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System Analysis and Design

In the era of business process re-engineering which aims at the evolution of existing business systems into entirely new patterns, by incorporating the current and emerging developments in information technology, system analysis and design assume greater significance. The subject-matter of information system design is the provision of a system that could meet the information requirements of end-users in the most efficient manner, and the product of a good system analysis and design is called Business Process Reengineering (BPR). System analysis and design become far more challenging with the availability of new products in huge volume, quality-ensured services, and highly improved price performance ratio, providing new ways of doing business. System analysis is an orderly and systematic process of identifying and solving problems, before system design is developed.

System Analysis

System analysis is the process of dividing the whole system into component subsystems inorder to examine them in detail. It acts as the basis for designing and installing a system and for the study of the nature and problems of an existing system. It involves collection, organization and evaluation of facts about a system and the environment in which it operates. Basically, system analysis is a fact–finding process and involves critical examination of facts relating to

the system, with the objective of learning enough about a system to make it better and more efficient. The emphasis is on the investigation of the present operation of the system, to form a thorough understanding of the business aspects under consideration and to identify the requirements of the end-user. Thus, system analysis is a detailed study of:

- System requirements mainly dealing with the identification of information needs at each level,
- The activities, resources and outputs of current information system,
- Information needs of the organization and its end-users, and
- The capabilities required to meet the information needs of end-users.

The system analyst conducts the feasibility study, identifies the problem areas, Information needs, etc., conducts cost benefit analysis, and formally defines the objective of the study. Thus he should have thorough knowledge of the equipment used, computer procedures and interpersonal skills for the successful implementation of the system. The result of system analysis is a set of requirements and design ideas for the proposed system. In system analysis , the prime stress is on analyzing the system with the potential goal of improving or modifying it by breaking it down into smaller elements. Thus, in the words of Senn and James.A., system analysis is " the process of gathering and interpreting facts, diagnosing problems, and using the information to recommend improvement of the system" Thus the crux of system analysis is to look at the entire problem, to systematically investigate its objectives, to analyze the means for system effectiveness, and to make a cost benefit evaluation of the system.

Need for System Analysis

System analysis is required to be undertaken under the following circumstances to meet certain objectives, as follows:

1. To understand the ways to improve the existing system
2. To implement a new technology or idea,
3. To understand the type of changes required in the organization, with reference to new accounting or management practices, and
4. To help in problem solving in the proper perspective.

Systems and Subsystems in System Analysis

Information system is a hierarchy of subsystems. System anlysis involves the identification of the whole system and its components called subsystems, and a clear-cut definition of the interfaces between the lower level subsystem, so that the objectives of each and every subsystem can be analyzed and examined to ensure its accomplishments. The important steps in system analysis are:

1. System study proposal: It is the first step in system analysis , where the system analyst prepares a plan of activities to be undertaken while analyzing the system.

2. System survey: It refers to the survey conducted to analyze the current system and its various subsystems to have an overview of the present system and its working.

3. Problem specification: This is the most important step in system analysis and involves the proper identification and definition of the problems faced by the system, to help the analyst to probe the problem more deeply.

4. System study and proposal review: In this stage the proposal for system study is revised and made suitable to the problem specified.

S. System analysis: It focuses on the potential system to be designed. The analysis involves the objectives of this new system and the ways to achieve them.

6. System requirement specification report: This is the last step in system analysis, where a report is prepared specifying the requirements of the new system, regarding hardware, software, personnel, system reliability formats, frequency of reports, error tolerance rate, and security needs. It requires a detailed presentation of these requirements.

The important techniques used by system analysts for carrying out system analysis are:

1. Interview of people involved in the system,
2. Operating manuals,
3. Job descriptions,
4. Questionnaires,
5. Direct observation,
6. Work measurement,

7. System flow chart,
8. Grid chart, and
9. Decision tables.

The most widely used techniques of system analysis are:

System flow chart: It is a diagrammatical or pictorial presentation of the logical flow of operations and levels of information in an organization, depicting the relationship between input, processing, and output. It documents the flow of information in an organization. Flow charts are drawn to read usually from left to right and from top to bottom. The standard symbols used to represent an input, output, documents etc. are:

Input / Output

Storage

Document

Fig. 12.1

Grid charts: They are used to define the relationship among various documents in a system. Also called X-charts, they represent the relationships among variables with an 'x' mark in the relevant box. They assist the identification of the responsibilities of various managers for a particular subsystem, and also help in identifying the unnecessary documents and elements of data. Grid charts can be effectively used to trace the flow of various transactions and reports in an organization.

Decision tables: It is a method of representing information for the purpose of decision-making. Decision tables are valuable for both system design and documentation,

and permit complex and logical format. They are sometimes used in place of flow charts for problem definition and documentation. Thus, decision tables are tabular representations of the decision-making process and the tabular structure is divided into four parts, such as: condition stuff, condition entry, action stub, and action entry. The condition stub lists all conditions, which may be either true or false. The condition entry section does all possible states for all conditions. Hence for each condition there are two possibilities, which may be true or false. The action stub lists all possible actions that can be undertaken depending upon the conditions. The steps in using a decision-table are:

1. To identify the condition entries,
2. To identify the action entries,
3. To identify the outcomes,
4. To enter appropriate outcome in the decision table, and
5. To simplify the table by removing any redundant condition.

Data Dictionary (DD)

It is an extensively used tool in system analysis .Data Dictionaries provide detailed reference to every data item. The different names by which the items are represented in different program modules, different data structures used to represent the items in different modules the modules where data items are generated, where they are stored and destroyed, etc,. are given in the Data Dictionary. It is a snapshot of every data item used by the information system.

System Design

System has been designed as an assembly of procedures, process, methods, routines and techniques, integrated by some regulated interaction to form an organized whole. System design is developed on the basis of objectives of the organization. System design is developed after the system analysis is completed. The first task to be undertaken by the system designer is the identification of information needs and determination of information sources.

Conceptual MIS Design

MIS design may be either conceptual or detailed. In conceptual design, the system is designed to make it feasible

to meet the management objectives of MIS, and, as such, it is called the feasibility design of the system. It also gives the conceptual idea of the working of the system as a whole. It is sometimes referred to as gross design or high-level design before developing the conceptual design of a system, the management requires an idea about the information needs and the organizational objectives. And the design of the system needs to be such as will facilitate the information needs and managerial objectives which contribute to the overall organizational objectives and effectiveness. The important tasks involved in conceptual system design are:

1. Definition of the problem: MIS is designed to provide information to the managers to solve various problems in an organization. In the modern world of dynamic business, clear definition of problem is very difficult. Thus, managements must give importance to redefining the vague problems existing in the organization, and make them comprehensible to those who design and implement the MIS. The problems need to be taken and broken down into a long usage which the computer specialists will understand. The problems must also be clarified with the help of specific statements about them. The steps involved in the definition of a problem are: stating the information needs, asking questions about the needs, interpreting the needs, detailed explanation of the original problem statement and review of the problem statement with regard to the needs of the management.

2. Setting up of system objectives: This is the second step in the development of conceptual system design. It is very difficult to set up the system objectives, since it must cover and integrate the various objectives of all functional areas within the system, which we refer to as subsystems. First of all the managers must define the system objectives, consisting the legitimacy of information needs, which contributes to the overall system objectives – management effectiveness. Various system design have various objectives developed in terms of benefit to the users. When these objectives are integrated together, they will contribute to the general system objectives. While setting up the objectives of various subsystems, as well as of the system as a whole, care must be given to ensure that they are stated in clear terms, as against vague expressions of objectives like, keep accurate accounts, provide quality products ensure efficiency,

etc., This means that system objectives are given in specific terms so that the measure of performance of the system is made easy to help the attainment of the objectives. Moreover, system objectives must be expressed in terms of objectives of the department, group, function or manager, and on the basis of what a manager can do after the information needs have been met. While stating the objectives, flow charts, descriptive statements etc. can be used by the system designer to convey the objective to the manager. It is more beneficial to express the objectives in quantitative terms rather than in qualitative terms.

3. Establishing system constraints: System constraints are the restrictions upon the system or the problem boundaries within which the system must be operated. Constraints are the conditions under which system objectives need to be achieved, and the specific limitations that restrict the system design. The system constraints limit the freedom of action in designing a system in such a way as to enable the achievement of system objectives. Though considered as a negative force, system constraints can also provide certain positive force like keeping the system away from promises that cannot be kept. Constraints may be either internal or external. Internal constraints are the restrictions within the organizational system, and include:

(i) Top management support: Top management officials are reluctant to support the organizational system and its working because they feel that computerized information system, if implemented, will cause a reduction in power and authority in the organization that they enjoy at present. But in reality management information system can be effectively implemented only with the co-operation of the top management. Otherwise, it will act as a constraint that restricts the functioning and development of the system.

(ii) Organizational and policy consideration: These considerations limits the system objectives, and thus demand modifications in system design. The structure of the organization and the policy of managers in different positions influence the system design. Another important problem related to this is the manager turn-over, requesting a redesign of the system. Company policies relating to products, service, research and development, marketing, finance, personnel, etc., impose certain limitations on the system design and development.

(iii) Personal needs and availability: It is the most important limiting factor or key factor in an organization influencing the design and utilization of information systems. It is the most critical factor, as skilled personnel all scarce in the organization, and it is difficult to find skilled hands to design, implement and operate the system. It is the most significant constraint in almost all the system, as failure to solve the personnel problems would naturally cause difficulties in attaining the system objectives.

(iv) Costs: It is another important constraint on system design. The costs involved in designing a system must be compared with the benefits derived from such a design. The cost of one design must be compared with the costs of similar other designs, in order to ensure that the system is designed in an optimum manner in such a way that the costs are reduced to the minimum while the benefits to be realized from the design are the maximum.

(iv) Self-imposed restrictions: There are restrictions placed on the system by the designer or the manager, like scaling down several requirements, to make them fit with other equipment, output or constraints, and to include the reduction of time and effort involved in the system design. Data requirements, data volume, etc., are other important self-imposed constraints.

External constraints are considerations surrounding the environment external to the organization, and relating to the end-user. While designing the system, the designer must consider the needs of the customer, especially in matters like billing, order entry, etc. Some times certain outputs are not acceptable to the customer, in which case system must be rearranged to cater to their needs. The various other external constraints are:

(i) Government: It imposes certain restrictions on each and every system, like maintenance of security of information compliance with law and regulations in conducting their business (tax, reports) and meeting certain procedures regarding bookkeeping.

(ii) Trade Unions: They have great influence on the operations of the system involving members in matters such as compensation, redressel of grievances, working conditions, etc.

(iii) Suppliers: They can influence the system design since input supply will always affect the effective working of the system.

Thus, while designing the system, external as well as internal constraints have to be considered and the system redesigned accordingly.

4. Determination of information needs: An efficient and effective system design requires a predetermination of the information needs of the organization and management. The management can specify the information crucial for solving the problems, selecting the alternatives and opportunities, and making plans. Unless the system is designed after careful analysis the system will not produce the desired results. The system designer can develop the best system design, of the managers define the objectives and specify the information required to attain these objectives. But it is very difficult to predetermine the information needs in an organization and hence the practical way is to require the subordinates to give a statement specifying certain responsibilities for which the manager may be accountable, and the information required to perform these responsibilities. Normally, the information requirements of managers are based on two factors: The personal attributes if the manager, and the organizational environment. The personal attributes of the manager, include his knowledge of the information system, managerial style, and perception of information needs, whereas the organizational environment influencing the information requirements consists in the nature of the organization, levels of management, structure of the organization, subsystems of the organizational system, etc.

5. Determination of information sources: Some organizations require external information while others require internal information. Thus, it is essential to identify the external and internal sources from where these pieces of information are obtained, to meet the various organizational requirements. The important information sources are:

(i) Interview: Interview of managers and operating personal in an organization is a source of information where the interviewer can directly collect the information through face-to-face conversation, which enables him to ensure the accuracy of the data being obtained.

(ii) Internal records: They are written reports prepared in an organization, and include reports relating to inputs, outputs, file records, memoranda and letters, reports about the working of an existing system, etc.

(iii) External records: These arte records prepared outside the organization and contain information required for the organization. Such external records may be created from a variety of sources including trade unions, government, financial institutions, etc.

(iv) Sampling techniques: Sampling study helps us to collect various items of information required for our purposes, by analyzing the nature and trend of the samples. It also helps to analyse the actions of people, machine or events, in terms of time.

6. Development of alternate system designs and selection of one design: In this stage, various alternatives are designed for conceptual system and these alternatives are evaluated on the basis of certain performances. The important basis of evaluation are: comparison of anticipated performance of the designer with the objectives of previously designed system, preparation of cost efficiency analysis, flowchart examination to identify the strong and weak points of each design, expansion of the system design, etc. After evaluating the various alternatives, the best one is selected for implementation in the organization.

7. System Documentation: It means the detailed description of the system on the basis of the various forms of information collected, and includes flow charts and other modes of documentation, which reflect the movement of inputs, outputs and various operations. While documenting the system, the involvement of the manager and the designer must be ensured. The manager's involvement refers to the extent to which he provides information to the system, and the contribution of the designer is related to the nature of materials, equipment, technical processing consideration, etc. The details to be worked out by the designer include instructions regarding what data are to be captured, when the files are to be used, what details of processing will generate outputs, and how various files are to be distributed. System documentation involves system elements such as inputs, outputs, master file, and rules for processing data through black box. The general structure of a computer-based system can be represented as:

(i) System flow chart: It is the most common and popular method of representing a system. It is the logical description of the data processing function, reflecting design efforts such as setting objectives, establishing constraints and determining the information needs and sources. The system flow chart has many major features. It reflects the system objectives, defines the information needs and sources, shows design rules, involves designation of inputs and outputs, and ensures the subsystem integration.

(ii) System inputs: After information sources are identified the inputs are structured and an input format is designed. Input design refers to the conversion of the form of inputs received from outsiders into a machine-usable form. If the inputs are received from other subsystems in the system itself, then it is closely integrated, otherwise the production process will be delayed.

(iii) System outputs: 'System output' includes the specification of output destination, distribution of output, frequency of output and its timing, form of output, etc. The manager has to ensure that the outputs meet his information needs, specified earlier. While designing the system output, the principles of management by exception, and information by summary should be followed.

(iv) Other documentation: The other means of documentation of the system are the preparation of activity sheet and system narrative. Activity sheet gives the description of the particular activity and provides the volume, time relations and various other functions. In system narrative, the level and kind of description are available at the end of the detailed explanation of the system concepts.

The conceptual system design is a proposal for the expenditure of funds and for organizational change, directed to the management, and comprises a summary of the problems occurring in the system , system objectives and their general nature.

Detailed MIS Design

The purpose of detailed MIS design is to provide a description of the system that achieves the goal of the conceptual system design, with the help of flow charts, personnel specification, procedures, equipment support tasks, information files, operating manuals, etc. After setting up

the detailed system design, the system requires analysis and testing, to justify the design. The design is said to be detailed since it facilitates the management and operating personnel to implement the system by yielding construction and operating specifications. The various steps involved in detailed MIS design are: project management, identification of dominant criteria, definition of the subsystems, sketching the detailed operating subsystems and information flows, determination of degree of automation, informing and involving the organizational input, output and planning, early system testing, physical system design, etc.

1. Project management: It involves planning and organizing the system design. The project management is divided into two activities, i.e., planning and control. Project planning involves establishment of project objectives, definition of the project tasks, planning of logical development of tasks, scheduling the work, estimating the labour equipment and cost requirements, establishing a budget , and planning the staffing function. The important steps in project control are: determination of project objectives and their achievement, maintenance of control over the schedule, evaluation of expenditure, evaluation of work force utilization, and evaluation of time, cost and work performance in terms of budgets, schedules and technical plans.

2. Identification of dominant and trade-off criteria: 'Dominant criteria' refers to an activity that makes the task most important and overriding all other tasks, like one day customer service, zero defect product, specified price range, maintenance of multiple sources of supply for materials, etc.

Trade –off criteria are those criteria by which the criterion for the performance of an activity may be reduced to increase the performance of another activity. For example, a firm can achieve low manufacturing cost canbe achieved by a firm by adopting a reduction in environmental pollution. The dominant and trade–off criteria are identified since the detailed system design requires development of decision centers.

3. Definition of the subsystem: The assumption regarding the subsystem, developed at the conceptual design stage, must be redefined in this stage, after undertaking an investigation of the detailed activities involved in the system. These major activities are then broken-down into various subsystems and defined clearly. The breaking up of activities

results in a hierarchy of activities like system, subsystem, functional component, task subtask and operation element. The revised subsystems are identified with the help of network diagrams, by drawing a loop around the total activities to be included in the subsystem. Information items for defining the subsystems are obtained from various sources, such as interview, task force meetings, internal and external source document, and direct observation.

4. Sketching the detailed operating subsystem and information flows: It refers to the use of graphic symbols and charts to define the subsystems clearly. The major charts used for this purpose are: task oriented chart like block diagrams, forms –oriented charts used for communication or reporting the flow of all copies through the organization, and program flow charts to give instructions to the computer.

5. Determining the degree of automation: The degree of automation of each operation is determined here. The different degree of automation are: no automation, work-automated control manual, work- automated feed back, automated central manual, and work-automated, feedback-automated, and control-automated.

6. Informing and involving the organization again: It refers to the provision of information about the detailed system to the interested parties like top level managers, lower level managers, and users, So that they can identify the resisting ones to adopt changes and to ensure participation by ensuring the involvement. The top-level managers must give an overview of the detailed design with the help of system flow charts and their comments and suggestions obtained. Explanation of the detailed system design to the users is a critical level activity, which can ensure the involvement of end-users in the functioning of the system.

7. Input processing and outputs/forms and report design: After defining the subsystems the inputs and outputs of subsystems are again defined in detail to provide a better description of the performance of the tasks assigned to each and every subsystem. The definition of inputs and outputs involves two tasks, such as: specification of inputs and outputs exactly, and designing forms that can fulfill their function. While designing the forms of inputs and outputs, the designer must identify the function of the form, when it is used, how many copies are used in a single cycle, who fills out the forms

and who uses it, and finally, how many units of the forms are required per year. The important factors to be considered while designing the forms are:

1. The form should have a title and identification number.
2. Group information on related areas in the form and box designs, with captions, is used in the box.
3. Items in the form are arranged in a logical order.
4. The use of box items needs to be checked or coded.
5. The form should be attractive and easy to understand
6. Sufficient space should be provided in the form to enter data.
7. Formats need to be shown on video display terminals.
8. Forms and envelopes are designed to match the location of the address on the form, which must show through the envelope window.
9. Forms are to be placed in a binder leaving adequate blank space at the top and sides.
10. Stander form size (81/2" x 11" to 11" x17") should be used.
11. Different colors must be used for routine instructions.
12. Standard contract information must be given on the back of forms like purchase orders.

The development stage of system life cycle consists of four activities, such as: physical system design, physical database design, program development, and procedure development.

Physical System Design

It refers to the hardware configurations of the system. The guidelines helping the system designer to develop the physical system design include: buying enough computing power for the entire job, buying some extra power, buying enough storage capacity(external) to manage the database and ensuring the provision of some space here for future needs, buying other physical and peripheral devices like printers, displays, etc., buying computer suppliers like paper ribbon, tapes, etc., buying computer power to provide the required user response, buying the best documentation and buying the sufficient maintenance and support packages.

Physical system design is the detailed system design, which prepares the technical design of the system, and it is based on the conceptual design and information requirements. It is the base on which physical database design, program development and procedure development taken place. Physical system design provides for a system reflecting the flow of work, programs and user functions, a control design representing the controls implemented at various points, hardware specifications, data communication requirements and specifications, overall structure of programs, security and back-up provisions, and an application test to ensure the quality of the system. The physical system design is developed by system analyst and various other technical personnel in the organization. It provides for reduction in system complexity by dividing the entire system into important techniques available for physical system design are: Top-down design, structural design, System Analysis and Design Tehnique (SADT), Hierarchy Input Process – Output (HIPO) technique, and Warnier–Ore technique.

Physical Database Design

Database is the data stored for later managerial decision-making. The design of the database must cover steps like: identification of all points on flow charts requiring data inputs, preparation of data file, specifying the source data, length and format, current and potential frequency of updating, retention schedule end use of the data, grouping of data worksheets by the system, grouping of data worksheets by activity, eliminating delicate data, and evaluating the data items in master files.

It refers to the development of a design for organizational database. A design of physical database can be prepared in a number of ways, such as: creation of new physical database, using the existing database or its modification, and accessing of an existing database by means of a user scheme.

Program Development

This stage in system development cycle involves coaching and testing of programs required for the application. Here, each and every program is divided into small, well-defined modules, which helps the system to reduce program complexity and enhance reliability. The important techniques

of program development are: Modulating structured programming, application generators, and tailoring of application packages.

Modulating is the process of subdividing the program into small, well-defined modules that can be programmed as sub programs and can also be coded, tested and integrated with other modules

Structured programming refers to the development of a program with the help of a small set of basic coding structures that can ensure the well-defined modules. Such programming is also called 'GOTO-Less programing, as it prohibits the GOTO statements.

The testing techniques adopted by systems to test programs are: module testing, integration testing, and system testing. The testing is conducted to check the reliability as well as the correctness of the program. Reliability refers to a program that operates in an acceptable manner, A program is said to be correct when it meets specifications.

Procedure Development

Procedures include manuals, instruction cards, input or output forms, help screens , etc. Procedure development is undertaken along with program development. The procedure in a program is developed by the system designer, mainly for the primary users (instruction to interpret the report to select different options for a report, etc.), secondary users (detailed instruction on how to enter each kind of input) and computer operating personnel (instructions for quality assurances, back-up system files, etc.). Training procedures are also developed for the implementation of MIS.

Quality Assurance

Quality of an information system refers to its fitness in the organizational context. Perfect quality is not possible in any system. It is highly relative in the sense that a quality information to the primary users need not have quality to secondary users and computer-operating personnel. It is very difficult to define the concept of quality, and thus it is better to specify the features of quality in information system, as completeness of data accuracy of data, previous data, timely output relevance of output, user-friendly operation, error-resistant operations, meaningful output, understandable output, authorized use, and protected system and its operations.

To control and ensure quality in information systems organizations assign certain duties to the top management, to the executives to the operating personnel, and to the users. The duties of the top management in this regard are: establishing domain authority and responsibility of such functions, "selecting" information system executives, approving the information system character plan and budget, approving hardware and software system, approving major applications, reviewing result and comparing them against plans, and reviewing the information system procedures. The duties of the executives include establishment and supervision of assurance procedures developed in-house, establishment and supervising of control functions, and establishment and supervision of procedure to measure and report evidence of quality, returns, repair, maintenance error, etc. Users also have certain duties for the development and maintenance of quality information system with special controlling and quality assurance functions.

Quality assurance in application is based on three conditions such as organizational commitment information processing discipline, and redundancy to achieve error control. Some of the quality assurance process adopt in applications are: determination of information requirements, development of program development procedures, installation testing, and post-audit evaluation.

The quality of the new system can be ensured by testing the system before its implementation. After certifying all aspects of the system, it must be assembled and tested. Parallel-run tests are conducted to test the new system using the live data. The result of the new system is compared with those of the old system. When both are correct or when the performance of the new system is found to be better than that of the existing one, the quality of the new system is ensured with reference to complete operational control. There are other testing approaches like pilot conversion, where one subsystem is chosen as the prototype and implemented before others, only when the prototype is of high quality and ensured complete operational effectiveness. Then the next system be considered. In the crash conversion approach the entire new system is installed and the organization suddenly relies on the new system alone. These methods are also highly useful in assuring the quality of the system.

Testing of the System

The three ways of getting feedback on the feasibility and suitability of the system design, i.e., the way of testing the system design are: modelling, simulation and test planning.

(i) Modelling: The modelling may be either mathematical modelling or logical table modelling. Logical tables or decision tables include quantitative and qualitative bases for decision-making. They help in design and documentation of systems. The decision structures may take the form of "if... then" relationships containing condition and action stubs.

(ii) Simulation: The steps involved in simulation are: selection of exogeneous data values at random within the anticipated range of each variable, tracing their effect on the system, examine outputs of various subsystems, etc.

(iii) Test planning: It means the detailed plan for testing MIS design in which certain questions are asked and answered in detail, such as the exactly available subsystems as various data, external data user interface, typical scenarios tried out against the MIS, identification of likely test subjects, etc.

System Development Cycle

Every system goes through the process of birth, growth, maturity and decline. System development process is a method for studying and changing systems, as they go through these phases. It is also known as the system life style. The important stages of system development life cycle are:

1. Area selection and problem definition: The objective of this phase is to obtain a system definition, which will then be implemented, if accepted in the subsequent analysis and design phases. The basic activities involved in this phase are:

(i) To determine the objectives of the current system,

(ii) To study the current system, to see how far it merits its objectives,

(iii) To analyze users and companies requirements to develop new objectives.

(iv) To identify the constraints imposed by users' environment

(v) To identify users' responsibility of data inputs and outputs to other systems,

(vi) To examine the interaction of the proposed system with other systems,

(vii) To prepare details of requirements of users, data elements, volume, response time. etc.,

(viii) To design specifications,

(ix) To prepare plan for design and implementation phases, and

(x) To produce a report for the user and system management.

2. Data gathering: Data gathering refers to the collection of information pertinent to systems project. To get information, the designer may read books or reports, go through records, collect forms for later analysis, or conduct interview with people, managers workers and customers.

3. Creation of alternatives: To create various sound alternatives, the system analyst must have a broad and familiar background with different types of equipments that are applied to problems and the procedures that can be used for solving such problems.

4. Feasibility study: Once the existing system has been studied, the analyst has to finalise the feasibility report containing the cost benefit analysis. All tangible and intangible benefits are analyse in the report, such as increase in sales or profits, decrease in operating costs, improved information availability, computational facilities, reduction in labour house etc.

5. Master development plan: Master plan is a sort of blue print of system development effort. In a dynamic organization there are numerous opportunities for computer processing application. Hence a master plan is required for system development. It is treated as a schedule of application to be computerized and consists of start and finish dates of system analysis, design, implementation and maintenance activities. This schedule needs to be supported by manpower, hardware, and finance. The master development plan is based on the following objectives:

(i) Avoiding the development of systems that are definitely duplicates of some other systems.

(ii) Providing for integration of current systems or current and proposed applications ensuring the effective and efficient use of resources.

(iii) Ensuring that systems are developed according to the assessment of their development and operating costs and their value in achieving the objectives.

(iv) Ensuring that all systems are tied to the overall master plan.

6. Equipment evaluation and selection: In this stage the solutions stated in general terms are evaluated by the analysts by contacting the equipment vendors. Prices of different alternatives are checked, the capabilities of these are evaluated alternatives and it is made sure that costs projections are reasonable.

7. System design: After the proposal is entered into the designer concerned with the local design of the system, detailed specification are made for each and every aspect of the system. The steps involved in this stage are:

(i) Specification of data elements, records and files,

(ii) Specification of input forms, data preparation format, and identification format of personel who compete with others,

(iii) Specification of system output,

(iv) Development of system flow chart,

(v) Development of feedback and control procedure,

(vi) Development of programme specification,

(vii) Development of operational specification,

(viii) Resources planning,

(ix) Training of personal, system review and parallel operation.

8. System Development: The activities undertaken in this phase include:

(i) Determination of file organization and lay-out,

(ii) Finalizing information flow, data dementia, data relationships, etc.,

(iii) Identifying master files, working files, data volume, frequency of updating, etc.,

(iv) Specifying input lay outs,

(v) Defining reporting requirements, volume and frequency,

(vi) Developing overall system logic,

(vii) Identification of computer program and manual procedures,

(viii) Deciding the storage device to be used,

(ix) Determining control procedures.

9. System Implementation: It refers to the tasks involved in bringing the system into operational use, and involves programmers, users, operational management, etc. Its planning and timing is performed by the system analyst. Before implementation, the system needs to be tested for user satisfaction, and for the initial operation of the new system.

The activities undertaken in this stage are:

(i) Conducting training programs,

(ii) Installation of the equipment,

(iii) Preparing operating schedule,

(iv) Conversion of programs and files into new configuration,

(v) Parallel operation of new systems and existing systems (use of new system along with existing system) to compare the results).

10. System Maintenance, Review and follow up: It is also known as the system evaluation phase. Here, the system is evaluated after its implementation to find out whether it has achieved what it was actually intended to do. Follow up measures are designed to get feedback from the end-users to revise the system accordingly or to make alterations in the system wherever necessary.

Final Documentation of the System

The final documentation of the system design will provide every aspects of its operation. The final report should be professionally bound and concisely written by giving clarifications with the help of clear illustrations, avoiding

technical jargons. Such a report should contain an overview of the entire project, describing the general purpose of the system and all the information available, printer spacing charts accompanied by descriptions, system flow chart, financial analysis of proposed and existing systems, projection of current and future costs as well as potential cost saving, and description of the computer system and its peripheral devices.

Conclusion

Business system is a combination of policies, personnel, equipment and computer facilities, operating according to a set of procedures, which co-ordinate the activities of the business organization and are designed to improve the flow of data through an organization, by eliminating waste, providing the best distribution of resources, efficiently handling the data, and responding to user needs. Computer – based information system need careful analysis and design before their implementation. Conceptual and detailed system design is required for ensuring the effectiveness of information system, to meet the information requirements of end-users efficiently. System analysis is a holistic approach, wider than the use of computers, to perform various activities that have been handled manually for years.

Exercise

Short Answer Questions

1. What do you mean by system analysis?
2. Explain the various steps involved in system analysis.
3. What are the different techniques used for system analysis?
4. Explain system flow chart.
5. What is a Grid chart?
6. Describe a decision table.
7. What are the steps involved in using decision table?
8. Define a Data Dictionary.
9. What is system design?
10. Describe the concept of conceptual MIS design.
11. What are the steps involved in conceptual system design?
12. What are the different types of system constraints?
13. Explain the major external constraints in system design.

14. What is system documentation?
15. Describe the concept of detailed system in MIS designs.
16. What are the steps involved in detailed MIS design.
17. Explain physical system design.
18. What is program development?
19. Explain procedure development.
20. Describe Quality Assurance.
21. How can quality is assured in information system?
22. What is the significance of quality assurance in information system design?
23. Explain testing of the system.
24. Explain the ways of testing a system.
25. What do you mean by system development cycle?
26. Explain master development plan.
27. What is feasibility study?
28. Explain system implementation.
29. Describe the steps involved in system design.
30. Explain the need for system analysis.

Essay Questions

1. Explain system development cycle. What are the steps involved in it?
2. Describe the steps involved in system analysis. What are the technique used for it?
3. Explain conceptual MIS design and important tasks involved in it.
4. Describe detailed MIS design.What are the steps involved in it?
5. Explain the concept of quality assurance in relation to system analysis and design. Bring out its need and significance.