BCA-602(N)
Subject- Information System: Analysis, Design & Implementation
Unit- III
SECTION- B&C

Project Feasibility

Feasibility is the determination of whether a project is worth doing. The process followed in making this determination is called a feasibility study. This type of study determines if a project can and should be taken. Once it has been determined that a project is feasible. The analyst can go ahead and prepare at the project specification which finalises project requirements. Generally, feasibility studies are undertaken within tight time constraints and normally culminate in a written and oral feasibility report. The contents and recommendations of such a study will be used as a sound bases for deciding whether to proceed, postpone or cancel the project

Since the feasibility study may lead to the commitment of large resources, it becomes necessary that it should be conducted competently and that no fundamental errors of judgement are made.

Preliminary investigations inspect project feasibility; the probability the system will be functional to the organization. Three significant tests of feasibility are considered and described below:

Technical Feasibility: This is concerned with specifying equipment and software that will successfully satisfy the user requirement. The technical needs of the system may vary considerably, but might include:

The facility to produce outputs in a given time.

Response time under certain conditions.

Ability to process a certain volume of transaction at a particular speed.

Facility to communicate data to distant location.

Out of all types of feasibility, technical feasibility generally is the most difficult to determine.

Operation Feasibility: It is mainly related to human organisational and political aspects. The points to be considered are:

What changes will be brought with the system?

What organisational structures are disturbed?

What new skills will be required? Do the existing staff members have these skills? If not, can they be trained in due course of time?

Generally project will not be rejected simply because of operational infeasibility but such considerations are likely to critically affect the nature and scope of the eventual recommendations. This feasibility study is carried out by a small group of people who are familiar with information system techniques, who understand the parts of the business that are relevant to the project and are skilled in system analysis and design process.

Economic Feasibility: Economic analysis is the most frequently used technique for evaluating the effectiveness of a proposed system. More commonly known as cost/benefit analysis; the procedure is to determine the benefits and savings that are expected from a proposed system and compare them with costs. If benefits out weigh costs, a decision is Taken to design and implement the system. Otherwise, further justification or alternative.

A number of approaches for assessing the costs of solutions have been suggested.
Approaches include the following:

Last cost: This is based on the observation that costs are easier to control and identify the revenues. Thus, it assumes that there is no change in income caused by the implementation of a new system. In such an evaluation, only the costs are listed and the option with the lowest cost is selected.

Time to Payback: This method of economic evaluation is an attempt to answer the question. How long would it be until we get out money back on this investment in system? This requires data on both costs and benefits. This method of evaluation has two significant disadvantages:

It only considers the time taken to return the original investment and ignores the system's long term profitability.

The method does not recognize the time value of money. Benefits that accrue in the distant future are not worth as much as similar benefits that occur more quickly but this method fails to recognize this.

Cost-effectiveness: Some type of cost benefit analysis is performed for each alternative. Rough projections of equipment requirements and costs, operational costs, manpower costs, maintenance cost, etc., need to be made. Projections of potential, tangible as well intangible benefits are also needed to be made.

Example: Tangible benefits are ability to obtain information, which was previously not available, faster or timely receipt of information, improved or better decision making, improvement in planning and control etc.

In the conduct of the feasibility study, some more interrelated types of feasibility can be considered are discussed below:

Social Feasibility: Social feasibility is a determination of whether a proposed project will be acceptable to the people or not. This determination typically examines the probability of the project being accepted by the group directly affected by the proposed system change.

Management Feasibility: It is a determination of whether a proposed project will be acceptable to management. If management does not accept a project or gives a negligible support to it, the analyst will tend to view the project as a non-feasible one.

Legal Feasibility: Legal feasibility is a determination of whether a proposed project infringes on known Acts, statutes, as well as any pending legislation. Although in some instances the project might

appear sound, on closer investigation it may be found to infringe on several legal areas.

Time Feasibility: Time feasibility is a determination of whether a proposed project can be implemented fully within a stipulated time frame. If a project takes too much time it is likely to be rejected.

Elements of Design

The computer system design process is an exercise of specifying "how" the system will work. It is an iterative process which is based on "what" the system will do.

Mainly, following parts have been included in the system design process:

Output

The starting point of the design process is the proper knowledge of system requirements which will normally be converted in terms of output.

A major obj ective of a system is to produce an output that has value to its user. A system feeds on input to produce output in much the same way in which a business brings in human, financial and material resources to produce goods and services.

Files

Once the input data is captured in the system, these may have to be preserved either for a short or long period. These data will generally be stored in files in a logical manner. The designer will have to devise the techniques of storing and retrieving data from these files. Files are used to store data. Inputs necessary for the system are stored in files either in terms of isolated facts or in large volumes.

After designing the input and output, the designer begins to pay his attention on the work of file designing or how data should be organized around user requirement. How data are organized depends on the data

and response requirements that determine hardware configurations. Selecting from options available for organizing the data.
File organization may be sequential, Index sequential, inverted lost or random.
Files are the heart of a computer application. The basic terms used to describe a file hierarchy are:
Data Item: A basic or individual element of data is called data item. Each data item is identified by a name and is assigned a value.
Record: The collection of related data items is called a record. It is necessary to distinguish one specific record from another. System analyst select one data item in the record that is likely to be unique in all the records of a file which is used to identify the record for further processing. This item is called the key field or: record key.
File: A collection of related records. Each record in a file is included because it pertains to the same entity.
Database: The highest level in the hierarchy is the database. It is a set of interrelated files for real time processing. It contains the necessary data for problem solving and can be used for several users who are accessing data concurrently.

Types of Files

There are various types of files in which the records are collected and maintained. They are categorised as:

Master File: Master files are the most important type of file. Most file design activities concentrate here. In a business application these are considered to be very significant because file that contain the essential records for maintenance of the organisation's business.

Transaction File: A transaction file is a temporary file used for two purposes. First of all, it is used to accumulate data about events as they occur. Secondly, it helps in updating Master file to reflect the result of current translations.

Table File: A special type of master file is included in many systems to meet specific requirements where data must be referenced repeatedly. Table files are permanent files containing reference data used in processing transactions, updating master file or producing

Report File: Report files are collected contents of individual output reports or documents produced by the system. They are created by the system where many reports are produced by the system but printer may not be available for all reports. The process of creating it is known as spooling which means that output that cannot be printed when it is produced, is spooled into a report file. Then, depending on the availability of printer, the system will be instructed to read the report file and print the output on the printer.

Backup File: It is a copy of master, transaction or table file made to ensure a copy is available if anything happens to the original

Archival File: These files are copies of files made for long term storage of data that may be required at a much later date. Usually, these files are stored far away from the computer centre so that they cannot be easily retrieved for use.

Dump File: This is a copy of computer field data at a particular point of time. This may be a copy of master file to be retained to help recovery in the event of a possible corruption of the master file or it may be part of a program in which error is being traced.

Library Files: Library file generally contains application programs, utility programs and system software packages.

Database Interaction

An integrated approach to file design is the database. The general theme is to handle information as an integrated whole, with a minimum of redundancy and improved performance.

A database is defined as a system, used to record and maintain data. The most important point to understand database is that database contains data and not necessarily information.

In technical words, a database may be defined as follows: Database a collection of interrelated data, which can be used by one or more applications so that it can be integrated and stored in a shared organized way so that it has a controlled redundancy, consistency and integrity with a provision of data independence. Objectives of Database All organizations need to collect, store and process data for their functions. The database is used to store and process data for providing useful information to the organization.

The database must have the following basic objectives: 1. Centrally Controlled: A database must be centrally controlled. It is possible that the data

of a particular system may be spread in different branches of a company but it must be controlled from one central location.

Advantages of Centrally Controlled Database: The major advantages of the centrally controlled database are as follows: (i) Organized way: If the database is centrally controlled, then the data can be stored, processed, modified or accessed in an organized way.

(ii) To follow standard rules: In a centralized database, the standard rules can be followed Notes in storing different items. The interdepartmental agreement is required for standardizing the data formats and definition. If it is not done, then the data can become incompatible when interchanging it between different applications.

(iii) Non redundancy and consistency: Many of the different applications generally use the same set of data. Example: The inventory and invoicing application, both can use, items data as an input. If separate data would be stored for both applications, there would be a redundancy (duplication) of stored data. The redundant data has many drawbacks. First of all, there would be a wastage of disk space and secondly, most important, if there is any modification, deletion or addition is required, that has to be done twice for both applications. In that case, the data can become inconsistent. The inconsistent data means that the two kinds of applications will be using a non-matching data. Therefore, a database must be organized in such a way that the redundancy and inconsistency can be avoided as much as possible. In reality, some redundancy exists in many applications, basically due to two reasons - first, to simplify logic of the program for accessing the data; and secondly, to save the data as backups so as to recover it if lost accidentally. Therefore, it is advisable to control the redundancy to minimal level so that it does not cause data for becoming inconsistent and also does not waste too much disk space.

(iv) To maintain integrity: Integrity means to ensure that the database contains accurate and correct data. If the database is centralized then the proper validation procedures can be applied for checking whether the data are being entered in different applications is valid or not.

(v) Security and privacy: If the database is centrally controlled, then the security checks can be applied to prevent the data from unauthorized access. The same data can be restricted to access by different users to maintain privacy and security.

Logically organized: The database must be organized in a logical manner. Example: If the user wants to see the name of person whose basic salary is greater than 5000 and is working in EDP department, then the database must be organized in that logical order so that the data can be accessed faster.

Integrated: The database must be integrated for many applications of different departments in an organization. In an integrated database system, the same collection of data is available for as many applications as possible. Example: The data required for Financial Accounting, Invoicing and Inventory System are generally interrelated. If the database is not designed in an integrated way, then the data required for different applications would be entered separately and there would be a lot of duplication of data and hence inconsistency in data storage.

Shared: In multi-user applications, it is expected that the database is designed such that the data can be shared or accessed by different users. Did u know? The sharing of data is possible only if the database is integrated.

Control The control design indicates necessary procedures which will ensure correctness of processing, accuracy of data, timely output etc. This will ensure that the system is functioning as per plan

Design of Computer Output Presenting the data processed by a computer based information system in an attractive and usable form has become very essential these days. Success and acceptance of a system to some extent depends on good presentation.

Objectives The system is accepted by the user solely by quality of its output. If the output is not of good quality, user is likely to reject the system. Therefore, an effective output design is the major criteria for deciding the overall quality of system.

The output can be of two forms - hard copy (printed report) and screen output.

Output design considers the content, the occurrence, the format, medium and the allocation of output. Content is fairly established during the information analysis and may be only slightly revised or refined during design. Format treats such matters as column and row headings on reports, spacing, graphic displays and so forth. Output frequency may be daily, weekly, monthly or, in interactive systems, continuous. The output medium may be paper, pre-printed forms, mailers, video displays or some combination of these and other media. Standard forms are available to assist in the layout of output specification.

Needs There are three main reasons why outputs from the computer are required. They are: (i) For communicating to the persons

concerned. (ii) For re-input to the computer for being connected with other data and further processing. (iii) For permanent storage.

Types of Output The most common outputs of a system are reports, displays on screen, printed forms etc. The outputs also very in terms of their contents, type of stationary, frequency and timing etc. Design of Computer Output and Input due consideration also need to be given as to who will use the output and for what purpose. Design of Computer Output Presenting the data processed by a computer based information system in an attractive and usable form has become very essential these days. Success and acceptance of a system to some extent depends on good presentation. Many new output devices are being introduced in the market because of recent development in computer technology. System analyst must be aware of these new technology and try to use these new output devices if possible.

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Outputs of a data-processing system can be placed into two categories:

1. Application Output: These are the outputs desired out of the system to meet its objectives.

These are of three types: (a) Output as a basis for decision making, required by management for decision making by purposes. (b) Output as a requirement to meet a functional objective, such as, Invoices, Excise Gate Pass, Purchase Orders etc. (c) Statutory Outputs, required by all organisations to produce a certain amount of reports and forms as required by law. Such as, 'C' forms, '3A' and '6A' forms for provident fund, income tax certificates etc.

2. Operating Output: These outputs are mainly generated for use of E.D.P Staff and give various indications as to how the system operates. Example: System logs, error messages, status indicators etc., are the examples of such output. These types of output are not concerned for the users. Task Make distinction between application output and operating output.

Output Design We will now discuss the major features of output forms along with guidelines for designing them. Design of Printed Output After designing input forms, the analyst designs the format of all printed outputs, commonly called as hard copies.

There are three common formats of a printed output: (a) Tabular format (report format); (b) Form like format; and (c) Graphic format

Advantages of Printed Output

A printed output offers the following advantages to the user: A printed output is permanent and is not erased. It can be carried anywhere, i.e., it is portable. It provides a detailed information. Its information cannot be changed by the user.

Design of Screen Output A printed output is the basic requirement of any computerized system. However, it is not always possible and even not advised to print each and every output. Therefore, the system should also display all outputs on screen.

The screen output offers following advantages over hard copy: A screen output provides any information immediately. It can be viewed in different formats. It is more secure as it can be accessed by only authorized users (printed report can be leaked out). Its information can be changed by the user if the user has access to modify it.

The output screens are designed on following important guidelines: The screen layout should be simple and may be similar to printed output. The number of key strokes must be minimum for displaying any information. The output screens may have a multi-window presentation. The information displayed on screens need not be as detailed as in printed output. It should provide the on-line instructions to the user, which are generally displayed on

the bottom line. These are just a few guidelines for designing a good output screen. However, there can be many new features in a good screen depending upon the experience of analyst

Design of Computer Output Presenting the data processed by a computer based information system in an attractive and usable form has become very essential these days. Success and acceptance of a system to some extent depends on good presentation.

Software User Interface Design

User interface is the front-end application view to which user interacts in order to use the software. User can manipulate and control the software as well as hardware by means of user interface. Today, user interface is found at almost every place where digital technology exists, right from computers, mobile phones, cars, music players, airplanes, ships etc.

User interface is part of software and is designed such a way that it is expected to provide the user insight of the software. UI provides fundamental platform for human-computer interaction.

UI can be graphical, text-based, audio-video based, depending upon the underlying hardware and software combination. UI can be hardware or software or a combination of both.

The software becomes more popular if its user interface is:

- Attractive
- Simple to use
- Responsive in short time
- Clear to understand
- Consistent on all interfacing screens

UI is broadly divided into two categories:

- Command Line Interface
- Graphical User Interface

Command Line Interface (CLI)

CLI has been a great tool of interaction with computers until the video display monitors came into existence. CLI is first choice of many technical users and programmers. CLI is minimum interface a software can provide to its users.

CLI provides a command prompt, the place where the user types the command and feeds to the system. The user needs to remember the syntax of command and its use. Earlier CLI were not programmed to handle the user errors effectively.

A command is a text-based reference to set of instructions, which are expected to be executed by the system. There are methods like macros, scripts that make it easy for the user to operate.

CLI uses less amount of computer resource as compared to GUI.

CLI Elements

A text-based command line interface can have the following elements:

- **Command Prompt** - It is text-based notifier that is mostly shows the context in which the user is working. It is generated by the software system.
- **Cursor** - It is a small horizontal line or a vertical bar of the height of line, to represent position of character while typing. Cursor is mostly found in blinking state. It moves as the user writes or deletes something.
- **Command** - A command is an executable instruction. It may have one or more parameters. Output on command execution is shown inline on the screen. When output is produced, command prompt is displayed on the next line.

Graphical User Interface

Graphical User Interface provides the user graphical means to interact with the system. GUI can be combination of both hardware and software. Using GUI, user interprets the software.

Typically, GUI is more resource consuming than that of CLI. With advancing technology, the programmers and designers create complex GUI designs that work with more efficiency, accuracy and speed.

GUI Elements

GUI provides a set of components to interact with software or hardware.
Every graphical component provides a way to work with the system. A GUI system has following elements such as:

- **Window** - An area where contents of application are displayed. Contents in a window can be displayed in the form of icons or lists, if the window represents file structure. It is easier for a user to navigate in the file system in an exploring window. Windows can be minimized, resized or maximized to the size of screen. They can be moved anywhere on the screen. A window may contain another window of the same application, called child window.
- **Tabs** - If an application allows executing multiple instances of itself, they appear on the screen as separate windows. **Tabbed Document Interface** has come up to open multiple documents in the same window. This interface also helps in viewing preference panel in application. All modern web-browsers use this feature.
- **Menu** - Menu is an array of standard commands, grouped together and placed at a visible place (usually top) inside the application window. The menu can be programmed to appear or hide on mouse clicks.
- **Icon** - An icon is small picture representing an associated application. When these icons are clicked or double clicked, the application window is opened. Icon displays application and programs installed on a system in the form of small pictures.
- **Cursor** - Interacting devices such as mouse, touch pad, digital pen are represented in GUI as cursors. On screen cursor follows the instructions from hardware in almost real-time. Cursors are also named pointers in GUI systems. They are used to select menus, windows and other application features.

Application specific GUI components

A GUI of an application contains one or more of the listed GUI elements:

- **Application Window** - Most application windows uses the constructs supplied by operating systems but many use their own customer created windows to contain the contents of application.
- **Dialogue Box** - It is a child window that contains message for the user and request for some action to be taken. For Example: Application generate a dialogue to get confirmation from user to delete a file.

- **Text-Box** - Provides an area for user to type and enter text-based data.
- **Buttons** - They imitate real life buttons and are used to submit inputs to the software.

- **Radio-button** - Displays available options for selection. Only one can be selected among all offered.
- **Check-box** - Functions similar to list-box. When an option is selected, the box is marked as checked. Multiple options represented by check boxes can be selected.
- **List-box** - Provides list of available items for selection. More than one item can be selected.

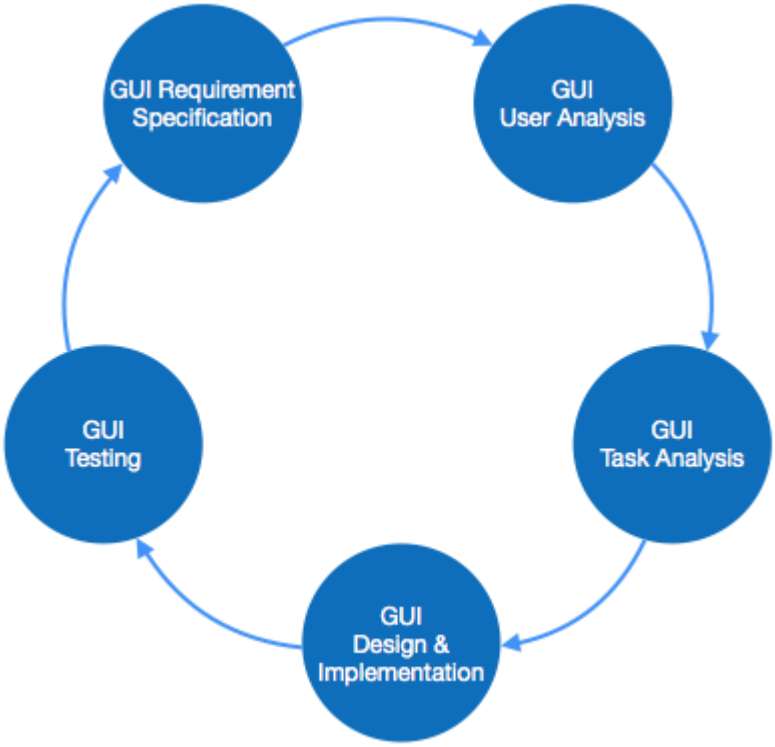
Other impressive GUI components are:

- Sliders

- Combo-box
- Data-grid
- Drop-down list

User Interface Design Activities

There are a number of activities performed for designing user interface. The process of GUI design and implementation is alike SDLC. Any model can be used for GUI implementation among Waterfall, Iterative or Spiral Model.
A model used for GUI design and development should fulfill these GUI specific steps.



- **GUI Requirement Gathering** - The designers may like to have list of all functional and non-functional requirements of GUI. This can be taken from user and their existing software solution.
- **User Analysis** - The designer studies who is going to use the software GUI. The target audience matters as the design details change according to the knowledge and competency level of the user. If user is technical savvy, advanced and complex GUI can be incorporated. For a novice user, more information is included on how-to of software.
- **Task Analysis** - Designers have to analyze what task is to be done by the software solution. Here in GUI, it does not matter how it will be done. Tasks can be represented in hierarchical manner taking one major task and dividing it further into smaller sub-tasks. Tasks provide goals for GUI presentation. Flow of information among sub-tasks determines the flow of GUI contents in the software.
- **GUI Design & implementation** - Designers after having information about requirements, tasks and user environment, design the GUI and implements into code and embed the GUI with working or dummy software in the background. It is then self-tested by the developers.
- **Testing** - GUI testing can be done in various ways. Organization can have in-house inspection, direct involvement of users and release of beta version are few of them. Testing may include usability, compatibility, user acceptance etc.

GUI Implementation Tools

There are several tools available using which the designers can create entire GUI on a mouse click. Some tools can be embedded into the software environment (IDE). GUI implementation tools provide powerful array of GUI controls. For software customization, designers can change the code accordingly.

There are different segments of GUI tools according to their different use and platform.

Example

Mobile GUI, Computer GUI, Touch-Screen GUI etc. Here is a list of few tools which come handy to build GUI:

- FLUID
- AppInventor (Android)
- LucidChart
- Wavemaker
- Visual Studio