INPUT DESIGN

Input design involves capturing of data as well as inputting it to the computer. According input design consists of data capturing and data validation.

Data Capture:

There can be no information system without "Data". Data are the facts which describe events and entities. Data are communicated by various types of symbols such as letters of the alphabets, numbers, speech patterns, dots and dashes, hand signals, pictures and so on. The processed data with specific purpose are called information. Data obtained in general are not suitable for directly feeding into the computer. To get the data into the computer the analyst has to design the form, design the input record and design methods for getting the data into the computer. The computers will only accept those data which are in machine sensible form. If its original form is unacceptable, then it has to be brought into the acceptable form.

What is Data Capture?

Data capture covers all the stages from the recording of basic data to the feeding of this data into the computer for processing. The basic steps in this process are:

- ❖ Original Recording
- ❖ Data Transmission
- ❖ Data Preparation
- ❖ Verification
- ❖ Sorting
- ❖ Control
- ❖ Computer Input

In any particular application these functions may not all exist or they may take place in a different sequence from that listed above. The data capturing process will also depend on the type of input data, type of application and the hardware configuration available.

Data Capture Objectives:

If the data input is bad then output will be worse. This calls for clear data capture objectives such as:

1. Reduction in the volume of input to the extent possible.
2. Lesser manual preparation
3. An input design which will ease the work of the person engaged in input preparation.
4. Minimizing the number of steps practicable in the data capturing process

Basic Steps in Data Capture:

a. **Original Recording**: This is the collection of data at its source. This involves clerical preparation of source documents including manual checks.

b. **Data Transmission**: The data moves from the point of origin to the data processing centre.
c. **Data Preparation**: The transcription of source document on to an input media such as magnetic tape, magnetic disk, magnetic drum etc. is data preparation.
d. **Verification**: It is to verify that the transcription has been done correctly. This is vital because it can result in wrong output.
e. **Sorting**: Sorting is the process of arranging data into some desired sequence. Sorting may be done manually or mechanically.
f. **Control:** Throughout all the stages listed above it is essential that checking, verifying and validity controls are maintained. This is to ensure that all the data collected, transmitted and input are correct.
g. **Computer Input**: The data is read by the input device like magnetic disk drive and transferred to the internal store where it undergoes validity checks.

Data Validation:

The objective of a data validation system is to detect errors at the earliest possible stage before costly activities are performed on invalid data. Some data validation is done by way of manual verification in data capture stage itself.

Validation Checks: There are various categories of checks which can be applied to data during a validation run.

a. **Field Checks**: Includes the followings:

1. **Limit check:** May be applied to each field (data item) of a record to ensure that its contents lie within predefined size.
2. **Picture check:** May be applied to each field to detect entry of incorrect characters in the field.
3. **Valid code check:** To validate input against predefined transaction codes. These predefined codes may either be embedded in the programs or stored in files.
4. **Check Digit:** It is used to detect transposition errors when recording "key" fields.
5. **Arithmetic Check:** are used to ensure the validity of the results by performing arithmetic operations in different ways.
6. Cross Check: may be applied to verity fields appearing in different files to verify that result fully.

b. **Transaction checks:** include the following:

1. **Sequence checks**: are applied to detect any missing transaction.
2. **Formal completeness:** are used to check the presence and position of all fields in a transaction.
3. **Redundant data checks**: are employed to check the validity of codes with reference to description.
4. **Combination checks:** may be applied on various fields of a file.
5. **Probability checks**: are sued to avoid unnecessary rejection of data.

6. **Pass words:** may be exercised to check entry of data by unauthorized persons in on line system.
7. **Checks:** may be incorporated to ensure that transaction pertains to the current period.
8. **Batch total**: Can be used to ensure that transaction have been transcribed correctly.
9. **Hash total:** A control total i.e. the sum of values in a particular field or record area of a file, to ensure that transactions have been transmitted currently.

DESIGN OF OUTPUT

The output generally refers to the result and information that are generated by the system. One of the most important features of an information system from the point of view of users is the output it produces. If the output is of poor quality, the whole system is in peril because the users will then avoid using it. Hence, the design of output assumes greater importance.

Design Principle of Output:

A system designer should try to incorporate the following design principles for output:

 ❖ Principle of starting with output
 ❖ Principle of acceptability of reports.
   The end user has to accept these outputs since they are the people who will be using it for their desired purposes. Hence it is ideal to have their participation in the output design phase for the greater success of the system.
 ❖ Principle of timely output.
   An output in time can help to make better decisions.
 ❖ Principle of enhancing he decision making process.
 ❖ Principle of practicing "Management by Exception".
   Management controls through completed tasks. The report should be designed not only for what has happened but for what deviations where there from actual plans.
 ❖ Principle of duplication reduction in reports.
   Duplicate or unnecessary information in the reports should be minimized to the extent possible. This automatically reduces the cost of processing.
 ❖ Principle of simplicity in reports.
   Report should be concise, simple and self explanatory.

Output Objectives:

Before designing output, the objectives of each output must be clear. Simply because the output is very attractive or it has used the latest computer technology, output can not be regarded as 'good'. It must accomplish one or more of the following objectives.

An output must
 1. Convey information about
    a) Past Activities   -Personnel File, Vendor History
    b) Current Status   -Inventory on hand, Cash on hand
    c) Future Projection –Sales or cost of manufacturing a new item

2. Confirm an action   - Completed task
3. Trigger an alarm   - Rush purchase, Market Loss

4. Signal Events   - Through exception reporting or report on lurking
                              Opportunities etc.

Types of Output:

There are various types of output required by most systems. The main types of output are as below:

1. External Outputs: Those intended to go outside the user's organization e.g. invoices, pay slips, Tax returns etc.
2. Internal Outputs: Those used within the user's organization and it requires careful design because they are user's main interface with computer.
3. Operational Outputs: The use of this is in general within the computer department e.g. program listing.
4. Interactive Outputs: This involves the user communicating directly with the computer.
5. Turnaround Outputs: The data will be added to this document before.

Output Considerations:

While designing outputs, systems analyst must consider the following points:
   (a) Determine what information is to be present
   (b) Decide whether to display, print or "speak" the information and select the output medium.
   (c) Arrange the presentation of information in an acceptable form.
   (d) Decide how to distribute the output to intended users.

After considering all the above questions, the analyst and the suer can define output more clearly in terms of:

1. Types of output
2. Contents (Heading? Numeric? Alphanumeric? Etc.)
3. Format (Hard copy? Screen? Microfilm? Etc.)
4. Location (Local? Remote? Transmitted? Etc.)
5. Frequency (Daily? Weekly? Hourly? Etc.)
6. Response (immediate? With a period? Etc.)
7. Volume (Number of documents? Growth? Etc.)
8. Sequencing (Account no.? Within sales area? Etc.)
9. Action required (Bursting? Error detection? Etc.)

The content of the output must be designed in detail.

Output Media:

Output from a computer system can take a variety of forms. The systems analyst has to determine the most appropriate medium for the output. The most common media are:

1. Printed Output:
   The device used for printed output may be line printer, dot matrix printer, laser printer or plotter.

2. Visual Output:
   With the increasing emphasis on the design of interactive management information systems, the CRT unit is becoming a widely used form of output. The most common use of CRT unit is inquiry whether hard copy is not required.

3. Turnaround Document Output:
   In order to reduce the input workload at a later date, turnaround documents in the form of punched cards are widely used. The applications include Credit Card Billing and Employee Time Cards. Additionally OCR (Optical Character Recognition) forms can be prepared as output which at a later date serves as input to the computer system.

4. Secondary Storage Output:
   This generally includes magnetic disk, magnetic drum, and magnetic tape.

5. Microfilm or Microfiche Output:
   Microfilms are photographically reduced documents on films. The information can subsequently be inspected by using a viewer which projects on to screen.

6. Audio Response Output:
   A newer form of output is the audio response unit. The unit is capable of providing on-line inquiry into the systems where output is restricted to short messages. This system consists of message handling unit.

Fact Gathering 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 are left out
   b)   right problem are identified
   c)   repetitive work is avoided
   d)   wrong or incomplete details are not collected

Here we try to get an overall idea about the search methods or fact gathering techniques which are commonly use, they are

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

1.   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.

❖ Put yourself in other man's place and pose your question. Cultivate the ability to appreciate his point of view.
❖ Be sure you really understand instead of jumping to conclusions.
❖ Maintain a neutral attitude. However, show genuine interest so that the other person can come out with his problem, thoughts and ideas.
❖ Let him do the most talking ,listen, listing is an art.
❖ Ask specific.
❖ Notice what he does not say.
❖ Do not allow your mind to wander. It is usually reflected in your face. If the interview leaves the core subject, bring him back to the track tactfully.
❖ Don't shoe you are in a hurry.
❖ Be prepared for disagreement.
❖ Distinguish between fact and opinion.
❖ Always be polite, don't be over polite.

General Rules for Conducting an Interview:

❖ Obtain prior permission
❖ Prepare oneself as regards to objective and methods.
❖ Put the interview at case.
❖ Explain in advance about the subject of the interview.
❖ Avoid arguments involving too many people at the same time.
❖ 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 and 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 shorter time than in the formal ways.

Advantages:
• useful when more information is required from few people
• more familiar and personal
• people unwilling to write critical or controversial comments, might be more free in person
• You can react immediately to anything the interviewee says
• Can watch for clues to help you determine if responses are knowledgeable and unbiased

- Can contribute to improved human relations

Disadvantages:
- **More time consuming**
  - o Both people must prepare
  - o Interviewer has to do follow-up work
- **Costly**
  - o Cost substantial when a large no. of interviews are planned
  - o Most expensive fact finding technique

2.   QUESTIONNARIES:

Questionnaires may be used as a supplement to interview. More people can be reached and answers can be corroborated. The questionnaires can have open ended question like – What are the major and minor problem in the existing system.

A questionnaire can be considered as a structured interview form. Since 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.

Questionnaires are useful for:
1. Gathering numerical data.
2. Getting relatively simple opinion from a large number of people.
3. Obtaining collective opinion

Advantages and Disadvantages of Questionnaire

Advantages:
useful when asking a series of questions to many individuals
opportunity to many people to provide input and suggestions
recipients can answer at their convenience
if anonymous responses allowed, more candid responses are offered
Disadvantages:
Preparation requires skill and time
If question is misinterpreted, cannot clarify the meaning
If questionnaire not well designed, recipients view them as intrusive, time consuming and impersonal

3.   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. This record review can take place at the beginning of the system study or later in the study for comparing actual operations with the records indicate. Records may include:

1. Written policy manuals
2. Rules and regulations
3. Standard operating procedures used in the organization
4. 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 is the form?

(4) Is it ideal for analysis and inference?

5.   OBSERVATION:

An analyst must always keep his mental antenna alert. 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 like 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:

(i)   Operational Inefficiencies.

(ii)   Alternate routes and procedures.

(iii)   Interruptions in the normal flow of work.

(iv)   The usage of files and documents.

(v)   Informal communication channels etc.

On site observation provides close view of the working of real system. He can observe people, objects, documents and occurrences of events.

Unlike the other fact finding techniques, in this method the analyst himself visits the organization and observes and understand the flow of documents, working of the existing system, the users of the system etc.