System Analysis And Design of Information System

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Reference Book:

Title **Analysis and Design of Information System**

Author **James A. Sen**

Introduction

What is a system?

In a broad term we can say that system is a group o**r** set of components that interact and work together to complete a specific task.
For example our body itself is one system, which has components like legs, hands, and etc. Our way of communication is also one system, which is developed with components like words and symbols by which one person can communicate with other person.
Any business itself is also a system which may has components like Manufacturing, sales, marketing, accounting. All these components Work together to generate profit and benefit to organization each of these Components are also a system. For example manufacturing itself us one system, which has component like production, quality control and packing.
Your pc itself is a system, which has component like CPU, Monitor Keyboard and other devices, which together interact with each other and process the data. Every system depends on the information system where data flows from one person to another or one department to another.
This information system serves almost all the business system by linking all the components of business and the produce valuable information in the form of data. This type of system has some certain properties or characteristics, which are as below.

(1) Open system \ close system:

To perform certain task or to achieve any purpose system has to interact with the entities outside the environment. They are called open system. The system do not interact with their environment are called close system.
The entire system exit on the world is open system. Thus closed system is a concept only

(2) In control:

When the systems are operate within tolerable performance then they are called In –control systems. For example when the temperature is 98.6 degree Fahrenheit then we can work at our best. Slight changes in temperature will disturb the functionality of human body

(3) Standards:

The system which performs their activities according to the predefined functionality are nearer to their standards. All the system have acceptable level of performed called standards standers can be checked by

(1) Defining the standard performance
(2) Measuring the actual performance
(3) Comparing the actual performance with standard performed

(4) Sub- system or components:

Almost all the system is made up off components or sub-system, which interacts or related with each other to perform certain task.

Types of information system?

Information system supports the business activities by performing various activities like processing of input data, maintaining the data and files, produces
Information in the form of report and other outputs. To understand the functionally or Performance we have to consider some important details like…

(1) Interdependencics:

Which department or which component is depended in another department or component.

(2) Key people and their functionality:

Who are the key person in the system and what are their activities.

(3) Communication channels:

Flow of the data or information or instruction are passing by one Component to another component. How they interact with case other.

(4) Informed channel:

The interaction between people and department exit but not show
As any operation or producer is called informed channel.
Generally there are 3 type of systems exit in the world. They are as follows

(1) Transaction processing system.
(2) Management information system.
(3) Decision Support system.

Transaction processing system:(TPS)

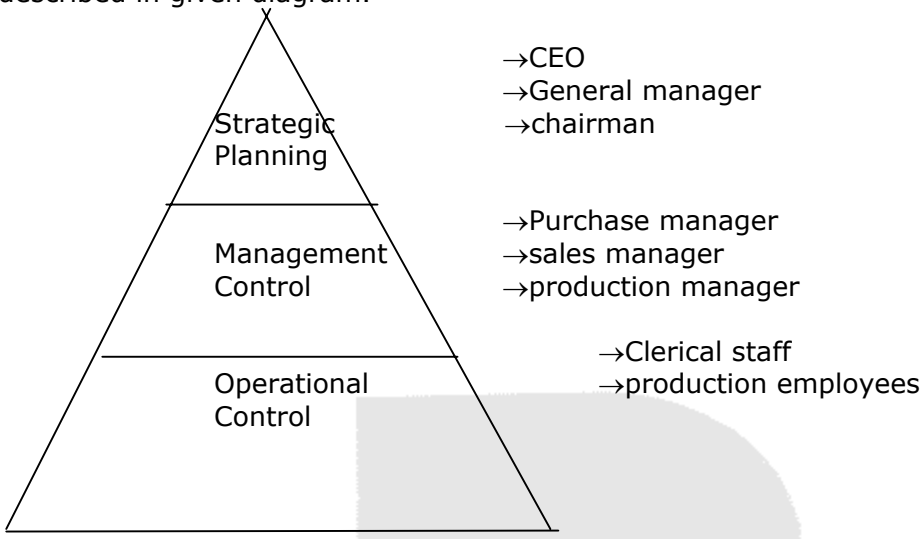
It is the most fundamental and wildly used computer based system to perform and to process business active and translations. TPS system is used to improve the daily business active on which organization is depending. Here Transaction is any business activity or event that effect the organization.
For example, placing order, billing customer deposit money in bank are called transactions. These Transaction processing supports the business activities like

(1) Calculation (2) Classification (3) Sorting (4) Storage (5) Summarization

Banking system is are of the most suitable example of TPS Systems where transactions like withdrawal of money, deposit of money, transaction of money, counting interest are performed.
Transaction. Processing system provided Speed and accuracy to the routine or daily business activities.

EXAMPLE OF AUTOMATOD TOLLER SYSTEM

Volume of transaction processing at different level in an Organization is described in given diagram.



(1) Management and System:

MIS helps the manager and policy makers to take decisions related to the business MIS use data, which is processed by TPS system and also some other information.

Decision making is one of the daily activities performed by the higher authorities of organization MIS system provide better support and produced data to make certain decision. MIS leads policy makers and manager to make decision nearer to the perfection.

Generally MIS system supports the organization by providing summarized data and compressed reports.

System specialist frequently describes the decision Supported by MIS as structured decision because these decisions are taken on the base of accurately processed data.

Regular reports on total deposit and total withdrawal by branch office are routines used by bank officer to keep track of performance of branch.

Systems, which generate this type of information, are called MIS.

Information supplied by MIS is often combining with other external information such as economic trends, demands for loans and cost of borrowing.

(3) Decision Support System:

The decisions making is also one of the most important activity of top level management. It is related to taking decisions and defining policies as a part of long-range planning and long term goals of organization. This type of activities can be carried out with the help of Decision Support Systems.

For example: Any manufacturing plant to install or not

Define: System Analysis & System Design

System analysis and design is a process of examining business organizations for their problems and to improve it through better and systematic procedure. System analysis design refers to bringing the solution using computer based information system.

The whole process is divided in two steps

1. System analysis
2. System design

System analysis involves following process

- Examining existing system
- Identifying problems
- Identifying requirements
- And specifying solutions

System design is a process of identifying input output requirements preparing forms, database design, file design and software design. Thus, it is a process of planning the new business information system.

User and types of user:

The word "USER" refers to the person who may directly or indirectly using the information system. For example the managers and employees of organization are users of the system. There are various types of user, which can be classified as given below.

End user
Indirect user
Managers
Senior Managers

End users:

The people who are directly using the system are End users. To perform their day to day task they use information system. They are not information system specialist. They are just operators of the system. Some may use the system rarely where as some may be frequent user. For example, the customer of bank is an End user of an ATM (All Time Money) system.

Indirect users:

Some people may not be using system directly but they may take the benefit of information system. For example, the chief executive officer of any business organization may not use information system directly but the processed reports about the production of company can help him to take the decisions. Direct end user work for indirect users of the information system.

Managers:

Those who are involves in management activities are third type of users. They continuously use the system for day to day planning as well as other managerial functions.

Senior Managers:

Senior managers have big burden of responsibilities on their shoulder. The best management organization can improve very fast, thus senior managers are the persons who use information system for the development of organization.

System Development Strategies:

System Developers applies the different strategies or methods to develop the system.
They are:

1. System development life cycle
2. Structured Analysis and design
3. System prototyping method

System development life cycle (SDLC):

An information system is designed and developed to meet organizational needs. The whole design and development operation is done in several different steps. The various activities under all such steps are carried out in fixed sequence and time. Thus, the total time required for system development beginning from initial investigation to implementation is said to be the life cycle of system development. The various activities of SDLC are carried out in sequence but in real application they may overlap. The whole SDLC process is shown graphically as given below.

First step in SDLC is to find the problem. Once the problem is realized, the process of SDLS starts. The system analyst is requested to have new system for solution. The system analysts then carry out the initial investigation to collect primary information about the organization and its problem.

(a) Information Gathering & Feasibility Analysis:

The next stage is to collect detail information about the organization and to check the feasibility. There are various methods for information gathering like asking questions, questionnaire, Interview and on-site observations. Fact -about organization can be found by using above methods.

The feasibility analysis is for checking possibilities of completion of project. There are three different ways feasibility is checked. It may be financial, operational or technical. All the three feasibility conditions must be satisfied.

(b) System Analysis:

System analysis is to find the problematic area. It is the approaches like "Where the problem is?" it includes learning about the existing system. It is a process of knowing the need of the organizations as well as operation of, the organization. So, it is a process of.

- Examining existing system
- Detection of problems.
- Specifying solution

The various tools like DFD, Decision table, Decision tree, etc are used for the system analysis.

(c) System Design:

System design is an actual plan of the system solution. In system design processes following activities has to be performed.

- Identifying Inputs and Outputs of system.
- Sketching and designing forms.
- Describing and defining data types.
- Design of hardware components.
- Development of software.
- File and database organization.

The step of system design is an actual blueprint of the solution.

(d) Coding:

This phase of system development life cycle performs system coding and decides method of coding to develop application. Various methods can be used to code software like function oriented software design and object oriented design. System analyst has to decide which coding method has to be adept. As well module level testing is also perform here in this stage.

(e) System integration and Implementation:

System integration phase integrates different module developed individually to build one application. System implementation is transferring system from development site to client site. It includes

- Connecting various hardware components.
- Establishing computer network
- Installation of various software.
- Providing training to the user.

Thus it is a process of putting the whole system into action.

(f) System Testing:

System testing is a process of detecting errors and correcting .it in newly designed system. Under this stage the debugging programs as well as the whole system performance testing is carried out.

(g) System Maintenance:

System maintenance is the process to remove the defects and problems in the working of System. The system maintenance may be adaptive. It is also used to make the system modernized by making some positive changes to it.

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Feasibility study.

It is a second stage of information gathering. The analyst begins to collect data about existing system's outputs, inputs and casts. The various methods (information gathering tools) used for fact finding are.

- Review of Written Documents
- On-site observations
- Interviews
- Questionnaires

Review of Written Documents:

The available documents of organization like forms, reports, manual, etc. are organized and evaluated. They help in determining with what extent new requirements met by the present system. The analyst should learn how various forms have to design and what charges to bring to have new information system design.

On-Site Observation:

The analyst is an information collector. On-site observation provides good opportunity to know and study real information about system. During on-site observation analyst should more concentrate on listening and viewing. He should avoid giving advice or passing comment. It is very difficult method of information gathering. Past experience of analyst can help in this method of finding facts.

Interviews & questionnaire:

The personal interview and questionnaire is very precise and effective method of information gathering. The information gathered by this method is highly reliable and valid.

In interview method there is a face-to-face meeting. That is why this method is more convenient for extracting required information skilled system analyst can do it easily.

On the contrast questionnaire method is less flexible but very good for quantitative information. It is economical and less skill requirements to administer it. The interview in which the questions are preplanned they are asked one by one and response can be noted.

Interviewing can have two distinct types as structured interview and unstructured interview. In structured interview analyst has proper planning of question and is expensive way of approach. It requires lots of paper work. Unstructured interview is flow of question as it comes in mind at the time of interview.

Other Methods:

Other methods for information gathering are:

- By the study of similar type of organizations.
- By the study of journals and reports describing the same type of system, which is analogous to, requested one.
- Prototyping:

  This is used where the information is highly uncertain and unpredictable. Here initial system is built up based on initial information. User is allowed to use this new system. The user than clarify about lagging facilities in the system.

What is a prototype method?

Generally information required are not always well defined user may know only some areas of business activity and the improvement needed in the information system. Also when user may know that they need better information system to manage business activity but not sure about how to get information in this type of section prototyping method is a best solution.

A prototype is not just an idea on paper but like any computer bused system it consist of working software that accepts input performs or display information. It may being with only a few functions and can be expanded to include other function and features that are identified letter on. The stop in prototyping methods is as follow.

Project Selection

Sources of Project Requests

There are four primary sources of project requests. The requesters inside the organization are department managers, senior executives, and systems analysts. In addition, government agencies outside the organization may request information systems projects. Depending on the origin of the request and the reason for it, requesters may seek either completely new applications or changes in existing ones.

Department Managers

Frequently, persons who deal with day-to-day business activities, whether employees or managers, are looking for assistance *within* their departments. For example, a business manager in a large medical clinic supervises the preparation of patient claim forms submitted to insurance companies, which reimburse the clinic for medical care.

Even though the business manager knows that preparing insurance claims is necessary to aid the patient and ensure that the clinic is reimbursed, he or she may be dissatisfied with the amount of time the staff devotes to the task, especially when much insurance information (such as patient name, address, age, and the name of the attending physician) is already available in the patient's records.

Pointing out the duplication of work, the bookkeepers express their desire to be free of the clerical tasks involved in processing claims.

After discussing the insurance problem with administrators in other clinics, the business manager asks the clinic's management committee to approve the development of a computer-based system for preparing insurance forms and maintaining patient records about insurance payments.

This example is typical of cases where managers ask for systems projects. An ongoing activity needs improvement, either to solve a problem (for example, too many errors, excessive costs, or inconsistent work) or to improve the efficiency of a job.

The department manager requesting a systems project may not consider the interaction between departments, even though the potential for such interaction can be high. For example, the manager who requests an inventory forecasting system for ordering materials and supplies may be looking primarily at ways to eliminate out-of-stock conditions. The request may not discuss the implications in other areas, such as fewer production problems due to material shortages, lower carrying costs for materials stored, or better prices through quantity purchasing. Yet, on an organization-wide basis, these may be even more important reasons to consider the project. The point here is that project requests submitted by department managers seeking specific operating assistance may actually have wider implications that can affect other departments.

Senior Executives

Senior executives, such as presidents, board chairpersons, and vice presidents, usually have information about the organization that is not available to department managers. That information, coupled with the broader responsibilities these executives assume (they manage entire organizations rather than individual departments), influences the systems project requests they make. For example, the vice president for manufacturing who knows that an additional production *plant will* be *built in* another city within two years may want to launch a systems project to develop a centralized production planning system one that will enable management to plan manufacturing at both plants at the same time. This project spans several departments (including manufacturing, inventory control, and purchasing) at two locations and involves many other managers.

The project requests submitted by senior executives are generally broader in scope than those prepared by department managers. Consider how many departments and divisions of an organization are included within the scope of a systems request to design and implement a new corporate-wide budget system or a financial planning model. Such projects tend to cut across more of the organization than does an inventory control system.
Multidepartment projects are also more difficult to manage and control, however. Departmental projects, in contrast, are more likely to be successful, especially if the actual users take an active role early in the project.

Systems Analysts

Sometimes systems analysts see areas where projects should be developed and either write a systems proposal themselves or encourage a manager to allow the writing of a proposal on their behalf. For instance, an analyst who sees that a university's course-registration procedure is slow, error-prone, and generally inefficient may prepare
a project proposal for a new registration system. The request prescribes the development of a system that takes advantage of new easy-to-use data entry terminals to speed registration.
Normally, proposals for operating systems, such as those for course registration, are prepared by department managers. However, in this case, the analyst has information about new equipment and technology that makes a more efficient registration system possible.
The department manager, who is not responsible for researching computer technology, may not take the initiative for developing a systems proposal to facilitate registration procedures.
Do not forget that systems analysts and developers can also be users themselves. Project management systems, file monitoring pack-ages, or programming library projects are typical of the application projects that systems personnel might request.

Outside Groups
Developments outside the organization also lead to project requests.
For example, government contractors are required to use special cost Accounting systems with government-stipulated features. The Internal Revenue Service requires organizations to keep careful payroll
Records and to account for employee income tax withheld. The Internal Revenue Service also specifies the format for many of the tax documents *that must be prepared; the employer has no choice in the* matter.
Quite often, new demands from external groups bring about project requests, either for new systems or changes in current ones. Projects. Originating from this source is just as important as those from within the organization. In some cases, such as when there are strict deadlines imposed by the outside agency, these projects take on a higher priority than ones from, say, department managers.

MANAGING PROJECT REVIEW AND SELECTION

Many more requests for systems development are generated than most firms can pursue. Someone must decide which requests to pursue and which to reject (or perhaps solve by other means). The decision to accept or reject a request can be made in a number of different ways and by various members of the organization. The systems analysts are not the final arbiters.
One of the more common methods of reviewing and selecting projects for development is by committee.

Steering Committee Method

In many organizations, *steering committees* (also called operating committees, operating councils, or project selection boards) supervise the review of project proposals. The steering committee typically consists of key managers from various departments of the organization, as well as members of the information systems group. However, systems specialists do not dominate the committee. A typical Seven- to ten-person committee would consist of the following membership:

1. Upper-management members:
   Executive vice president
   Vice president for manufacturing
2. Departmental management:
   Manager of retail marketing
   Credit manager
3. Technical managers:
   Manager of research and development
   Quality control coordinator
4. Information systems group:
   Data processing manager
   Senior systems analyst

The committee receives proposals and evaluates them. The major responsibility of the committee is to make a decision, which often requires more information than the proposal provides. Therefore, a preliminary investigation, discussed in the next section, is often requested to gather those details.
The steering-committee method brings high respectability and visibility to the review of project proposals. The committee consists of managers with the responsibility and the authority to decide which projects are in the best interests of the entire firm. Because several levels of management are included on the committee, members can have informed discussions on matters relating to day-to-day operations (treating patients, ordering materials, or hiring staff members) and long-range plans (new facilities, new programs) that may have a bearing on the project request. The managers provide practical information and insight about operations and long-term development.
Systems specialists on the committee provide technical and developmental information that is useful in reaching decisions about project management.
The steering committee approach is often favored because systems projects are business investments. Management, not systems analysts or designers, selects projects for development. Decisions are made on the basis of the cost of the project, its benefit to the organization, and the feasibility of accomplishing the development within the limits of information systems technology in the organization.
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Information Systems Committee Method

In some organizations, the responsibility for reviewing project requests is assigned to a committee of managers and analysts in the information systems department. Under

this method, all requests for service and development are submitted directly to a review committee

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Information Systems Committee Method

In some organizations, the responsibility for reviewing project requests is assigned to a committee of managers and analysts in the information systems department. Under this method, all requests for service and development are submitted directly to a review committee within the information systems department. The *information systems committee* approves or disapproves projects and sets priorities, indicating which projects are most important and should receive immediate attention.

This method can be used when many requests are for routine services or maintenance on existing applications. For these projects, information systems staff members can offer good insight into project requirements. In addition, by working with other projects (and by coordinating their efforts with the organization's business planning committee) systems developers can have access to information about where the firm is moving overall—an important consideration for effective project selection.

Sometimes, such as when major equipment decisions must be made or when long-term development commitments are needed to undertake a project, the decision authority is shared with senior executives who determine whether a project should proceed. However, sharing project decision authority may confuse users who want to know how the committee will make the decision about a request. In addition, if top managers and systems-committee members disagree about the merit or priority of a request, the potential for conflict can disrupt the handling of future project proposals.

In still other cases, users may attempt to submit a request directly to senior executives after the information systems committee has disapproved it.
If upper management approves the request, the authority of the information systems committee is undermined.

User-Group Committee Method

In some organizations, the responsibility for project decisions is delegated to the users themselves. Individual departments or divisions hire their own analysts and designers, who handle project selection and carry out development. In effect, departments form their own selection committees—*user-group* committees—controlling what is developed and when it is implemented.
Although the practice of having user committees both choose and develop systems does take some of the burden from the systems development group, it can have disadvantages for the users. For example, a number of small departments working independently toward the same goal could unknowingly waste resources and miss the opportunity to coordinate planning of a shared and integrated information system that could benefit the entire firm. A company's computer facilities can be unduly strained if the systems development team is not made aware of the future demands on the facilities that are being planned throughout the firm. Some user groups may find themselves with defective or poorly designed systems that require additional time and effort to undo any damage caused by the misinformation that such systems could generate. Although user groups may find the decisions of steering committees and information systems committees disappointing at times, the success rate for users who take on the development job is not very encouraging.
Membership often rotates under each of these committee formats, with individuals serving for, say, six- or twelve-month periods. Membership changes are staggered to avoid changing the entire membership at one time. The chairperson of each committee should have experience in serving as a committee member and in reviewing systems proposals and making decisions about project requests.

Other Methods

Other approaches are also tried from time to time, although usually with much less success than the methods already discussed. Some organizations have management planning committees that propose new projects, which are in turn evaluated by the systems department staff members. This method suffers from lack of user involvement, as well as limited insight into technology.
In still other cases, department managers are able to bypass the organizations' information systems departments to contract within dependent systems companies, which handle all analysis and design work for projects. A disadvantage of this approach is the possibility that a department can sponsor the development of a system while the information systems group or upper management is completely unaware that a project is in the making.

The Project Request

The project proposal submitted by the users or analysts to the project selection committee is a critical element in launching the systems study. Although the form of such a request varies from firm to firm, there is general agreement on the kind of information that should be provided.
In the proposal, the requester identifies where assistance is needed and gives details. A statement describing the significance of the problem or situation is also useful to the committee members, who want to know why the requester thinks the project is important.
Whether the project request has been triggered by a single event or recurring situation is of interest to the committee as well. For example, the existence of a continual control problem in processing vendor checks (costing the company several thousand dollars each year) tells the committee members that the situation is much more important than one in which a single check worth $100 was lost. In contrast, a committee reviewing a patient information systems proposal for a hospital will want to know that a mismarked patient chart nearly resulted in the administration of the wrong drug to a patient.
Both frequency and significance are important details in this medical situation since, although the error occurred only once, it could recur with dangerous results.
Since a preliminary investigation will be conducted to learn more about the problem or situation, the requester also should provide the names of other people who can provide additional information.

PRELIMINARY INVESTIGATION

Whether a system will be developed by means of the systems development life cycle method (SDLC), a prototyping strategy, or the structured analysis method, or a combination of these methods, a project request should first be reviewed. The choice of development strategy is secondary to whether a request merits the investment of an organization's resources in an information system project.
It is advisable for all proposals to be submitted to the selection committee for evaluation to identify those projects that are most beneficial to the organization. The preliminary investigation is then carried out by systems analysts, working under the direction of the selection committee. This section discusses the scope of the preliminary investigation *and* the activities it comprises.

Scope of Study
The purpose of the preliminary investigation is to evaluate project requests. It is *not* a design study, nor does it include the collection of details to completely describe the business system. Rather, it is the collecting of information that permits committee members to evaluate the merits of the project request and make an informed judgment about the feasibility of the proposed project.

Analysts working on the preliminary investigation should accomplish the following objectives:

1. *Clarify and understand the project request .What* is being done? What is required? Why? Is there an underlying reason different from the one the requester identifies?

   Example: The user justifies a request for developing an accounts receivable system on the basis of wanting faster processing.
   However, the preliminary investigation may reveal that the need for better control of cash handling outweighs the need for speed. Lost checks, not speed of processing, is the real problem, but the requester has not described this specific need clearly.

2. *Determine the size of the project.*

   Example: Does a request for a course-registration project call for new development or for modification of the existing system? The investigation to answer this question will also gather the details useful in estimating the amount of time and number of people required to develop the project. Since many enhancements of existing systems are costly, they are treated in the same way as new projects by the project selection committee.

3. *Assess costs and benefits of alternative approaches.*

   Example: What are the estimated costs for developing a patient information system, as requested by the hospital's chief of staff? What expenses will be incurred to train medical and nursing personnel and install the system? Will the proposed system reduce operating costs? Is it likely that the cost of errors will decrease?

4. *Determine the technical and operational feasibility of alternative approaches.*

   Example: Does the necessary technology to link office word processing systems to the main computer exist or can it be acquired? How workable is the request to enable administrative assistants to retrieve sales information from the main system and insert it directly into typewritten reports prepared on a word processor?

5. *Report the findings to management, with recommendations outlining the acceptance or rejection of the proposal.*

   Example: A proposal for the installation of an order entry system should be modified to allow all salespersons to submit their orders through ordinary telephone connections directly into the computer. The modification will improve the usefulness of the system and increase the financial benefits to the organization.

Conducting the Investigation

The data that the analysts collect during preliminary investigations are gathered through two primary methods: reviewing documents and interviewing selected company personnel.

Reviewing Organization Documents

The analysts conducting the investigation first learn about the organization involved in, or affected by, the project. For example, to review an inventory systems proposal means knowing first how the inventory department operates and who the managers and supervisors are.

Analysts can usually learn these details by examining organization charts and studying written operating procedures.

The procedures describe how the inventory process should operate and identify the most important steps involved in receiving, managing, and dispensing stock.

Conducting Interviews

Written documents tell the analysts how the systems should operate, but they may not include enough detail to allow a decision to be made about the merits of a systems proposal, nor do they present user views about current operations. To learn these details, analysts use interviews.

Interviews allow analysts to learn more about the nature of the project request and the reason for submitting it. To accomplish the purpose of the interviews, analysts must be sure to emphasize the request and the problem it addresses. In other words, interviews should provide details that further explain the project and show whether assistance is merited economically, operationally, and technically. Working out a solution to the situation comes later, during the detailed investigation.

Usually, preliminary investigation interviews involve only man agreement and supervisory personnel.

Project Request Form

- **WHAT IS THE – PROBLEM?** '.
  Inventory records are frequently inaccurate, causing shortages at Manufacturing time and variances in cost of goods sold.
- **DETAILS OF PROBLEM** -
  Quantity on hand and actual physical count records do not always agree—no pattern appears evident. Sometimes quantity on record is high and other times it is low. The quantity should always agree if material requisitions are posted properly. The two buyers usually ensure that enough material has been ordered and delivered on time.
- **HOW SIGNIFICANT IS THE PROBLEM?**
  The shortage causes major problems. Sometimes we even have to shut down lines until emergency reorders are filled.
  Controller objects when costs become excessive at end of month.
  Inventory manager complains when books are out of agreement with her on-hand actuals.
- **WHAT DOES USER FEEL IS THE SOLUTION?**
  We need to automate receiving, withdrawal, inventory records, and Posting to eliminate arithmetic errors.
- **HOW INFORMATION SYSTEMS WILL HELP**
  Cut down on arithmetic errors; also provide quicker information.
- **WHO ELSE KNOWS ABOUT THIS AND COULD BE CONTACTED**?
  Controller
  Buyers.
  Manager of Inventory

Signed by Mfg. Manager

Requirement Analysis

Fact Finding Techniques

Information gathering in large and complex organizations is not an easy task. It has to be gathered in an organized way so that

a. No system details is Left out
b. Right problems are identified
c. Repetitive work is avoided
d. Wrong or incomplete details are not collected

To this end, a proper search strategy must be decided first. Search strategy includes selecting information sources and search methods. It also includes modeling methods to make sense out of information so collected. Here we try to get an overall idea about the search methods or fact gathering techniques, which are commonly used, they are:

1. Interviewing
2. Questionnaires
3. Record inspection
4. Observation

These techniques are used in system analysis, design or even during implementation stage.

Interviewing

This technique is used to collect information from individuals or from groups. It is an art better learned from practice than from, books. It is an invaluable technique to gather qualitative information, opinions, policies, suggestions, underlying problems etc.

It can clearly indicate any resistance to the proposed system. However, there are certain points to be remembered in conducting interviews:

(1) Put yourself in other mans place and pose your questions. Cultivate the ability to appreciate his point of view.
(2) Be sure you really understand instead of jumping to conclusions.
(3) Maintain a neutral attitude. However, show genuine interest $o that the other person can come out with his problems, thoughts and ideas.
(4) Let him do the most talking! Listen! Listening is an art.
(5) Ask specifics.
(6) Notice what he does not say.
(7) Do not allow your mind to wander. It is usually reflected in your face. If the interviewer leaves the core subject, bring him back to the track tactfully.
(8) Don't show you are in a hurry
(9) Be prepared for disagreement.
(10) Distinguish between fact and opinion.
(11) Always be polite! Don't be over polite!

General rules for conducting an interview:

1. Obtain prior permission
2. Prepare oneself as regards to objective and methods
3. Put the interviewee at ease.
4. Explain in advance about the subject of the interview.
5. Avoid arguments involving too many people at the same time.
6. Do not try to cover too much ground in one interview.

Advantages of interviewing:

You can observe a lot just by watching. People talk with eyes gestures. Interviewer is directly on "on-line" with the people connected to the system. Hence, the responses are quickly received. They say more and in quick time than in the formal ways.

The questionnaires and forms can be filled at the time of interview so desired.

The interviewee gets a sense of belonging to the proposed system if handled properly. On many occasions, as the interviewee is not asked to commit in writ he offers many tips anonymously which are very difficult to obtain in normal process. Further any doubts clarification can be obtained subsequent. The greatest advantage is that the underlying problems come to surf.

Questionnaires

Questionnaires may be used as a supplement to interviews. More people can be reached and answers can be corroborated. The questionnaires can have open-ended question like - What are major and minor problems in the existing system?
A close-ended questionnaire will have fixed responses Like - What the average value of invoice in your department?

a) Less than Rs. 3000/
b) Rs. 3000/- to Rs. 5000/.
c) Rs. 5000/- to Rs. 10000/
d) Rs. 10000/- and above.
A questionnaire can be considered as a structured interview form. The cost involved in developing and distributing is very high, the following points must be kept in mind while designing questionnaires:

1. The objective of the questionnaire must be clear.
2. The structure must be useful for the study.
3. Question must be easily and unambiguously understood.

In addition, the respondents should be carefully selected. The responses received must be analyzed scientifically and without any bias.

Questionnaires are useful for:

1. Gathering numerical data.
2. Getting relatively simple opinion from a large number of people.
3. Obtaining collective opinion etc.

Thus while interviews are suitable for in depth searches, questionnaire~ provide valuable attitudinal data. Questionnaires are also useful to get feedback in a post implementation audit.

Record review:

Believe in record than in people! Thus a good analyst always gets facts from documents. An existing system can be better understood by examining existing documents, forms and files. Thus record review can take place at the beginning of the system study or later in the study for comparing actual operations with what the records indicate.

Records may include:
(i) Written policy manuals.
(ii) Rules and regulations.
(iii) Standard operating procedures used in the organization.
(iv) Forms and documents.

The following questions may be useful in analysis of forms:
1. Who uses these forms?
2. Do they include all the necessary information?
3. How readable and easy to follow are the form?
4. Is it ideal for analysis and inference? etc.

Observation:

An analyst must keep his mental antenna alert always! Observation can bring in missed facts, new ways to improve the existing procedures, duplicate work- done inadvertently etc. Observation can bring in what other fact-finding methods cannot! But this task is delicate because people do not tike to be observed when they work. It is not the quantity of time observed is important but the unorthodox angles of observations of the work content and methods are going to be rewarding.
Observation can look for:
(a) Operational inefficiencies.
(b) Alternate routes and procedures.
(c) Interruptions in the normal flow of work
(d) The usage of files and documents
(e) Informal communication channels etc.

On site observation provides close view of the -working of the real system. He can observe people, objects, documents and occurrences of events. But the analyst's role should be strictly to obtain information as a detached observer.

Structured Analysis

What is structured analysis?

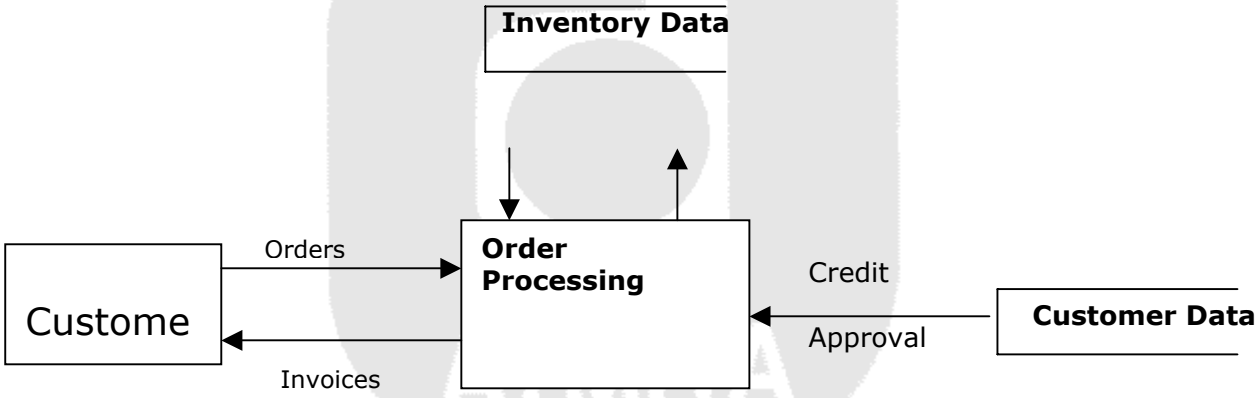
Structure analysis specifies what the system or application supposes to do. It does not state how the requirement will be accomplished many system analysis founds it difficult to fully understand the large and complex the use structured analysis method by
(1) Partitioning the system into components
(2) Constructing the model of the system structured analysis methods use some of elements like

(1) Graphic Description
(2) Data flow diagrams
(3) Data dictionary

1. Graphic Description

One-way to describe system by defining its features, defining its function and defining how they interact with each other in written document but it will become very tedious and complex to understand whole system. It is a human mentality that he can understand process or system very will by viewing pictorial representation rather than documents.

Instead of words structured analysis uses symbols, icons to create a graphic model of the system graphical description shoes computer processes tape, disk file, program and operating procedures with some define symbols. System with this graphical description.



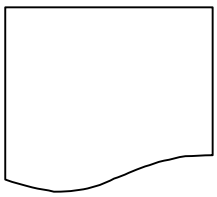
Above figure has been shown with some symbols and data flows.

(2) Data flow Diagram: -

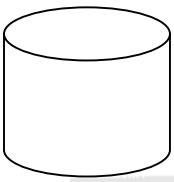
The system model is termed as data flow diagram actually it consist of set of data flow diagram which describes how data or process moved from one entity to other. Structure analysis follows a top-down approach to describe the system. An initial model of the system only shows major activities of the system and this model is then explored into more detailed lower level diagrams. Each process in the system can be describe with data flow diagram and can be broken into several another process to fully understand the system.

(3) Data Dictionary: -
It contains the entire data item used in information system. Also it contains all definition of all the elements used in the system Generally data item are defined with their properties like their data type with and the link with another data items.

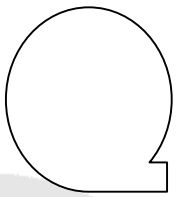
Graphical description



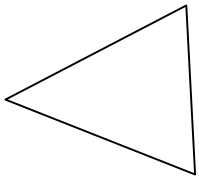
Document



Magnetic disk

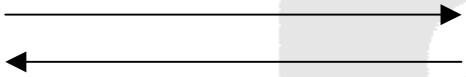


Magnetic tape

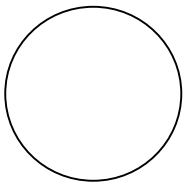


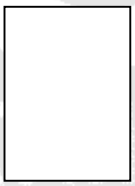
Online display

Data flow diagram



Data Flow





Processes

Source or Destination Entity

_____ _____

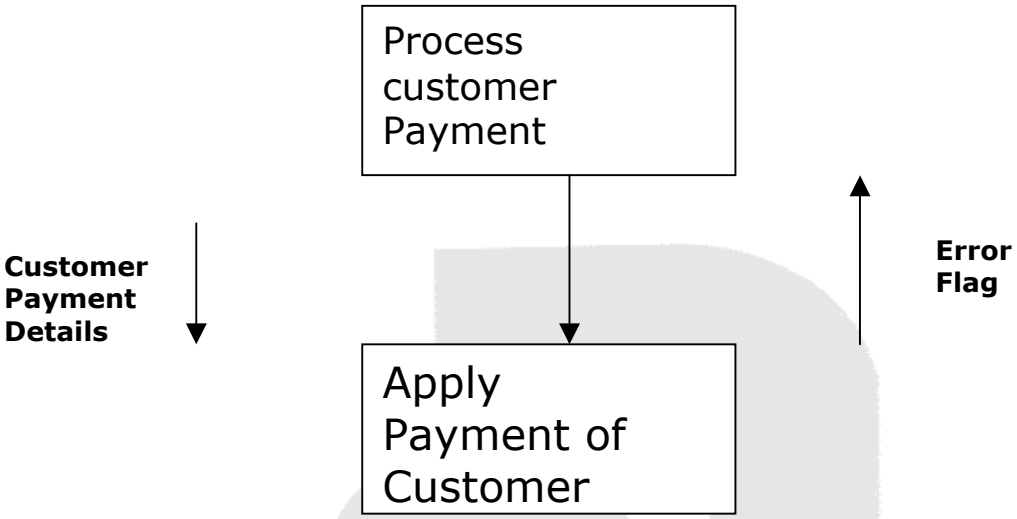
Data Source

_____ _____

The structured analysis method decomposes the complex and large system in several small units, which show all the process of the system with certain symbolic representation.

What is structured Design?

Structure design is another element of structure analysis, which utilizes graphics description to specify relation between different modules or units of the system. The structure chart does not show program logic or detailed information bur they describes interaction between different independent module and the data passing between modules.



This structure chart shows relation between two modules the –the calling module and the called module and data passes between them. Open arrow indicates data passes between modules and solid arrow describes error condition or some notes.

Input Design

Explain the considerations of input design.

The input design is the link that with information system and user. There are general input concerns that all analysts should have. Input design consists of procedures for data preparation as well data entry. Here data procedures means by those steps necessary to put transaction data into a usable form for processing. And data entry mean by activity of putting the data into computer for processing. Data entry can be achieved by computer to read data from a written or printed document, or by having data directly into the system.

There are several way to guide the design of input are,

- Controlling amount of input: Because data entry operations are dependent of people, if possible less data entry leads low cost. Second as data input is high leads much time consumption for processing.

- Avoiding Delay: This means by, how analyst can design input of the system so that time delay can be reduced for input.

- Avoiding Errors in Data: The rate of errors directly depends on data input. The analyst can also affect the error rates of an operation through input design by the way data be entered.

- Avoiding extra steps: When the volume of transactions can not be reduced, the analyst must be sure the process is as efficient as possible. Perfect analyst will also avoid input designs that cause extra steps. This will save time as well less data entry.

- Keeping the process simple: the users always accept Simple input design. It is advisable to avoid complexity when there are simple alternatives for complex systems.

Explain Data capturing guidelines.

For various categories of information systems, the data to be inputted varies. So it is important to collect information related to input data and categories of data. Here we have general guidelines for analyst to formulate an input design. The analyst should start by capturing only those items that must be input when processing transactions.

There are two types of data that must be input when processing transaction:

a) Variable data: Those data items that change for each transaction. For example withdraw amount from account varies on each transaction. On other hand account number does not vary with time. So amount should be interred in variable as well account no should be maintained in data files.

b) Identification data: The data items which are identical to the system should be identified first. That results in low data entry as well generates proper results.

What not to enter is equally important in the system. Input process should not require entry of the following cases:

a) Constant data: Data that are the same for every entry. For example value of pie is 3.14 and is constant for each transaction. So the user should not enter this type of values.

b) Details that the system can retrieve: This means by stored data available on data file anywhere should not enter by the user again.

c) Details that the system can calculate: This means derivative of existing values in the data file. For example, withdrawal amount of today can be calculated by doing sum of every transaction and that should not be stored anywhere in data file.

Explain: Caption and Data capture of input design.

Captions are static information available on the input design. Which guides user for data entry. Captions tell the user what data to provide and where they should be entered. For better and user friendly layout one should avoid using abbreviations for caption. Caption should be proper informative for respected data entry. For example, to insert date value in birth-date field one has to mention format of input data, like 'dd-Mon-yy', 'DD/MM/YY', or 'MM/DD/YYYY'. Figure shows student data entry screen with respected fields and captions. Fields are mentioned with boxes and rest are captions.

A well-designed source document is easily completed and allows rapid data entry. Captions can be mentioned with variety of ways like before line, After line, Above Line, Below line, inside box, below box, ballot box. These varies with requirement and display available on screen. Many a times due to space allocate for input these requirements may vary. Data capture facility is always attached with captions.

List the different coding techniques in input design.

Information system projects are always based on time limit, cost conscious and teamwork. Looking to these requirements system analyst has to design project guideline in a way that reduce development time, cost and employee. For these types of settlements system analyst can look forward to coding methods that fulfills above-mentioned goals. A code can be brief number, title or symbol instead of lengthier or describe coding techniques. With code, fewer details are necessary in input, but no loss of information results. Various coding methods are adopted for these are:

- Classification codes
- Function codes
- Sequence codes
- Significant digit
- Mnemonic codes

Classification codes:
Classification codes place separate entities, such as events, people or objects into distinct groups called classes. A code is used to distinguish one class from another. The code is recorded on the source document by the user or, in an online system. The user classifies the event into one of several possible categories and records the code.
For example, College management system can be classified by students, faculty or course. In this system, to maintain library information system can be classified using books issue or author to check book of interest.

Function Codes:
Function codes state the activities or work to be performed without spelling out all of the details in narrative statements. User uses this type of coding method to process the data. The particular function code may determine the contents of the input record whether data in the code are keyed or scanned. For example to process today's total withdrawal amount in a bank analyst can design function, which accepts today's transaction with complete details of the transaction and data. A derived function can evaluate amount using input data. Another function can be derived to delete account information with different input values. For deletion of account, identical account number has to pass and rest function can be performed by function code.

Sequence codes:
Sequence codes are either numbers or letters assigned in series. For example roll no is a sequence in a class. Another example, a banking system must be able to keep track of the order of transactions so that it is clear which transaction to process first, which second and so on. Therefore, a sequence number should be specified in the design to order the transactions.
Sequence codes are also used for identification purpose but are assigned in the order in which customers enter the system.

Significant-Digit Subset codes:
Suppose item number will be assigned to the different materials and products a firm stocks or sells. One way to accomplish this is to assign number in sequence. Starting with the first and going through to the last. Or a prefix can be added to the

identification numbers to further describe the type of item: steel has an S-prefix, plastic a P and so on.
The codes can be divided into subset or sub codes, characters that are part of the identification number and that have special meaning. The sub codes give the user additional information about the item.

Mnemonic Codes:
Mnemonic does use letters and symbols from the product to describe it in a way that communicates visually. For example, to describe a 21-inch color television set, a useful code is TV-CL-21 (black and white is TV-BW-21). Universities frequently use mnemonic to code information: BIT (Bachelor of Information Technology)

In general data and transaction coding reduces the volume of data for input and simplifies the process. Code selection depends on the nature of data and objectives of the analyst.

Verification and validation?

Input designs are aimed at reducing the chance of mistakes or errors during the data entry. However, an analyst must always assume the error will occur. The general term given to methods aimed at detecting errors in input is input validation. Three main categories of methods are checking the transaction, checking the transaction data and changing the transaction data.

Checking the transacting:
It is essential to identify any transactions that are not valid, that is, not acceptable. Transaction can be invalid because they are incomplete, unauthorized or even out of order.

Batch Controls:
Batch processing means delaying processing by accumulating the transaction into batches or groups of records. When transaction are accumulated and not processed as they are occurring, there is a good chance that some will be misplaced, forgotten, or simply overlooked. Whether large or small, a lost transaction should always be a concern to the analyst. One method of batch control uses fixed batch size. Transactions are accumulated into groups of say 50. These transactions may be in temporary in memory then at any instance they can be stored in data files.

Transaction Validation:
Inexperienced analysts sometimes assume that users submit only valid transactions for processing, that is, only those that are acceptable to the system and that can be properly processed. Unfortunately, users often attempt to process data in unexpected ways, either accidentally or intentionally. It is the responsibility of the analyst to specify validation procedures that test the acceptability of a transaction.
The transaction itself must be acceptable to the system before it can be processed. The steps the system takes to ensure that the transaction is acceptable are called *transaction validation*. For example, a typical inventory system is designed to expect inventory transactions to add items to inventory, delete item, or change the quantity on hand through withdrawal of stock. However, it is not acceptable to add a new item when there is already an item with the same name and identifying stock number.

Sequence Test:
In some systems, the order of transactions is important. When processing bank checking deposits and withdrawals, it is important to ensure that each is processed in the order in which it arrived.

Checking the transaction Data:
Even valid transactions can contain invalid data. Therefore, analysts should be sure to specify methods for validating the data when developing input procedures. There are four data validation methods.

Existence Test:
Some data fields in transactions are designed to not be left empty or blank. Existence tests examine these essential fields to determine that they contain

data. For example, in processing inventory, it is incorrect to accept orders that do not specify the quantity of an item ordered.

Limit and Range Tests:
Limit tests validate either the minimum or maximum amount acceptable for an item. In most banks, tellers must notify a bank officer before completing a cash transaction in excess of Rs 1 lakh is the limit they are authorized to handle without approval when actual cash changes hands.

Combination Test:
Combination tests validate that several data items jointly have acceptable values; that is, the value for one element of data determines whether other data values are correct. For example, a systems design for this industry should note that a customer order for an automobile with factory air conditioning must also specify other options; heavy-duty battery, heavy-duty shock absorbers, and an oversize radiator. All must be ordered in combination with each other.

Modifying the transaction Data:
A third way of validating data involves modifying the data them selves.

Automatic Correction:
This method simply requires the program to detect an error and make the correction automatically. For example, data entry personnel keying data into, say, a six-digit numeric field can enter only three digits.

Check Digits:
Transcription errors occur if data are accidentally copied incorrectly by the data entry person. For example, a customer number of 24589 is transcribed incorrectly if it is entered as 24587.

Methods of data capture.

The methods in which the data are captured for transactions are called methods of data capture. Variety of methods is adopted in this concern. Those methods are Source data capture with keypunching, key-to-storage, with scanner and with intelligent terminals. Let us take look to individuals:

Source data capture with keypunching:

Best-known and most widely used data entry method is key punching. Logical code is transcribed in punching cards. This verification and correction can be done using computer. A card reader provides a final validation check to ensure against missing data and other errors during preparation and entry. The use of punch cards has largely given way to key-to-storage devices.
Best example of this system is employee attendance punch card system. This tracks employee attendance on certain time frame.

Source data capture with key-to-storage:

When punch card system fails and times when user require data to be entered like text, one has only alternate like key-to-storage data capture method. Key are alphanumeric values as well special signs inputted from key board. Contents are always stored on storage devices. Storage devices can be temporary or permanent, primary or secondary. Generally data are entered through a workstation, which includes a typewriter-like keyboard for keying the data and a visual display.
Sequence of this procedure is,
Writing data on source document,
If required code data from source document to form acceptable for processing.
Process data on tape or disk
Validate the data as they processed
Store data permanently.

Source data capture with scanner:

Optical Character processing is possible with scanner machines. A source document that can be directly used as an input document for scanning by the optical character reader (OCR). When transaction occur, the data are written of marked on the scan able form, sometimes with hand-printed letters and numbers and in other cases by marking special symbols or boxes or represent data. Variety of scanner is available in the market, which provides OCR facility. This sort of instruments is useful in huge data entry job works.

Direct Entry through Intelligent Terminals:

Intelligent terminals are special machines, which have connection with computers. These terminals receive data from user and passes to computer. This has very sophistication on work and advance technology has to be used to have these facilities. For example, pen scanner can be used to scan bar code of any product which has information of product like rate, qty etc. Ophthalmic doctors use machine to have eye number of patient, output of the same can generate on computer. Future tends to this emerging technology.

File and Database Design

Basic File terminology

Information systems in business are file and database-oriented. Data are accumulated into files that are processed or maintained by the system. Here file concepts and concern concepts are reviewed.

Data Item

Individual elements of data are called data items. It is also known as fields or simply items. For example, student register consists of the following data items: RollNo, Name, Birth Date, Address, City, Blood Group, Contact Nos. etc.
Each data item is identified by name and has a specific value associated with it. Respected values are shown in the example below:

Date item name	Value
RollNo	1
Name	Rakesh Jani
Birth Date	20/9/1975
Address	C.G Road
City	Ahmedabad
Blood Group	A+ ve
Contact Nos.	123456

The association of a value with a field creates one instance of the data item. Data items can have subitems or subfields. For example, one person can have many addresses to contact or many contact nos.

Record

The complete set of related data for all the fields is a record. For single student all related information creates one record. Each field has a predefined length and type (data type). For example, a record description of the student contains the following data:

Date item name	Type	Length
RollNo	N	2
Name	C	75
Birth Date	D	-
Address	C	255
City	C	50
Blood Group	C	5
Contact Nos.	N	10

When the number and size of data item in a record are constant for every record, the record is called fixed-length record. The advantage of fixed-length records is that

they are always the same size. Variable-length records are widely used in most business applications than fixed-length designs. Record size may vary because the individual data items vary in length.

Record Key

To differentiate one specific record from another record, systems analysts select one data items in the record that is likely to be unique in all records of a file and use it for identification purposes. This item is called the record key, key attribute and is part of record itself.
Common examples of record keys are the roll no of student data, part number in the inventory record, and the chart number in a patient medical record or serial number in manufactured product. Each of these record keys has variety of other uses.

Entity

An entity is any person, place, thing or event of interest to the organization and about which data are captured, stored or processed. Patients and tests are entities of interest in hospitals.

File

A file is a collection of related records. Each record in a file is included because it contains to the same entity. A file of student information consists of student related information. Attendance and library issues are not included in that file. The number of records in the file determines the file size. If each record is fixed-length and uses 250 characters of storage, the file uses 6 times 250 characters of storage.

Databases

A database is an integrated collection of data stored in different types of records, and in a way that makes them accessible for multiple applications. The logical or physical relationship establish low storage in data files. Records for different entities are typically stored in a database. In college database, for example, records of students, course and faculty.

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Methods of file organization

Records are stored in files. The organization of file specifies how records are stored, located and retrieved. Here we are discussing three ways of records storing. Among them two are sequential and direct are available in most if the computer where index method is possible with special type of software.

Sequential Organization:

Sequential organization is the simplest way to store and retrieve records in a file. In a sequential file, records are stored one after the other. The first record stored in placed at the beginning of the file. The second is stored right after the first, the third after the second, and so on. This order never changes in sequential file organization.

To read a sequential file, the system always starts at the beginning of the file and reads one record at a time. System starts retrieving until last record is reached. It cannot go directly to any particular record without passing through earlier records.

Searching for any particular record cannot be done by jumping through records, because of sequential files do not use physical record keys. Records are accessed in order of their appearance in the file.
Example of this type of file organization is handling text editor. In text editors file store data line by line. As well it retrieves data line by line.

Direct-Access Organization:

When sequential file fails for a proposed system, an alternative is direct-access organization. This method requires the program to tell the system where a record is stored before it can access the record. In contrast to sequential organization, processing a direct-access file does not require the system to start at the first record in the file. This file are keyed files. They associate a record with a specific key value and a particular storage location. All records are stored by key at addresses rather than by position.

Using the record key as the storage address is called direct addressing. This method is more useful with data base storage, which is given record key. With direct access records can be retrieved randomly. Reason behind random selection of record is record key and address information of particular record.

Example of this file organization is database file, which stores information in row and column manner. Because database file is mean for random record retrieval.

Indexed Organization:

A third way of accessing records is through an index. The basic form of index includes a record key and the storage address for a record. To find a record when the storage address is unknown, it is necessary to scan the records. However, the search will be faster if an index is used, since it takes less time to search an index than an entire file of data.

An index is a separate file from the master file. Each record in the index contains only two items of data; a record key and a storage address. A record key is unique for all the records like storage address. To find a specific record when the file is

stored under an indexed organization, the index is first searched to find the key of the record wanted. When it is found, the corresponding storage address is noted and then the program accesses the record directly.

For example, Bank account master table can be indexed to retrieve account information fastest possible.

System Development, Design and Implementation

Design of software:

Design of software can be classified in two different way, they can be Object-oriented design as well function oriented design. To learn about design of software let us consider software distributed in different modules and modules in sub modules up to leaf level module. Design of software has consideration for software strategies. Different principles guide software designs are modularity and partitioning, coupling, cohesion, Span of control, size and shared use.

Each of these principles will be examined in more detail, with examples to demonstrate how they are applied.

Top-down structure of Modules (Modularity and Partitioning):

Top-down methods are used throughout the analysis and design process. In this method, modularization happens in top to down approach. This method is widely used in system engineering and software design. Each function the system will perform is first identified and then developed in greater detail.
For example, an accounting system consists of many separate modules top to down approach. This methods is widely used in system engineering and software design. Each function the system will perform is first identified and then developed in greater detail.
For example, an accounting system consists of many separate modules that are invoked one at a time as users indicate the particular function they wish to perform.

Coupling:

It is degree of functional interdependence or interaction between the two modules of software. Coupling of two different modules are common matter in object-oriented design approach. Low coupled modules are called best software design. Variety of coupling methods are here explained…

- Data Coupling: In general two modules are coupled via a parameter that can be of any primitive data type like integer, float or character.
- Stamp Coupling: Two modules communicate via composite data item like structure or say private data type.
- Control Coupling: One module give direction to another module to be executed is called control coupling.
- Common Coupling: If two module share common data then it is called common coupling.
- Content Coupling: If two module share common data code then it is called content coupling.

Cohesion:

- It is a measure of functional strength of a module. This means as no of function increases design of software gets better.
- Coincidental Cohesion: performs tasks that are related to each other very loosely.
- Logical Cohesion: If all elements of module perform similar operations like error handling, printing, data input and output is called logical cohesive module.
- Temporal Cohesion: Module contains tasks that are related by the fact that all tasks must be executed in the same time span. That means data start up, shutting down and initialize procedure are similar operation.
- Procedural Cohesion: A set of function of module are part of a procedure is called procedural cohesive module.
- Communicational Cohesion: All function of module refer to or update same data structure is called communicational Cohesive module.
- Sequential Cohesion: One function refer another in same module is called sequential cohesive module.

There are varieties of cohesive module as mentioned above and are tightly bound with a good software design.

Span of control:

Span of control refers to the number of subordinate modules controlled by a calling module. In general, we should seek to have no more than five to seven subordinate modules.
On the other hand, excessive span of control, meaning a high number of subordinate modules.

Module size:

Some organization has defined rules to manage module size. A common one is that no module should contain more than 50 instructions. For example, If the module cannot be coded in 50 instructions, create a second module that is called by the first. Again module should be highly cohesive and loosely coupled. The size of the module depends on the language used.

For example, 50 statements in COBOL may be require more lines of code in fourth generation language.

Shared Modules:

Object oriented design works with code reusability. Specific size of code can be shared between different modules. Sharing modules reduces size of software design. Second benefit is, it minimizes the number of changes that must be made during system maintenance.

For example rate of product can be shared with sales as well marketing division of the company.

Managing Quality Assurance

To develop properly designed software and low-failure chances system analyst has to look forward to quality standards. Quality assurance is the review of software products and related documentation for completeness, correctness, reliability and maintenance. It must include assurance that the system meets the specifications and the requirements for its intended use and performance.

Levels of assurance

Analyst use four levels of quality assurance: testing, verification, validation and certification.

Testing:

Testing is most important part of system development. Testing takes 50 percent of the budget for program development. Testing purpose is to make program error free. That means testing purpose is to make program fail. The tester, who may be an analyst, programmer or specialist trained in software testing is actually trying to make the program fail. A successful test, then, is one that finds an error.

Verification and Validation:

Verification is also intended to find errors. When commercial systems are developed with the explicit intention of distributing them to dealers for sale or marketing them through company-owned field offices, they first go through verification, some times called *alpha testing.*

The feedback from the validation phase generally produces changes in the software to deal with errors and failures that are uncovered. Then a set of users sites is selected that puts the system into use on a live basis. These beta test sites use the system in day-to-day activities; they process live transaction and produce normal system output. The system is live every sense of the word, except that the users are aware they are using a system that can fail. But the transactions that are entered and the persons using the system are real.

Validation may continue for several months. During the course of validation the system, failure may occur and the software will be changed. Continued use may produce additional failures and the need for still more changes.

Certification:

Software certification is an most important factor in software market. At any time end user can claim for software facilities, which were not satisfied. In such time third party consultants can certify software product on basis of study of software documentation and actual use of system. Such consultants then certify about product.

Testing Strategies:

Testing strategies use practical data input on real system. It generates respected output of the system. Practical data can be generated manually and end user can implement on the software. This is the proper way of checking system performance and completeness. This may vary and depends on system outline. At the end manual data and test result can be compared to certify product.

Code Testing:

The code-testing strategy examines the logic of the program. To follow this testing method, the analyst develops test cases that result in executing every instruction in the program or module. This means any application can be distributed in module, sub module and leaf level modules which can be checked individually is called unit testing or code testing. Code testing seems to be an ideal method of testing software.

Specification Testing:

To perform specification testing, the analyst examines the specifications starting what the program should do and how it should perform under various conditions. Then test cases are developed for each condition or combination of conditions and submitted for processing. By examining results, the analyst can determine whether the program performs accordingly to its specified requirements.

Software design and documentation

For well design software have modular design. Such designs are more likely to complete the application. Two methods of structured designing as Structured flowcharts and HIPO diagrams are explained here,

Structured flowcharts:

Structured flowcharts also called Nassi charts, are graphic tools that force the designer to structure software that is both modular and top-down. They provide a structure that can be followed by programmers who develop the application software. In some organizations, analysts are responsible for developing module logic, while in others that responsibility is delegated to the programmer. In either case, the programmer should be well prepared in the use of structured flowcharts.

Basic Elements:

Three basic elements are process, decision and iteration for designing of structured flowcharts.

Process: Simple process or steps in a program are represented by a rectangular box, the process symbol. This symbol represents initialization of values, input and output activities.

Decision: The decision symbol represents alternative conditions that can occur and that the program must have a manner of handling. Decision is structure of IF-THEN-ELSE type. The decision symbol may show actions for more than two alternatives at the same time.

Iteration: The iteration symbol represents looping and repetition of operations while a certain condition exists or until a condition exists. The form of the iteration symbol clearly shows the scope of the iteration, including all processes and decisions that are contained within the loop. The left-hand portion of the symbol shows the path of repetition to follow until the conditions are satisfied for iteration.

Using Structured Flowcharts:

When designing structured flowcharts analyst specifies the logic in a top-down fashion. An important use of structured flowcharts for the designer is to verify systems specification. Logic of system can be explained via flowcharts. Complex logic can be explained in easiest manner. The structure chart is easy to read will enable the analyst to determine whether the debit adjustment transaction, sales transaction or what so transaction done and affected data file.

HIPO

HIPO is commonly used method for developing systems software. IBM developed this method for its large, complex operating systems.

Purpose:

HIPO diagrams are graphic, rather than narrative description of the system. They assist the analyst in answering three guiding questions:

- What does the system or module do? (Asked when designing the system.)
- What does it do it? (Asked when reviewing the code for testing or maintenance.)
- What are the inputs and outputs? (Asked when reviewing the code for testing or maintenance.)

A HIPO description for a system consists of the visual table of contents and the functional diagrams.

Visual table of contents:
The visual table of contents (VTOC) shows the relation between each of the documents making up a HIPO package. It consists of hierarchy chart that identifies the modules in a system and relation to each other and gives a brief description of each module.

Functional Diagrams:
There is one diagram for each box in the VTOC. Each diagram shows input and output, major processes, movement of data and control points.

HIPO diagrams are effective for documenting a system. HIPO diagrams are not as easy to use for communication purposes as many people would like. And, of course, they do not guarantee error-free system. Hence, their greatest strength is the documentation of a system.

SYSTEM MAINTENANCE: -

System maintenance is the very important process of system development. Once the system – testing is carried out next stage is to remove the errors, which are detected.

Thus, "System maintenance is process of recovering a system to it's original." If any hardware problem is there it is require correcting. If any software bug is there, it is require debugging. Software never wears or tears out. Thus, major maintenance activity in S/W is debugging and modification to modernize it.

There are 3 – different way maintenance is carried out.

1. Corrective Maintenance
2. Adoptive Maintenance
3. Perceptive Maintenance

1) Correcting Maintenance: -

If system fails in working, it is required to correct it. Thus, it is a method of maintenance to work against processing failures. It also includes repairing of the hardware components to remove problem.

2) Adaptive Maintenance:-

The organizational need may vary from time to time. Thus to meet these changing needs, the software is also maintenance is carried out to add some facilities into the S/W and to make it more suitable to organization. Thus, it is a process of making advancement in the system software.

3) Perfective Maintenance:-

To get the system performance best one has to make changes in H/W and S/W to enhance the system performance, the positive changes are brought. The aim of this process is to get the system performance perfect and to make perfect system.

The system maintenance process starts where system testing ends up. The system manuals as well as operational manuals are very helpful in system maintenance process. Various different software debugging and utility programs are used to maintain the software.

Management Information System (MIS)

Organizational Impact of MIS:

It is a method to see how management Information system affects or change the organization. The new MIS is implemented to get increased speed, less errors and better integration of organizational activities. The main purpose of MIS is to get more benefits and less cost.

The implementation of MIS may change the functioning and working style of organization. It may improve the performance of organization. Thus it is necessary to study the impact of MIS on Organization.

Due to recent revolution, the concept of global village is developed. The advance method of control, monitoring and evaluation has dominated the old traditional methods of management. The Airline Reservation system of America called "SABRE" is a classic example of MIS. Even in Indian context the railway reservation system has simplified the operations and provided the facilities to the users. The MIS has brought the dynamism in the global management scenario.

The MIS provides the Accuracy of operations. Due to fast and accurate operations the organization can perform well and ultimately can have more financial benefits and faster business growth.

The MIS may affect the organization using it in following areas like

- Accuracy
- Timeliness
- Relevance
- Structure
- Human Behavior
- Organizational Culture
- Organizational Policies
- Long term Benefits
- Working Style

Due to In-time availability of data the organization can take decision at right time. With the MIS future data forecasting is also possible which may help in decision making.

The MIS is capable of maintaining and capturing useful and relevant data. It discards redundant set of data provides up-to-date latest information.

The organizational structure may change due to introduction of MIS in the organization. For Example there may be the requirement of the post like Manager (MIS). Again the work – distribution among employees may change. Due to extensive possible communication between the people of organization, there is more understanding and less confusion. This may improve the organizational culture. The organizational goal and target may change. In short due to launching of MIS the organization will be capable of performing faster, accurate, effective and better performance. The firm as well as the employees will get the benefits so that they will be less resistive to change.

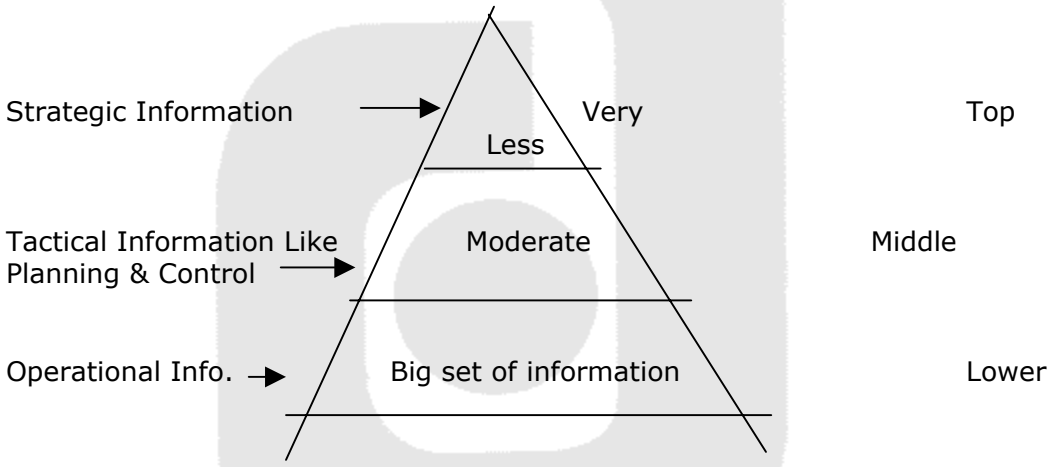
Understanding MIS:

The invention of Computer has simplified the processing of large amount of data with enough speed and accuracy. In day-to-day management operation lot of data gets generated which is required to be processed to get the results. The various departments have then realized the advantages of computer in improving and simplifying managerial operations. The Concept of MIS is now grown up. It is very popular among the users now are days.

The term MIS means "Management Information System". It is basically a computer based Information system, which is designed for the managers of Government sector, private and public sector. The MIS is used at various levels of the organization. The Requirement of information and the type of information may very from level to level. There are three levels of management as shown in the below given diagram.

The concept of MIS differs from the ordinary Electronic Data processing system. It is specially designed to help the managers for their special activities. The MIS is basically used for….

- Bringing full integration in organization
- Smoothening decision- making process
- Short-term and long term planning



There are many managerial operations taking place in any organization everyday like,

1. Accounting
2. Planning
3. Supervising
4. Analysis and Control
5. Financing
6. Social welfare
7. Staffing etc…..

To perform above operations effectively one can use MIS. Thus MIS can be defined as...
"A Computer based Information system which is designed to improve the organizational operations like organizing, planning, decision-making etc…"

MIS is developed by keeping in view all the levels of managers. The information generated at top level is less but very important and crucial where as the information generated at lower level is huge but not very sensitive and less important.

Thus it can be said that MIS is the way by which organization can feed the managers requirement to show their better performance.

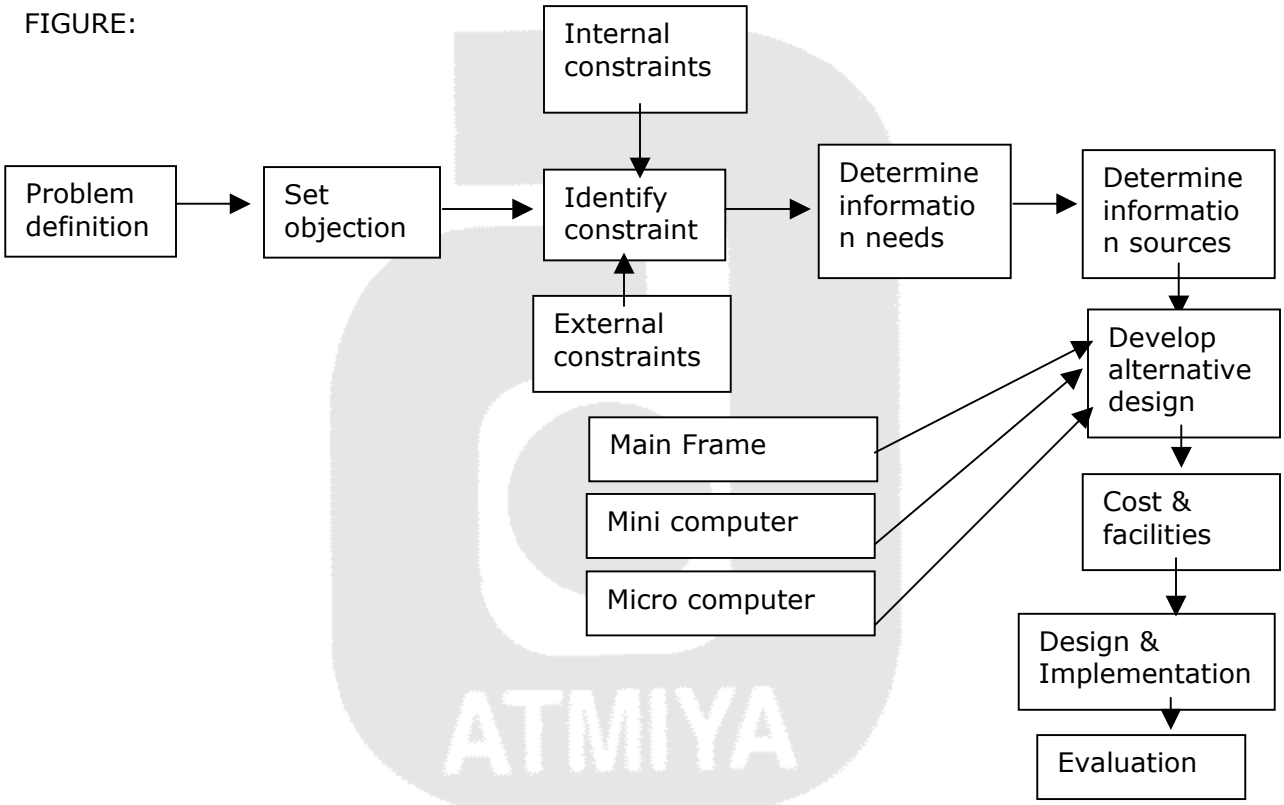
Design of MIS

Different organizations have different functions and different goals and need.
The purpose of MIS Design is to cater the above needs.
Data gets generated at various levels of management, irrespective of type of organization.
MIS transforms such raw-data into information and helps on taking actions based on real information.
Following steps are followed in MIS Design.

First step in MIS design is to identify problem to be solved and to make it clear.

For example objective of Automation System for any government organization may make millions of records to computerize.

FIGURE:



Question Papers

Paper-1

SECTION - I

Q.1 Attempt following questions. (Any Two) **[20]**

1. List the different types of information system user. Explain each in brief
2. Write steps of SDLC. Explain any one of them.
3. What is transaction? Explain transaction-processing system in detail.

Q.2 Answer following questions. (Any Four) **[20]**

1. List different feasibility study. Explain any one of them.
2. Write a note on data dictionary.
3. Write short note on decision tree.
4. What do you mean by project request? List the different source of project Request. Explain any one of them.
5. List different fact finding techniques. Explain any one of them in detail.

Q.3what is decision table? Explain in detail also illustrate with suitable example [10]

SECTION - II

Q.4 Attempt following question. (Any Two) **[20]**

1. What is the objective of output design? Explain tabular format for presenting Information.
2. List the different types of flies used in the information system? Explain any one of them in detail.
3. What is quality? List and explain the different information system testing methods in detail.

Q.5 Answer following questions. (Any Four) **[20]**

1. Write note on HIPO chart.
2. Write note on following implementation methods for information system
   (i) Direct, cut-over
   (ii) Parallel system
3. Explain: coupling and cohesion.
4. List different data validation methods. Explain any one of them.
5. Explain: Classification code with reference to input design.

Q.6 What is MIS? Discuss the organizational impact of MIS. **[10]**

Paper-2

B.C. A. (Sem II) Examination
April /May-2000
Elements of System Analysis & Design: CS - 9

Section -1

Q-1 Attempt the following questions: (any two) [20]

(I) Explain the function of system analyst
(2) What is information system? List the different type of computer based Information systems. Explain any one of them.
(3) Discuss system prototyping method for the development of any compute Based system.

Q-2 Answer following questions: (any four) [20]

(1) What is preliminary investigation? Write in brief.
(2) Explain: Decision tree.
(3) What do you mean by project review and selection? List the different Methods for project selection. Explain any one of them.
(4) Explain the following fact finding techniques:
(i) Questionnaire
(ii) Record review
(5)Explain : data dictionary.

Q-3 What is data flow diagram? Explain in detail and illustrate with suitable Example.

Section – 2

Q-4 Attempt following questions (any two) [20]

(1) State the utility of output. List the different types of presenting Information. Explain any one of them.
(2) List different types of file organization. Explain any one of them.
(3) List different coding techniques in input design. Explain any two of them

Q-5 Answer following. : (Any four) [20]

(1) Write notes on. (i) Unit test (ii) System test
(2) What is verification and validation ~
(3) Write note on HIPO chart.
(4) What is implementation? List different implementation techniques. Explain any one.
(5) Explain Caption and Data capture of input design.

Q-6 What is MIS? Write steps to develop MIS. Explain it with suitable example.