

(17E00106) MANAGEMENT INFORMATION SYSTEM

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UNIT-3

BUSINESS APPLICATION OF IS

8. DECISION MAKING AND ROLE OF MIS:

- Herbert's A Simon's model of decision-making proposes three stages in the decision-making process.
- MIS plays its role in all the three stages.

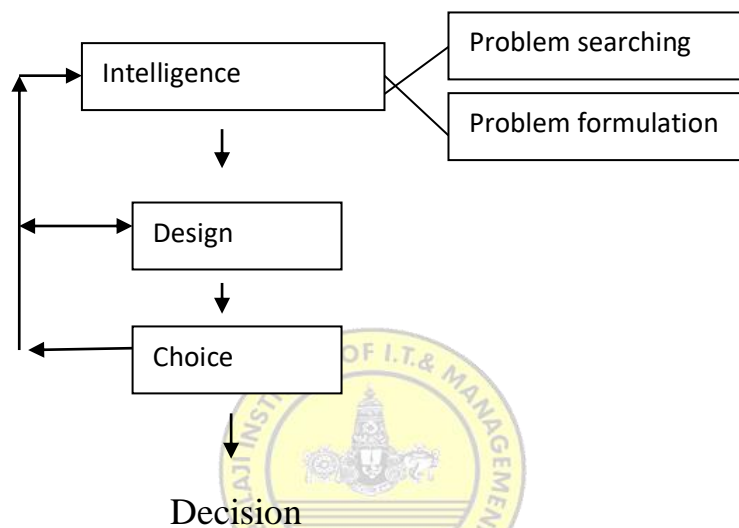


Figure: Decision Making Process

1. INTELLIGENCE PHASE: In this phase, the decision maker scans the environment and identifies the problem or opportunity.

- In this stage, an information system may provide information about internal as well external environment.
- Internal information is generated from the functional areas.
- External information is collected from various sources such as databases newspapers, government reports, personal contacts etc.

a. PROBLEM SEARCHING

Problem is defines as the difference between something that is expected and reality.

$$\text{Difference (problem)} = (\text{desired/expected}) - (\text{actual/reality})$$

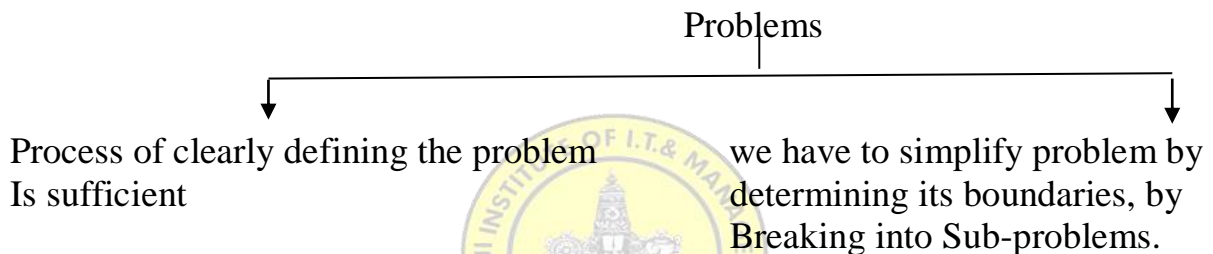
- Differences are measured and the differences are evaluated to determine whether there is any problem or not.
- Various types of models can be used to compare reality.

- Some of them are,
 - a. Planning model
 - b. Historical models based on extrapolation
 - c. Models used by other people in the organization

FOR EXAMPLE: sales manager who has set a sales target of Rs. 5 lakh in one particular month and he could achieve only Rs 4 lakh worth of sales. Thus difference is Rs. 1lakh (5-4) which worries the manager.

b. PROBLEM FORMULATION (FORMATION OF CORRECT PROBLEM CAREFULLY)

- When the problem is identified , there is always a risk of solving the wrong problem.
- To avoid such risk, it is very important that the problem is well understood and clearly stated.



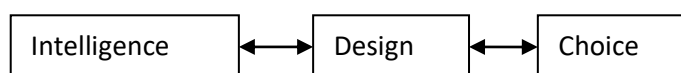
- In problem formulation, establishing relations with some problem solved earlier or analogy proves quite useful.

2. DESIGN PHASE

- In this phase, the decision-maker identifies alternative courses of action to solve the problem.
- Inventing or developing of various alternatives is a time consuming and crucial (difficult) activity as the decision-maker has to explore all possible alternatives and he cannot take a risk of missing any alternative , as the missed-out alternative might be the best one.
- Developing alternatives is a creative activity which can be enhanced by various aids such as brain-storming, checklists, analogies etc.

3. CHOICE PHASE

- At this stage, one of the alternatives developed in design phase is selected and is called a decision.
- For selecting an alternative a detailed analysis of each and every alternative is made.



- However at any phase, the decision-maker may return to a previous phase.

For example, the decision-maker in the choice phase may reject all alternatives and return to the design phase for developing more alternatives.

9. BUSINESS INTELLIGENCE (BI)

BI may be defines as knowledge about the

<ul style="list-style-type: none"> The customer The competitors The business partners The competitive environment The internal operations
--

Of the

organization

- This knowledge, in turn enables the organization to make effective decisions that may have strategic implications for the business.
- BI enables an organization to extract the right meaning of information to take creative and important steps to get the competitive advantage.
- The **purpose of BI** is to improve the timelines and quality of the input for decision making.
- BI helps the managers to understand the following,

- | |
|--|
| <ul style="list-style-type: none"> • Internal capabilities of the organization • Trends and future directions in the markets • External environment such as economic, political social, technological and demographic environment • Behavior of the competitors. |
|--|

- Business intelligence is a way to truly understand markets, competitors and processes.
- Software technology such as,

- | |
|---|
| <ul style="list-style-type: none"> • Data warehouses • Data marts • Data mining • OLAP (online analytical processing) |
|---|

Makes it possible to find out trends and patterns that can be used by the organization to improve profitability.

The organizations that develop BI tools create interfaces that help the managers to quickly grasp business situations.

- Such an interface is simple to understand and interpret by the manager.
- **Example:** one of such interface is called dashboard, because it looks similar to a car dashboard.
- Visual images such as speedometer, indicators for periodic revenues, profits and other financial information such as bar charts, line graphs and other graphical representations are used in dashboards.

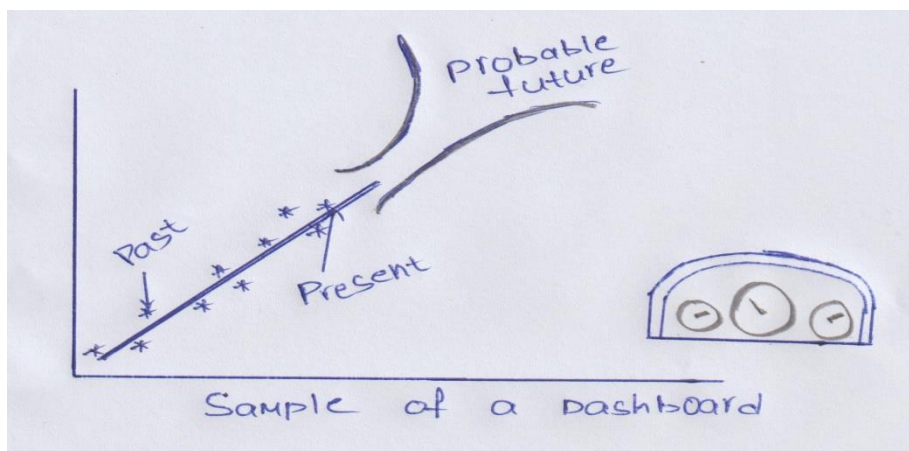


Figure shows sample of a dashboard

OLAP

- OLAP systems are multidimensional database. Such as product, geographic sales region, time period as a separate dimension.
- OLAP is computer processing that enables a user to easily and selectively extract and view data from different points of view.

9.1 BI APPLICATIONS IN BUSINESS

Customer Relationship Management

— Retailing (grocery stores)

— Credit card management

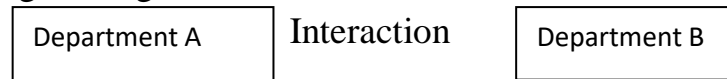
Telemarketing

— HRM

10. KNOWLEDGE MANAGEMENT SYSTEMS

KNOWLEDGE: Knowledge is the fact of knowing something with familiarity gained through experience or association.

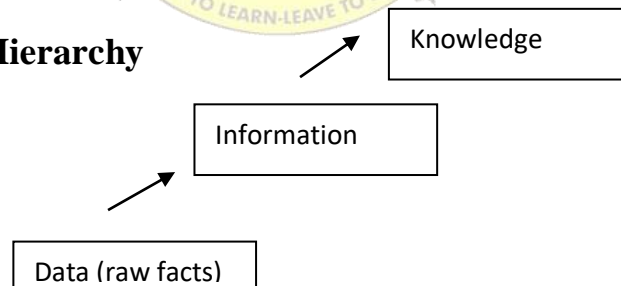
K.M: K.M is defined as the management of the skills and experiences of those at an organization through certain programs and workshops that allow for understanding and implementation that can be done via discussion and interactions among colleagues.



BENEFITS

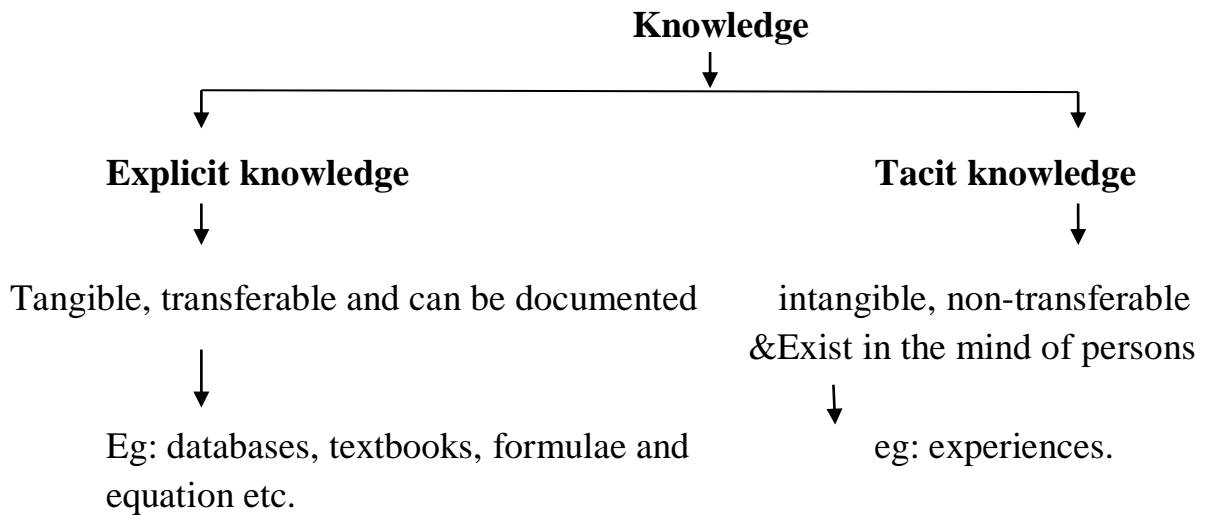
- Increase employee knowledge base.
- Increase customer satisfaction and needs
- Improves organization efficiency and effectiveness
- Avoiding repetitions of the same problem due to increased knowledge base.
- Improving decision making process by having expertise advice.
- Information and knowledge can now be available to all at the organization.
- The concept of knowledge has been shown in figure.

Figure: knowledge Hierarchy



DEFINITION

- KMS is defined as a strategy , a framework , combination of activities or a system that is designed to help organization create, capture, analyze ,apply and reuse knowledge to improve its performance and to achieve competitive advantage.



10.1 CONCEPT OF KNOWLEDGE MANAGEMENT:

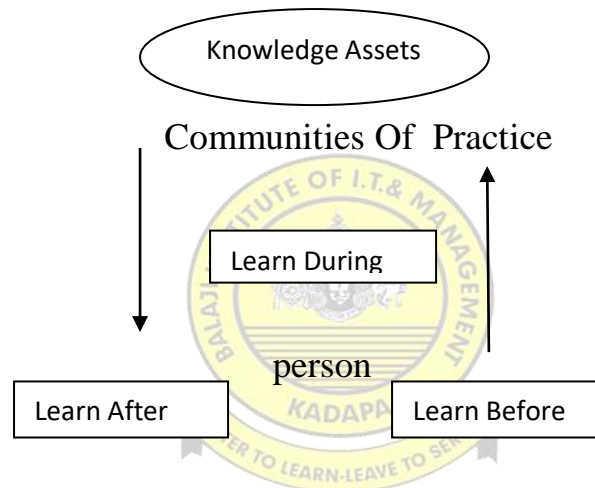


Figure: Knowledge Management Model

1. **A KNOWLEDGE ASSET:** It is validated knowledge, captured and stored for re-use
2. **LEARNING BEFORE:** knowledge accessed at the start of a project, to ensure that you start the work with a full knowledge base.
3. **LEARNING DURING:** New knowledge is identified and collected during implementation while work is in progress.
So that operational plans can be changed immediately as new knowledge becomes available.
4. **LEARNING AFTER:** Upon completion of task, the knowledge is collected from all those who took part and collected for future use.
5. **COMMUNICATIONS OF PRACTICE:** These are networks dedicated to sharing knowledge among practitioners in order to help them practice better.

EXAMPLE: these practitioners can be professionals.

Information Technology , now-a -days because of its capabilities in terms of both storage and communication is considered as a key enabler of KM and KMS.

10.2.K.M STRATEGIES

There are a number of strategies that can be formulated and implemented for the KMS in the organization.

1. What knowledge to share (sales marketing, research etc.)
2. With whom to share knowledge { internal audience (staff)
External audience (raising complex Issues)
3. How will knowledge be shared (disks, telephones, fax, emails.)
4. Why will knowledge be shared (to increase speed, lower cost of operation, to increase client base.)

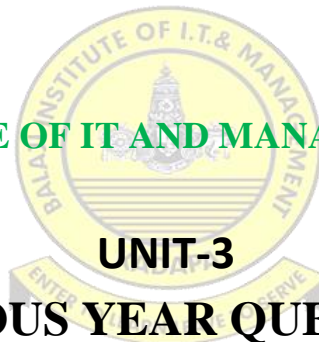
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PREVIOUS YEAR QUESTIONS

1. Explain about role of MIS in decision making? **(2018 supply)**
2. Explain the components of SCM and DSS? **(2018 supply)**
3. Explain the components of ERP and CRM? **(2018 regular)**
4. Explain about business intelligence and knowledge management systems? **(2018 regular)**
5. Write a note on **(2017 supply)**
 - a. DSS
 - b. Knowledge work systems
6. What are the concepts and characteristics of DSS? **(2015 regular)**
7. What is the importance of artificial intelligence for management decisions? **(2015 regular)**

DATA BY ITSELF IS USELESS DATA IS ONLY USEFUL IF YOU APPLY

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UNIT-4

MANAGEMENT OF INFORMATION SYSTEM

1. PROJECT PLANNING:

INTRODUCTION

- Organization that plan their Information System (IS) tend to achieve better results than organization that do not, yet studies reveal that many organizations either do not plan for or do it unsystematically.
- As a result; without plan organizations may end up **spending money** on Information System (IS) that may not be required.
- In other words, such systems do not provide the required value to the business and may prove to be failures in the organization.
- Thus, it is important that the managers understand the IS planning process so as to apply and leverage the IT in the right way.

1.1 INFORMATION SYSTEM PLANNING:

- The business organizations today are quite complex, large and dynamic and exist in an ever increasing competition.
- Accordingly, they have to develop and update their Information System (IS) in a systematic way.
- This requires an overall plan for the IS in the organization.
- Creating an Information System plan (**CRIS PLAN**) is a process that comprises many steps, as indicated in figure,

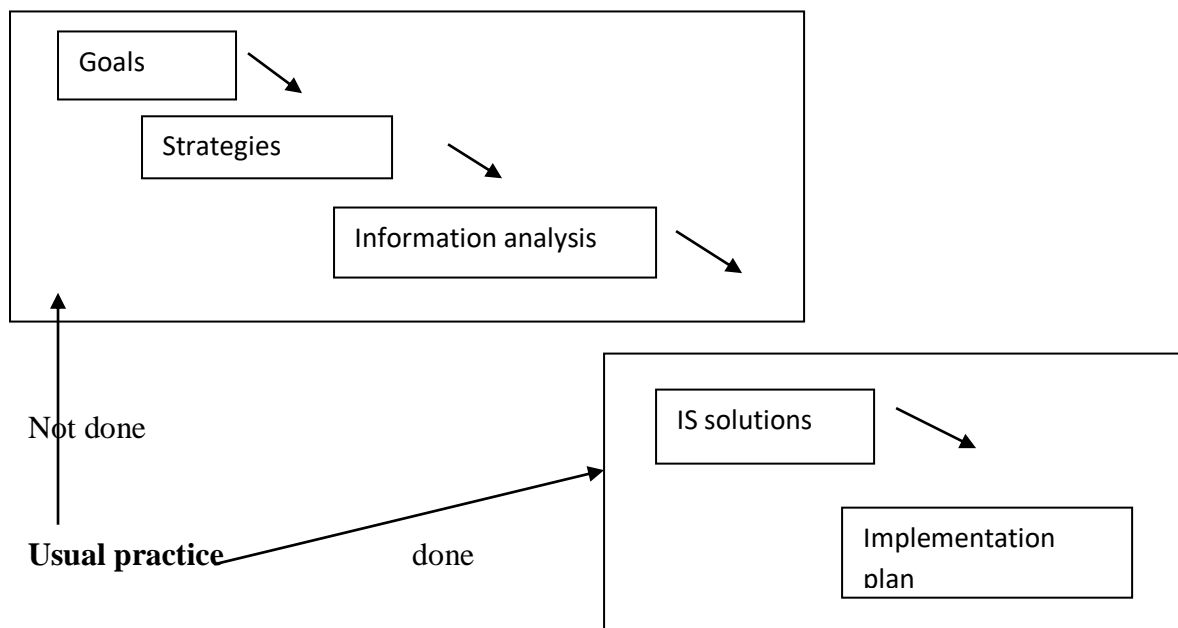


FIGURE: Creating Information System (IS) PLAN

- The IS plan is comprehensive one which is derived from the organizational strategic plan.
- The IS plan generally includes the **goals, objectives, structure of IS.**
- A plan acts as a basic for actions.

1.2 PLANNING TERMINOLOGY:

1. MISSION

- It states the **basic purpose** for which an organization exists.
- It answers the basic questions, “what is our business?” and distinguishes one organization from other similar organizations.

2. OBJECTIVES

Objectives are the desired future positions and destinations the organization intends to reach in order to fulfill its mission.

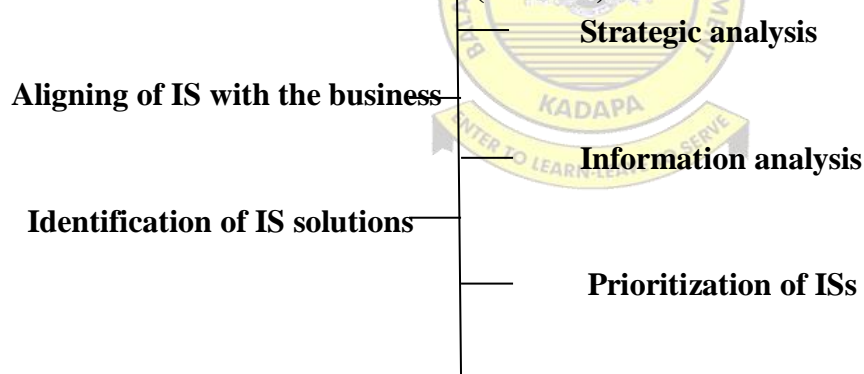
3. STRATEGIES

A strategy is a general direction in which an objective is to be sought.

4. POLICIES

A policy is a general guideline that directs and constrains decision making within an organization.

1.3 CREATING AN IS PLAN (CRISP):



1. STRATEGIC ANALYSIS:

- Strategic analysis refers to the formulation of Mission, goals and strategies for the organization.
- Various models like SWOT analysis, stages growth model, value chain model etc., are applied.

2. ALIGNING OF IS, WITH THE BUSINESS:

- The business is aligned with the required IS.
- In this stage, mission, goals and strategies of **IS** are derived from the mission goals and strategies of the **organization.**

TECHNIQUES USED FOR ALIGNING THE BUSINESS WITH THE REQUIRED IS:

- a. Derivation from the organizational plan
- b. The strategic information system grid
- c. Strategic fit with organizational culture

3. INFORMATION ANALYSIS:(Information requirements of managers):

- After the strategic planning stage, in which goals, objectives and strategies for IS are formulated we need to determined the information requirements of the managers which is done in this stage.
- It needs to be understood that this stage does deal with the detailed information requirement analysis, rather current and future needs for ISs to support decision- making and operations of the organization are assessed.

To undertake information requirements analysis the followed steps are followed:

a. Define Underlying Organizational Requirements: Underlying Organization sub-systems are defined

For Example, the major processes for a computer training institute may include (Advertising, accounts receivable, faculty administration, computer maintenance, credit, audit etc.)

b. Develop Sub-System Matrix:

Relate specific managers to organizational sub systems.

The matrix thus prepared is known as manages sub-system matrix.

Organizational sub system	Manager-1	Manager-2	Manager-3
Advertising	×		
Accounts receivable		×	
Faculty Administration		×	
Computer maintenance	×		

Figure: manager by sub system matrix

c. Determine the critical information requirements:

In this phase, information requirements of each sub system are obtained.

- Commonly used approaches namely Business System Planning (BSP), Critical Success Factors (CSF) Etc.

4. IDENTIFYING IS SOLUTIONS:

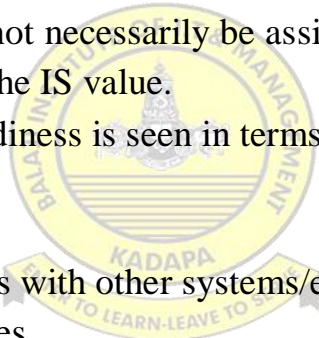
The IS that need to be developed or the proposed changes that are identified to be done in the existing system, become the candidate systems for the proposed IS solutions.

For example: in a business school the following IS solutions need to be deployed.

Online admissions, online academics, online placement, online administrations, online research, online library etc.

5. PRIORITIZATION OF ISs:

- Having identified the need for IS applications for the entire organization the next step of IS planning process is the prioritization of IS applications.
- As the resources in terms of manpower and financial resources may be limited and not all IS applications may be developed at once, it becomes important to identify which applications are to be developed and in what order.
- The value of ISs may not necessarily be assigned in rupees, sometimes, it is important to access the IS value.
- The organizational readiness is seen in terms of,
 - People issues
 - Date issues
 - Integrations/links with other systems/external links
 - Technology issues
 - Other issues.



Info systems	People issue	Date issues	Integration	Technology	Other
Online academics					
Online admissions					
Online placemen placement					

Figure: prioritization of IS applications

1.4 RESOURCE ALLOCATION:

This stage provides the framework for personnel planning, technology procurement and budgeting to provide services to users.

- a. Return on investments (ROI)
- b. Change out
- c. Portfolio approach
- d. Steering committee approach

1.5 PROJECT PLANNING:

Having decided the requirements of IS applications and the sequence in which these applications are to be implemented in the organization management needs to take a decision whether to develop these applications in house get them developed from the vendors. A wide variety of tools of project management are available which include milestones, Critical Path Method (CPM), Gantt charts and so on.

2. SDLC (SYSTEM DEVELOPMENT LIFE CYCLE)

2.1 INTRODUCTION

- It is important to understand that the knowledge of the system development process is important to not only the **system analyst** but also the **Business managers** working in an organization.
- Many a time ,the IS fail because of the mismatch between the thinking of the managers and that of the technical persons on the development issues.
- **Business managers** may also have the perception that the IT department would solve all their problems and thus may have high expectations from the technical team.
- On the other side, **system analyst** may not understand the business and business processes, and thus may not completely understand the requirements of their managers.
- As a result the technical team would end up developing IS(Information System), which may not cater to the needs of the managers.
- Sometimes, the IS development project is not properly planned ,monitored controlled, and thus leads to the failure of the developed IS.

2.2 SDLC (SYSTEM DEVELOPMENT LIFE CYCLE):

System development is regarded as another form of problem solving in software which consists of activities such as following,

1. Understanding the problem
2. Deciding a plan for a solution
3. Coding the planned solutions
4. Testing the coded program
5. Installing the system

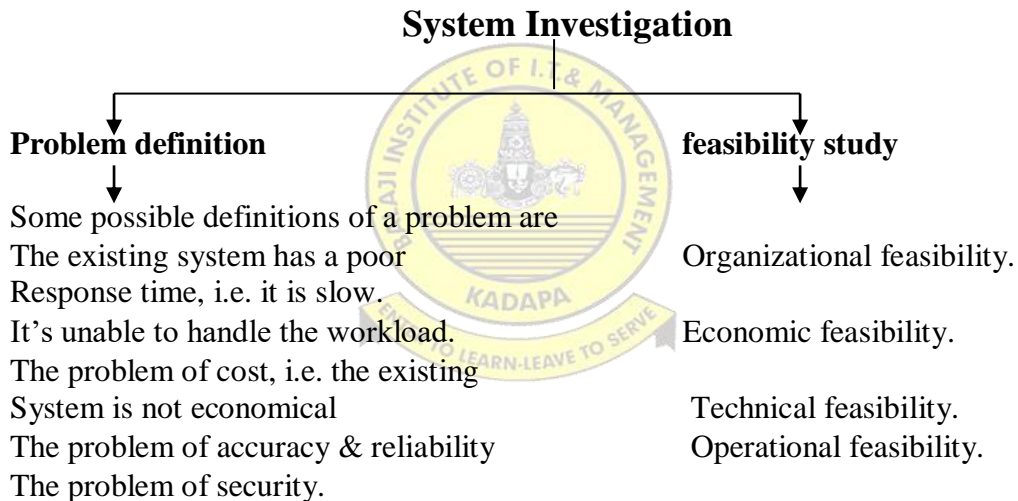
In order to develop a system successfully, it is managed by breaking the total development process into smaller basic activities.

- Any system development process, in general is understood to have the following phases.

1. **System Investigation**
2. **Analysis**
3. **Design**
4. **Constructions**
5. **Implementation**
6. **Maintenance**

1. SYSTEM INVESTIGATION:

- Some problem may be bothering a business organization. The managers in the organization (users) may or may not be very clear about the problem
- The user may invite a system analyst to assist him/her in defining and resolving the problem in a clear way.



a. PROBLEM DEFINITION:

- Although the need for problem definition may seem obvious ,this is perhaps the most frequently bypassed step in the entire system development process.
- So the first responsibility of a system analyst is to prepare a written statement of the objectives and scope of the problem.
- In other words, proper understanding and definition of the problem is essential to discover the cause of the problem and to plan a directed investigation by asking questions such as what is being done? Why?
- Similarly a system analyst should provide a rough estimate of the cost involve for the system development. This is again a very important

question that is too often not asked until it is quite late in the system development process.

b. FEASIBILITY STUDY:

- The literal meaning of feasibility is viability.
- This study is undertaken to know the likelihood of the system being useful to the organizations.
- Feasibility study basically is a high-level capsule version of the entire process intended to answer a number of questions such as what is the problem? Is the problem even worth solving?

The aim of a feasibility study is to assess alternative systems and to propose the most feasible and desirable systems for development.

- Thus, a feasibility study provides an overview of the problem and acts as an important checkpoint that should be completed before committing more resources.

1. ORGANISATIONAL FEASIBILITY:

The extent to which a proposed IS(Information System) supports the objective of the organizations strategic plan for IS determines the organizational feasibility of the system project. The IS must be taken as a subject of the whole organizations.

2. ECONOMIC FEASIBILITY:

- In this study, costs and returns are evaluated to know whether returns justify the investment in the system project.
- The economic questions raised by analyst during the preliminary investigation are for the purpose of estimating the following,
 - a. The cost of conducting a full system investigation
 - b. The cost of hardware and software for the class of application being considered.
 - c. The benefits in the form of reduced costs, improved customer service, improved resource utilization or fewer costly errors.

3. TECHNICAL FEASIBILITY:

- Whether reliable hardware and software capable of meeting the needs of the proposed system ,can be acquired or developed by the organization in the required time is a major concern of the technical feasibility.
- In other words, technical feasibility includes questions such as,
 - a. Does the necessary technology exist to do what is suggested and can it be acquired?

- b. Does the proposed equipment have the technical capacity to hold the data required to use the new system?
- c. Can the system be expanded?
- d. Is there any technical surety of accuracy, reliability, ease of access and data security?

4. OPERATIONAL FEASIBILITY:

- The willingness and ability of the **management, employee's, customers, suppliers** etc, to operate, use and support a proposed system come under operational feasibility.
- The following questions are asked in operational feasibility.
 - a. Is there sufficient support from
 - (i) **The management**
 - (ii) **Employees**
 - (iii) **Customers**
 - (iv) **Suppliers**
 - b. Are current business methods acceptable to the users?
 - c. Have the users been involved in the planning and development of the system project?

Operational feasibility would pass the test if the system is developed as per rules, regulations, laws, organizations culture, union agreements etc, and above all with the active involvement of the users.

2. SYSTEM ANALYSIS

- Analysis is a detailed study of the various operations of a business activity (system) along with its boundaries.
- **The objectives of this phase are to determine exactly what just be done to solve the problem.**
- System analysis involves a detailed study of the following.
 - (i) The information needs of the organization and its end users
 - (ii) Existing information system, their activities ,resources products
 - (iii) The expected information system

The final product of a system analysis is a set of system requirements of a proposed IS.

The analysis phase provides the analyst with a clear understanding of what is to be done.

3. SYSTEM DESIGN:

- A system analysis describes **WHAT** a system should do to meet the information needs users.

- A system design specifies **HOW** the system will accomplish these objectives.
- The term **design** refers to the technical specification that will be implied in constructing the system
- A system design should stress on the following three activities,
 - (i) User interface (focuses on designing the interactions between end users & computer systems).
 - (ii) Data design (focus on the design of the logical structure of database and files to be used by the proposed IS)
 - (iii) Process design (focuses on the design of the software resources i.e. the programs and procedures needed by the proposed IS).

4. CONSTRUCTION AND TESTING:

- Once the system specifications are understood, the system is physically created. The required programs are coded, debugged and documented.
- In fact, construction of the system takes place on the basis of the system design specifications.
- The system would be tested with some test data to ensure its accuracy and reliability.

5. IMPLEMENTATION:

- The system implementation stage involves hardware and software acquisition, site preparation, user training and installation of the system.
- Implementation is the most crucial phase of SDLC, because this step is vital in assuring the success of any newly developed system.
- Even a well-designed system will fail if it is not properly implemented.

6. MAINTENANCE:

- It involves **monitoring, evaluating and modifying** a system to make desirable or necessary improvements.
- Maintenance includes **enhancements, modifications** or any change from the original specifications.

3. SYSTEM DEVELOPMENT MODELS:

- In order to make sure that the systems are analyzed and designed efficiently and effectively, it is essential to adopt a suitable model, for which a basic understanding of various system development approaches / models currently in use is a must.

- As has already been discussed, the development process consists of activities namely investigation, analysis, construction, implementation and maintenance.

A system development model specifies how these activities are organized in the total system development effort.

The various models for system development are as follows,

1. Waterfall model.
2. Prototyping model
3. Interactive enhancement model
4. Spiral model
5. 4GT model
6. Hybrid model

1. WATERFALL MODEL:

- Waterfall model which follows the SDLC approach became popular in the 1970's.
- The model states that the phases are organized in a linear order.
- In other words, the output of one phase becomes the input for the next phase.

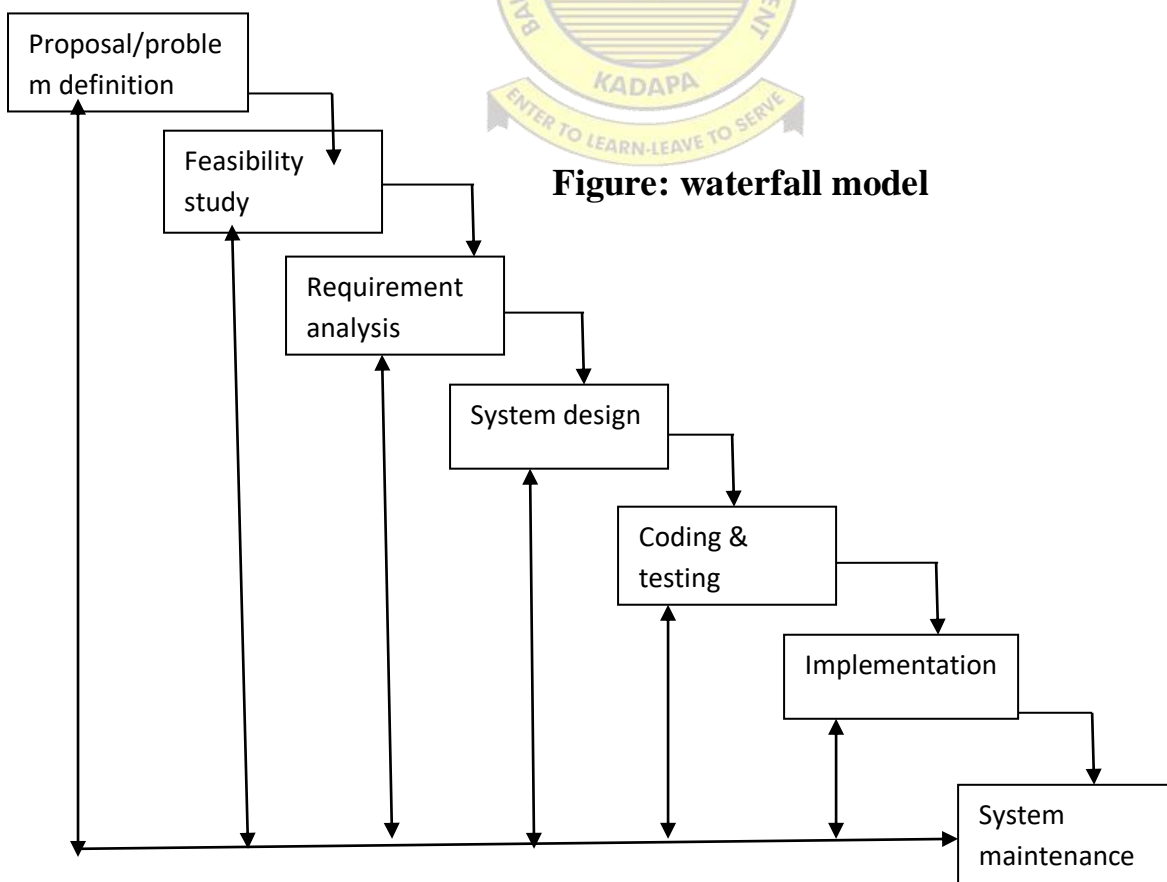


Figure: waterfall model

In SDLC approaches the system is visualized as a living organism. The system takes birth reaches the maturity stage through adolescence and ultimately dies its natural death.

ADVANTAGES OF WATERFALL MODEL:

- This waterfall model is simple and thus easy to understand.
- Each phase has specific deliverables.
- Quality of the IS(Information System) ensured as each and every phase is well defined and distinct.

LIMITATIONS OF WATERFALL MODEL:

- Does not show overlap between phases
- High amounts of risks and uncertainty
- Not a good model for complex and object-oriented projects
- A phase should not start until the previous phase is signed off.

2. PROTOTYPING MODEL:

- In the prototyping approach, a prototype of the system is developed, instead of the complete system
- A prototype is a comprehensive system and does not include all the requirements of the user.
- This model is based on the evolutionary method of system development.
- Prototyping is used in those systems, in which identification of requirements is difficult and requirements may change during the development process.

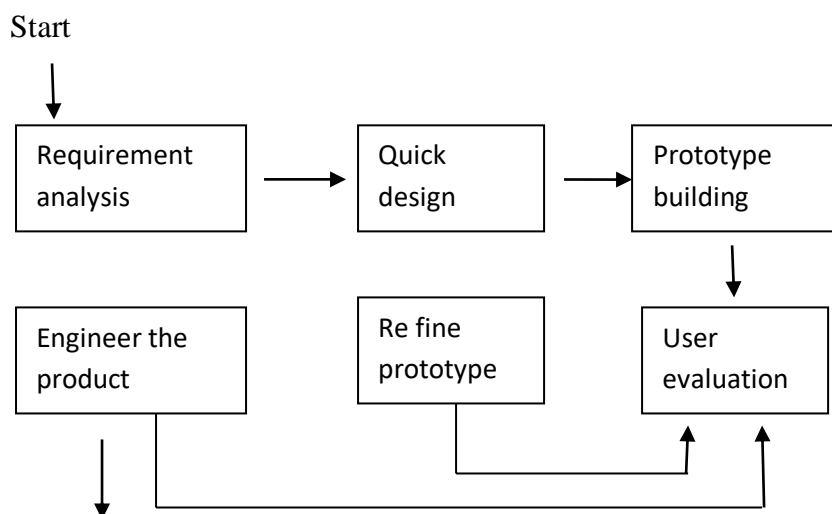


Figure: prototype model

THE MODEL IN GENERAL HAS THE FOLLOWING FOUR STEPS,

1. IDENTIFY THE USER'S BASIC INFORMATION REQUIREMENTS:

- In this step the user identifies his requirements in the form of outputs required from the system.
- The information analyst on the basis of user expectations, estimates the cost of a workplace prototype.

2. DEVELOP THE INITIAL PROTOTYPE SYSTEM:

- Here the initial prototype system which meets the user's basic information requirements is developed.
- It is developed in the minimum possible time.
- The speed of building, rather than efficiency of the prototype are the main consideration.

3. USE OF THE PROTOTYPE SYSTEM TO REFINE THE USER'S REQUIREMENTS:

The initially developed prototype is delivered to the user to allow him to gain a hands-on experience with the system and to identify further changes required in the prototype.

4. REVISE AND ENHANCE THE PROTOTYPE SYSTEM:

- In this stage the designed makes the necessary changes pointed out by the user after using the prototype.
- Steps 3 & 4 are repeated till the prototype is refined to the satisfaction of the user.
- The prototyping approach may not be cost-effective in small organizations.
- It is more suitable for larger organizations ,where it is difficult to identify user requirements.

ADVANTAGES:

- Ability to “tryout” ideas without incurring large costs.
- Lower overall development costs when requirements change frequently.
- The ability to get a functioning system into the hands of the user quickly.

DISADVANTAGES:

- A major criticism of this approach is because of its iterative nature. This approach requires at least two iterations. Moreover it may become an unending process of refinement, which may make too much time, effort and money.
- Due to frequent changes, management of the development process.

3. ITERATIVE ENHANCEMENT MODEL:

- In an iterative enhancement model, the system is developed in increments and each increment adds some functional capabilities to the system, until the full system is developed.
- Additions and modifications can be done at each step.
- The iterative enhancement process model is understood to have only three phases, namely **analysis, implementation and design** as shown in figure.

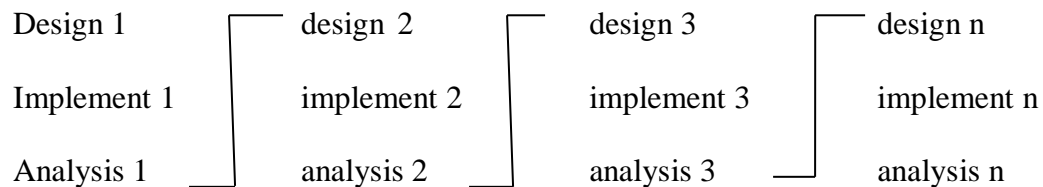


Figure: The iterative enhancement model

MERITS:

- It result in better testing, as testing each increment is relatively easier than testing the entire system similar to the waterfall model.
- Further as in prototyping the increments provide feedback to the user, which is useful for determining the final requirements of the system.

Thus the iterative enhancement model combines the benefits of both prototyping and the waterfall models.

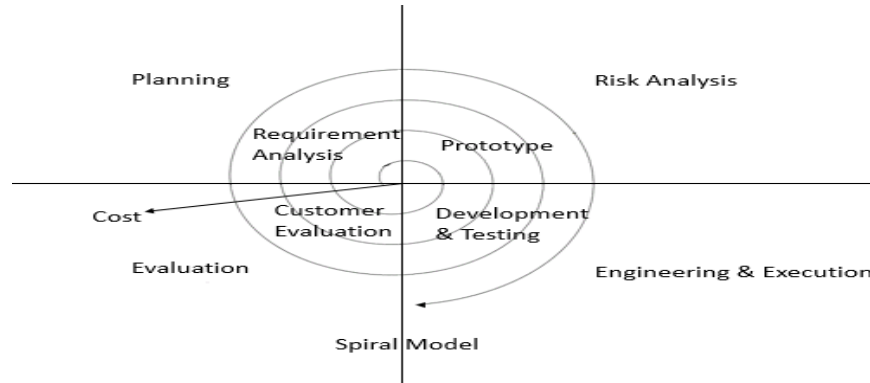
LIMITATIONS:

- The model does not give a complete system and thus many of the details may not be incorporated in the developed system.
- As the model is based on **modify-it-again** approach it may be time-consuming and is not cost effective.

4. SPIRAL MODEL

- The spiral model is the most recent system development model which has been proposed by **BOEHM**.
- This model suggests that the various activities involved in system development should be organized like a **spiral**.
- This model as the name indicates is cyclic in nature as shown in figure.
- Each cycle of the spiral consists of four stages represented by each quadrant.

- The angular dimension represents the progress in the development process, where as the radius of the spiral represent the cost involved.



FIRST STAGE: it is concerned with the identification of the objectives, various developmental alternatives and possible constraints to develop an IS.

SECOND STAGE: evaluation of various alternatives and identification of the risk is undertaken.

THIRD STAGE: the next level prototype is developed and verified and the results of the previous stages are reviewed.

FOURTH STAGE: planning of next iteration is done in the fourth stage.

The spiral model is more suitable for high-risk projects. For small projects, this model may not be time and cost-effective.

5. 4GT (FOURTH GENERATION TECHNIQUE):

- 4GT is being used to quickly developed IS.
- This technique makes use of a number of software development tools.
- The developer has to specify only a few characteristics of the software at a high level.
- The tools then automatically develop the code for the given specifications.
- This model, no doubt is quick but its success is restricted by the capacity of the available fourth generation languages (4GLs)
- However the model may be useful for smaller projects.

6. HYBRID MODEL(combination of more than one model):

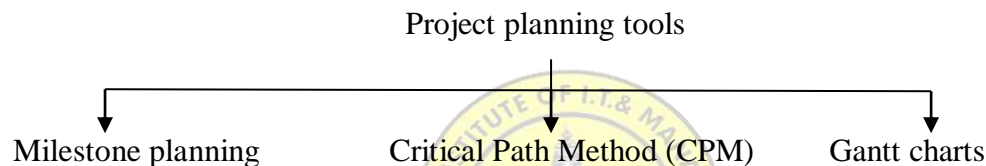
- It may be noted that the different approaches discussed above are used as supplementary rather than complementary approaches to software development.

- Depending upon the nature and size of the project and the risk involved therein a combination of more than one model (hybrid approach) may be an appropriate strategy.

4. PROJECT MANAGEMENT

- After the decision on whether the proposed IS solutions are to be built or to be purchased, the proposal for the same is put before the approving authority for its approval.
- Once approved, the proposed IS solutions become the **projects** to be undertaken for implementation.
- Thus, the phase- wise IS solutions are taken up, which needs a proper planning about all the required activities to complete the project within the available time and cost, and also to ensure the quality output from the IS.

4.1 PROJECT PLANNING TOOLS:



1. MILESTONE PLANNING/check point planning:

- In milestone planning techniques, all project requirements and **problems are not anticipated in advance**, rather these techniques allow projects to evolve as they are developed.
- Milestone is established to allow periodic reviews of progress so the management may assess if a project needs more resources or requires adjustments, or if it should be abandoned.

2. CRITICAL PATH METHOD (CPM) / NETWORK ANALYSIS:

- In this method, various tasks require to complete a project are represented in the form of a network chart.
- This method establishes sequential dependencies and relationships among the tasks.
- Longest path in terms of time – total time required to complete the project.
Longest path – critical path
- Any delay of tasks in the critical path would result in a corresponding delay in the overall project.

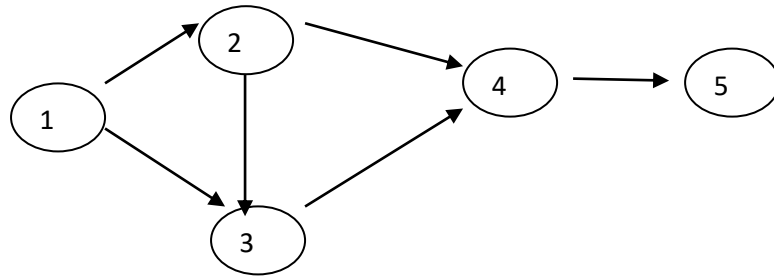


Figure: A Network Showing Critical Path

3.GANTT CHART:

- This is another planning technique similar to CPM, which provides definitions of tasks to be performance and specifies when they are to start and finish.
- However similar to a CPM chart ,a Gantt chart does not establish sequential dependencies.

Activities	May	June	July	September
System analysis	_____			
System design	_____			
Conversion	_____			
Testing	_____			
implementation	_____			

Figure: Gantt chart

PROJECT MANAGEMENT FRAME WORK:

- MIS project management refers to an overall framework for the planning of all the activities to be undertaken, and scheduling and controlling of those activities.
- The various activities for IS (Information System) project management are,

1. Identification of various tasks to be undertaken for the project.
2. Determination of the order of sequence in which these activities may be undertaken.
3. Assessment of risk and mitigation strategies
4. Allocate resources to each and every activity
5. Monitor the progress and corrective action.

1. Identification of various tasks to be undertaken for the project:

The various activities involved in MIS implementation process are as follows,

- Preparation of the implementation plan.
- Formation of steering committee.

- Acquisition of facilities.
- Analysis and redesign of business process
- Systems design, coding and testing
- Acquisition of IT infrastructure
- User's training
- Conversion of data
- Documentation
- Changeover to the new system
- Change management
- Evaluation and maintenance

2. **Determination of the order of sequence in which these activities may be undertaken:**

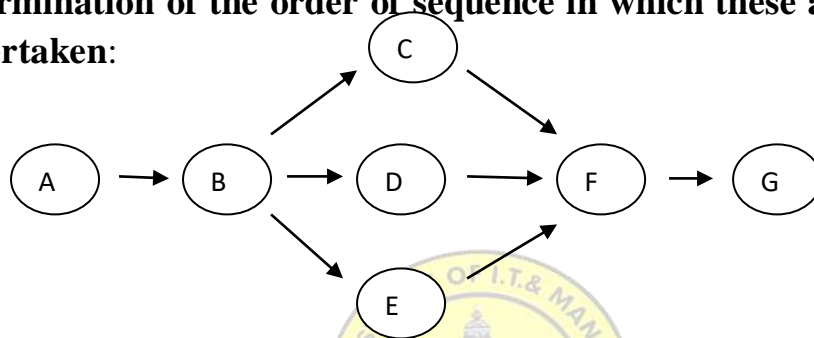


Figure: A Typical Network Diagram Showing The Sequence Of Various Activities

3. **Assessment of risk and mitigation strategies:**

- A risk may be defined as the likelihood of a given outcome and the magnitude of the occurrence.
- There may be many risks associated with the implementation of MIS systems
- In order to make sure that the process of MIS implementation is smooth and MIS systems are meeting the goals and strategies of the organization, the project manager must assess all the risks and prepare a plan for the mitigation, monitoring and management of these risks.

4. **Allocate resources to each and every activity:**

- Once the order of activities is known, the appropriate resources in terms of **time, people and money are allocated.**
- The project milestones, which are sub-goals to be achieved over a period of time (per month and per week) are defined and a month-wise or week-wise schedule is prepared so that the MIS team can have benchmark for performance and may adhere to these defined milestones.
- An example of milestone is existed in table.

S.NO	ACTIVITY	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5
1	Preliminary investigation					
2	Systems analysis					
3	System design					
4	System coding					
5	System testing					
6	Acquisition of infrastructure					
7	System implementation					

Table: project activities and milestones.

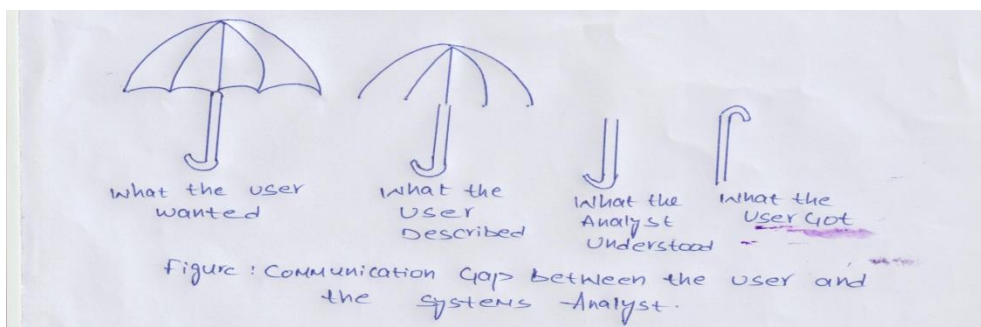
Figure depicts diagrammatic representation of sequence and allocation of resources using MS project.

5. Monitor the progress and corrective action:

- In this step, the progress of various activities is monitored to see whether the MIS implementation is progressing as per the plan or not.
- If there are deviations between the actual and the planned activities, the corrective steps are taken to bring the MIS project implementation on track.

5. SYSTEM ANALYSIS

- It has been observed that many of the IS systems fail as they are not able to provide the required information to the users.
- This failure of ISs may be attributed to the fact that at the time of understanding the information requirements, the systems are not properly understood because of the communication gap between the user and the system analyst.
- For the illustration purpose, the communication gap between the user and the technical professional is depicted in figure.



Thus, it becomes important for the managers to understand the systems analysis and system design to help the systems analyst understand all the information requirements for designing an efficient and effective IS.

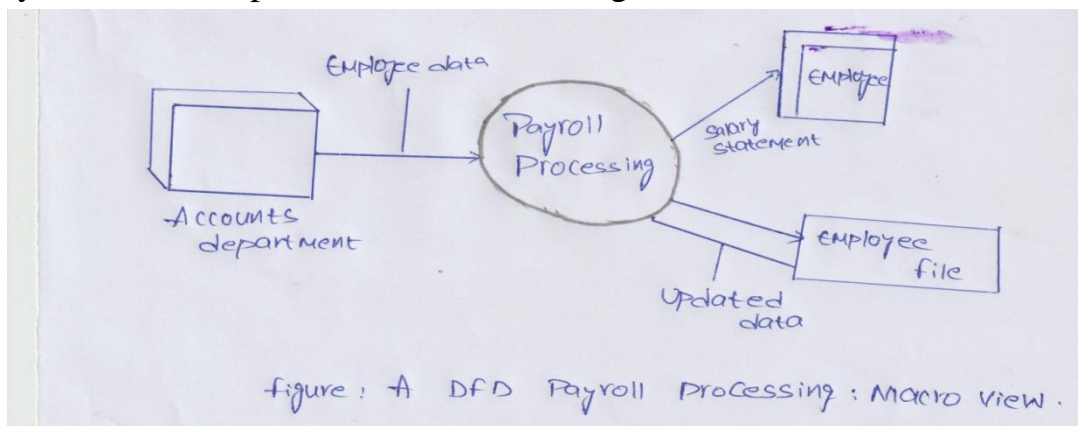
5.1 SYSTEM ANALYSIS:

- System analysis may be understood as a process of collecting and interpreting facts, identifying problems and using the information to recommend improvements in the system.
- In other words, system analysis means Identification, Understanding and Examining the system for achieving predetermined goals/objectives of the system
- Systems analysis is carried out with the following two objectives
 - 1.To know how a system currently operates and**
 - 2.To identify the users requirements in the proposed system**
- Systems analysis is regarded as a logical process
- The emphasis in this phase is on the investigation to know how the systems is currently operating and to determine what must be done to solve the problem
- The systems analysis phase is very important in the total development efforts of a system
- The user may be aware of the problem but may not allow how to solve it.
- During system analysis the developers (system designer) works with the user to develop a logical model of the system
- A system analyst, because of the communication gap between him and the user, may not understand all the information requirements and may even move too quickly to program design, thus trying to skip this phase.
- In order to avoid this, the systems analyst must involve the user at this stage to get complete information about the system
- This can be achieved if a logical model of the system is developed on the basis of a detailed study
- Such a study (analysis) should be done by using various **tools and techniques** such as.
 - 1. Data flow diagram**
 - 2. Data dictionary**
 - 3. Structured English**
 - 4. Decision trees**
 - 5. Decision tables.**

} structured analysis tools

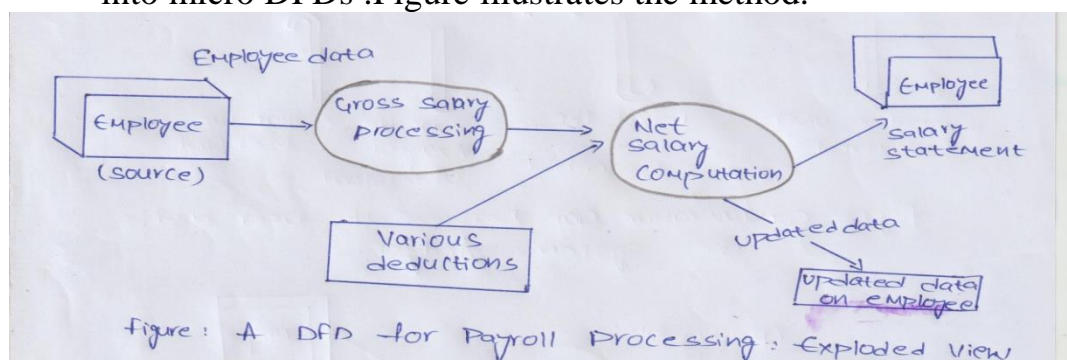
1. DATA FLOW DIAGRAM (DFD)/BUBBLE CHART:

- DFD is a **graphical representation** of the logical flow of data.
- It helps in expressing the systems requirements in a simple and understandable form
- A DFD consists of a series of bubble joined by lines representing data flow in the system
- DFD is very effective, when the required design is to clear and the user and the analyst require some symbolic representations for communication.
- The main disadvantage of a DFD is that a large number of iterations are often required to arrive at an accurate and complete solution
- For example, consider the case of a **payroll system** to prepare salary statements for each employee of an organization. Dataflow for such a system can be represented as shown in figure.



Employees data originate from accounts department (source), gets processed, salary statements are received by employee and updated data on employee (example: Total tax deducted, PF contribution etc.,) is stored in an intermediate file (data store), which is required for processing in the subsequent months.

- A DFD displays dataflow in a top-down approach
- To draw a DFD, start with a macro DFD (overview) and then explode it into micro DFDs. Figure illustrates the method.



While exploding a DFD into lower levels ,continuity and linkage is maintained between a DFD and its member DFDs.

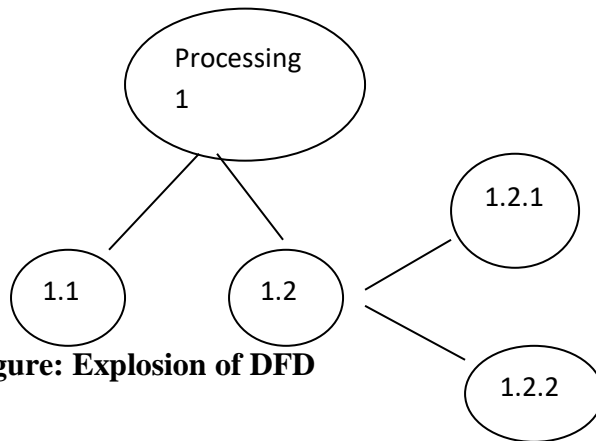


Figure: Explosion of DFD

2. DATA DICTIONARY

- A data dictionary is a structured repository of data.
- In order words it is a set of precise and accurate definitions of all DFDs, data elements and data structures.
- It improves communication between the user and analyst
- It can solve as a common database for programmers and can also be used for control purpose.

There are mainly three items of data, present in a data dictionary



1. **DATA ELEMENT:** it is the smallest unit of data and cannot be decomposed further.
2. **DATA STRUCTURE:** it is a group of data elements handled as a unit. A data structure contains a number of data elements as its field.
3. **DATA FLOWS AND DATA STORES:** data flows are nothing but data structures in motion.

Data stores are data structures at rest. Data stores are locations where data structures are temporarily stores.

Various symbols which are used in the data dictionary are explained in table.

SYMBOLS	MEANING
=	Is equivalent to
+	Add
(option 1 Option 2)	Only one of the options is used at a given time
Max	Iterations of the component
(component) Min	Min=lowest possible number of iterations Max=highest possible number of iterations
(component)	Component is an optional one

*Comment

Words within asterisks are comments

Table: symbols used in data dictionary

EXAMPLE:

VENDOR-INVOICE = INVOICE-NUMBER+VENDOR-NAME+TOTAL-INVOICE-AMOUNT+INVOICE-DUE-DATE+ (SHIPPING-DATA)
{ITEM-DETAIL-LINE }

- One extra copy may be kept.

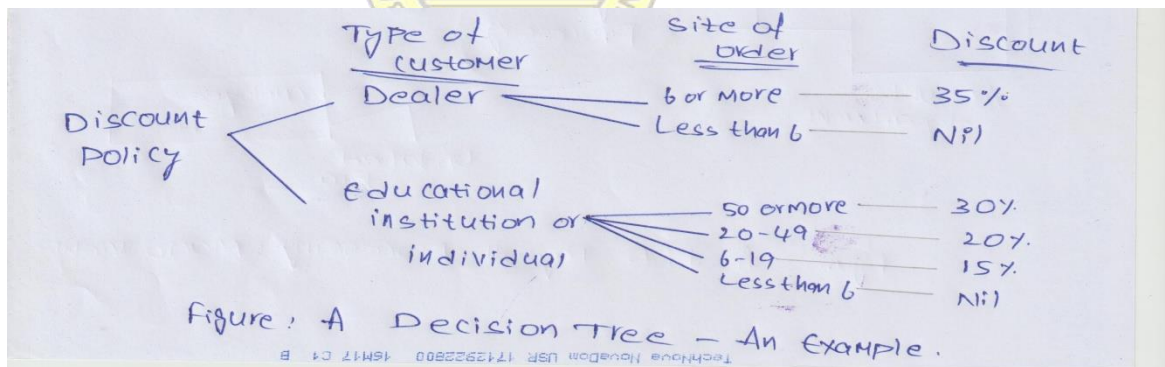
Data dictionary and DFD are correlated and data should be present in a specification.

However, a Data Dictionary (DD) does not provide functional details and thus is not very acceptable among technical users.

3. DECISION TREES

- The logic of the process which may not be very clear through Data Dictionary(DD), can easily be represented using a graphic representation which looks like the branches of a tree called “Decision Tree.”
- A decision tree has as many branches as there are logical alternatives.
- It is easy to construct, read and update.

For example, a policy can be shown through a decision tree



4.STRUCTURED ENGLISH:

- Alternatively the discount policy can be represented by using structured English. The structured English uses logical construction and imperative sentences designed to carry out instructions for actions.
- Decisions are made through IF – THEN – ELSE statements.
- For example the process ORDER may have the data element ORDER-SIZE, which defines certain values,
- Using these values, structured English would read as shown in figure.

MINIMOM: 5or more personal computers ,per PC type.
SMALL: 6to 19PCS
MEDIUM: 20 to 49PCs
LARGE: 50 or more PCs

```

DISCOUNT- POLICY
Add up the number of PCs per PC type
If order is from the dealer
And – if ORDER-SIZE IS SMALL OR MEDIUM OR LARGE
    THEN:Discount is 35%
ELSE (ORDER-SIZE IS MINIMUM,
    SO:NO DISCOUNT IS ALLOWED
ELSE (ORDER IS FROM EDUCATIONAL INSTITUTIONS)
SO –IF ORDER-SIZE IS LARGE
    DISCOUNT IS 30%
ELSE-IF ORDER – SIZE is MEDIUM
    Discount is 20%
ELSE-IF ORDER –SIZE is SMALL
    Discount is 15%
ELSE ORDER – SIZE is MINIMUM
    So no discount is allowed.

```

Figure: structured English – an example

Decision trees can be used to verify logic in problems that involve few complex decisions, resulting in a limited number of actions. However, its biggest limitation is the lack of information due to its structure.

5.DECISION TABLE

- Decision table is a matrix of rows and columns that shows conditions and actions.
- Decision rules state the procedure to be followed when certain conditions exist.
- Decision table are best-suited for dealing with complex branching routines ,example, inventory control etc.
- A decision table consists of four sections
 - A condition stub at the upper left
 - A condition entry at the upper right
 - An action stub at the lower left
 - An action entry at the lower right.

Condition stub	Condition entry
Action stub	Action entry
Stub	Entry

Figure: a decision table.

- Questions are listed in the **CONDITION STUB**
It outlines the actions to be taken to meet each condition **ACTION STUB.**

The condition entry part contains the answers to questions asked in the condition stub and the action entry part indicates the appropriate action resulting from the answers to the conditions in the condition entry quadrant.

Condition stub	Condition entry					
	1	2	3	4	5	6
Is the customer a dealer?	Y	Y	N	N	N	N
Is the order size 6PCs or more?	Y	N	N	N	N	N
Is the customer educational institution or individual			Y	Y	Y	Y
Is the order size 50 or more PCs?			Y	N	N	N
Is the order size 20 to 49 PCs?				Y	N	N
Is the order size 6 to 19 PCs?					Y	N

ACTION STUB	ACTION ENTRY					
Allow 35% discount	×					
Allow 30% discount			×			
Allow 20% discount				×		
Allow 15% discount					×	

Figure: decision table – an example

6. SYSTEM DESIGN (OUTPUT OF SYSTEM ANALYSIS):

System design is another important step in the system development process.

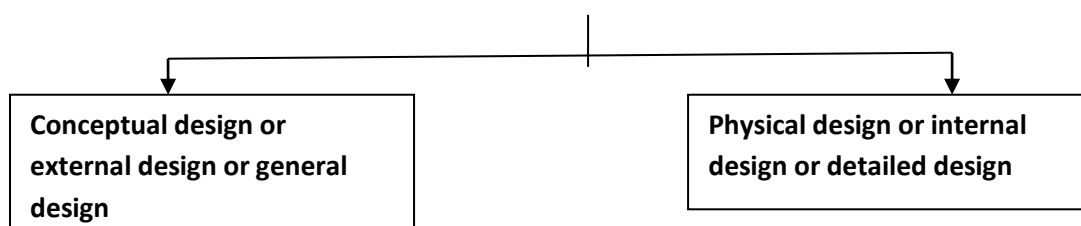
- In other words, the output of the system analysis, becomes an input in the design phase.
- For example, for designing a salary system, a system designer would consult the input documents (data sources) such as attendance, leave account, deductions to be made etc.

6.1 DESIGN OBJECTIVES

- Practicality
- Flexibility
- Efficiency
- Security

6.2 LEVELS OF SYSTEM DESIGN:

LEVELS OF SYSTEM DESIGN



1. CONCEPTUAL DESIGN/OVERALL MIS DESIGN/GROSS DESIGN/HIGH LEVEL DESIGN:

It is in the conceptual design stage that alternative overall MIS designs are conceived and the best one is selected by the system analyst in consultation with the top management.

STEPS INVOLVED IN CONCEPTUAL DESIGN

- Define problem
- Set system objectives
- Identify constraints $\left\{ \begin{array}{l} \text{external constraints} \\ \text{Internal constraints} \end{array} \right.$
- Determine information needs
- Determine information sources
- Develop various designs (economics basis, performance basis, operational basis)
- Document the conceptual design (involves overall system flow, system inputs, system outputs)
- Prepare report.

DESIGN METHODS

1. Problem partitioning
2. Structured design
3. Top down design



1. PROBLEM PARTITIONING

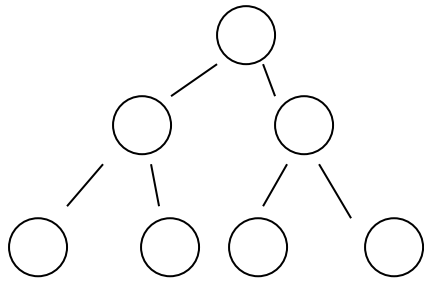
- The method is based on the principle of **divide and conquer**
- Instead of solving the entire problem of once, the problem is divided into small manageable parts (modules) that can be solved separately
- This method reduces complexness, maintenance is minimized.

2. STRUCTURED DESIGN

In this method, a structured chart is created, which can be used to implement the system.

- The aim is to produce a structure where the modules have minimum dependence on each other.
- Various tools like flow-charting, data flow diagrams, structure charts, structured English etc, are used in a structured design

3. TOP DOWN DESIGN



- Top-down design suggests that a system consists of sub systems, which have sub- systems of their own.
- It involves high level components and low-level components.
- It attempts to smoothen the path of system design by starting of the top and designing the broad modules first.

2. DETAILED SYSTEM DESIGN

- The main objective of the detailed system design is to **prepare a blue print of a system that meets the goals of the conceptual system design requirements.**
- **Detailed system design involves the following phases,**
 1. Project planning and control
 2. Involve the user
 3. Define the detailed sub-systems
 4. Input/output design
 5. Feedback from the user
 6. Database design
 7. Procedure design
 8. Design documentation

7.IMPLEMENTAION PROCESS

7.1 INTRODUCTION

Once the design of MIS is complete it is ready for implementation

- Implementation is a process of **coding, testing, installation, documentation, training and support.**
- Implementation means constructing and putting the new system into operation.

IMPLEMENTATION PROCESS

- Implementation of MIS is a process in itself and involves various steps

- It is understood here that the major steps are based on the design specifications
- All requirements of the system such as input, processing, output, equipment, personnel are provided by the design specifications
- However, the steps are not sequentially exclusive some of the steps overlap

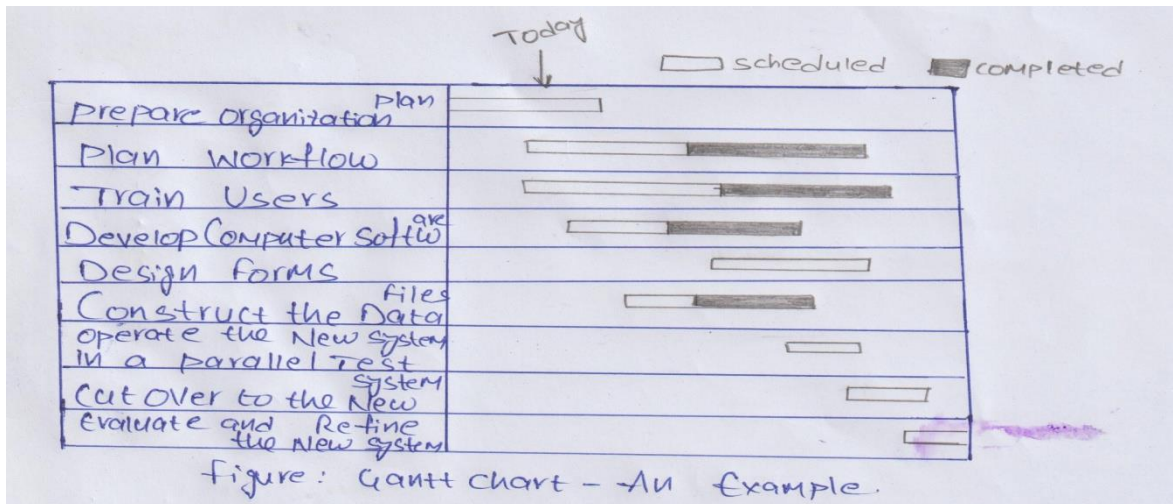
7.2 THE VARIOUS STEPS IN IMPLEMENTATION PROCESS ARE AS FOLLOWS,

- 1. Planning the implementation**
- 2. Acquisition of facilities and space planning**
- 3. MIS organization and procedure development**
- 4. Acquisition of hardware and software**
- 5. Coding**
- 6. Testing**
- 7. Creation of forms and database**
- 8. Documentation**
- 9. User training**
- 10. Installation**

1. Planning the implementation

- It is obviously that the first step in the implementation of an MIS to plan it.
- It is in this step that various activities which are required for implementing a system are identified and their sequence and relation to each other is decided.
- Time required and cost estimates are also obtained
- To better describe the plan and implementation schedule, a system analyst should make use of various tools like, GANTT CHARTS, NETWORK DIAGRAMS ETC.





2. Acquisition of facilities and space planning:(Office,Computer Room,Computer Library)

- The IS (Information System) to be implemented may be for a new organization, where no old system is in existence.
- For proper implementation of the system the MIS manager is required to prepare **estimates of floor space requirements** and also rough layouts
- Space planning should take into account the space occupied by computers terminals, printers, etc., as also by people and their movement.

3.MIS organization and procedure development

- It is also important that a manager (finance/accounts/computer centre) be given the responsibility of guiding the task of implementation
- The users should develop a feeling as if the system is their own system
- It is right time here that the manager starts recruiting / hiring other required personnel.
- The procedure development includes evaluating and selecting hardware, buying or developing software, implementation strategies, testing of the system etc.

4.Acquisition of hardware and software

- Start immediately after the design specifications of the system are over.
- It may be quite complex and time consuming
- It should be ensured that the facilities which are required for installing the hardware, such as preparation work, computer room layout, AC, electric connections, communication lines etc, should be complete to avoid loss of time in making the system operational.
- At this stage ,consumables like ribbons, paper, floppies, tapes, CD, etc, should also be acquired.

5. Coding

- During coding stage, the physical design specifications created by the system designer team are turned into working computer code by the programming team.
- Depending on the size and complexity of the system, coding can be an involved intensive activity

6. Testing:

- Immediately after the coding has started, the testing process can begin and proceed in parallel.
- As each programme module is produced it needs to be tested individually, then as part of a larger program and then as part of a larger system.
- These tests are performed mainly for accuracy, range of inputs, frequency of inputs and operating conditions and reliability etc.
- Testing of IS, now a days can be undertaken with the help of computer Aided Software Engineering (CASE) Tools.

7. Creation of Forms And Data Base:

- Forms are very important for transmitting data.
- They are also required for input to the system and output from the system.

8. Documentation:

system documentation
User documentation

SYSTEM DOCUMENTATION: it is intended primarily for maintenance programmers or technical persons, records detailed information about systems design specifications, its internal working and its functionality.

USER DOCUMENTATION: It is intended primarily for users and consists of written or other visual information about an application system, how it works and how to use it.

9. User Training:

- Training is very important for successfully implementing an IS.
- FOR EXAMPLE, clerical or managerial, frequent users versus occasional users.
- The MIS manager must design training programmes as per the needs of the users.
- Clerical users must be trained in the processing of transactions.

10. Installation/Change over:

- it is even of switch-over from the **old system to the new system** which takes place after the system is tested and found reliable.
- The existing system is replaced by the new system in this phase.

- Conversion from the old system to the new system may be accomplished by selecting one or a combination of various conversion approaches.

8. PRODUCT BASED MIS EVALUATION:

8.1 INTRODUCTION: Evaluation of MIS, is a process of measuring performance of organizational information system. The feedback so obtained helps determine the necessary adjustments to be made in there Information System.

Product Based MIS Evaluation:

- Since the focus of the product-based evaluation is on the product (information support) or the output from the system, the evaluation may be termed as effectiveness evaluation.
- For assessing the effectiveness of output from MIS, the following model may be used.

8.2 MODEL STRUCTURE:

- The information attributes may be identified as components of a general model for evaluation of MIS effectiveness in an organization.
- Some of these attributes are listed below,
 1. Timeliness
 2. Relevance
 3. Accuracy
 4. Completeness
 5. Adequacy
 6. Explicitness
 7. Exception based



8.3MODEL IMPLEMENTATION

- Various types of outputs/reports, being generated by MIS of the organization can be evaluated for their effectiveness in terms of the attributes of the management information.
- To employ this model, managers at different levels of management of the organization may be asked to rate the outputs/reports on each of the information attributes.
- To get responses, a five-point scale may be used on which the users of Information System may be asked to rate the effectiveness of MIS in terms of these information attributes.
- For example: A five-point scale may be prepared to get an evaluation of the no. of reports received by the managers in terms of 'timeliness' as given below,

all reports	most reports	many reports	some reports	no reports
4	3	2	1	0

- The scale thus prepared is to be administered either through a mailed questionnaire or through personal interview and the scoring may be done by assigning a numerical value of 0 to least favorable location on the scale 1 to the next favorable and soon.

$$ES_{MIS} = \frac{\sum_{K=t}^{10} E.S_{K/n}}{K=t}$$

Where ES_K = Effectiveness score for K^{th} attribute.

S = score assigned to the response

F = frequency of the score

N = number of respondents.

EFFECTIVENESS NORM

Now ideally speaking, ES_{MIS} should be equal to 4.

- However owing to the high cost involved in such a system and uncertain environment, such a situation is not practical.
- Therefore, a tolerance limit is to be prescribed which serves as a standard norm, against which the organization may compare the effectiveness of the existing MIS to determine deviations, if any.
- It is on the basis of this comparison that an MIS maybe termed as either effective or otherwise.
- The tolerance limit for defective reports may be decided by the organizations concerned; it may vary from 5 to 20% and accordingly ,the standards for an effective MIS may be computer in terms of its ES_{MIS} as follows,
- On the fire point scale, the total scale is divided into four parts.
- Taking total scale = 100, each part = 25.
- Thus, on this scale 100%, 75%, 50%, 25% and of 0% of the reports are represented by a score of 4, 3,2,1,0.
- According to this rule 11% of the reports would be represented by $1/25^{th}$ (0.04) part on the scale.
- For 90% of output is $0.04 * 90 = 3.6$ on the scale.
- Therefore, 90% of the outputs will be represented on the scale by an effectiveness score of 3.6

9. COST/BENEFIT-BASED EVALUATION:

In cost/benefit evaluation, a thorough study of various expected costs, the benefits to be expected from the system and expected savings, if any, is done. It

is an economic evaluation of the system, in which costs to be incurred for developing, implementing and operating a system are to be justified against the expected benefits from the system.

In other words, cost/benefit analysis determines the cost-effectiveness of the system.

- **Expected cost elements** – initial development costs, capital costs, operating costs.
- **Expected benefits** – reduced cost, better performance/decisions

A brief description of all these cost elements and benefits is given below,

1. **Initial development cost**
2. **Capital cost**
3. **Annual operating cost**
4. **Identification of costs and benefits**
5. **Classification of costs and benefits**

1. INITIAL DEVELOPMENT COST: Initial development cost is the cost incurred in developing an information system. Various elements of development cost include project planning cost, feasibility study cost, design cost, conversion cost, implementation cost (including user training cost, testing costs, etc.). In other words, total development cost is considered one-time cost and is termed as initial development cost.

2. CAPITAL COST: It is also one-time cost.

- It is the cost incurred in facilities and in procuring various equipment, including hardware etc, required for the operation of the system
- Facility costs (wiring, flooring, lighting, AC cost), space required for office, storage computer room, hardware equipment cost.

3. ANNUAL OPERATING COST:

- Annual operating cost is the cost incurred in operating the system.

a. AMC (ANNUAL MAINTENANCE COST)

- (It includes computer and equipment maintenance cost, personnel cost, overheads and supplies cost.)

b. PERSONNEL COST

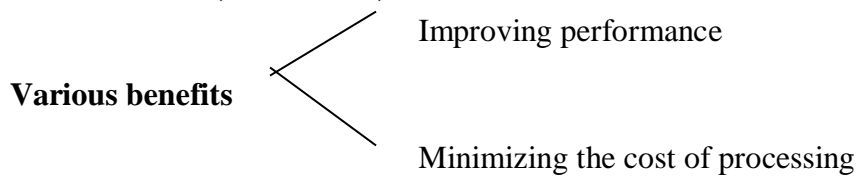
(Includes staff salary, PF, health insurance, pensionary benefits)

c. OVERHEAD COST

(Include all costs associated with the day-to-day operations of the system)

d. SUPPLY COST

Supply cost are variable costs that increase with increased use of paper ribbons, disks etc.,



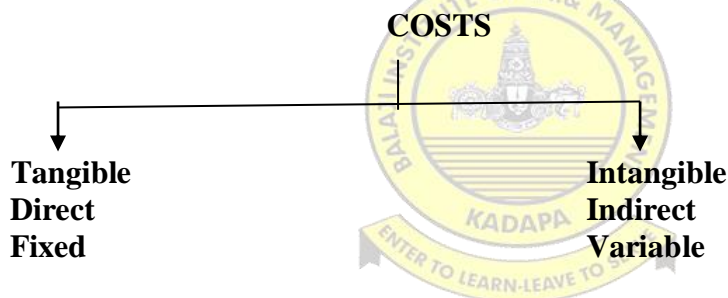
For identification and categorization of various costs and benefits the following concepts are importance,

4. IDENTIFICATION OF COSTS AND BENEFITS:

DIRECT COST: (Price of PC, ribbon etc,) Easily identified from invoices or records

DIRECT BENEFITS: reduction of staff because of the new system/fast processing etc.,

5. CLASSIFICATION OF COSTS AND BENEFITS:



TANGIBLE COST: costs can be identified and measured.

Example: computer cost, consultancy fee.

INTANGIBLE COST: whose monetary value cannot be accurately measured.

Example: lowered employee morale because of a new system is an intangible cost.

DIRECT COSTS: Direct Costs are those with which an amount in rupees can be directly associated to any of the items or operations of the system

EXAMPLE: the purchase of a computer ribbon for 3500/-

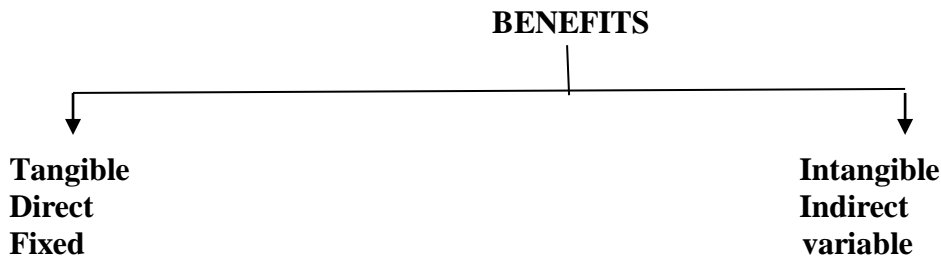
INDIRECT COSTS: Indirect costs are the results of operations that are not directly associated with the system

EXAMPLE: safety and security of computer room, electricity, AC and maintenance etc.

FIXED COST: Fixed Costs are constant costs and do not change regardless of how well system is used.

EXAMPLE: capital, Development cost.

VARIABLE COST: Variable Costs are incurred on regular basis.



TANGIBLE BENEFITS: Reduced salaries producing, Reports with no errors.

INTANGIBLE BENEFITS: High morale among employees, Improved Organizational image .

DIRECT BENEFITS: for example 5% reduction in salary expenditure.

INDIRECT BENEFITS: Indirect Benefits are realized as by-product of some other activity or system

FOR EXAMPLE: Newly computerized salary system

FIXED BENEFITS: Fixed Benefits are also constant and do not change.

FOR EXAMPLE: 10% reduction in staff.

VARIABLE BENEFITS: Variable Benefits are realized on a regular basis.

FOR EXAMPLE: Amount of daily time saved of a manager varies with the number of types of decisions taken.

The MIS evaluation table summarizes the benefits to be expected from the system and the expected costs and expected savings, if any for the MIS user

10. PROCESS BASED CALCULATION/EVALUATION:

Process-based evaluation focuses at the effectiveness of the processes (sub processes)that make it. The IS sub-processes are plan process; development process; and use process. These sub processes as the contributors to IS effectiveness, are shown in figure 1 and the detailed view is given in figure 2

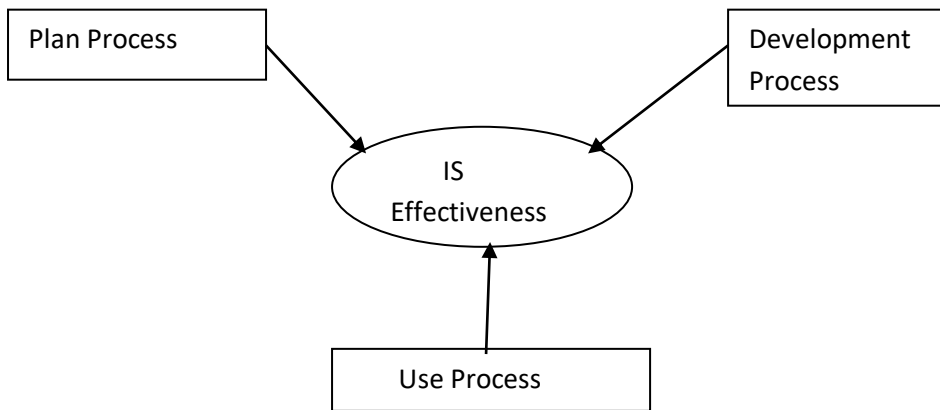
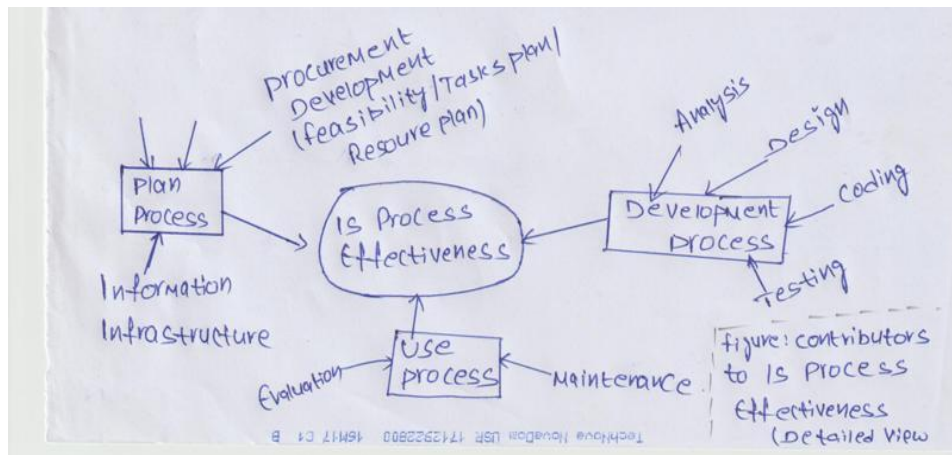


Figure: 1 Contributors to IS Process Effectiveness

As per this model, for effectiveness of IS, the efforts must begin at the planning stage. To achieve this effectiveness, all the contributors of IS must be well in place, i.e. their effectiveness should contribute to the overall IS effectiveness.



11. SYSTEM MAINTENANCE

The results obtained from the evaluation process help the organization to determine whether its information systems are effective and efficient or otherwise. As the organizations exist in dynamic and competitive environments, evaluation is a continuing activity. On the basis of the feedback provided by the evaluation process the organization in order to keep its MIS at the highest levels of effectiveness and efficiency, of course, within cost constraints, must respond by taking corrective actions. Corrective action may include removing errors which may be due to design, due to environmental changes or due to organizational changes, or due to changes while enhancing the existing system. This process of monitoring evaluating and modifying of existing information systems to make required or desirable improvements may be termed as **system maintenance**.

System maintenance is an ongoing activity ,which covers a wide variety of activities including removing program and design errors ,updating documentation and test data and updating user support. For the purpose of convenience, maintenance may be categorized into three classes, namely;

- (i) **Corrective**
- (ii) **Adaptive and**
- (iii) **Perfective**

1. CORRECTIVE MAINTENANCE

This type of maintenance implies removing errors in a program which might have crept in the system due to faulty design or wrong assumptions. Thus, in corrective maintenance, processing or performance failures are repaired.

2. ADAPTIVE MAINTENANCE

In adaptive maintenance program functions are charged to enable the information system to satisfy the information needs of the users. This type of maintenance may become necessary because of organizational changes which may include,

- (i) Change in the organizational procedures
- (ii) Change in organizational objectives goals, policies etc,
- (iii) Change in forms
- (iv) Change in information needs of managers
- (v) Change in system controls and security needs etc.

3. PERFECTIVE MAINTENANCE

Perfective maintenance means adding new programs or modifying the existing programs to enhance the performance of the information system. This type of maintenance is undertaken to respond to the user's additional needs which may be due to the changes within or outside of the organization. Outside changes are primarily environmental changes, which may in the absence of system maintenance, rendering the information system ineffective and inefficient. These environmental changes include,

- (i) Changes in government policies laws etc.
- (ii) Economic and competitive conditions and
- (iii) New technology

No doubt, maintenance is regarded as necessary evil but is should not be delegated to junior programmers; nor should it be performed on a haphazard or informal basis; rather maintenance must be given its due status in the organization and should be,as far as possible, properly planned and the maintenance responsibility should be entrusted to a qualified supervisor and team of MIS experts.

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***THE PURPOSE OF EDUCATION IS TO REPLACE AN EMPTY MIND
WITH OPEN ONE***

UNIT-4

PREVIOUS YEAR QUESTIONS

1. Write different phases of SDLC with proper explanation? **(2018 supply)**
2. Explain about product and process based MIS evaluation? **(2018 supply)**
3. Discuss about system development models? **(2018 regular)**
4. Explain the steps in cost/benefit based evaluation? **(2018 regular)**
5. Write about SDLC? **(2017 supply)**
6. What are the activities required for maintenance of MIS? Explain. **(2017 supply)**
7. What is system development methodology? **(2016 supply)**
8. What are the different stages of SDLC? **(2016 supply)**
9. What are the techniques of assessing value and risk of IS? **(2016 supply)**
10. Discuss brief system development approaches? **(2015 regular)**
11. What is the process of cost and benefit analysis during system validations? **(2015 regular)**

***THE BEAUTIFUL THING ABOUT LEARNING IS THAT NO ONE CAN
TAKE IT AWAY FROM YOU***

(17E00106) MANAGEMENT INFORMATION SYSTEM

The objective of the course is to provide the basic concepts of systems concepts and Management of Information System and utility of the systems for the managerial decisions.

1. **MIS An overview** - Introduction, Need for MIS and IT nature and scope of MIS, MIS characteristics, Structure of MIS, role of MIS in global business. Challenges of Managing MIS.
2. **Data resource management** - Data base concepts, The traditional approaches, the modern approaches (Data base management approaches) DBMS, Data models, Data ware housing and mining.
3. **Business application of IS** - Enterprise systems, ERP, CRM, SCM, DSS, Types of decisions, Decision support techniques, Decision making and Role of MIS, Business intelligence and Knowledge management systems.
4. **Management of IS** - Project planning, SDLC, System development models, Project management, system analysis, system design, Implementation process, Product based MIS evaluation, Cost /Benefit based evaluation, Process based calculation, System maintenance.
5. **Security, Ethical & Social Issues** : IS security threats, Protecting IS, IS Security Technologies, The disaster recovery plan, IS Ethical Issues, social issues.

Textbook:

- MIS –Managerial Perspective, D.P.Goyal,Vikas Publications.

References:

- Management Information Systems, C Laudon and Jane P.Laudon, et al, Pearson Education.
- MIS, Hossein Bidgoli, Nilanjan Chattopadhyay, Cengage Learning
- Management Information Systems Text & Cases, W S Jawadekar, Tata McGraw-Hill.
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- Management Information Systems, Dharminder and Sangeetha, 1/e, Excel books.
- Cases in MIS, Mahapartra, PHI.
- Management Information Systems, Gordon B. Davis & Margrethe H.Olson, Tata McGraw-Hill .

UNIT-5

SECURITY, ETHICAL AND SOCIAL ISSUES

INTRODUCTION

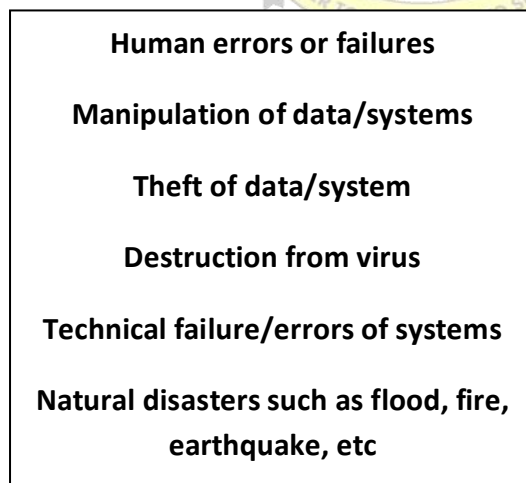
- IS security is not a new concept. It started from the day, the first mainframe computer was developed.
- With the advances in telecommunication systems, organizations have started using more and more networked systems.
- Because of the networked systems, ISs have become easy targets of threat as the internet has thousands of unsecured computer networks which are in communication with each other.

Thus ,now a days IS security has assumed all the more significance than ever before.

- Today, organizations need to understand the potential threats/risks to their ISs and just have well defined strategies to manage those risks.
- Further, the managers need to take an important decision regarding the adequate level of safety and security for their IS.

1. IS SECURITY THREATS

Some of the major threats to the Information Systems (IS) are categorized as follow,



1. HUMAN ERRORS/FAILURES

- This category includes unintentional errors made by an authorized user.
- The employees of the organization may commit errors such as,
 - Entry of wrong data

- Accidental deflection
- Modification of data
- Storage of data in unprotected areas such as desktop, website.
- These types of errors/failures of ISs may happen because of **lack of experience/ improper training.**

2. MANIPULATION OF DATA/SYSTEMS

- These happens because of the deliberate acts of some persons/the organizations designed to harm the data/IS of an organizations
- In this type of threat, **an unauthorized individual** gains an access to the private/important data of an organization and purposefully do some wrong acts like delete, corrupt /steal the data.

3. THEFT OF DATA/SYSTEM

Though thieves may steal physical items such as entire computer ,circuit boards and memory chips, the theft of electronic data pose a greater challenge.

HACKING: the act of breaking into computer or computer networks illegally is known as hacking/cracking.

IDENTITY THEFT/PHISHING: It is done with fake websites that look as genuine ones.

Example: Ms sunitha receives an email from her bank, asking for upgrading the login and password details for security reasons and asks her to click the link, and then taken to a website looks similar to her banks website, when she enters her login ID and password, she is not able to enter the page and only gets an error message. Thus Ms sunitha was directed to a fake website where login ID and password was taken by somebody.

4. DESTRUCTION FROM VIRUS

- This category of threat is the potential for deliberate (done intentionally) software attack. This kind of attack happens when a person or a group write software to attack data or IS of an organization with the purpose of damage, destroy or deny services to the target systems.
- Malicious code/software/malware: The program, which is written with an intent to attack data or IS.

Example of malware,

- Viruses and worms
- Trojan horses (illegal programs, contained within another program)
- Logic bombs/time bomb.

5. TECHNICAL FAILURE/ERRORS OF SYSTEMS

It occurs because of the manufacturing defects in the hardware or the hidden faults in the software.

6. NATURAL DISASTERS

- Sometimes the threat may not be because of unintentional acts of an individual/group of persons, rather it may be from the acts of God that result from forces of nature that cannot be prevented / controlled.
- Such threats include **fire, flood, earthquake, lightening**.

In view of above mentioned threats, organizations need to implement controls so as to avoid, reduce and manage risk from these threats.

2. PROTECTING INFORMATION SYSTEM

- Avoiding, reducing IS threats is one of the challenging tasks for any IS manager.
- To do so, organizations need to formulate the right protection strategies and implement appropriate controls.
- These strategies and controls are intended to prevent accidental hazards, detect problems and improve damage recovery problems.

2.1 IS PROTECTION STRATEGIES



Figure: IS PROTECTION STRATEGIES

1. PREVENTIVE STRATEGY

It refers to the controls that would help prevent errors from occurring, deter criminals and deny access to unauthorized people.

2. DETECTION STRATEGY

Organization should use special diagnostic software that may detect the potential threats.

3. MINIMUM LOSSESS STRATEGY

- It refers to minimize losses once a threat has happened.
- Users should get their systems back in operation as early as possible.

4. RECOVERY STRATEGY

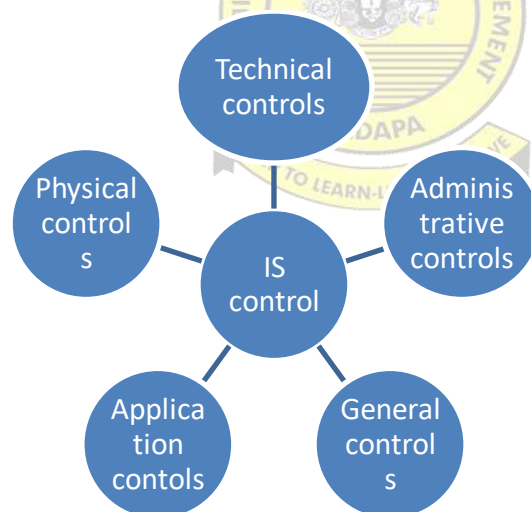
A recovery plan, that explains how to fix a damaged information system as quickly as possible must be in place. Replacing rather than repairing components is one way to fast recovery.

5. CORRECTIVE ACTION STRATEGY

The damaged system must be corrected immediately so as prevent the problem from occurring again.

2.2 IS CONTROLS

- The organization can plan and implement various kinds of IS controls so as to avoid, reduce and manage the risks to the potential threats to IS.
- These controls can be understood under the following five categories.



1. PHYSICAL CONTROLS

- These controls refer to the protection of computer facilities and other IS resources.
- This includes protecting computer hardware, computer software, data base, computer networks etc.

- Physical security of the IS resources include various controls such as, the site should have proper AC, adequate drainage facilities and emergency power shutoff and backup systems.

2. TECHNICAL CONTROLS

- The technical controls are the controls which are implemented in the application of IS itself.
- These type of controls include,
 - a. Access controls
 - b. Data security controls
 - c. Communication controls

A. ACCESS CONTROLS

- These controls refer to the restrictions imposed for the unauthorized access of any user to IS resource.
- The identification of the user can be obtained through a unique user identifier such as the password a smart card, digital signature, voice, finger print, eye scan etc.
- Unique user identifier is normally implemented through bio-metric controls.

B. DATA SECURITY CONTROLS

- To protect data from accidental disclosure to unauthorized person, data security controls are very useful, which can be implemented through operating system (OS), database security, access control programs, backup and recovery procedures etc.

C. COMMUNICATION CONTROLS

- With an increased use of the internet ,intranet and electronic commerce, communication controls have become all the more important.
- Various communication controls include,
 - Access control
 - Data encryption
 - Fire wells

3. ADMINISTRATIVE CONTROLS

It includes clear guidelines, policies of the organizations with regards to the use and deployment of IS resources are very important in protecting IS.

For Example, email policy, internet use policy, programming and documentation standards.

4.GENERAL CONTROLS

These control are implemented so as to ensure that ISs are protected from various potential threats

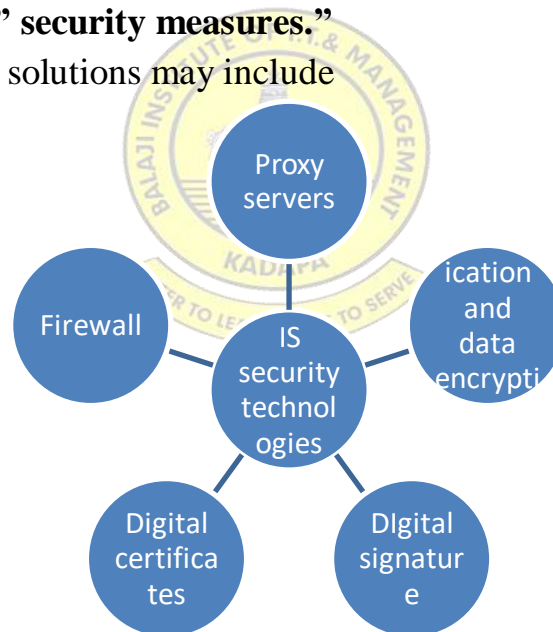
For example, system development controls such as budgeting schedule, quality etc.

5.APPLICATION CONTROLS

- These controls are usually written as validation rules.
- These controls are popular known as input controls, processing controls, output controls.

3.IS SECURITY TECHNOLOGIES

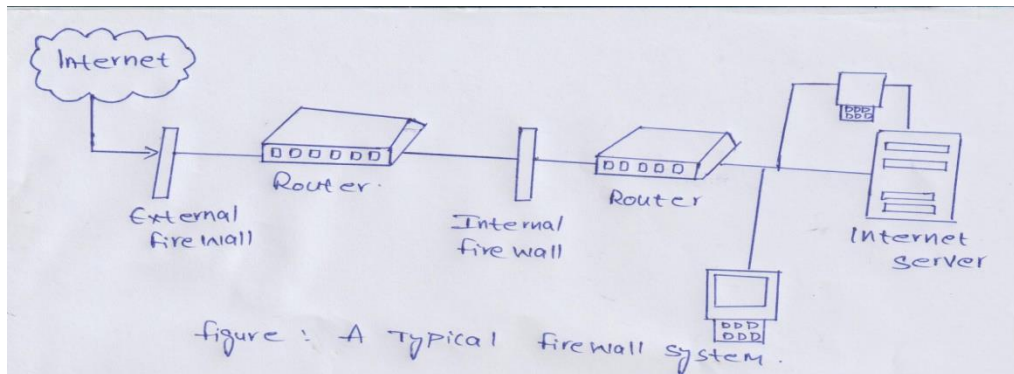
In order to protect the IS resources, organizations implement a number of technical solutions as” **security measures.**”
Some of the technical solutions may include



1. FIRE WALL

- A firewall is a system designed to prevent unauthorized access to or from a private network.
- Firewall can be implemented either hardware, or software or both that acts as gatekeeper and protects IS.
- Firewalls prevent unauthorized internet users from accessing private networks connected to the internet.

- Acts like watchman, will not allow any unauthorized user to access the server of an organization.



2. PROXY SERVERS

- It acts as a representative of the true server of an organization
- A proxy server is configured to look like a web server with the domain name of the true server of the organization.
- When any person from outside requests a particular webpage, the proxy server receives from the true server.
- Thus the person gets the information without getting in direct contact with the true web server.
- When business hires the services often ISP (internet service provider) the proxy server is often the one operated by the ISP.
- Both the organization network server and proxy server employ firewalls.

3. AUTHENTICATION AND DATA ENCRYPTION

- Authentication is the validation of a user's identity.
- For the authorized access, a user is given a password or PIN.
- The password is known only to the authorized person.
- ID cards, ATM cards, smart cards are the other access control measures, through which the user's identity is proved.
- Bio-metric access control (trending one)
- Authentication can be accomplished by senders and receivers exchanging codes known only to them.

ENCRYPTION:

- Coding a message into a form unreadable to an interceptor is called encryption.

- It uses mathematical algorithm to jumble information (coded) to be transmitted over the internet and then to decode the data offer it is received.
- The widely used encryption method uses a pair of public and private keys unique to each person.

For Example, a message which is to be set, could be encoded using a unique public key for the recipient that is known to the **sender**.

After the message is transmitted, only the recipient's private key could decode the message.

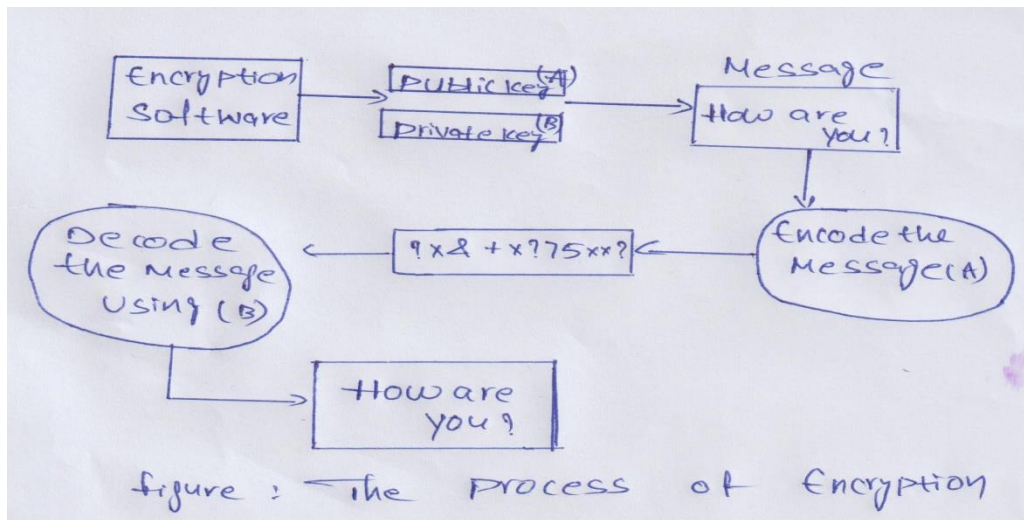


Figure : The Process of Encryption

4. DIGITAL SIGNATURES

A digital code (generated and authenticated by public key encryption) which is attached to an electronically transmitted document to verify its contents and the sender's identity.



- A digital signature, which is implemented with public-key cryptology, is created in two phases.
- First, the crypton programme uses a mathematical algorithm to create a message digest for the message to be transmitted.
- A message digest is similar to the unique finger print of a message.
- Then ,the software uses the private key to encrypt the message digest.
- This results into digital signature for that specific message.

5. DIGITAL CERTIFICATES

- It is like a digital signature which is used to authenticate the sender as well as content.
- Digital certificates are issued by organization which is then called a certificate authority.
- The information such as senders name, serial numbers expiration date and a copy of the certificate holder’s public key along with the digital signature of the certificate authority are stored on the digital certificate.
- There are many companies that sell digital certificates, for example American Express certificate authority, Digital Signature trust co, version inc, global sign NV, etc.

4. THE DISASTER RECOVERY PLAN

- As it is difficult or may be very expensive to avoid or control all disasters organizations must be ready to reduce the risk from the potential threats and manage on its own if some disaster happens.
- In order to minimize the business loss it is important that is services must be brought back to order or resumed as early as possible.

- Thus it becomes important for the organizations that they need to have disaster recovery plan in place.

4.1 THE DISASTER RECOVERY PLAN

It is a well-documented programme that provides detailed guidance and procedures to execute during and after a disaster.

It also lists the roles and responsibilities of the person involved in recovery, if IS resources go down.

4.2 STEPS INVOLVED IN DISASTER RECOVERY PLAN

STEP-1-Commitment of the top management

STEP-2-Sensitisation of all the employees

STEP-3-Appointment of business recovery coordinator

STEP-4-Establishment of priorities

STEP-5-Selection of a recovery plan

STEP-6-Execution of the selected plan

STEP-7-Review and updating of the disaster recovery plan.

STEP-1

- For the success of any disaster recovery plan, it is important that there is a strong commitment of top management.
- The plan requires a substantial amount of resources which must be properly budgeted and provided by the top management.

STEP-2

- IS security is not the sole responsibility of any one person rather it is the responsibility of the whole organization.
- Thus all the employees of an organization must be sensitized regarding the concept of IS security and their overall responsibility.

STEP-3

- There should be a team of persons drawn from all the departments of the organization, along with a coordinator, who should be responsible for the disaster recovery.
- The roles and responsibilities of the members and the coordinator should be clearly established.

STEP-4

- The committee should identify all the risks and then prioritize these risks so as to handle them as per their impact on the business.
- For example, the applications without which the business cannot conduct operations, should be given the highest priority and soon.

STEP-5

- The commitment should find out various recovery plan alternatives, which are evaluated by considering advantages and disadvantages in terms of risk reduction cost and the time required for an organization to adjust to the alternative system.
- On the basis of evaluation the recovery plan is finalized and selected.

STEP-6

Immediately after the recovery plan is selected it must be executed as the top most priority

STEP-7

The plan must be reviewed after a regular interval to consider the changing requirements so as to update the plan.

5. IS ETHICAL ISSUES

- Ethics may be understood as the principles of right and wrong that individual or society choose to guide their behaviors.
- Ethics, may be referred as publicly accepted norms of behavior for social engagement.
- Ethics may differ from one society to that of another society.
- Ethics should not be confused with the term legal (law).
- Any legal issue is decided by the system of justice of the country Where as ethics are not written down.
- The following ethical issues are of concern these days, which have been portrayed in figure,

1. Private data
2. Workplace monitoring
3. Power of IS professionals over other users.
4. Internet Challenges to privacy

1. PRIVATE DATA/PERSONAL DATA

- The IS are gathering huge data that may pertain to the employees, customers suppliers or any other stake holder.
- This data may be very personal to those people.
- For example,

- a. The hospital IS keep a record of the details of the diseases and the treatments of their patients.
- b. E-commerce sites capture personal details of a customer.
- c. E-governance sites such as Income Tax department, passport department etc, capture personal details of its citizens.
- d. HR IS collects a lot of personal and details of its employees.
- **The ethical issue regarding the private data** is whether this data relates to the person or to the concerned organization and thus whether the organization can use private data related to a person for its decision making/profit making.
- The answer to this relevant ethical issue varies from country to country.

It is important that the organizations as well the concerned governments of the respective country should have clear policies /laws in place so that the personal data may not be misused by the organization.

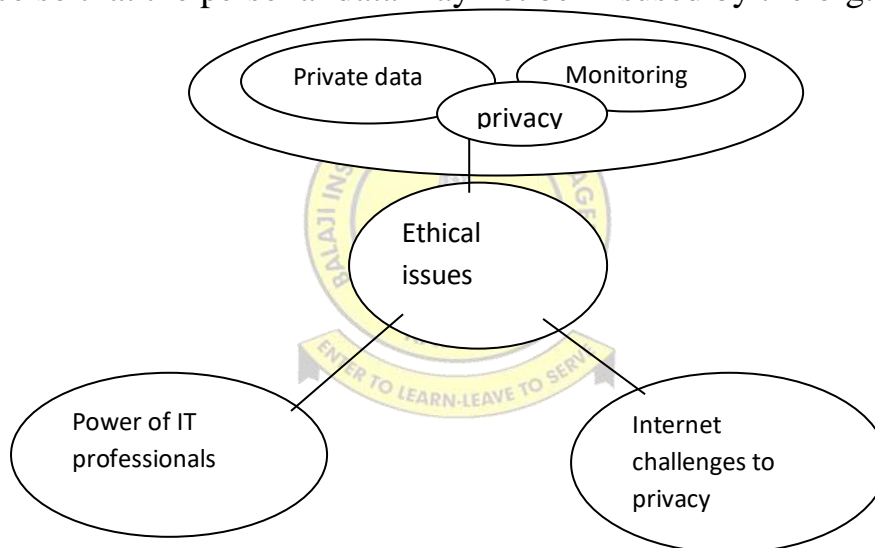


FIGURE: ETHICAL ISSUES OF INFORMATION SYSTEMS

2. WORKPLACE MONITORING

- Monitoring at the work place has been an established method of controlling the performance and the behaviour of the employees.
- The management of an organization argues that the employees are required to have a close watch and supervision so as to ensure the desired behavior from their employees that would in turn help to achieve the targets of the organizations.

However, the other school of thought on the workplace monitoring opines that close supervision leads to a loss of privacy and confidence of the employees.

- The increased use of IS has increased the scale and precision of monitoring of employees in the organization.

FOR EXAMPLE, the BPO companies digitally record and store the conversations of their employees to analyze whether the call was answered as per the prescribed norms.

However internet technology has posed new challenges for the workplace monitoring that has led to the loss of individual privacy.

THE FOLLOWING EXAMPLES ILLUSTRATE THE PRIVACY ISSUE

1. Some companies monitor employee e-mails and web surfing activities to minimize to wastage of their productive time during office time.
2. The movement of the employees is captured from the security systems that use swipe cards for opening the office doors.
3. The time spent by the employees may also be monitored from the log of the computer.

3.INTERNET CHALLENGES TO PRIVACY

- Cookies pose a great threat to the privacy of the users by using **cookie technology**, the websites can also capture data about the visitors without their knowledge's.
- Cookies are small files that are stored on a computer hard drive when a user surf the websites.
- For example, e-commerce (that the customer details)

4.POWER OF IS PROFESSIONALS OVER OTHER USERS

- IS are developed and managed by IS professional with technical knowledge and the users do not have this technical knowledge.
- It has been observed that IT professionals many a times influence the thinking of the other users and make them to listen to and agree to what they say.
- This is known as exercising the power of IS professionals over users.
- In still another situation, where the user is not aware of the power exercise, this would result into manipulation by the IT professional.
- However, if the user is aware and the IS professional is not aware of such a situation, then it may lead to the resistance of the user.

The ethical issues arise in situations where either party is unaware of the power exercise.

- Organizations should sensitize all the users as well as the IT professionals in the organizations. So that no one feels that they are being dominated by the other party.

6. SOCIAL ISSUES

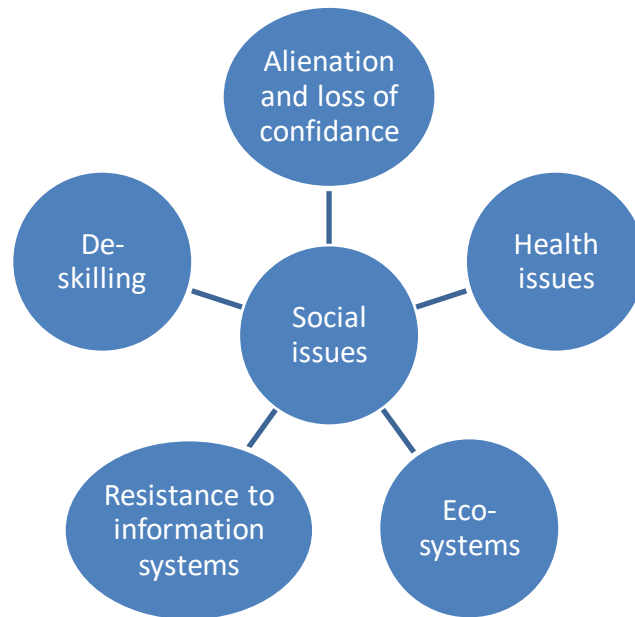


FIGURE: SOCIAL ISSUES OF INFORMATION SYSTEMS

- Information systems impact the individuals and the society in a number of ways.
- IS ,despite many benefits can damage our culture and society in a big way.
- Some of the negative social consequences of these IS are discussed as below as shown

- 1.De-skilling
- 2.Alienation and loss of confidence
- 3.Resistance to ISs
- 4.Health Risks
- 5.IT eco-svstem

1. DE-SKILLING

- With the new information systems in place the employees may be required to forget or unlearn some of the skills that were required to work with the manual or the old systems.
- This process of losing the skills because of the new systems is referred to de-skilling.

FOR EXAMPLE

- With the dependency of the children on the computer systems, their ability to calculate numbers is decreasing.
- Similarly, the employees who used to work with the new computerized IS, does not use their memory even for small things.

In order to develop the skills which are necessary for the overall development of the users, there should be more focus on improving the analytical and aptitude skills and thus more programmes need to be organized where the employees find challenges in solving problems requiring mental and logical abilities.

2. ALIENATION AND LOSS OF CONFIDENCE

- As the people start doing more tasks using IS, they may not be doing tasks that require meetings and discussions with people.
- Slowly, their interactions with the colleague's would decrease.
- Even it may lead to spending of their lesser time with the family member's, friends etc.
- It results alienation among individuals IS and the lack of socialization may lead to loss of confidence among the individuals.

So in order to overcome this problem organizations should develop more programs or organize social events so as to increase the interaction among the employees.

3. HEALTH ISSUES/HEALTH RISK

- Working with IS for long hours leads to several health issues. Like **back pain, eye strain, posture problems, wrist injuries, mental stress**.
- So in order to overcome these problems organizations should design the equipment and the supporting furniture, so as to take care of the convenience and comfort of the users.
- Wellness programmes can also help taking care of the employee's health.

4. IT ECO-SYSTEM (ENVIRONMENT)

- The information technology ecosystem **comprises hardware, software, computer-embedded machines, networking equipment**.
- For developing and using of these IS, many human activities such as **Research and design, production, assembly, packaging, transportation, retailing** are required to be executed.
- The end users also engage in activities such as **using, buying, and eventual disposition of IT components**.

- Refresh cycle for IT equipment is relatively short, At the same time the users want to constantly update their equipment with newer, fancier once even though the older equipment is often still working (example, smart phone, laptop etc.)
- All new above problems create environmental problems and thus are significantly affecting the natural ecosystem of this planet.
The disposal of all the unneeded electronic devices, which contain a lot of toxic substances, creates huge problem due to toxic chemicals contained in its hardware.

So to overcome this problem, the manufacturing companies need to focus on developing efficient technology products, keep e-waste out of landfills and adopt recycle and reuse programmes.

- Awareness programs (helpful tips on how to serve energy)
- A social movement is needed to encourage all organizations and individuals for judicious use of IT products.
- People should be awarded that any unnecessary use of IT products causes energy waste, environmental pollution and depletion of natural resources and emission of CO₂

5. RESISTANCE TO IS

- Generally ,it is found that whenever an organization wants to implement a new IS, it is resisted by the users.
- This resistance is because of
 - a. Fear of loss of job
 - b. Fear of loss of authority
 - c. Changed social relations
 - d. Fear of learning new technology
- Organizations should not forget that the biggest enable of an IS are the people.
- The social/behavioural aspects of the IS are required to be understood properly before the implementation of IS.

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IF YOU WANT TO SHINE LIKE A SUN FIRST BURN LIKE A SUN

(17E00106) MANAGEMENT INFORMATION SYSTEM

PREVIOUS YEAR QUESTIONS

UNIT-1

1. Explain the scope and characteristics of MIS? (**dec-2017-regular**)
2. Discuss about the role of MIS in global business environment? (**dec-2017-regular**)
3. Define MIS? explain different stages of system development? (**dec-2017-supply**)
4. Enumerate the importance of management decisions? (**dec-2017-supply**)
5. Describe three ways in which IS are transforming business? (**june-2014**)
6. What is IS? What activities does it perform? (**june-2017**)
7. What is MIS? Explain how MIS helps in improving business decision making? (**dec-2016**)
8. Explain IS architecture. Explain the significance of quantitative analysis in decision making? (**dec-2016**)
9. Explain the importance of information for managerial decisions? (**dec-2015**)
10. Discuss the architecture for IS in any organizations? (**dec-2015**)

UNIT-2

1. Explain the modern approaches of DBMS? (**dec-2017 regular**)
2. Briefly discuss the features of data warehousing? (**dec-2017-regular**)
3. Discuss the hierarchy of IS? (**dec-2015**)

UNIT-3

1. Explain about role of MIS in decision making? (**2018 supply**)
2. Explain the components of SCM and DSS? (**2018 supply**)
3. Explain the components of ERP and CRM? (**2018 regular**)
4. Explain about business intelligence and knowledge management systems? (**2018 regular**)
5. Write a note on (**2017 supply**)
 - a. DSS
 - b. Knowledge work systems
6. What are the concepts and characteristics of DSS? (**2015 regular**)
7. What is the importance of artificial intelligence for management decisions? (**2015 regular**)

UNIT-4

1. Write different phases of SDLC with proper explanation? (**2018 supply**)
2. Explain about product and process based MIS evaluation? (**2018 supply**)
3. Discuss about system development models? (**2018 regular**)
4. Explain the steps in cost/benefit based evaluation? (**2018 regular**)
5. Write about SDLC? (**2017 supply**)
6. What are the activities required for maintenance of MIS? Explain. (**2017 supply**)
7. What is system development methodology? (**2016 supply**)
8. What are the different stages of SDLC? (**2016 supply**)
9. What are the techniques of assessing value and risk of IS? (**2016 supply**)
10. Discuss brief system development approaches? (**2015 regular**)
11. What is the process of cost and benefit analysis during system validations? (**2015 regular**)

UNIT-5

1. Discuss about IS security technologies? (**2018 supply**)
2. Explain about disaster recovery plan in detail? (**2018 supply**)
3. Explain about recent trends in IS security threats? (**2018 regular**)
4. Discuss about IS ethical and social issues? (**2018 regular**)

EXPECTED QUESTIONS – MIS (17E00106)

UNIT-1

1. Define MIS? What is MIS and overview of MIS? What are the different types of management? what are the functions, Components and benefits of MIS?
2. What is the need for MIS and Explain IT nature and scope of MIS?
3. What are the characteristics and structure of MIS?

UNIT-2

1. Explain the Modern approaches of DBMS?
2. What are the different types of Data Models?
3. Discuss the features of data warehousing and data Mining and Differentiate them.

UNIT-3

1. Explain the Concepts and Characteristics of DSS? What are the types of decisions? What are decision support techniques?
2. What is decision making and role of MIS.
3. Write a note on a)Business Intelligence
b)Knowledge Management System

UNIT-4

1. Explain Project Planning.
2. Write about SDLC and System Development Models.
3. What is Evaluation? Explain Product based Evaluation, Process based evaluation and cost/Benefit based evaluation.
4. Briefly explain System Maintenance.

UNIT-5

1. Discuss about IS security threats and IS security technologies.
2. How do you protect IS.
3. Explain the disaster recovery plan.

ALL THE BEST

THE PAST CANNOT BE CHANGED.THE FUTURE IS YET IN YOUR POWER