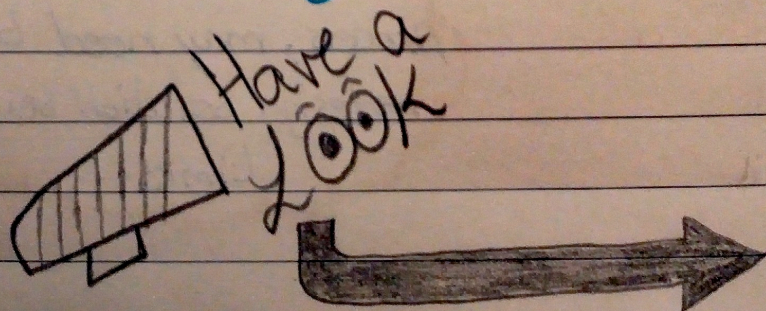
$\Rightarrow$ Observation "watching personnel using the current system to find out how it works"

$\Rightarrow$ Interview "one-to-one question and answer between the analyst and the user"

$\Rightarrow$ Questionnaires "used to find out the users views of the existing system & how tasks are carried"

$\Rightarrow$ Looking at the existing documents "used to see how files are kept, look at operating instructions & training manuals"

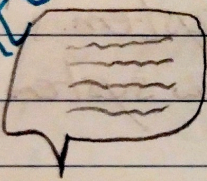
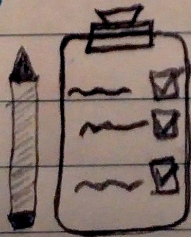
Each method has advantages and disadvantages

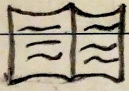


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Very Important

Subject :

Method Name	Advantages	Disadvantages
Observation 	• reliable data • better overall view • inexpensive method • all inputs & outputs are seen.	• People feel uncomfortable being watched • workers may work in a different way.
Interviews 	• Giving open & honest answers to the questions • Probe more feedback as questions can be extended • Possible to modify questions • Analyst can watch body language & facial expressions	• Time-consuming • Relatively expensive • Interviewee can't remain anonymous • Interviewee can give answers they think the interviewer wants to hear • Interviewees may not be available
Questionnaires 	• Questions can be answered quickly. • Inexpensive Method • Individuals remain anonymous • Quick data analysis • Questionnaires can be filled at any time. • Greater number of people take part	• Number of returned questionnaires can be low • Not possible to ask follow-up questions. • Not possible to expand the answers • Users tend to exaggerate their responses • Interviewees may not take it seriously.

Method Name	Advantages	Disadvantages
looking at existing documents 	• Allows information to be obtained. • The analyst can see how the current system operates	• Very time-consuming • Expensive method because of the analyst's time needed

2] Record & analyse information about current system
 "one method the analyst can use is DFD data flow diagram"

This stage requires the analyst to find out:

- What input & output takes place
- What processing is done
- What problems exist with the current system.
- User & information requirements for the new system

User Requirements ⇒

- ▶ written by the analyst for the managers / clients / customers
- ▶ written in natural language with very few technical details
- ▶ allow the customers to check the analyst proposes.
- ▶ describe what the analyst thinks the customer does with system

Information Requirements ⇒

- ▶ information needed to support the business
- ▶ made up of what is the data and when (the timing)

3] System Specification

Identify & justify hardware (which input devices are needed such as barcode reader, scanner, touch screen --- and which output devices are needed such as 3D printer, large monitors, speakers ---)

Identify & justify software (which operating system is the most appropriate and what the applications software that suit- the system)

Identify & justify storage devices (size of storage and the storage type such as HDD / SSD / magnetic tapes and the type of access - serial or direct -)

Design:-

- File structures and data structures
- Input formats - data capture forms -
- Output formats - screen & report layouts -
- Validation routines

1] File Structures and data structures

- ▶ consider how the files containing data will be structured.
- ▶ consider the format of the data types
- ▶ each field needs to be defined (field name, field length, data type & the primary key field)

Need an example!



Field Name	Field length	Data Type
Product Code	30	Text
Year of manufacture	4	Numeric: integer
Product description	40	Text
Price	6	Numeric: currency
Department	1	Text

2 Validation Routines: it is an automatic process where data entered into a computer is checked if it is acceptable or not.

Very Important Below is a table which shows
↓ validation routines ↓

Validation check	Description
• Range	Checks to see if the data lies between the upper & the lower value.
• Type / character	checks to see if the data is of the correct type (letter or number only)
• Length	checks if the data contains only the required number of characters.
• Format	checks if the data is in the correct format (dd/mm/yyyy ⇒ 10/12/2022)
• Presence	checks data has been entered and the field has not been left empty.
• Check Digit	Extra digit added to a number which has been calculated from the other digits.

3 Input Formats (data Capture forms)

used to input data into a computer either paper-based or computer-based depending on the application.

Note usually this section comes as a question which indicates you to draw a data capture form. You should read the case scenario very carefully to find out whether it is asking to draw a paper-based or computer-based form.

Paper-based Forms need to have the following:-

- Heading (Title)
- clear where to fill the answers
- text boxes limit the amount of the information
- use printed text boxes such as date of birth
- use tick boxes to make choices easier
- make sure there is space to write answers
- clear fonts & text colors to make it easy to read.

Computer-based Forms need to have the following:-

- text boxes
- on-screen help when completing the form
- drop-down / combo boxes for limited options
- radio buttons and tick boxes
- automatic validation of data as it is entered.
- control buttons such as (Next, clear, save ---)
- double entry boxes to check data verification such as (password, e-mail ---)

[4] Output Format (Screen & Report Layouts)

Screen outputs should be designed:-

- to make sure the size of all output fields is correct.
- any instructions / descriptions are clear
- avoid large areas of 'nothing'
- colors & fonts (size & type) of outputs are clear.

Development & Testing

The file structure would need to be finalised at this stage it is created and needs to be fully tested.

Validation routines and verification methods are used to ensure that the correct data is stored in files.

How the screens and input devices will be used to collect the data and the way the output will be presented. If specialist hardware is needed we should take into consideration how these devices are used.

Development Stage

Test Designs $\Rightarrow$

- Testing data structures
- Testing file structures
- Testing input methods
- Testing output
- Testing validation rules

Test strategies $\Rightarrow$ Software is developed in modular form broken down into smaller modules each needs to be tested separately and any problems will be modified and tested again then the whole system will be tested. *very time-consuming process but necessary*

Test-plan, test-data & live data $\Rightarrow$ Types of data referred to as: normal, abnormal & Extreme.

Normal $\Rightarrow$ data which is acceptable / valid and has an expected outcome

ex. month can be any whole number in the range 1 to 12

Extreme $\Rightarrow$ data at the limits of acceptability / validity
ex. the month can be either of the two end values 1 or 12

Abnormal $\Rightarrow$ data outside the limits of acceptability / validity and should be rejected or cause error

- any value less than 1

- any value greater than 12

- letters or other non-numeric data - July

- non integer values 3.5

Once a system has been fully tested, it is then tested with **live Data**

$\hookrightarrow$ This data has been used with the current system

• Data not created for test purposes

• The results are known

Implementation

Some of the stages in this process are:

There is need to train staff

Transfer paper or electronic files to the new system

Scan the documents

key in the data

Download files

Direct Changeover

Parallel Running

Pilot Running

Changeover to the new system

Phased implementation

very important

► **Direct** ⇒ The old system is stopped overnight and the new system introduced immediately

Adv. • Benefits are immediate

• Costs are reduced no need to pay for two sets of staff

Dis. • if the new system fails the old system is no longer available

► **Parallel** ⇒ The old & new systems are run side by side for a time

Adv. • If the new system fails, the old one is still available

• Gradually train staff

Dis. • More expensive than direct as extra staff are needed

• More time consuming than direct as data needs to be entered twice

► **Pilot** $\Rightarrow$ The new system is introduced into one branch and it's assessed before being introduced to the other branches.

- Adv.
- If the new system fails only one part is affected
 - Train staff in one area only which is faster & less costly than parallel
 - The costs are less than parallel because only one part is being used

► **Phased** $\Rightarrow$ Only part of the system is introduced and when it works successfully the next part will be introduced and so on.

- Adv.
- If the part fails we only go back in the system to the point of failure
 - ensure the system works properly before expanding.

- Dis.
- More expensive than direct because we need to evaluate each phase.
 - Very time consuming

Documentation

• **Technical documentation** $\Rightarrow$ designed to help analysts/programmers to make improvements to the system or repair/maintain the system

• **User documentation** $\Rightarrow$ designed to help users to learn how to use the system or software

Technical documentation consist of:

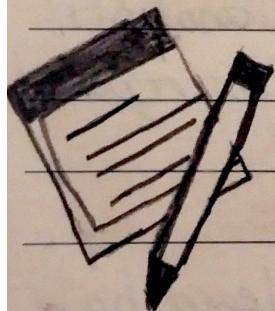
- program listing / coding
- programming language
- program flowcharts
- system flowcharts
- known bugs in the system
- file structures
- validation rules
- memory requirements
- variables used

User documentation consist of:

- How to load / install software
- How to save
- How to search
- How to sort
- How to login / log out
- Glossary of terms
- How to print
- How to add / delete records
- Error Handling
- Troubleshooting guide
- Tutorials

Common elements appear in both documentations:

- ▶ The purpose of the system
- ▶ Limitations of the system
- ▶ Input format
- ▶ Meaning of error messages
- ▶ Hardware requirements
- ▶ Software requirements
- ▶ Output format
- ▶ Sample runs



Take into consideration what are the points that you are going to write down in your answer when you are asked.

Is the question asking for the common elements or for the elements which appear in one of the documentations

Evaluation

Once a system is up and running it is necessary to do some evaluation. Below a list of some of the things to evaluate:-

- Compare the final solution with the original requirements
- Identify any limitations of the system
- Identify any improvements need to be made
- Evaluate the users' responses to the new system
- Compare the current results with the previous ones
- Compare the current performance with the previous one
- Observe users performing tasks
- Measure the time taken to complete tasks
- Interview users to gather responses about the new system
- Give out questionnaires to gather responses

Results from the evaluation may lead to $\Rightarrow$

► Update the hardware because

Feedback from
end-users

new hardware
comes on the market.

changes within
the company.

► Update the software because

Feedback from
end-users

Changes to the
company structure

Changes in the
legislation