Topics Covered/Syllabus

- *Inform and involve the organisation*
- *Aim of detailed design*
- *Project management of MIS detailed design*
- *Dominant and trades off criteria*
- *Define the subsystem*
- *Sketch the detailed operating sub-system and information flow:*

CHAPTER

5

DETAILED DESIGN SYSTEM

5.1. INFORM AND INVOLVE THE ORGANISATION

Q.1. Give an overview of Detailed Design System.

Ans. The detailed system design provides a detailed explanation of system that has achieved the goal that are described in conceptual system design. The detailed system design is related to design of operating system. It is a step by step explanation of the procedure that is required to operate the system. This is the main aim of detailed system design.

The description in the detailed system design consists of:

- Drawing in the system design.
- Flow charts
- Procedures
- Specification of equipment
- Specification of file
- Operating manuals that are required to run the system
- Operating specification.

The detailed system design can not be applied on the all of system because of following reasons:

(*i*) Different approaches are available for designing the system.

(*ii*) The design of system is rational process.

(*iii*) The design of system is social process.

(iv) The detailed explanation may not give an idea about the general nature of design.

(v) The designer must interface frequently with the detailed system design with the help of descriptive ways.

Q.2. "Inform and Involve the organisation". Explain in short note.

Ans. The vary first step in system design is not a technical one. It is concerned with gaining support of most members of the organisation to obtain the information for the design of system and to obtain acceptance of final system. At a minimum member of organisation should be aware of the objectives and nature of study. It is preferable if possible to draw many members into the study, atleast in some small way further-more. It is desirable to reassure the employees that change in the system will benefit them or that they will not suffer financially from the implementation of system.

Even so, natural human resistance to change (requires that sufficient information on the general progress be dissiminated to gradually recustomers the employees to their future role).

5.2. AIM OF DETAILED DESIGN

Q.3. Write in Brief "Aim of detailed design". **(*KU 2015*)**

Ans. The detailed design of an MIS is closely related to the design of operating system. Sometimes, it is true, the operating system must be accepted without change and or new MIS appended to it. However, it is preferable to design both system together and this parallel effort will be apparent, even though our principle focus is on MIS.

By drawing upon the analogy of engineering system design, we can clarify the meaning of detailed design. The direct goal of engineering design is to furnish the engineering description of a tested and producible product. Engineering design consists of specification in form of drawing and specification reports for system as whole and for all component in the system. Justification document in the form of reports of mathematical analysis and test results are part of the detailed design. Enough detailed must be given so that engineering design document and manufacturing design/drawings are sufficient for shop to construct the product design/drawings are sufficient for shop to construct the product. The product of the operating and maintenance instruction is also considered part of design output.

The analogy of detailed design of MIS readily follows. The aim readily follows. The aim of the detailed design is to furnish a description of a system that achieves the goal of conceptual system design requirement. This description consists of drawing, flow carts, equipment and personnel specification, procedure support task, specification of information files and organization and operating panel required to run the system.

Also part of design is the documentation of analysis and testing, which justifies the design. The design must be sufficiently detailed that operating management and personnel can implement the system. Whereas conceptual design gives the overall performance specification for the MIS, the detailed design yields the construction and operating specification.

5.3. PROJECT MANAGEMENT OF MIS DETAILED DESIGN.

Q.4. Write a short note on: **(KU 2015)**

(a) MIS design

(b) Analysis of existing design.

Ans. (a) MIS design: While design an MIS, a general approach has to be followed so that a suitable system can be devised to cater the needs of organisation as per their function and decision making requirement.

Irrespective of organisation, the data gets generated at various level of the management. These data when processed and analysed becomes information which when properly communicated intime to the decision maker, helps in making decision and understanding actions.

1. Listing the objectives of MIS and anticipated benefits: The user must define system objectives in terms of information demands and not in terms of satisfaction of demands that are not related to an objectives. In several government dept, prior to the designing of an information system, the system objective was the automation of hundreds of reports without looking at the management for task related to functional or resource system represented by report. These are training needs, employee relation, safety, recruitment.

Such attention is possible only by automation of records or processing of existing data, otherwise the true objectives of the organisation represented by the system are overlooked.

Obviously, the objectives of MIS design have to match with the objectives of the organisation. A common fallacy in stating objectives of the MIS system is to emphasize these in vague terms, reduce cost, improve efficiency, keep accurate records, meet customer demands and meet the production schedule.

2. Developing alternatively conceptual design and select one: This conceptual design of MIS is considered as a skeleton of MIS which guides and restricts the form of detailed design. The concept of design of MIS consists of patterns of information flow, channel of information and role of decision makers.

The alternative concepts of a system can be evaluated on the basis as follows:

(*i*) Compare anticipated performance of conceptual design with relatives of system developed earlier.

(*ii*) Examine the quality of database and information to be made available. Study the number of operations, dispensions and potential breakdown points.

3. Prepare the conceptual design report: The conceptual design report is a proposal prepared for the expenditure of funds possible changes of the organisational setup. Since, this report is submitted to management, it must contain the summary of problems that necessary for the current system, the objectives the general nature of the system reasons why this concept was selected over others and time and resources required to design and implement.

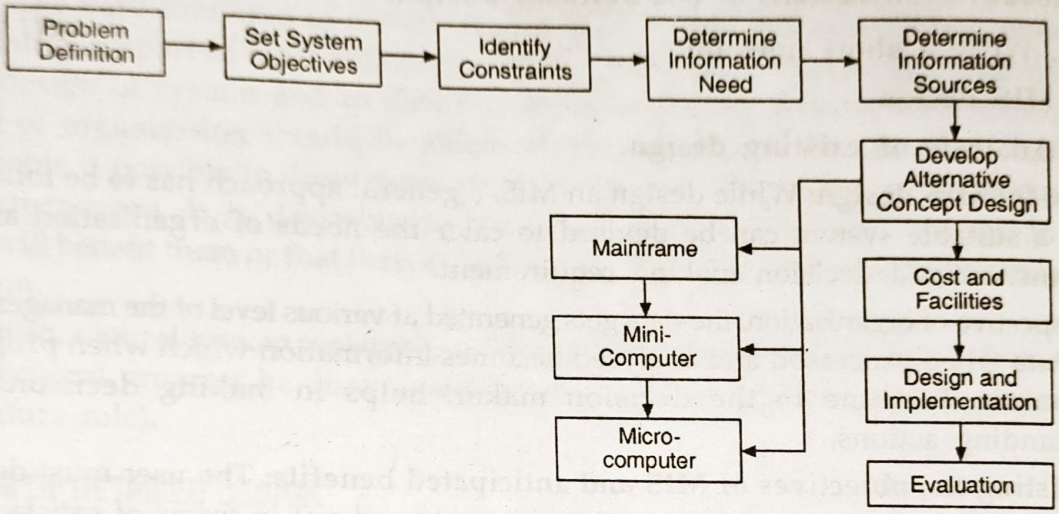

Fig. 5.1

4. Identifying information needs at all levels of management: There are problems in every growing business organisation. But most of the time, a clear definition of problems and a priority system for their solution is not known. Thus, as a first step in MIS design, the management should identify the problems to be solved. The mission statement for the business as a whole leads to objectives for the general business and these objective helps in framing various plans. Each of these various business objectives and plan need some kind of information. The following steps are taken to initiate the design process and are repeated until the information requirement and problem to be solved are fully understood:

(*i*) Initiating information need
(*ii*) Asking question about need
(*iii*) Suggesting interpretions on that need
(*iv*) Detailing the original statement
(*v*) Reviewing with the management the more detailed statement of the need.

5. Identifying system constraints: The system constraints are also called problem boundaries or restriction under which objectives may achieved. These constraints in the design of system are creation of the manager user or the designer himself because of his limited freedom of action is designing a system to achieve the objectives. System constraints may either be internal or external.

6. Determining information needs and resources: The system design must begin with determining the real information need of the management information

that can increase the perception of managers in critical areas, such as problems, alternatives, opportunities and plans. If a decision maker can define his objectives and spell out the items of information that are needed to attain the objectives then he/she is at least half way home in the system design.

(b) Analysis of existing design: System Analysis is the process by which an organisation develops and information system best suited to it and compare it with the existing information system to find out the defects if any and modify it or if the old system is completely absolete substitute it with the new systems.

Procedure:

(*i*) Make a list of outputs containing information. Get the contents of the reports approved by HOD.

(*ii*) Note down the key personnel in the system beside the HOD. The key personnel are those who contribute towards the system contribution.

(*iii*) Note-down the check points and the controls used in the system and ensure that data flow is complete.

(*iv*) Analyse the requirement of information and report *s* from the utility point of view. More the information, higher the cost of its generation.

(*v*) Carry-out the analysis of the system at the place where system is function. It will ensure that analyst is accepted as on of those operating system.

(*vi*) Spend some time with operating personnel and observe the system to understand the finer details of system.

(*vii*) Collect the documents which are raised in the system. These documents carry the data from one point to another. This document could be printed or handwritten.

(*viii*) Define the scope of system and its objective. The scope will cover the boundaries of system. Further, should identify the problems facèd in the system which causes difficulties in achieving the objectives.

(*ix*) Obtain approval of new the new system from the users and top management.

(*x*) Discuss the flowchart and personnel operating system so that they understand system. Impress upon them that they should run the system as per the flow chart and resist any deviation that would cause a disturbance in the system. Explain the modified system. In such a way that the user would appreciate the changes.

(*xi*) If there are problems in the feasibility of implementation, then examine whether present system can be modified by introduction of documents control procedure and systems. If this is not possible redefine the scope of the system and objective in light of system.

(*xii*) Examine whether the achievement of system objective is feasible in the present system. Which means examining whether adequate data exists whether it

can be processed by rules, method, model. If so, will the information be correct, precise and complete.

(*xiii*) Make list of rules, formulae, guidelines, policies etc. which are used in running the system.

(*xiv*) Study the flow of data in the system in units, summary and aggregates from documents to documents and from one stage to other.

(*xv*) Compare the cost of the old and new system and benefits offered.

(*xvi*) Make a small system note as a base document and seek an appointment with each head of the department to discuss the system. Ensure that system view and understanding is same as that the HOD. Ascertain from him whether he has any other objectives which the system should achieve.

(*xvii*) Write a system manual for use of people in the department and for reference to the other user of system.

(*xviii*) Collect separatively the output which as statement reports, memos etcs, made in the system to throw more light on information.

(*xix*) Draw a revised system flowchart to indicate how the system run the major steps of processing the information. This chart should include all the modification which had been suggested and accepted.

Q.5. How is an MIS design managed in a project? **(*KU 2010, 2015*)**

Ans. Planning and organising: The first step that is performed in detailed system design is planning and organising the project management is done for both small and large projects.

1 Small projects: All of the required phases must be planned before performing the conceptual system design.

2. Large projects: All the phases must be planned after the conceptual system design.

The project planning that is done in advance goes wasted, if it is shown by conceptual system design that the system design is not appropriate. The amount of effort which is required in project management of the detailed system design depends upon:

- Size of MIS project
- Cost

Project planning: The project planning of the detailed system design consists of:

(*i*) *Establish project objective:* The establishment of project objectives consists of:

- Review of objectives
- Sub-division of the objectives
- Modification of objectives

(*ii*) *Define the project task:* The tasks that are to be performed are identified. These talks are also documented along with the project itself.

(iii) *Plan:* Planning of sequential and concurrent task is done. A network diagram showing the events and activities is required.

(iv) *Schedule:* As per the requirement of the management, the scheduling must be performed. End date and systems constraints should be established.

(v) *PERT diagram:* The work and schedules are tied together with the help of pert diagram.

(vi) Estimate the labour, equipment and management cost required in the projects.

(vii) *Budget:* A budget should be made for project. Funds should be collected for each task.

(viii) Plan the staffing organisation.

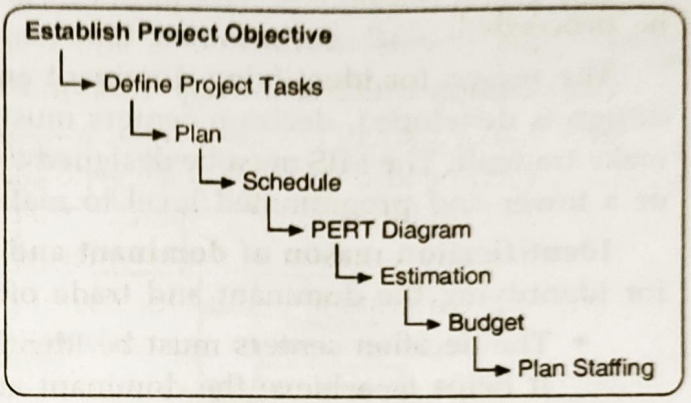

Fig. 5.2. Project planning

Project control: In the controlling of project, following factors are taken into consideration.

(a) During the progress of project, determine whether project objectives are fullfilled are not.

(b) The expenditure of project must be evaluated in terms of-

- Time
- Work done

The budget of project must be revised if necessary.

(c) Evaluate the work for utilisation and work performed by an individual.

(d) Evaluate time, cost and work requirements in term of:

- Schedule
- Budget

5.4. DOMINANT AND TRADES OFF CRITERIA

Q.6. Briefly describe the concept of "Dominant and trade off criteria".

(KU 2014)

Ans. Dominant criteria for a system are those that make an activity so important that it over-rides all other activities. For example, a dominant criteria might be that the system operates so that there is never a stack out. This oversides the criterion of minimizing inventory cost. Such a criterion might hold for a company selling human blood, life preserving drugs or electric power. It might even hold for a company selling consumer product where loss of consumer is permanent and all competitors have a no stockout policy.

Example of other dominant criteria might be one day customer service, zero defect product, specified price range for products, maintenance of multiple sources of supply for all material and components purchased or conformity of all research and engineering to long range co-operate plans. It is obvious that identification of dominant criteria is necessary before subsequent design steps can be proceeded.

The reason for identifying dominant and tradeoff criteria is that as the detailed design is developed, decision centers must be identified to achieve such criteria or make tradeoff. The MIS must be designed to provide the information for the decision, or a tower and programmed level to make trades off.

Identification reason of dominant and trade off criteria: There are two reasons for identifying the dominant and trade off criteria which are as follows:

- The decision centers must be identified when detailed design is developed. It helps to achieve the dominant and trade off criteria.
- A proper management information system must be developed to provide relevent information. It helps in the taking decision making regarding trade off.

5.5. DEFINE THE SUBSYSTEM

Q.7. Write in brief 'How, defining of sub-systems is done'?

Ans. The defining of sub-system is done with the help of two main blocks of information which are:

1. Conceptual design: Conceptual design requires assumptions regarding the sub-system. The conceptual design contains:

- Review of sub-systems
- Redefining of sub-system if required
- Detailed activity of each important activity block.

2. Dominant and tradeoff performance criterion: The activity design form is used to develop description about each activity. Trade off criteria must be used when dominant criteria is not present. The tradeoff criteria stresses on different functional activities this helping in defining the sub-system in a more proper a relevant manner.

<table>
<tr><td colspan="2">Activity</td><td>Activity Number</td></tr>
<tr><td colspan="3">Purpose and Description</td></tr>
<tr><td colspan="2">Input</td><td>Media</td></tr>
<tr><td colspan="2">Output</td><td>Media</td></tr>
<tr><td>Sequence</td><td>Performer</td><td>Decision Pole</td></tr>
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Fig. 5.3. Activity design form.

Q.8. Write a short note on following:

(a) Quality control activity **(b) Activity**

(c) Information component **(d) Information attaining**

Or

Write briefly on operating sub-system and information flow. (KU, 2015)

Ans. (a) Quality control activity: The quality control activity consists of:

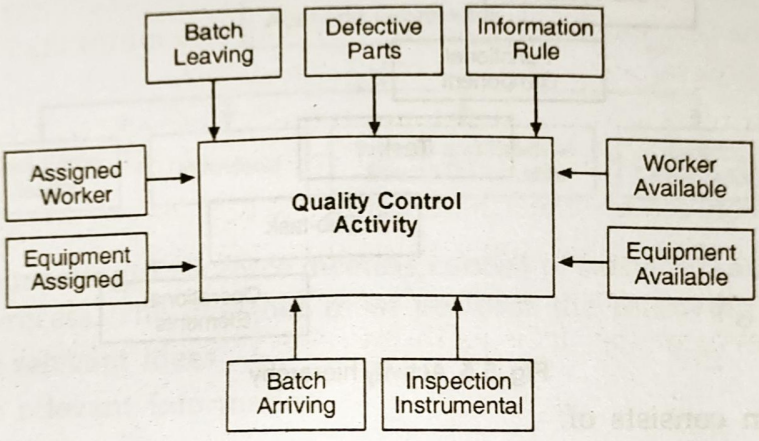

Fig. 5.4. Quality control activity

(*i*) **Activity processor:** The activity processor consists of the equipments and the number of worker assigned to perform a particular task.

(*ii*) **Information output:** It is the resources available after assigning to a particular activity.

(*iii*) **Operating output:** Batches are created. The operating output is the reduced size batches.

(*iv*) **Information results:** The information result provides information about the average quality of batches and number of batches that are inspected in a unit of time.

(b) Activity: The activity can be explained by two terms:

(*i*) Inter-relating activities

(*ii*) Hierarchy of activities.

The inter-relating activities must be defined in Network format. The degree of break-down of activities shows :

- Size
- Complexity of the network

The design process will never be completed if the activities are broken down too finely. Important information will be left out from design process if activities are broken down too broadly.

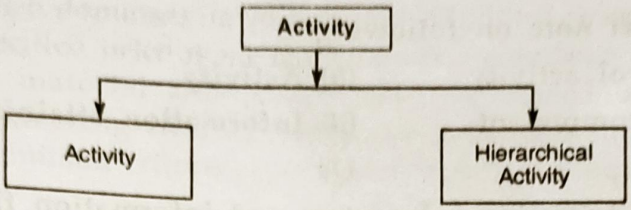

Fig. 5.4. Activity

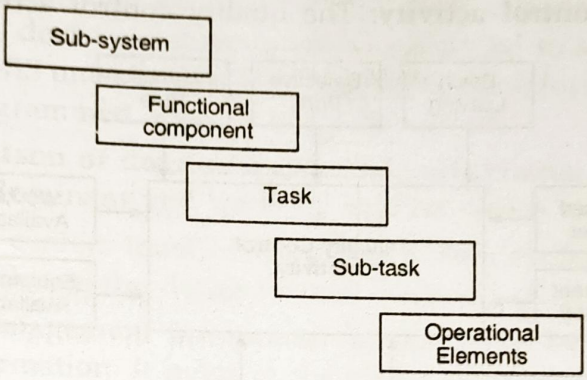

Fig. 5.5. Activity hierarchy

The sub-system consists of

- Activities matching to major activities block of conceptual system design.
- Detailed activity block can be transferred from one group to another group so that network of sub-system can be created.

"How to identify new sub-system": New sub-system can be revised and identified by drawing a loop around the group of activities that are to be include in the sub-system.

Grouping of activities: The grouping of activities is done on the basis of following:

- Common function
- Common techniques
- Common inputs and output
- Common flow relationship.

(*c*) **Information components:** The information must consist of the following factors:

(*i*) **Available resources:** The system be developed in terms of the resources that are available in the company.

(*ii*) **Activity:** Each activity and its relationship with another activity must be identified to achieve the system operation and performation.

(*iii*) **Information:** The relevant information that is required in the decision making process must be identified. This is done with the help of computer based system.

(iv) **Output:** The specific output is required by all the system. The should include a detailed a list of purpose that must be fulfilled by the information. It should also determine:

- Specific content of each report
- Method of utilization.

(d) **Information attaining/Information sources:** There are four sources of attaining the information:

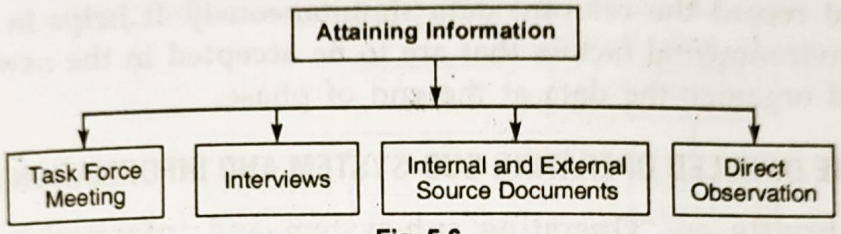

Fig. 5.6

(a) **Task force meeting:** Task force meeting consist of managers and key specialist. It is important process. The designer must perform the following functions:

- Draw out relevant ideas
- Draw out relevant information
- Abstract ideas
- Containing more ideas
- Present information is most diagramatically way
- Present the information in documents
- Modify the information
- Evaluate the information.

Main purpose of task force meeting is:

- Reduce the information gap
- Increase the operating need
- Decrease the database points.

(b) **Interviews:** The interview process is conducted by the manager and designer to identify the objectives and develop an optimum plan. This performed at both the top and intermediate level of an organisation. It is an addition to the task force meetings. Employees of the organisation and specialist should also take part in the interview process.

The manager and designer must search for information on:

- Format of information that is presented.
- Style of manager on decision making process.
- Resources required for operation in system.
- Resources required for implementation of the system.
- Degree of manager involvement in decision making process.

(c) Internal and external source documents: The documents can either be internal and external. The internal source documents may be large depending upon the size of the company. The traditional reports and documents must be reported. The external documents provides, economic, marketing, industrial and financial information.

(d) Direct observation: Direct observation also plays an important role in obtaining the information. Designer should also perform on the spot surveys to gather more information and record the relevant data simultaneously. It helps in knowing the physical and environmental factors that are to be accepted in the new system. The designer should organize the data at the end of phase.

5.6. SKETCH THE DETAILED OPERATING SUB-SYSTEM AND INFORMATION FLOW:

Q.9. Write briefly on "Operating sub-system and information flow".

(KU 2011, 2010)

Ans. The development of the detailed design is first carried out for the sub-system, functional and task level of detailed. It is very much similar to detailed engineering design which requires trial and error, shifting operation to find good arrangements and performing calculations to check out the system. The equivalent of engineering sketch in MIS designs are flowcharts.

There are three type of system flow charts:

1. **Task oriented charts:** These are block diagrams showing the relationship among various task or activities. Subsequently, the detailed elemental steps requited to complete an activity are analysed and described step by step on an operation analysis is form (sometimes called as a flow chart process)
2. **Form oriented charts:** These charts brief the forms used in communication or reporting and trace the flow of all copies through organisation

   In some cases, chronological movement may receive emphasis.
3. **Program flow chart (Block diagrams):** Prepared by the people who give the instructions to the computer. The program flowchart is fundamental tool of programming, designed to show the logical sequence of steps to steps to be carried out by the computer. It structures the logic that the coding of program will follow. Program flowcharts will be of interest at a larger stage in the design but we include them completeness.

   The flowcharts are not the complete detailed design. It shows primarily flow and relationship. Inputs and outputs are shown only in gross form. The quantitative relation among elements in the system must be expressed in the terms of mathematical order/models. Where this is not possible, detailed verbal description must be used to actually develop the detailed operating design. The flowcharts are important in the developing the information necessary

for managerial decision with respect to the design for model constructions and for programmed decision making in system operation.

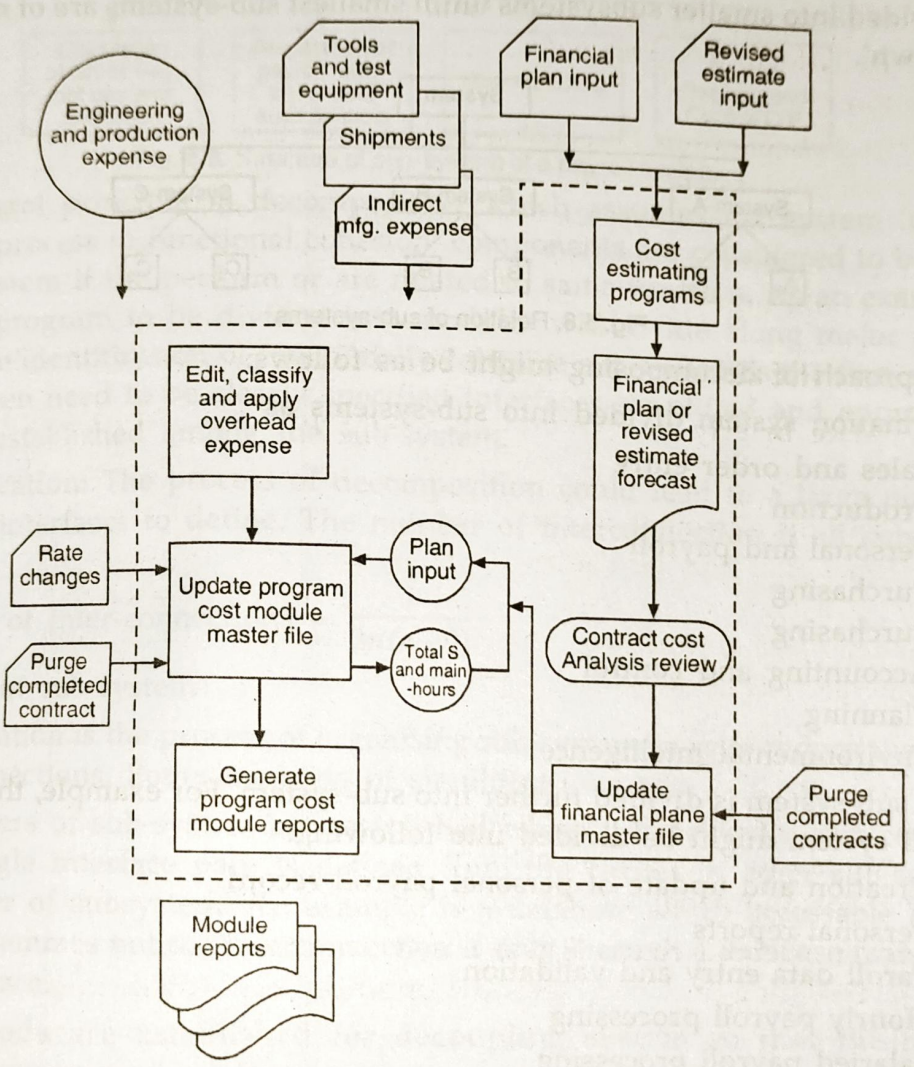

Fig. 5.7. Flowchart: Task oriented

Q.10. What is the role of sub-system in enhancing efficiency of MIS?

(KU 2012)

Ans. Sub system: The use of sub-system as building block is basic to analyse and development of system. This requires an understanding of principles which dictate how systems are built from sub-systems.

Decomposition: A complex system is difficult to comprehend when considered as whole. Therefore, system is decomposed or factorised into subsystems.

The boundaries and interfaces of all sub-system so that sum of sub-systems constitutes the entire system. The process of decomposition is continued with sub-system 'divided into smaller subsystems untill smallest sub-systems are of managable size as shown'.

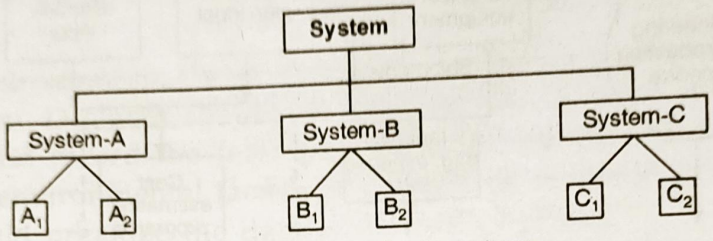

Fig. 5.8. Relation of sub-systems

One approach of decomposing might be as follows:

1. Information system divided into sub-systems as
   - (*a*) Sales and order entry
   - (*b*) Production
   - (*c*) Personal and payroll
   - (*d*) Purchasing
   - (*e*) Purchasing
   - (*f*) Accounting and control
   - (*g*) Planning
   - (*h*) Environmental intelligence

2. Each sub-system is divided further into sub-system. For example, the personal and payroll system might be divided into following:
   - (*a*) Creation and update of personal payroll record
   - (*b*) Personal reports
   - (*c*) Paroll data entry and validation
   - (*d*) Hourly payroll processing
   - (*e*) Salaried payroll processing
   - (*f*) Payroll reports for managements
   - (*g*) Payroll reports for governments

3. If the task is to design and program a new system, the subsystem defined might be further sub-divided into smaller sub-system or modules e.g., Hourly payroll processing system might be factorized into modules for the calculation of deduction and next pay, payroll register and audi control preparation.

Decomposition into sub-system is used both to analyse an existing system and design and implement a new system. The decision will be depend on the objectives of the decomposition and also on individual difference among designer, the latter should be minimized.

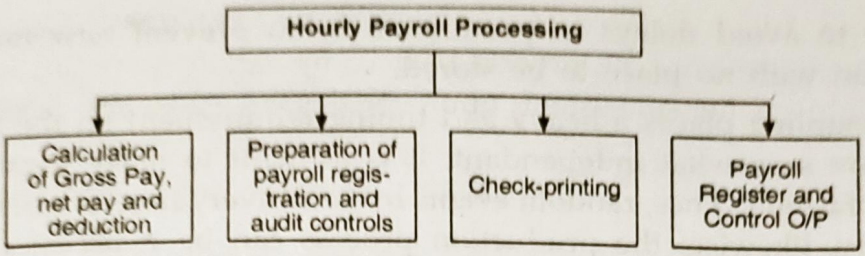

Fig. 5.9. Structure of sub-system of a payroll system

The general principle in decomposition which assumes the system 'objective dictates the process in functional cohesion' components are considered to be part of same sub-system if the perform or are related to same function. As an example, an application program to be divided into modules will divide along major program function. The identification of functionally cohesive sub-system is the first step. The boundary then need to be clearly specified interfaces simplified and appropriation connection established among the sub-system.

Simplification: The process of decomposition could lead to a large number of sub-system interfaces to define. The number of interconnection if all sub-systems interact is

$$\text{Number of inter-connections} = \frac{1}{2n(n-1)}$$

n = No. of sub-system

Simplification is the process of organising sub-system so as to reduce the number of inter-connections. Some methods of simplifications are:

1. Clusters of sub-system are established which interact with each-other, then a single interface path is defined from the cluster to other sub-system or cluster of subsystem. An example is a database which accessable by many programmes but the interconnection is only through a database management interface.
2. Methods are established for decoupling system so that the need for interconnection is reduced.

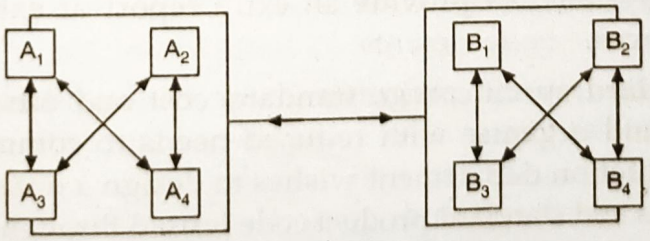

Fig. 5.10. Simplified interface patterns

Decoupling: If two different sub-systems are connected very tightly, very close co-ordination between them is required. If raw material is put directly into production the moment it arrives at the factory, the raw material system can be said to be tightly coupled. Under these conditions, raw material delivery must be precisely

timed in order to avoid delays in production or to prevent new material from arriving too soon with no place to be stored.

Such tight coupling places a heavy and timing requirement on the two systems because these are somewhat independant. It is difficult to make them completely in synchronised fashion. Since, random events make delivery time uncertain expected, arrival time vary, likewise, the production process can be experience random or unplugged plans. The solution is to decouple or loosen the connection so that two system can operate in the short run with some measure of independance.

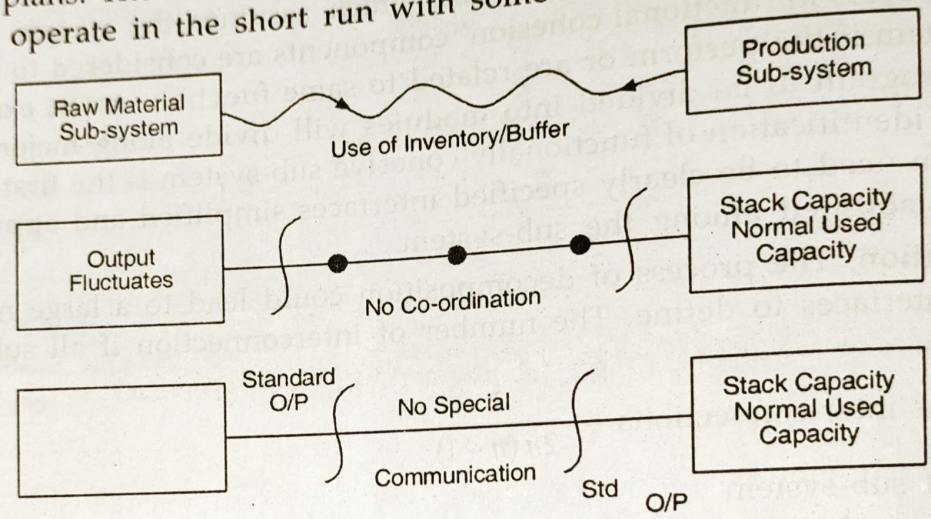

Fig. 5.11. Decoupling mechanism to reduce need for communication and close connection among sub-system.

1. Inventories-Buffers or waiting lines: In raw material and production system, the raw material inventory allows the two sub-system to operate somewhat independently. Data buffers are used in some computer systems and communications system to compensate for different rates of input/outputs of data.

2. Stack and flexible resource: When the output of one sub-system is the input of another, the existance of slack resources allows sub-systems to be somewhat independant and yet allows each to responds to the demands of other sub-system. Most data processing system can provide an extra report or extra analysis because they have slack resources.

3. Standards: Standard specification, standard cost and other standards allows a sub-system to plan and organise with reduced needs to communicate with other sub-system. If the production department wishes to design a data processing module involving finished goods and standard product code is used throughout the organisation, there is no need to communicate and negotiate with other departments about the codes to be used. A standard database description maintained by the data administrator allows use of the database without tedious and time consuming checking with other sub-system also using the data base.