

## INTRODUCTION TO SYSTEM ANALYSIS AND DESIGN

### ❖ **System and its components**

A system is simply a set of components that interact with each other to accomplish some purpose or a particular goal.

I.e. physical sensation is a complex nervous system; it is a set of brain, spinal cord, nerves and special sensitive cells under your skin, that work together to make you feel hot, cold and so on.

A business is also a system. Its components are marketing, manufacturing, sales, research, shipping, accounting and personnel – all work together to create a profit that benefits the employees and stock holders of the firm. Each of these components is itself a system and it is called *subsystem*. I.e. the accounting department may consist of accounts payable, account receivable, billing, auditing and so on.

**Environment:** Are the entity outside the boundaries of the system.

To achieve their purpose, system interacts with their environment. The systems that interact with their environment (receive input & produce output) are called **open system**.

The systems that do not interact with their surroundings are called closed systems. In real life all systems are open system. Thus closed systems exist only as a concept.

Any system use a basic control model consists of

- A standard for acceptable performance.
- A method of measuring actual performance.
- A means of comparing actual performance against the standard.
- A method of feedback.

A system that can adjust their activities to acceptable levels continue to function. Those can not eventually stop.

For example, if a business, produces as output products or services that are at high priced and of low quality people will probably be not continue to buy them. Low sales figures are feedback, telling managements, it needs to adjust the products and the way they are produced to improve performance and bring it into the line with expectation.

## ❖ **Information system**

Every business system depends on a more or less abstract entity called an information system. This system is the means by which data flow from one person/department to another. Information system helps all the system of business, linking the different component in such a way that they effectively work towards the same purpose.

The purpose of an information systems are to process input, maintain data and produces information, reports and other output.

It consists of subsystems including hardware, software, and data storage for files and database. The particular set of subsystems used – the specific equipment, programs, files and procedures – constitutes an information systems application.

**Categories of information systems :** Information system can be categorized as follows :

(i) **Transaction processing system (TPS) :** The aim of this system is to improve the routine business activity on which organization depends. A transaction is any event or activity that affects the organization. I.e. placing orders, billing customers, hiring employees, deposit checks. Transaction processing involves :

- Calculation
- Classification
- Sorting
- Storing & retrieval
- Summarization

### **Characteristics of transactions**

- There is a high volume of transactions
- Each transaction is similar.
- The procedures for processing the transaction are well defined and can be described in detail.
- Few exception to the normal procedures occurs.

Using these characteristics the routines will be established, which describes the process and what to do if exception occurs. Some time it is called standard operating procedures.

TPS provides speed and accuracy and can be programmed to follow routines without any variance.

- (ii) Management Information system (MIS) :** TPS are operation oriented. In contrast MIS assist managers in decision making and problem solving. They work on the data stored as a result of transaction processing, but they may also use other information.

In any organization, decision must be made on many issues that recur regularly and require certain set of information to make the decision. Because the decision process is well understood, one can identify the information that will be needed to formulate decisions. The information system can be developed so that reports are prepared regularly to support this recurring decisions. Each time information is needed, it is prepared in a pre designed form presented in a predetermined format.

The decision supported by these systems is structured decisions. It means manager knows what factors to consider in making the decision and which variables most significantly influence whether the decisions will be good or bad. System analyst in turn develops well structured reports containing information that is needed for the decisions or that tells the status of important variables.

In the banking example, the information reported is often combined with other external information, such as details about economic trends, demand for loans, rate of consumer spending, and cost of borrowing. Bank officers can make informed decision about the level of interest. The need to make each of these decisions frequently, and the information needed to formulate the decisions is also prepared regularly.

- (iii) Decision support system (DSS) :** All decisions are of not a recurring nature. Some occurs only once or recur infrequently. DSS assists managers who must make decisions that are not highly structured, often called unstructured or semi-structured decisions. A decision is consider unstructured if there are no clear procedures for making the decision.

A key factor in the use of decision support system is determining what information is needed. In well structured situation it is possible to identify information needs in advance, but in unstructured environment, it is difficult to do so. As information is acquired the manager may realize that additional information is required.

Consider the banking example, where manager must decide whether to begin cash management accounts or install an automatic teller machine. Both are the new services, management has to think about so many different questions such as

- What will each service cost?
- How many teller locations are needed?
- How will the competition respond to this?
- What limits should be placed on withdrawals at any one time?
- Can a charge be imposed for this service?

In such cases, it is impossible to pre design system report formats and contents. Thus a decision support system must have greater flexibility than other information system. The data needed to develop the information may originate from many different files or database, rather than form a single master file.

Manager judgment plays a vital role in decision making where the problem is not structured. The decision support system supports, but does not replace, management judgment.

## ❖ **System analysis and design**

It refers to the process of examining a business situation with the intent of improving it through better procedures and methods.

System development process can be thought of having two major components (i) System analysis and (ii) System design

**System analysis:** It is the process of gathering and interpreting facts, diagnosing problems and using the information to recommend improvements to the system.

**System design :** It is the process of planning a new business system or one to replace or complement an existing system. The system design is like the blue print for a building, it specified all the features that are to be in the finished products.

Analysis specifies what the system should do. Design states how to accomplish the objectives.

## ❖ **Functions of System Analyst**

A system analyst's primary responsibility is to identify information needs of an organization and obtain a logical design of an information system which will meet these needs.

Three groups of people are involved in developing information systems for organization managers, users of the systems and computer programmers. The efforts of the system analyst is to co-ordinates all these group, to effectively develop and operate computer

based information system, some important function of system analyst can be expressed as follow

- (i) Defining requirement
- (ii) Categorized the requirements and determines the priority.
- (iii) Gathering data, facts and opinions of facts.
- (iv) Analysis and evaluation
- (v) Solving up specifications
- (vi) Designing system
- (vii) Evaluating system

#### ❖ **Users and types of user**

The term end user is widely used by system analysts to refer the people who are not professional information system specialist but who use computers to perform their job. The end users can be categorized into following four categories

- (i) **Hands on user** : This user actually interact with the system. They feed in data or receive outputs. I.e. airline reservation agents, use terminals to query the system about passenger, flight and ticket information.
- (ii) **Indirect users** : This are the users who do not interact with the hardware or software, but they take the benefit from the results or reports produced by these system. These type of users are not alike. Some may have never used a computer, others are intermittent users, others may interact daily with an information system. The some of the users may be a competitor, not an employee of the firm.
- (iii) **User manager** : Such type users have management responsibility for application software. These users may be upper level managers. These users may not actually use the system directly or indirectly, they retain authority to approve or disapprove investment in the development of applications and have organizational responsibility for the effectiveness of the system.
- (iv) **Senior management** : They take the increased responsibility for the development of information systems.

All four types of users are important . Each has essential information about how the organization functions and where it is going.

## ❖ **Classical system development life cycle (SDLC)**

System development is a birth-to-mature process called **system development life cycle**. A system project begins with a decision to analyze user requirements. The project is completed once a useable s/w product is produced and implemented or released. The period of time that begins when a system is fully operational for use and gets maintained is called the development life cycle of a system.

- (1) Preliminary investigation
- (2) Feasibility Study
- (3) System Analysis
- (4) System Design
- (5) Development of Software
- (6) System Testing
- (7) Implementation & Evaluation
- (8) Maintenance

### **(1) Preliminary investigation:**

One of the most difficult tasks of the system analyst is identifying the real problem of the existing system.

Problem definition defines the user requirements or what the user expects out of the system.

This phase also sets the project boundaries, which define what parts of the system, can be changed by the project.

This phase also includes rough idea of the Resource Requirements for the project as well as the estimated Start & Completion date for each phase.

Thus preliminary investigation helps in

- Pinpointing the problem.
- Setting proper System goals.
- Determining the boundaries of the project by taking into consideration the limitations of the available resources.

### **(2) Feasibility Study**

A feasibility study is undertaken to determine the possibility of either improving the existing system or developing a completely new system.

The purpose of feasibility study is to determine whether the requested project is successfully possible. There are three aspects of feasibility study.

- Technical Feasibility
- Economical Feasibility
- Operational Feasibility

### **Technical Feasibility :**

Technical feasibility centers around the required computer system in terms of H/W and S/W and to what extent it can support the proposed the application.

This study should answer the following questions

- Whether the project can be carried out with the existing equipment?
- Whether the existing software is enough?
- Can the work will done with the existing personnel?
- If a new technology is required, how best can it be implemented?

### **Economical Feasibility :**

Economic feasibility study is the most frequently used method for evaluating the effectiveness of a new system.

This study should answer the following

- Whether the project is economically feasible?
- If enough funds are not available, what are the sources of funds?
- Whether there are sufficient benefits when compared to costs incurred?

### **Operational Feasibility :**

Operational feasibility is concerned with human, organization & political aspects. The analysts should determine

- Whether the system can be used if it is developed and implemented?
- Will there be resistance from users that will cripple the possible application benefits?

## **(3) System Analysis**

The analysis phase is the detailed understanding of all-important facts of the business area under investigation. The relationships of the various system components amount themselves and with environment are studied and understood.

The analyst must consult a variety of persons to understand the whole details about the business, the process involved in it and the problems faced by the staff.

The analyst must have a detailed study of the manuals and reports about the organization as a part of analysis. Further he should have a direct observation of the activities in the organization and collect a sample of the forms and documents to understand the whole system.

#### **(4) System Design**

In the system design process, the primary objective is to identify user requirements and to build a system that satisfies these requirements. Design of system is largely the logical design. The logical design can be sketched on a paper. It's a blue print of system. The design, also including the physical design elements, describing the data to be inputted, the processes involved in the manipulation of data and the output.

1. The analyst should specify the file structure, storage device etc.
2. The database is also designed in this phase.
3. H/w cost, capability, speed, error rates, and other performance characteristics are specified.
4. Changes to be made in the organizational structure of the firm are outlined.
5. Input, output, files, forms and procedures are planned.
6. Finally, standards for testing, documentation and system control are formulated.

#### **(5) Development of Software**

Development is the phase where detailed design is used to actually construct and build the system. In this phase, the system is actually programmed. Now, the analyst should decide whether to buy a commercial s/w or to develop new customized program with the help of programmers. In large organizations, the work is entrusted to programmers, whereas in small orgs, the job is assigned to outside orgs. Programmers are also responsible for documenting the programs. The document should include comments that provide explanation of the procedures coded in the programs

#### **(6) System Testing**

Testing is the process of making sure that the program performs the intended tasks. Once the system is designed it should be tested for validity. During system testing, the system is used experimentally to ensure that the s/w does not fail. The system is tested with special test data and the results are examined for their validity. Some of the users may be permitted to operate on the system so that the analyst can establish that he system can work in the specified environment.

#### **(7) Implementation and evaluation**

Implementation is the final phase of development. It consists of installing h/w, programs, collecting data and organizing people to interact with system and run the system.

In the implementation phase, user actually starts using the system. This phase therefore involves training the users for using the system and also providing them friendly documentation to refer.



Once the system is implemented, it should be evaluated. Evaluation is the process of verifying the capability of a system after it is put in operation, to see whether it is meeting the objectives or not.

Evaluation is an important aspect, due to the following reasons:

- To access the system, i.e. how the system is functioning, what the response time, overall reliability and level of utilization is etc.
- To find the limitation in the system.
- To identify whether the new system developed would be beneficial to the organization under operating conditions.
- To judge the attitude of different persons in the organization regarding the newly developed system.
- Evaluation of cost, time and effort taken for the overall project

## **(8) Maintenance**

Maintenance is the process of incorporating changes in the implemented existing system for proper utilization. This involves enhancement, adaptation and correction.

**Enhancement:** it implies adding new functions or additional capabilities to the system.

**Adaptation:** it implies customizing the s/w to run in the new environment.

**Correction:** correction implies correcting the bugs in the existing s/w

### **Fact – Finding Techniques:**

The specific technique analyst use for collecting data about requirement is called fact-finding technique. Thus this technique include interviews, questionnaires, record review, site observation.

#### **Interview:**

Analyst use interview to collect data from individual or from group. The respondents are the user of existing system and potential user of proposed system. In some instances, the respondents may be manager or employer who provide data for proposed system Or who will be affected by it.

Although some other analyst prefer the interview to other fact-finding techniques, it is always a best source of application data because of the time required for interviewing, other method must also be used together information to conduct investigation.

It is impotant to remember that respondents and analyst converse during an interview and the respondents are not being interrogated.

There are two types of interview.

- Structured Interview
- Unstructured Interview

### **Structured Interview:**

The advantage of structured interview are given below:

- Ensure uniform wording of question for all respondents.
- Easy to administer and evaluate.
- More objective evaluation of both respondents and answer to question.
- Limited interviewer training is needed.
- Result in short interview.

The disadvantages of structured interview are given below.

- Cost of preparation is high.
- Respondents may not accept high level of structure and mechanical posing of question.
- High level of structure may not be suitable for all situation.
- High level of structure reduces respondent's spontaneity and ability of interviewer to follow up on comments of interview.

### **Unstructured Interview:**

The advantage of unstructured interview are given below:

- Interviewer has greater flexibility in wording question to suit respondent.
- Interviewer can pursue areas that arise spontaneously during interview.
- It may produce information about areas that were overlooked or not thought to be important.

The disadvantages of unstructured interview are given below.

- May be inefficient use of both respondent and interviewer time.
- Interviewer may introduce their biases in question or reporting results.
- Extraneous information may be gathered.
- Analysis and interpretation of results may be lengthy.
- Takes extra time to collect essential facts.

## **Questionnaire:**

It allows the analyst to collect information about the various aspect of system from a large number of persons. The use of standardlized question formats can yield more reliable data than other fact-finding techniques. And the wide distribution ensures greater anonymity for respondents, which can lead to more honest responses.

However, this method does not allow analysts to observe the expression or reactions of respondents. In addition, response may be limited, since completing questionnaire may not have high priority among the respondents.

There are two type of questionnaire.

- (1) Open-ended Questionnaire
- (2) Closed-ended Questionnaire

Analysts often use open-ended questionnaires to learn about feeling, opinions, and general experiences or to explore a process or problem. Closed-ended questionnaire control the frame of reference by presenting respondents with specific responses from which to choose. This format is appropriate for eliciting factual information.

The high cose of developing and distributing questionnaire demands that analysts carefully consider the objective of the questionnaire and determine what structure will be most useful to the study and most easily understood by the respondents.

Questionnaire should also be tested and if necessary, modified before being printed and distributed.

The analyst should ensure that the respondent's background and experience qualify them to answer the question.

## **Record review:**

Record and reports can provide analysts with valuable information about organizations and operations. Analysts examine information that has been recorded about the system and users. Record inspection can be performed at the beginning of the study, as an introduction, or later in the study, as a basis for comparing actual operations with what the records indicate should be happening.

## **Site Observation:**

It allows analyst to gain information they cannot obtain by any other fact-finding technique. Though through observation analyst can secure the first hand activity process.

This method is very much useful when analyst needs to actually observe that how the documents are handled, how process are carried out and whether specification steps are actually followed experience analyst can gain a lot of thing from the observation, some time which is impossible to collect from other fact finding techniques.

This method is also useful when he needs to actually observe how documents are handled, how processes are carried out and whether specified steps are actually followed.

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

### **Advantages of Site Visits:**

- Data gathered by observation can be highly reliable.
- Observation is relatively inexpensive as compared with other fact finding techniques.
- The system analyst is able to see exactly what is being done. Complex task are sometime difficult to clearly explain in words. Through site observation, the system analyst can identify tasks that have been missed or inaccurately described by other fact finding techniques.

### **Disadvantages of Site Visits:**

- People usually feel uncomfortable when being watched. They may unwittingly perform differently when being observed.
- The task being observed are subject to various types of interruptions.
- Some system activities may take place at odd times, causing a scheduling inconvenience for the system analyst.
- If on site observation is to be done properly in a complex situation, it can be very time consuming.

Observation should first be conducted when the workload is normal. Afterwards, observation can be made during peak periods to gather information for measuring the effects caused by the increased volume of work.

### **Tools for documenting procedures and Decision:**

There are two types of tools used for documenting procedures and decisions.

- Decision Tree
- Decision Table

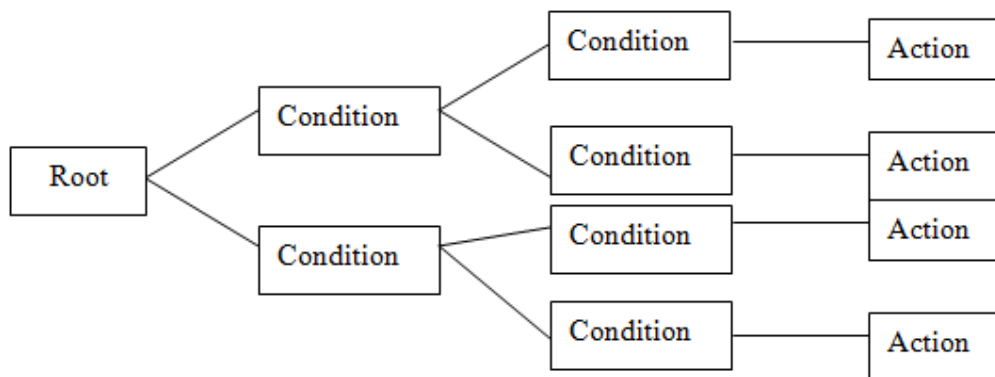
## Decision Tree :

Decision tree is a graphical diagram that presents conditions and actions sequentially and thus shows which condition to consider first and which second and so on. It is a method of showing the relationship of each condition and its permissible actions.

This tree provides the graphical representation of decision logic that helps the non computer people find easy to understand. Decision tree is one of the methods for describing decision.

### Characteristic:-

- This diagram resembles the branches on a tree.
- Root of the tree is the starting point of decision sequence.
- The particular branch to be follow depends on condition that exist and decision that is to be made.
- Progression from left to right along a particular branch is the result of making a series of decisions.
- Following to each decision is the next set of decisions to be considered.
- The right side of a tree lists the action to be taken depending on the sequence of condition that is follow.



### Advantage:

- The need to describe condition and action forced to formally identified the actual decision that must be made.
- Decision tree forced to consider the sequence of decision.

### Disadvantage:

- Decision tree for a complex system, many sequences of steps and combination of condition will be uncomfortable.
- A large number of branches with many path through them will create problem for analyst.

### How to construct decision tree:-

The principles for the development of decision tree are relatively straightforward.

- Identify all conditions.
- Find out values that the conditions may take or assume.
- List all possible outcomes.

### Decision Table:

- Decision table is a matrix of row and column rather than a decision tree.
- Organizations have complex policies and decision making rules that drives business process.
- Decision tables are popular tool in analyzing or expressing this requirement. Decision table is a tabular form of representation that satisfies the set of condition and their corresponding action.
- Decision rule, include in a decision table, state what procedure to follow when certain condition exist.

The general format of decision table is given below.

1. Condition statement	Condition entries
2. Action Statement	Action entries

### Characteristics:-

The decision table is made up of four section:

- condition statement
  - o Condition statement identifies relevant conditions.
- condition entries
  - o Condition entries tell which value applies for particular action.
- action statement
  - o Action statement list the set of all steps that can be taken when certain condition occur.
- action entries
  - o Action entries show that what specific actions in the set to take when selected conditions or combinations of conditions are true.

- Sometimes notes are added below the table to indicate when to use decision table or to distinguish it from other decision tables.
- The column on the right side of the decision table, linking the condition and action, from decision rules, which state the condition that must be satisfied for particular set of action to be taken.

### **Advantage of Decision Table:**

Decision tables are used in place of flowcharts because of the following reasons:

- They are easier to draw.
- They provide a compact representation of the decision making process. A small table can replace pages of flow charts.
- It is also much easier to understand a particular path down one column than through several pages of the flowchart.
- Decision tables are best suited for calculating discounts, commissions or inventory control procedures.
- A decision table is concerned with the logic of decision rules and is therefore problem oriented. There is no danger that a problem based on a decision table will have incomplete, inconsistent logic. The structure of a decision table promotes a logically complete and consistent problem definition.

### **Disadvantage of Decision Table:**

Decision tables have the following disadvantages:

- Decision table cannot express the complete sequence of operation to solve a problem. Therefore it may be difficult for a programmer to translate a decision table directly into a computer program.
- When there are too many alternatives, decision table cannot list them all.
- A decision table does not depict the flow of logic for the solution to a given problem.

### **Data Flow Diagram**

Data flow diagrams provide a logical model of the system and show the flow of data and flow of logic involved. Data flow diagrams show the flow of data into the system and between processes and data stores.

Data flow diagram has the following characteristics.

- They show the passage of data through the system.
- They focus on the processes that transform incoming data flows(input) into outgoing data flows(output)

- The process that performs this transformation normal creates as well as use data.
- External entities send and receive data flows from the system.
- Data flow diagram is also known as bubble chart.
- DFD supports a top down approach for analysis i.e. the analyst begins with a general understanding of the system, then further draws each component's details.

### Symbol used in DFD's:

DFD consist of a series of symbols joined together by a line. There may be a single DFD for entire system or it may be exploded into various levels namely level1,level2,level3, so on. The top level diagram is often called a context diagram. Context diagram contains a single process and it shows an overall view of the system under development.

Four symbols are used in drawing dataflow diagrams. These are:

- External entities (Source and Destination).
- Data flow.
- Processes.
- Data store.

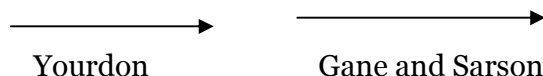
### External Entities (Source and Destination of data):

External sources or destinations of data, which may be people, programs, Organizations, or other entities, interact with the system but are outside its Boundary. The term source and sink are interchangeable with the origin and Destination.



### Data Flow :

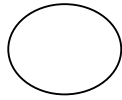
Data move in a specific direction from an origin to a destination in the form of a document, letter, telephone call or virtually any other medium. The data flow is a “packet” of data.



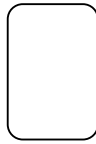
### Processes:

People, procedures, or devices that use or produce (transform) data. The physical component is not identified.





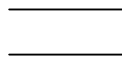
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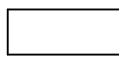
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### **Data store:**

Here data are stored or referenced by a process in the system. The data store may represent computerized or non computerized devices.



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Data Flow diagrams are of two types:

There are two types of data flow diagrams.

- Physical data flow diagram.
- Logical data flow diagram.

### **Physical Data Flow Diagram:**

It is an implementation dependent view of the current system, showing what tasks are carried out and how they are carried out and how they are performed. Its characteristics includes (name of people, form And document names or numbers, names of dept, master and transaction file, equipment and device used, location, name of procedures etc.)

### **Logical Data Flow Diagrams:**

It is an implementation-independent view of system, focusing on the flow of the data between processes without any concern of specific devices, storage location or people in the system.

### **How to construct a Data Flow Diagram:**

- Processes should be named and numbered for easy identification.
- The direction of flows is from top to bottom and from left to right.
- Data traditionally flows from the source to the destination.
- The names of data stores, sources and destination are written in capital letters and first letter of each word of process and data flow name should be capitalized.

## **Developing Data Flow Diagram:**

System analyst must first study the current system, that is, the actual activities and processes that occur. In the terminology of structured analysis, this is a study of the physical system.

The physical system is translated into a logical description that focuses on data and processes. It emphasizes data and processes in order to focus on actual activities that occur and the resources needed to perform them, rather than on who performs the work.

## **General rules for drawing logical data flow diagram :**

- Any data flow leaving a process must be based on data that are input to the process.
- All data flows are named; the name reflects the data flowing between processes, data stores, sources, or sinks.
- All process should be assigned names.
- Avoid uncertain process names.
- Assign process names that are unique to the activity they describe.
- Number each process.
- There is no direct data flow directly from source to destination.

## **Levels of Data Flow Diagram:**

- Zero Level Data Flow Diagram (Context diagram) : this diagram indicate the general characteristics of the business process under investigation.
- First Level Data Flow Diagram.
- Second Level Data Flow Diagram.

## **:- Data Dictionary:-**

Data dictionary is a metadata that means that it will store data about data. Or data dictionary is a storehouse of data giving information about data. It is a list of terms and their definitions for all data items and data files of a system.

Data dictionary is a catalog-a repository-of the elements in a system. In a data dictionary you will find a list of all the elements composing the data flowing through a system. The major elements are data flows, data stores, and processes. The data dictionary stores details and description of these elements.

The dictionary is developed during data flow analysis and assists the analysts involved in determining systems requirements. The content of data dictionary is used during system design as well.

Data dictionary is a valuable reference in any organization. During system implementation, it serves as common bases against which programmer who are working on the system compare their data description. It is also an important step in building a database.

### **Objective of Data dictionary:**

Data dictionary help to achieve the following desirable objectives:

- A standard definition of all terms in system, i.e. each item of data is uniquely identified and defined.
- Easy cross reference between sub systems programs and modules.
- Simpler program maintenance.

So, data dictionary contains the information about the data of system. There is an entry in the data dictionary for every element of DFD. Thus DFD's and data dictionary complement each other.

Data dictionary contains two types of description for the data flowing through the system: data elements and data structures. Data elements are grouped together to make up a data structure.

### **Data Elements:**

the most fundamental data level is the data element. Data elements are the basic building blocks for all other data in the system. By themselves they do not convey enough meaning to any user. Example of data elements are invoice number, invoice date.

### **Data Structure:**

a data structure is a set of data items that are related to one another and that collectively describe a component in the system. For example, the data structure INVOICE is defined to consist of data items, including the date of the invoice, vendor address, item details. Both data flows and data stores are data structure.

### **Format of Data Dictionary:**

A Data Dictionary is organized into five sections:

- Data elements
- Data flows
- Data stores
- Processes
- External Entities

Data dictionary lists all the data elements, data flows, data stores and processes of the system under consideration. It then gives the details about each item listed in a prescribed format. The format may contain the following:

- Data Type : data element, data flow and data store.
- Data Name: name of the data element, data flow and data store.
- Data Aliases: alternate names used for the convenience of multiple users.
- Data Description: a short explanation of data.
- Data characteristics: frequency of use, data length, range of data values etc.
- Data composition: various data elements contained in a data store or data flow.
- Data control information: source of data, user or access authorization, etc. in the case of data flow, the process from which data flow is coming and process to which data flow is going should be indicated. Also, in case of data stores, incoming and outgoing data flow needs to be indicated.
- Physical location of data: this is indicated in terms of records, file or data base.

### **Features of a Data Dictionary :**

Data dictionaries are an integral component of structured analysis, since data flow diagrams by themselves do not fully described the subject of investigation. The data dictionary provides additional information about the system.

### **Advantage of Data Dictionary :**

- To manage the detail in large systems.
- To communicate a common meaning for all system elements.
- To document the features of the system.
- To facilitate analysis of the details in order to evaluate characteristic and determining where system changes should be made.
- To locate errors and omissions in the system.