Planning and Implementing challenges of Information System →

● Planning for Information System Development

- The life cycle of system vary greatly in terms of length.

- The first four phases of this cycle may be termed the 'system investigation' phases.

- The large and medium sized organizations usually have full time systems investigation specialists including programmers and analysts.

- A system investigation is a project that involves people working together toward the common goal of improving the information system.

(a) Feasibility Study :→

- The systems development is a costly process therefore the systems investigation stage requires a preliminary study called a feasibility study.

- A feasibility study is a preliminary study that investigates the required information for prospective users, resources required costs, benefits and feasibility of proposed projects.

1. **Technical Feasibility :→**

• It evaluates whether equipments and software are available (or, in case of software, whether it can be developed) that have the technical capabilities required by each alternative design being considered.

• It also consider the interfaces between the existing systems and the new system.

   For e.g. components that have different circuitry specification can not be interconnected and software programs can not pass data to other programs if they have different data formats or coding systems, such components and programs are not technical compatible.

• It also deal with whether the organization has personnel who posses the technical expertise required to design, implement, operate and maintain the proposed system.

• If the personnel do not have these skills, they may be trained or, new employees or consultants may be hired who have the expertise.

2. **Economic Feasibility :→**

• Economic feasibility studies involves an analysis of the costs and benefits associated with each project alternatives.

• With cost-benefits analysis, all costs and benefits of acquiring and operating each alternative system are

clintified and a comparative statement is prepared.

(i) The expected costs of each alternative are compared with its expected benefits to ensure that benefits will exceed cost.

• Then the costs / benefits ratio of each alternative is compared with the costs -benefits ratios of the other alternatives to identify the alternative that is economically the most attractive.

(ii) Also the comparison is made about whether the organization could spend its money other than on systems project.

3. Operational Feasibility : →

• operational feasibility involves a determination of probability that a new system will be used as intended. Few major aspects of operational feasibility are considered.

(i) New system can be too complex and huge for the organization's users or the operators of its system
• If it is, users can / may ignore the new system or they may use it in ways that cause errors or system breakdowns.

(ii) The possibility of resistance in implementing a new system must be carefully explored.

• The resistance may be experienced because of fear of displacement, interests in old system etc.

(iii) A new system may introduce change too rapidly to enable personnel to adapt to it and accept it

(iv) The probability of subsequent system obsolescence.

4. Organizational Feasibility :→

• The organizational feasibility studies involves considerations about how well a proposed information system supports the objectives of organization and its strategic plan for information systems.

   For e.g. projects that do not directly contribute in meeting organizational strategic objectives are not funded.

• The important aspects of technical feasibility study, economic feasibility study, operational feasibility study and organizational feasibility can be summarized as —

1. Technical Feasibility
→ Equipment, interface, hardware
→ software, Technical expertise

2. Economic Feasibility
→ Cost-benefit analysis
→ Cost saving, increased revenue
→ Profit making, Decreased investment

3. operational Feasibility
→ Usefullness of system, complexity
→ Resistance in implementation
→ System obsolescence

4. organizational Feasibility
→ supporting organizational objectives
→ Strategic Plan.

Cost - Benefit Analysis :→

- Feasibility analysis mainly involves cost-benefit analysis.
- Some costs and benefits can be easily quantified, such cost and benefits are called tangible.
- When the costs and benefits can not be quantified they are called non-tangible.
- Quantifiable benefits are of two types -

  - Direct revenue :- hardware, software, salaries

  - Cost saving :- decreased operating costs

- Intangible costs are difficult to quantify. These are often related to the quality of information provided by the system and the ways in which information affects the organization.
- Examples of intangible costs loss of customer goodwill, employee morale.
- Tangible benefits are favourable result e.g. decrease in salaries, decrease in inventory costs.
- while intangible ~~XXXXX~~ ~~XXX~~ benefits are difficult to estimate e.g. better customer service, better managerial information.

Tangible benefits	Example
Improvement in profit	Development of product and service
Decrease in information processing cost	Reduction in unwanted processes
Decrease in operating cost	Reduction ~~~~ in inventory costs
Increased efficiency	Improved production process, less wastage

Intangible benefits	Example
Information availability	Fast and accurate information
Improved customer service	Excellent service response
Improved employee morale	Better amneties and working condition
Improved management decision making	Efficient MIS and decision support system.

(b) System Analysis :→

- several activities of system analysis are extension of step used in conducting feasibility study.

- Similar information gathering methods are employed along with some new tools.

System analysis is detailed study of end user Information requirement for producing functional requirements.

• functional requirements are used as the basis for designing new information system. Primarily system analysis involves study of :

- Information needs of end user and organization
- Activities, resources and products of IS.
- Capabilities required by information system.

To cover entire study of system analysis three major types of analysis are carried out -

(1) organizational analysis
(ii) Present system analysis
(iii) functional requirement analysis

(1) <u>Organizational Analysis →</u>

• In this the development team members are introduced to :-

- management and organization structure
- organization environment
- organization employees
- environment system of dealing companies

• while developing the information system the team members must consider the background of above related
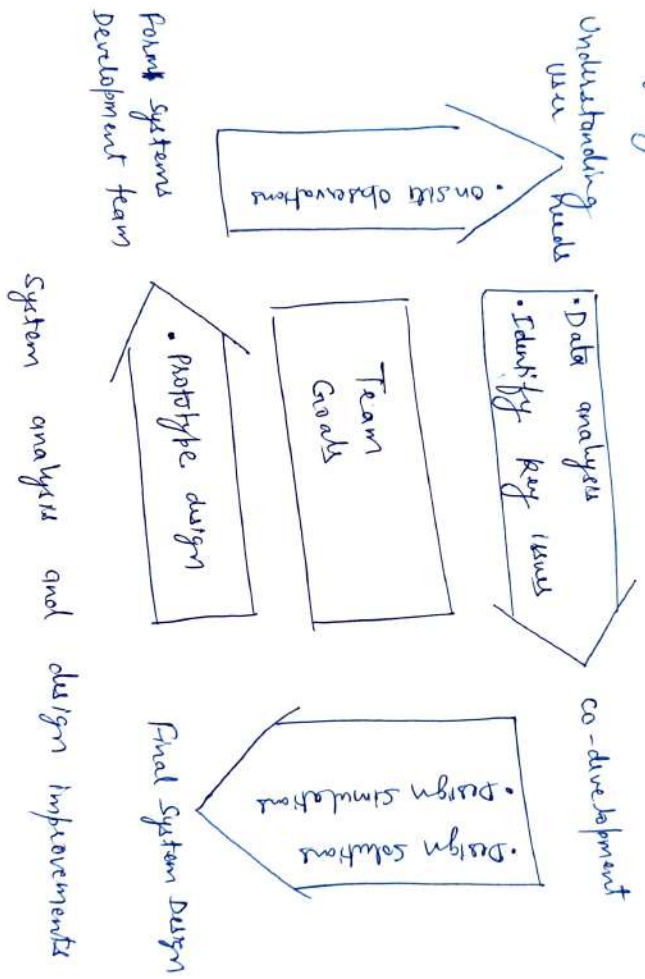
Information.

- This will affect the need or improved Information system being proposed.

- For example, inventory control system for big organization can not be designed unless development team knows its production process and activities.

- This is the reason why same end user is added to a systems development team.

(ii) Present System Analysis :→

- The purpose of present systems analysis is to examine its existing information system.

- This examination includes the assessment and documentation of the system :-

1. The total number of transactions of each type.

2. Use of hardware, software, network and people resources to convert data.

3. Normal-period, peak-period and seasonal usage and variations of usage.

4. The activities of information systems i.e. input, processing, output, storage and control.

5. The percentage of system capacity utilization.

6. Error, error rates and trends.

The type and format of documents and reports.

8. The timing, volume and quality of inputs.

9. The reliability of system e.g. frequency and malfunctions.

10. People problems that affect the operation of the system.

Five major activities in analyzing any system and designing are illustrated in below figure.

Understanding User Needs

→ • On-site observations

• Data analysis
• Identify key issues

Team Goals

• Prototype design

Focused Systems Development Team

System analysis and design improvements

Co-development

• Design solutions
• Design simulations

Final System Design

(ii) Functional Requirements Analysis : →

- Functional requirements are end user Information requirements
- The functional requirements are not tied to any resources like hardware, software, network data and people.

- Functional requirement involves following points :-
  - Types of information required for each group.
  - The format, volume, frequency and response time for the information.
- Information processing capacity of the system.
  - Information processing requirements by different functional groups are summarized in following table.

Groups	Functional Requirements
User Interface	Input/output formats, volumes, contents and frequency of input and output
Processing	Activities required for processing, Calculations, decision rules, capacity, response time etc.
Storage	Organization, size of databases, updating, record retention, security
Control	Accuracy, validity, safety, input process-ing, output and storage

- System requirements reports serves as the guide for system designing activities.
- Typical example of functional requirements for a sales transaction processing system are mentioned here :-

1. User Interface Requirements : - Automatic entry of product - Easy to use data screens

Processing Requirements :-
- Total sales calculation
- Total sale tax calculation

3. Storage Requirements :-
   - Storage of data
   - Retrieval of data
   - Product sales history
   - Price list

4. Control Requirements :-
   - Data error
   - Easily readable receipts

(c) System Design :-

- With an understanding of the existing system and the requirements for the new system can be designed.
- System design is the determination of the process and data that are required by a new system.
- System design involves activities that satisfies the functional requirement of system being developed.
- Three major activities of system design are :
  (i) User Interface design
  (ii) Data design
  (iii) Process design
  (iv) System specifications

(1) User interface design :-

- User interface design involves the interaction between user and the computer applications.

- The user interface designs, considered the most efficient and convenient way of input and output.

- The user interface enables the user to interact with the system by entering instructions and information in the system.

- The instruction specify the parameters that guide the system through its ruaning process.

  The input methods can be menus, commands, natural language and customized interfaces.

- The user interface design process produces detailed design specifications for information products.

- The import tips while designing an user interface for a business applications are :-

  – Keep it simple
  – Keep it clean

  – Organize logically.

(ii) Data design :-

- Data design activity involves the design of structure of data bases and data files proposal to be used by the information system.

data design is detail description of following :-

characteristics of entities. (objects, people, places or events about which the information system is to develop.

2. The inter-relation of these entities

3. The data related with each entity

4. The rules of data integration for the information system.

(iii) **Process Design :→**

- It is design of software resources required for information system.

- Software resources mainly involves programs and procedures of information system.

- The process design must ensure the need of user interface, data design specifications and also the functional requirements.

- Software process design constitute of three major processing services.

1. **User services :-**

- User services are front end client software which communicates with user through GUI.

2. **Application services :-**

- Application services includes software modules to enforce business rules, process information and execute transactions.

- Application services are installed on client and server.

3. Data services :-

- Here the data is made available to the application services software for processing.

- The data services are usually performed through database management system.

(iv) System specifications :→

- System specification indicate the user interface methods, database structures, processing and control procedures.

- Therefore, system designer specify the hardware, software network, data and personnel specification for the proposed information system.

- The expertise of system analysts is used for this purpose. The system specification / designer specifies the process of conversion of resources into information products i.e graphs, displays, documents.

Following important characteristics are to be included in system specification of an information system.

1. User interface specifications :-
  - contents, format, user interfacing sequence, display methods audio / visual / interactive, forms, documents, reports.

2. Database specification :
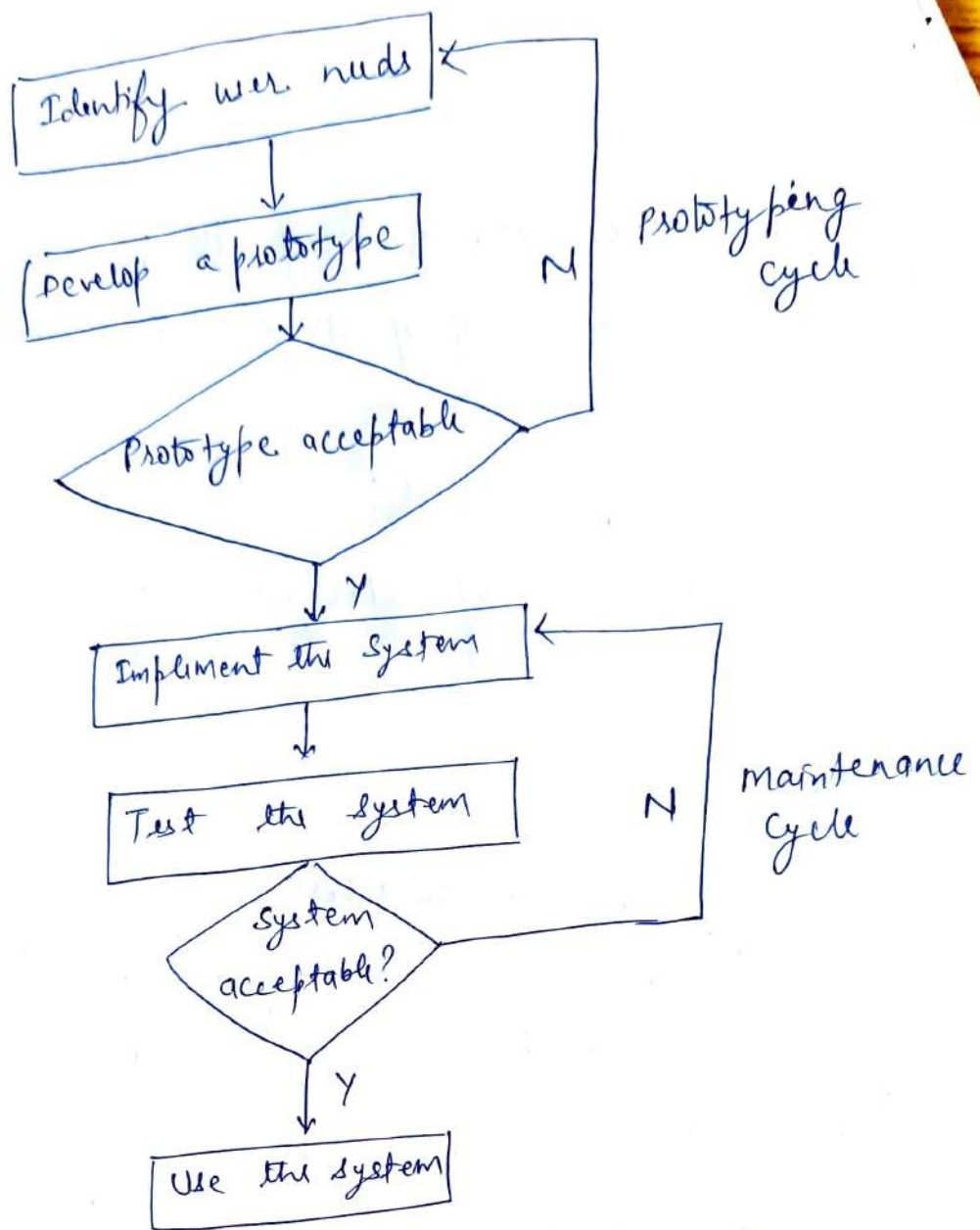 - contents, structure, data access, response, maintenance of data.

software specifications :
- Programming specifications, control specifications, performance specification.

4. Hardware and network specification :-
- The configuration specifications, performance characteristics of network.

5. Personnel specifications :
- The specifications of persons who are supposed to opera-te IS.

(d) Prototyping :-

- A prototype provides developers and potential users with an idea of how the system in its completed form will function. The process of producing a prototype is called prototyping.

- Making a prototype is an attempt to save development effort by eliminating an extensive and systematic approach to the analysis, design and implementation phases.

- The first version of the prototype system provide approximately the information sought and users experiment with using the system.
   As they gain experience with the system they use this experience to formulate additional information and system needed, and the designers alter the system accordingly.

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        │ Identify user needs │                 │
        └─────────────────────┘                 │
                   ↓                             │
        ┌─────────────────────┐          Prototyping
        │ Develop a prototype │      N      cycle
        └─────────────────────┘                 │
                   ↓                             │
            ╱─────────────╲ ────────────────────┘
           ╱ Prototype     ╲
           ╲ acceptable    ╱
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        ┌─────────────────────┐ ←──────────────┐
        │ Impliment the System│                 │
        └─────────────────────┘          maintenance
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        ┌─────────────────────┐      N          │
        │ Test the System     │                 │
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            ╱─────────────╲ ────────────────────┘
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                   ↓ Y
        ┌─────────────────────┐
        │ Use the system      │
        └─────────────────────┘
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Application development using prototyping

- Prototyping helps system analysts in developing process faster and easier, therefore it is sometimes called as Rapid Application Design (RAD).

   RAD is an integral part of information engineering and is an integrated set of strategies, methodologies and tools that exists within information engineering

   This changes the roles of end users and information systems specialists.

. Figure shows how prototyping combined the
steps of the systems development cycle and
changes the roles of information systems specialists
and end users.

(i) Prototyping process :-

. Prototyping process can be employed for both large
and small applications. A prototype of a business
application can be developed quickly using various
application development packages.

. The prototype is then repeatedly improved until it
is accepted by end user.

. As discussed, prototyping is an iterative, interactive
process of various steps of development cycle.

. It is modified several times until the end user
finds it acceptable.

. For small systems, prototyping can replace the
system Development Life Cycle (SDLC). For large
systems prototyping is incorporated into SDLC.

Life Cycle Phase	Step
Planning	Define problem and set objective
Analysis	Define information needs
Design	Prepare detailed system design. Evaluate alternative system configuration
Implementation	specify the h/w and s/w resources
Use	Maintain the system.

system life cycle where prototyping can be used

(ii) Benefits of prototyping :→

- End users and information specialists both requires prototyping for the following reasons:

- Prototyping improves communication between systems analyst and end user.

- System analyst can understand better the user needs.

- The user plays a more active role in system development.

- The information specialists and the user spend less time and effort in developing the system.

- Implementation is much easier because the user knows what to except.

    Above advantages enable prototyping to cut developmental costs and increase user satisfaction with the system.