UNIT 3 DOCUMENTATION

Structure

3.0 INTRODUCTION

A systcm cannot be completely effectivc unless it is adequately documented. I should be documcntcd as it is being crcatcd. That is, at various stages of the system development, status rcporls should be prepared for lhosc managcment personncl for whom the system is being designed. Such reporls could include flowcharts, decision tables, output forms arid othcr documents thus far devclopcd. It also includes various problcms encountered, suggcsted solutions and rcsulling schedulc revisions. In this way, management remains fully aware of systcm's progrcss so that they can offer criticisms or suggest change while it is still economically and physically possiblc to make these changcs without it being necessary to revise the entire systcm. Thcsc progrcss reporls provide an excellent basis on which to build additional documentation.

Instructions and narrative descriptions must be prepared for every phase and part of the system, including systcm logic, tunings, uscr instructions, guidclines for opcrations staff in the data processing centre and instructions relating to transmission of data and results. Much of this can be incorporated into procedures manual. This manual stipulates the relationship betweeñ personnel in thc application areas affected by the system and the data processing centre. It should relate in details, exactly what procedures must be employed by the user to operate the system efficiently and effectively.

3.1 OBJECTIVES

The following are the objectives of this unit

- To explain the characteristics of good documentation and its various types
- The tools needed for documentation
- The guidelines/format to be followed for preparing good documentation package.

3.2 CHARACTERISTICS OF A GOOD DOCUMENTATION

Documentation is considered to be good if it has the following qualities:

(a) Availability: It should be accessible to those for whom it is intended.

(b) Objectivity: It must be clearly defined in a language that is easily understood.

(c) Cross-referable: It should be possible to refer to other documents.

(d) Easy to maintain: When the system gets modified, it should be easy to update the documentation.

(e) Completeness: It should contain everything needed, so that those who have gone through it carefully can understand the system.

3.3 TYPES OF DOCUMENTATION

These are five major types of documentation. They are:

(i) Program Documentation

(ii) Operation Documentation

(iii) User Documentation

(iv) Management Documentation

(v) Systems Documentation

3.3.1 Program Documentation

Many companies discuss about programming documentation but fail to provide it adequately. Before a program is developed, the systems analyst should provide the programmer with the required documentalion. The logic in some programs is best described by a flowchart. Sometimes, decision tables are most appropriate for explaining the logic of a program. Programmers should insist on proper documentation before starting a job.

Four items constitute normal documentation required for each program.,

- Copying in final form of all input/output documents affecting the program.
- Statement of standards for coding structures and inputloutput layouts.

  Clarification of the program's interface with other related programs.
- General flowchart or decision table.

The programmer's responsibility in documentation is to provide information to enable future programmers to make necessary changes. Personnel turnover is normal feature in any business, and turnover is particularly high among programmers. Acompany can never think that a programmer assigned to a specific program will be available in two years, when some modifications to that program are required. For continuity of information a company must insist on complete and meaningful documentation. Typically a documentation folder is provided for each program which contains all the input/output forms associated with the program, a detailed flowchart or decision table for the program use a set of operator and user instructions.

Maintaining this type of documentation is costly and time consuming, for, programmers do not take interest in spending time for this type of work. Routine changes occur frequently in a program and all changes must be covered in the documentation folder. But the very changes which require the updating of existing documentation are the reasons for maintaining accurate documentation.

3.3.2 Operations Documentation

4 well designed system may run for a long time with little or no assistance from the systems department. This can happen only when the system has been documented in a proper way. For smooth running of the system, the console operator must'have complete knowledge about the job. Providing the computer centre with a set of operating instructions will not serve the purpose. The instructions must be in a form readily accessible to the console operator and written in simple and understandable style. A systems analyst must thoroughly discuss all the requirements of new jobs with the operations staff before the job can be properly transferred.

The run book is traditional in computer centres. It is a collection of operator instructions for each program at an installation and typically contains:

(i) Narrative, describing the run

(ii) Listing of the programmed error conditions

(iii) Detailed information for running the job, including:

- input/output forrns to be used
- anticipated problem areas and how to handle them
- detailed description of file assignment of each input/output device
- disposition of data files after completing the job
- general block diagram of the programming logic
- restart procedures

The run book generally takes the form of a loose leaf notebook because of the case of substituting sheets as programs change. It should be kept in mind that an operator in a multiprogramming environment must monitor many programs simultaneously. Instructions must be simple and complete enough for executing the job correctly.

3.3.3 User Documentation

Systems users require proper documentation to prepare a developing system and to smoothly carry out existing ones. To meet this requirement, each system should have a manual that spells everything the users must know to do their job correctly. Users require two general types of information; complete details to handle each case the system processes, and overall picture of the system so that they can see their role in the total operation of the company.

The manual should supply the following information.

General flowchart of the system

- Assignment of responsibility for specific tasks
- Standards for work flow, including target dates and deadlines lor specific tasks
- Simple input and output documents
- Detailed procedures
- Anticipated exceptions and instructions on how to handle them
- Accuracy standards lor data in the system

The systems department must write a thoroughly detailed narrative of each system, including the proper handling o l routine cases, as well as exception handling. A staff member in the user department must have an authority to consult when faced with a case not handled before. Properly prepared manual which is always available can provide the information needed by the user. Supervising staff in user areas must understand the overall picture in each system just as staff members must understand the details of their function. This requires documentation, in the form of charts, graphs and illustrations, so that the supervising staff have a clear grasp o l their department's role in the total system.

3.3.4 Management Documentation

The documentation required by corporate management differs quite a lot from that required by users. The systems designer must know the requirements of the management and provide documentation to enable management to perform three lunctions:

(i) Evaluate progress on systems development

(ii) Monitor existing systems

(iii) Understand the objectives and methods of new and existing systems

Management is primarily interested to know in general the system's overall objectives and basic operations, A brief manual highlighting the key steps in each system may be prepared for management. Good managers have an exceptional ability to get to the root of a system and, their experience should enable them to retrieve information from a systems summary or chart which may not be apparenl to the systems analyst.

3.3.5 Systems Documentation

Each phase in the systems development cycle is accompanied by appropriate documentation. The systems request, even if it is initially mark verbally, eventually must be written. It is desirable for the client and a syslems analyst to work jointly in writing the request since each can contribute knowledge the other does not have. The written system's request is merely a statement of the user's problem.

In documenting the results of its deliberations, the selection committee must specify the following:

(a) The objectives of the impending feasibility study

(b) The extent of the authority of the feasibility team

(c) The individual or group responsible for completing the study

A feasibility report is probably the most important form of documentation in the system development cycle. It accomplishes thc following two purposes:

(i) It defines the objectives of the proposed system's change in reasonable detail after a sufficiently detailed study.

(ii) It gives a plan to attain these objectives.

The documentation of this plan must be thorough enough so that system designers could produce a complete and effective system. At various points during systems design, the. designing team produces the following additional forms of documentation:

(i) File Specification: detailed definitions of each file in the system, best done in graphic form.

(ii) Transaction Specifications: detailed descriptions of each type of input in the system, including a layout of each nansaction and a narrative description of how it is used.

(iii) Output Specifications: detailed descriptions of all output anticipated from the system.

Documentation also includes plans to test the system and convert from the old to the new one. The systems analyst must also provide a plan to train the personnel affected by the changes.

During the life cycle of the completed system, the system itself must provide documentation of how well it is operating and consequently should be designed to yield data about itself as a normal by-product.

Check Your Progress 1

1. Describe the characteristics of a good documentation.

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2. List out various types of documentation.

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What is user documentation?

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3.4 SOFTWARE DESIGN AND DOCUMENTATION TOOLS

Well designed, modular software is more likely to meet the maintenance, reliability and testing requirement. Three specific tools are described below :

- Structured flowchart
- HIPO diagrams
- Warnier/Orr diagrams

3.4.1 Structured Flowchart

Structured flowcharts, also called Nassi-Schneiderman charts, are graphic tools that force the designer to structure software in modular as well as top-down Corm. They provide a proper structure that can be retained by the programmer for developing the application software. The programmer should be expert in using the structured flowcharts.

The basic elements are used in developing structured flowcharts arc :

- Process
- Decision
- Iteration

Process: Simple processes or steps in a program are shown by a rectangular box, the process symbol. This symbol represents initialisation of values, input and output operations and calls to execute other procedures.

Decision: The decision symbol represents alternative conditions that can occur and that the program must have a manner of handling. 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 structured flowcharts use no arrows or continuations on separate pages. Each structured flowchart is shown on a single sheet of paper. When designing a structured flowchart, the systems analyst specilies the logic in a top down fashion. The first consideration in a process is the top element. The second in sequence is next one shown and so forth. Similarly, there is a single exist from the process.

3.4.2 HIPO Diagram .

It is another tool commonly used for developing systems software. It is an acronym for Hierarchical Input Process Output. This method was originally developed to provide documentational assistance for programmers/analysts.

The major concspt upon which HIPO is based is the highly structured modular design. The HIPO documentation uses a structure that is similar to an organisation chart. This type of structure allows the enforcement of major principles to HIPO, a top-to-bottom approach to design. The emphnsis is made on forcing the flow of data down through the system, not in the opposite direction.

The main idea behind the top-to-bottom approach is the elimination of "output-oriented" systems solutions. An output- oriented system is concerned with providing output and does not bother about the sound principles of system design. In essence, an output-oriented system often gets the job done without delay.

Unfortunately,many data processing organisation try to employ this type of rationale in their system designs. Output-orientedsyslems are often fragmentary, with large gaps evident in· the logic and flow of data throughout the system. Programs written for this type of system often duplicate each other in part. The net effect is that more programming efforts are required,with a resultant, loss of manpower and time.

The HIPO concept, with its highly ordered structure and top- to-bottom approach, tries to eliminate piecemeal system design. A view of general H P O structure is shown in Figure 1.

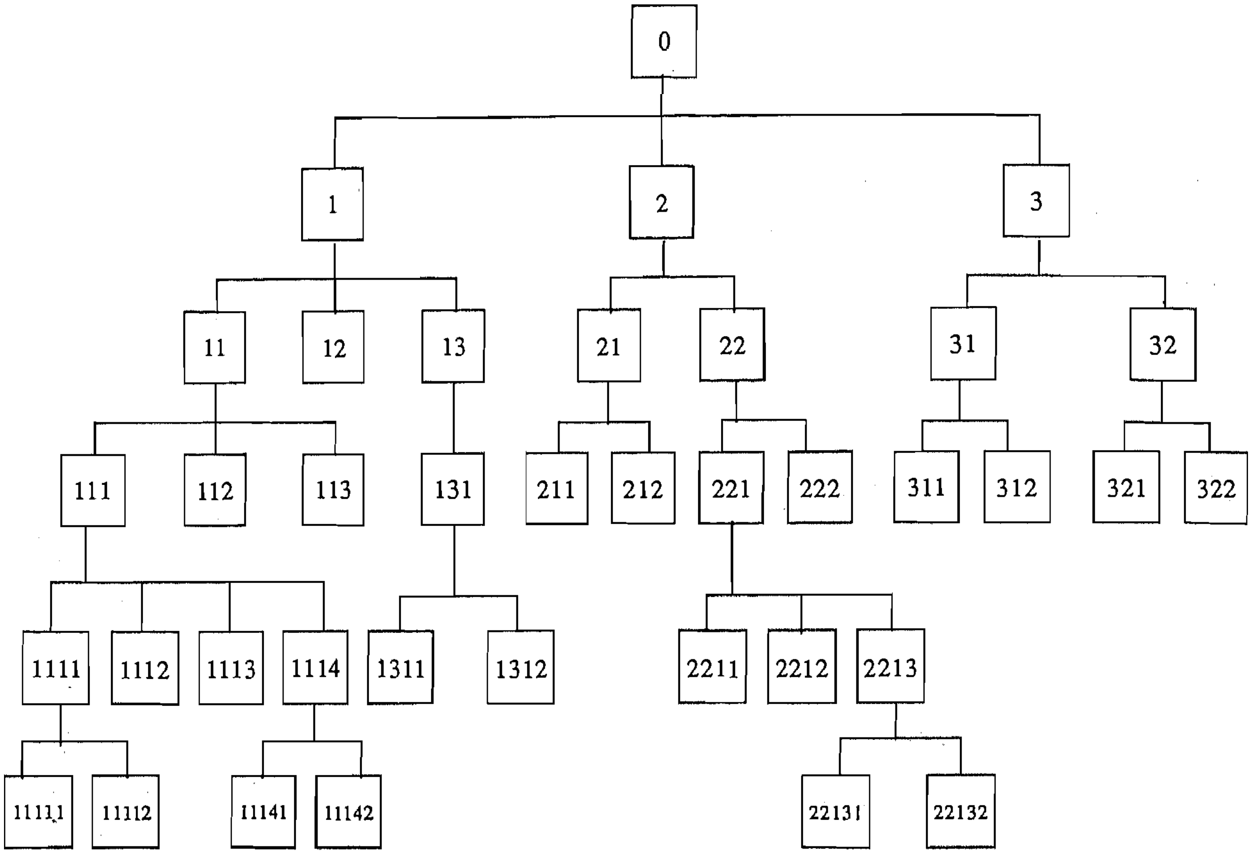


Figure 1: Structure of HIPO chart identifying all of the components withln the chart by number at each of the sub-level.

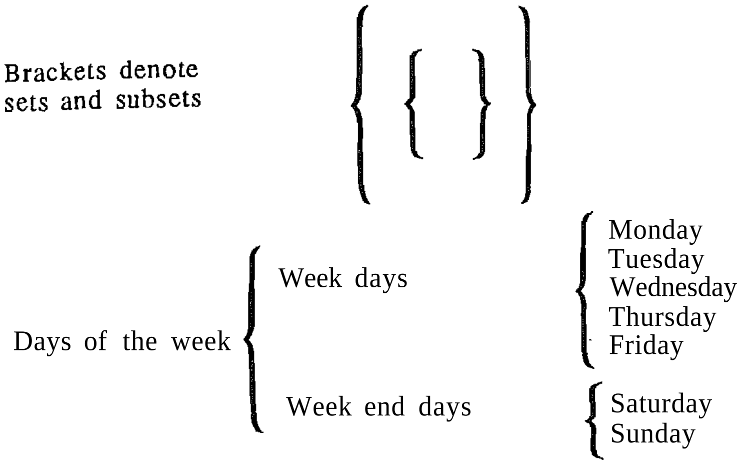
As you can observe that HIPO structure is quite similar to that of a manager's organisational chart. The numbers shown in various boxes of HIPO chart provide a means of identifying each of this sub-levels and componenl blocks on the chart. The rationale of subdividing and identifying the component blocks within a HIPO design is extremely important. Applying this concept, the analyst is capable of defining and completely laying out the overall structure of the entire system under study. The HIPO approach is mainly designed Io accommodate the development of a system.

3.4.3 Warnier/Orr Diagram

Warnier/Orr diagrams, also known as logical construction of programs/logical construction of systems are powerful tools aimed at designing of program structures by identifying the output and processing results and then working backwards to determine the steps and combinations of input needed to produce them. The simple graphic methods used in Warnier/Orr diagrams make the levels in the system evident and movement of the data between them vivid.

Warnier/Orr diagrams clearly show the various processes and sequences in which they are performed. Each process is defined in a hierarchical way. At each level, the process is shown in a bracket that groups its components (figure 2). Since a process consists of differentsubprocesses, a Warnier/Orr diagram employs a set of brackets to indicate each level of system clearly.

Brackets denote set and subsets



The set of days in the week has week days and week end as subsets.

Figure 2: Set Notation used in Warnier/Orr Dlagrams

Warnier/Orr diagrams are very powerful design tools and offer some distinct advantages to systems experts. They are quite simple in appearance and easy to understand.

Check Your Progress 2

1. List out various software design and documentation tools.

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2 What do you mean by HIPO diagram? Explain briefly.

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3. Explain briefly the Warnier/Orr Diagram.

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3.5 NEED FOR DOCUMENTATION

Preparation of documentation is quite important as it depicts what the system is supposed to be and how it should perform its functions. It illustrates both technically and economically how a system would better serve the objectives and goals of the company. Documentation improves overall operation in addition to management and audit control.

It also serves the following purposes:

(i) Reviews the progress or development of an application software.

(ii) Communicates facts about system to users.

(iii) Communicates between personnel working on a development project.

(iv) Provides necessary guidelines to allow correction or revision of a system or its computer programs.

(v) Provides operating instruction to users and operating staff.

(vi) Assists in the reconstruction of the system in case it is destroyed,

(vii) It helps the management to determine if the new design achieves the objectives of the company within the established constraints and if it is justifiable from a cost standpoint.

(viii) Documentation serves as a focal point from which the analysts' design can be assessed and as a standard to be utilised as a reference once the system is implemented.

3.6 GUIDELINES/FORMAT FOR PREPARING DOCUMENTATION PACKAGE

There are, as yet, no universal documentation standards, 'since systems vary greatly in form, contents and requirements. The format of each documentation package will be based on the following points:

(i) Characteristics **of system:** Some designs require descriptive while others can be explained with the help of diagrams.

(ii) **Management'sattitude toward documentation:** The analyst must prepare the documentation package within the limitations established by the management.

(iii) **Equipment** restraints: **A** company with large and integrated computer system having teleprocessing facilities will require mo·e formalised and technical documentation than a company with a more conservative and small computer system.

3.7 ELEMENTS THAT COMPRISE A DOCUMENTATION PACKAGE

A documentation package consists of the following elements :

- Cover letter
- Table of contents
- Narrative
- Flow charts
- File specification
- Program specification
- Cost of the proposed system and of its alternatives
- Test brochures

(i) Cover letter: The cover letter is a correspondence primarily to management, that describes Ihc benefits of the new design and that generally helps in selling the system. It should be kept in mind that unless the documentation is approved, the new system will never be implemented and the analysts' work will be of no use. Thus the analyst must try to convince the management that'the new design presented is feasible and appropriate to satisfy the objectives of the company. The cover letter should describe the purpose and function of the new system clearly. It should be written in concise language to facilitate executive understanding, without requiring complete familiarity with the intricacies of the system.

(ii) Table of Contents: The inclusion of a table of contents is an absolute necessity. Pages in the documentation package must be numbered and cross referenced in this table of contents.

(iii) Narrative: With the narrative, we begin the detailed formulation of the new system.

(iv) Flowcharts: Each subsystem within the analyst's formal design should be explained with the help of flowchart.

(v) File Specification: Each file within the formal design must be described with regard to:

- Purpose
- Programs that will use the file
- Volume
- Frequency of use
- Source from which the file is obtained
- Description of fields
- Layout and samples

(vi) Program Specification: At this point, the analyst must segment the new design so that each unit will have separate program, assuming that the design is itself approved by the management.

(vii) Cost of the proposed system and of its alternatives: The details of cost must be shown as part of documentation.

(viii) Test Brochures: The analyst should describe the operations and procedures (including test data) that will be employed to test the new system, once it is apnroved.

Check Your Progress 3

1. Why is documentation needed ?

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2. What are the elements that comprise a documentation package?

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3.8 SUMMARY

The unit stresses the need for effective documentation at all stages of the software development. The various type of documents discussed above are helpful to various personnel in their respective functional areas. It also stresses the need to use various tools for designing and documenting a soltware package.

3.9 MODEL ANSWERS

Check Your Progress 1

1. Various characteristics of **a** good documentation are:

   (i) Availability

   (ii) Objectivity

   (iii) Cross-referable

   (iv) Easy to maintain

   (v) Completeness

2. Major types of documentation are:

   (i) Program documentation

   (ii) Operation documentation

   (iii) User documentation

   (iv) Management documentation

   (v) Systems documentation

3. Systems users require proper documentation to prepare or developing system and to smoothly carry out existing ones. To meet this requirement, each system should have a manual that spells everything the users must know to do their job correctly.

Check Your Progress 2

1. Various software design and documentation tools are:

   (i) Structured flowchart

   (ii) HIPO diagrams

   (iii) Warnier/Orr diagrams

2. It is an acronym for Hierarchical Input Process Output. It is quite important tool commonly used for developing systems software. This method was originally developed to provide documentational assistance for programmers/analysts.

3., Warnier/Orr diagrams are powerful tools aimed at designing of program structure by identifying the output and processing results and then working backwards to determine the steps and combinations of input needed to produce them. They are important design tools and offer some distinct advantages to systems experts.

Check Your Progress 3

1. Preparation of documentation is quite important as it depicts what the system is supposed to be and how it should perform its functions. It illustrates both technically and economically how a system would better serve theobjectives and gods of this organisation.

2. A documentation package contains the following elements:

   (i) Cover letter (ii) Table of contents (iii) Narration
   (iv) Flow charts (v) File specification (vi) Program specification
   (vii) Cost of proposed system and of its alternatives (viii) Test brochures