according to analysis req.

Course code: CSC 315

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SYSTEM ANALYSIS AND DESIGN

✓ System analysis is study of problem domain to recommend improvements and specify requirements for solution

✓ System design Construction of technical computer-based solution from system analysis requirements.

✓ Systems are created to solve problems.

✓ Before system is created, there must be a problem.

✓ Cause of action

- leave things as they are
- Upgrade current system
- Develop new computerized system.

- Incase of new system, analysis start.
- Analysis is specified mostly on studying ~~new~~ old system to avoid same weakness. to know what new system will accomplish
- Then new system is designed
- Estimation of cost is done
- Input, output and processing specification is defined
- Immediately after design, Implementation start.
- Implementation - Actual programming and testing of new system.
- New system is ~~into~~ installed ready for operation
- The system is monitored to make sure its working well if not, changes are done.
- Technology may make the system to be changed and thats the life cycle of system.

✓ Interaction
✓ Intergration
✓ Interdependent
✓ Organization

Importance of studying System analysis and design.

> To know the management of Industries' property and, employees and capital

> Systems are developed to solve problems.

> " " " " seek what pple want to analyze.

> SAD is used to analyze, design and implement other systems.

>

NB Installing System ē Proper planning may lead to its fail.

→ System work ī each other together

→ Organized components make system.

→ Interaction ī each other.

→ Depend on each other.

Intergration
Organization
Interaction
Interdependent

Characteristics of system.

1. Inter-dependence → They depend on each other
2. Interactivity - manner in Wh systems interact ī each other.
3. Organization - Systems are made of organized components to achieve its goal.
4. Intergration → System works together within itself.
5. System hv common objective

Interactive - ī each other
Interdependent - dep each other
Interpated - in itself.

O - organ
I - interd
I - interg
I - inte

Elements
- input
- output
- Process
- Control
- feedback

Properties
> Environment - external
> Sub-system - small
> Interface - inter-con
> Boundary
> Control - monitor

40 40 50

System is collection of interrelated components working together to acheive certain goal.

- System receives input and transforms into output.
- Orderly group of independent components according to a plan to acheive particular functionality

Goals of Business system.

- Profit
- Improve quality of product

* System is designed to abheive pre-determined objective.

Example of a System.

- School system.
- Bis system.
- UNIVERSITY System. < manage users >

i. Administrators
ii. Lecturers
iii. Support staff

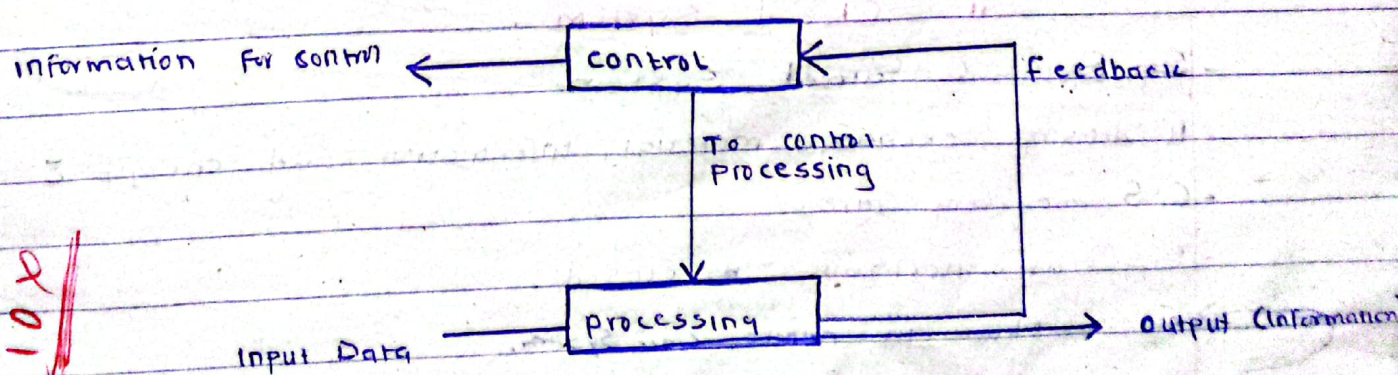
} purpose to model youth to be good citiz

Elements of system. < 3 main components > Input - Process - output

* Input - what is entering machine to be processed.
* Processing - converting input to output
* Output - Transfering processed information to their destination.

NB well-designed system also hv other elements called, control. that provides feedback to acheive desired objectives.

* Among components, interrellation is mostly required



- Feedback is data about system ~~analysis~~ performance.

To avoid failures of system, make sure the system is well planned before installation

Solve Prob
Do beyond
analyze & design
imp other system

Process } Major.
output
control } Minor.
feedback

information abt sym performance

Inter-dependency
Interactivity

Properties of System.

1. **Control** · <monitoring ~~and~~ evaluating feedback (to make sure system is doing its work)>
- Monitoring feedback to make sure system is moving toward acheivement of goal.

2. **Boundary and Environment** <provide input and receive output>
Anything around and $\bar{\bar{c}}$ system its, it's environment.

3. **Subsystem** < each subsystem hv its boundaries
The smaller systems making up larger system

4. **Interface**
- This is interconnection of subsystems
- No. of interconnections:

$$\frac{n(n-1)}{2}$$

Properties:
✓ control
✓ Environ.
✓ Sub-
✓ inter

Types of System.

1. Open System.
2. Closed system.

I Open system. ✓ supervised by pple

- This is system ~~th~~ interacts $\bar{c}$ its environment.
- Open system doesn't hv its own control thus it doesn't supervise itself.
- Its supervised by people.

II Closed System.

- ~~Sy~~ Self-Contained System.
- It doesn't exchange material, information and energy $\bar{c}$ environment
- C.S are very rare.
- C.S are normally ~~as~~ closed.
- Are abstract in nature < acc System.

III) Conceptual and Physical System.

IV) An abstract or Conceptual System.

- This is Orderly arrangement of Independent Ideas

- These are concerned ~ theoretical structure Th may or may not have counterparts in real world.

= Accounting System.

Hard — Goals are clearly defined and predictable

Not clearly defined and predictable — Etc.

VI Physical System.

- Concrete operational System made up of pple, material, machine energy and other physical things
- They can display activity and behaviour.

= Management Information System <MIS>

pple + Data + processing, information tech to support day to day bs

VII Deterministic and probabilistic System.

Deterministic System.

System Th operate in predictable manner.

* If one can predict the state of system at a given time ~ error, its called deterministic system, if ~~for~~ it can't be predicted its called probabilistic system. <unprobabilistic>

predict state of system at given time ~ error, its called deterministic

(*) in computer system - output is deterministic while Economic forecasting system and inventory system are ~~probabilistic~~ Probabilistic

VII Hard System. <clearly defined Goals and objectives are clearly defined>

Goals and Objective

- These are systems ~~Th~~ whose goals and objectives are clearly defined and predictable outcomes>

* Stock control System. - Easy to know stock level and reorder.

VIII Soft System. <No clearly defined goals>

- Systems in Th goals and objectives are not clearly defined.

* Sales tracking System

pple, data and information tech — To support daily bs activities.

IX Information System.

- Arrangement of pple, data, processes, and information technology to support day to day bs

Information presentation

pple + data + infor tech interacting to collect, process store data

> Deterministic → you can predict stage of system.

objective + goal

(Soft + Hard) → Environment

open / closed

7/7/17

> I.S helps org to compete and gain

Operation and Solve prob.

Components of Information System

1. People resources.

- The pple are mostly required in IS
- End users and IS Specialist.

End users → Users / clients Caccountants, Salesperson ---

IS Specialist - IS developers.

2. Hardware resources. Lapii, ---

Physical materials used in IS.

3. Software resources.

- All information processing instructions.
- Programs and Procedures: controlling hardware

i. System Software

Program Th support operation of computer.

ii. Application Software. <payrolls programs>

iii. Procedures.

Operating instructions for pple who will use IS

iv. Data resources.

i) Database - Holds processed and organised data

ii) Knowledge base - Holds facts, rules or bls

v. Network resources.

For IS to work effective, you have to have internet, extranet ---

Software resources
> Application System
> System software
> DB

Open source I.S -

~~Pro-priotory I.S~~

Commercial software.

5 Data

6 Processes - Tasks users perform to acheive results

- Telecommunication networks like internet, extranet, intranet are essential to all successful operations.

Types of ~~Telecommunication~~ Information Systems.

They are classified in.

1. Mode of processing
2. Nature of interaction of system to environment
3. They of function supported by system.
4. System objectives

1. Mode of processing

1. Batch processing System. <payroll>
   - Transaction is collected as they occur but processed periodi
2. Online system.
   - Transaction is done by online data entry devices.
   - Devices under CPU control.
3. Real time system.
   - Data capture and processing is done in real-time
   - Airline reservation system.
4. Distributed system.
   - Any system using more than one computer or processor to run application

Aged

Data resources
Database - Store data
Knowledgebase
Store rules
Face

Data
Database
Knowledgebase

Real time
Batch
mode
80
INT

TPS

→ Environment
→ Function
→ Objective
→ Processing

2 System objectives.

1. Transaction Processing System. (TPS).
   - Systems to capture and process data abt bis transaction.
   - They process transaction to update records.
   - Payroll - - -

12
10
22/61 ×100

$1

12 — 30 — 51

61 95
34 14

- Office system
  - Include Spreadsheet, email, database.
  - Classified as knowledge - level system

- Knowledge work system:
  - Used by technical and proffesional staff. and include.

- Management information system (MIS).
  - They condense and convert Transaction Process Systems' data to information for monitoring performance and managing Organization.
    (TPS — Information)
  - They provide management oriented report.
  - Ex- Trading profit and Loss Accounts.

Desicion Support System. [DSS].
- Provide use to Decision oriented information. wherever decision making situation arises.
- Their ~~pup~~ objective ~~to provide decision~~ support managerial decision.

Executive Information System. EIS.
- Mostly for executives of organization to make high unstructured decision.

Expert System ES.
- Programmed decision making information system that capture and reproduce knowledge and expertise of expert problem solver.

3 Based on function. It support.

1. Finance and Accounting Systems.

- Systems to maintain records flow of funds in firm and produce financial records.
- Cash management System, Loan mngmt System.

2 Human Resource System.

- Deals to Replacement, Compensation, Recruitment and Performance evaluation of ~~employee's~~ firm's employee.
- Applicant Tracking System.

3 Sales and marketing System.

- System responsible for Selling product and Service

4 Manufacturing and ~~Management~~ production System.

- Responsible for producing firm's good and services.
- Also deal to planning dvpnt and maintanance of production facilities.

- Functional
- Objective
- mode

- Mode - Online, DIS,
- Objective - Knowl, MIS, DSS, GIS,
- Function - Acco

3

INFORMATION SYSTEM BUILDING BLOCKS:

Information System architecture - provide unfying framework in which pple can organize and view fundamental building blocks of information system.

- 3 IS building blocks.

1. DATA: Raw material for information.
2. PROCESS = Activities carried out including management.
3. INTERFACE = How system interface T its users and other information system.

* DATA BUILDING BLOCKS:

- Data is raw material for information.

* DATA REQUIREMENTS.

Representatives of users data in terms of entities, attributes, relationships and rules

- Shld be independent to technology.

* PROCESS Building block.

- This delivers ~~the~~ functionality of information system.
- Pple, machine (computers) perform processes.
  - * Sales, Services, Shipping.

* Since process is activity that respond to event, its govern by:

  1. process requirements.

- Users expectations) of process requirement for process

2. Policy.

Rules governing process

procedure - step by step instructions

Workflow - flow of transaction to ensure there's appropriate check and approvals are implemented.

Communication building blocks.

concerned;

Who - Th user, employee, customer must interact c system?

what - other I.S will the hv to interact c

where - location of units, employees, customers

Interface Specification:

Shows how users interact c other systems

user dialogue.

Specification on how user move from window to window or page to page

Information Systems Development:

System life cycle:

System dvpnt, operation and maintainance.

Development.

- Formalized approach of system dvpnt process, and improve information system and software.

Representative system dvpnt methodologies

1 Architected Rapid ~~Development~~ Application Development Architected (RAD)

2 Rapid Application Development (RAD)

3 ~~eXtreme Engineering~~ X

3 eXtreme Programming (XP)

4 Information Engineering (IE)

5 Rational Unified Process (RUP)

6 Joint Application Development (JAD)
7 Structured Analysis and Design
8 Dynamic System Development Methodology (DSDM)

Principle of System Development

1 Get system user involved
2 Use problem solving approach.
3 Establish phase and activities
4 Document through development.
5 Divide and Conquer.
6 Establish Standards.
7 Document through Development.
8 Manage process and project.
9 Justify system as capital investment.
10 Don't be afraid to cancel or revise scope.
11 Design system for growth and change.

Use a Problem-Solving Approach.

1 Study and understand problem. (context and impact)
2 Define requirements to meet any solution.
3 Identify best solution.
4 Design and Implement ~~best~~ chosen solution
5 Observe solution impacts.

Establish Phase and activities

* Projects are diff according to size, complexity, methodology route.

* Phase occur in parallel.

Manage Process & Project.

1 Process management → ongoing activity that document, manage, oversee, chosen methodology.

2 Project Management → process of scoping, planning, staffing, directing and controlling project.

To:

DVP System at:

* Minimum cost
* Acceptable quality
* Specified time frame.

Justify Information System as Capital Investment:

1. Cost-effectiveness.

Striking balance b/w lifetime cost of dvping, maintaining and operating I.S and benefit derived from it.

2. Strategic Information System plan.

3. Strategic enterprise plan.

Don't be afraid of cancelling or revising scope

- Creeping Commitment - Re-evaluate risk of project throughout.
- Adjust project budget and deadline accordingly.

& Risk management - process of identifying, evaluating, and controlling what might go wrong in project before it b/c threat to whole project

Threats

Where do System Dvnt Project come from.

Problem - Undesirable situation which may make or prevent organization from achieving its goal.

2 Opportunity - chance to improve organization.
3 Directive - New requirements imposed by mngnt, gvnt, external influence.

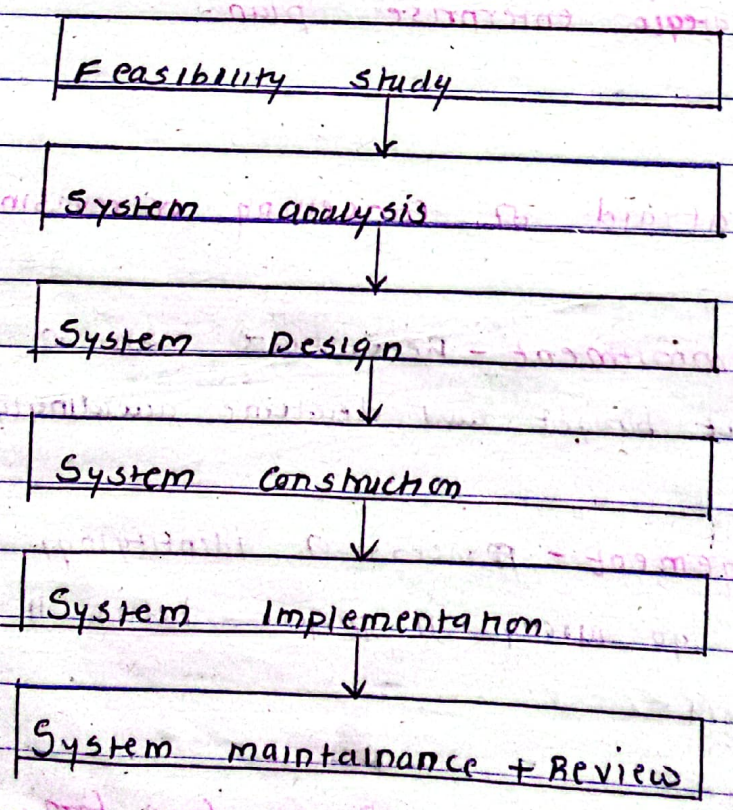
SOFTWARE DEVELOPMENT LIFECYCLE:

Developing system is large project.

Phases.

1 Identify project.
2 Feasibility Study.
3 System analysis.
4 System design.
5 System construction.
6 System Implementation.
7 System maintainance and Review

Phases of System developing.



- ~~The current stage Dep~~
- The sequence must follow each other.

1 Feasibility — Technical. Cost. → Requirement Specification

- b4 project start, first find wether its feasible or not.
- Feasibility looks at, cost, technical personel and ways to dvp system.
- After feasibility there's feasibility report (New). It summarizes to give way forward. It contains detailed Investigation
- If new project is to replace old project, its easy to study in depth of one and check on weakpoints to change.
- its simple to find new features to be included as well.
- Output of this is Phase called, Requirement Specification (Replace).

2 System design

- This phase take requirement specification and converts them to System Design Specifications
- It involves design of input, output, Database, comp prog, user interface.
- its divided into:
  1. Logical design.
  2. Physical design.

+ Logical design - concentrate on bis aspect of system and theoritical Indpendent of any hardware / Software.

+ Physical design - takes logical design specification and apply them on Implementation environment.

- Programing lang. is decided in this ~~face~~ phase.

System construction.

+ Where System is actually ~~bard~~ build.
- System specification is turned into working system by; writing, testing and documenting
- Once individual ~~sy~~ program is tested, whole system need to be put in test as well.

Output of this phase consist of detailed Program and file Specification. Th in total describe how system will work.

System Implementation:

- Its objective is to produce fully functioning and documented system.
- It involves putting new system in operation. "Going live"

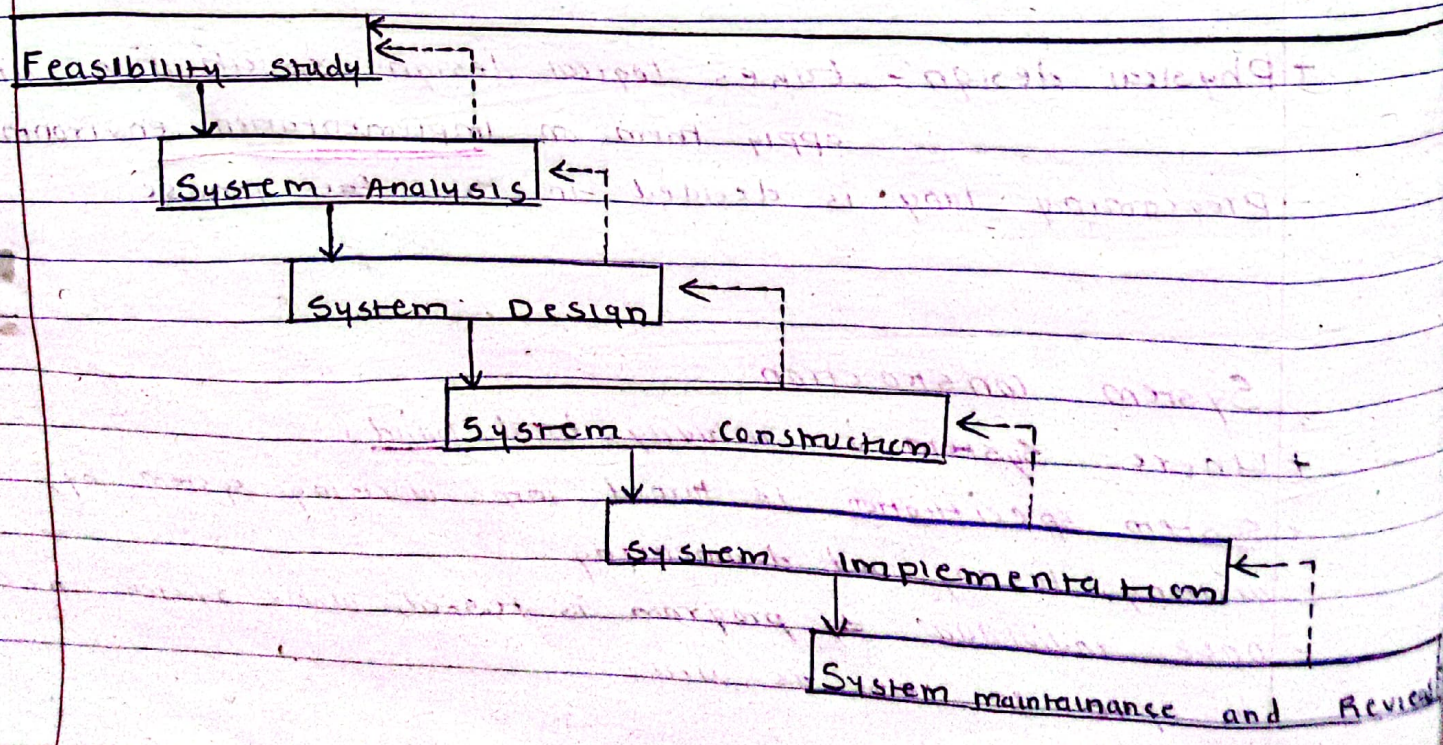
* Final System evaluation is also needed to make sure system is working accordingly.

System maintainance and Review:

- This is done to maintain its functionality.
- To implement new requirements and to rectify errors.
- This is done repeatedly, since;

⊛ Systems keep being outdated daily in need of being replaced.

* All these phases should follow each other & going back.
* Meaning SDLC is Iterative.
* Its called waterfall model.
* Does show posibility of going back.



Adv of SDLC.

1 makes project mngnt easy since ~~its~~ is broken into stages.

2 Makes documentation easier since each stage is ~~dd~~ documented to make quality assurance process much ease.

3 Tried and Tested Techniques

- Data flow, entity relationship diagram, entity life histories.

make ~~to~~ project effective.

Dis of SDLC

1 Inflexibility

- its inflexible coz of sequence of phases.

2 Narrow focus.

- mostly focus on small mngnt making it ignored by middle and Senior mangnt.

3 Old-fashioned techiques.

4 Time - Takes more time through all phases.

5 Cost - Costly coz every phase requires economic resources

System Development Methodology. SDM

✓ Methodology - formalized approach to implement SDLC.

✓ There are many unique methodologies, unique ~~coz~~ based on;

✓ order

✓ Focus on each SDLC.

Classifications.

* Process-centred methodology -

* Emphasizes on process model as core concept.

* First ~~defing~~ defining

2 Data-Centred methodology -

✓ Emphasizes on data model as core concept of system.

✓ May focus on content of storage area eg (refrigerator)

3 Object-Oriented methodology.

Tries to balance the focus btn Process and data. incorperating both into one model.

Structured Design

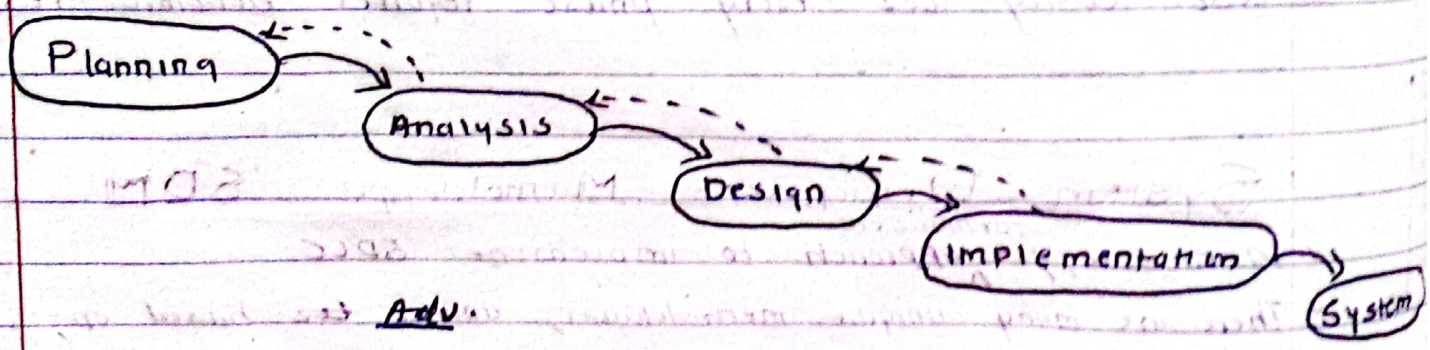
* First system dvpnt Methodology. in 1980s after ad-hoc or undisciplined approach.
* It follows SDLC approach <Step-by-Step>

Classification of Structured dvpnt:

1. Waterfall Development.

- Its called so coz it moves forward from one phase to another,

- Although you can move backward but its very difficult and costly



Adv.

1. Identifies system requirement before programming
2. Minimizes changes to requirements

Dis

1. Design must be completely b4 programming starts.
2. It takes time b4 system proposal.

Parallel Development.

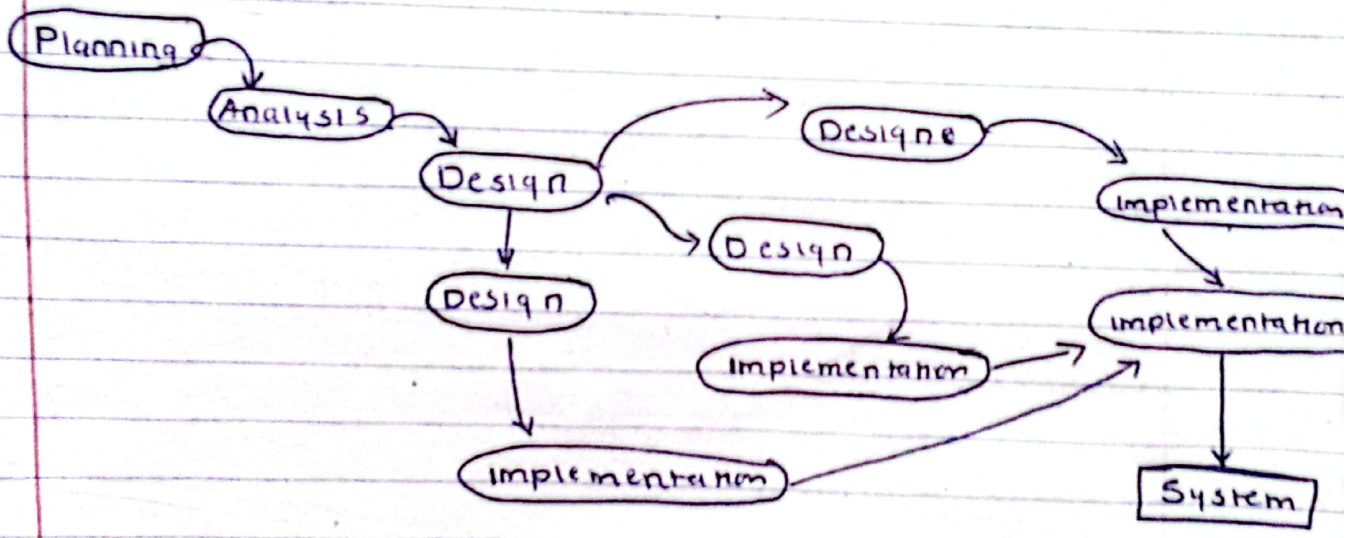
* Instead of doing design and implementation, in sequence, it perform general design for whole system and divide to series of subprojects to be performed in parallel.
- Once all subprojects are complete, final intergration is done

Adv

* Reduces schedule time to deliver system.

Dis

1 Suffers documentation problem;
2 Some subprojects are independent hence design decision of previous may affect current phase.



2 Rapid Application Development (RAD)
- Emerged in 1990s.
- It attempts to address both weakness of structured design by quickening them.
- This makes user understand better.
* RAD speeds up design, Analysis, Implementation phases as CASE, JAD

- changed SDLC and quickening techniques improves speed and quality of system dvpnt.

DLS

* User expectations – Many users expects alot since improved techniques are used ~~by~~ but not the case.

a Phased dvnt → Breaks overal system to series of versions

* Analysis phase identifies Overal System concept, and project team, users, sponsor categorize requirements in version

* Mostly important and fundamental requirement is recognized First

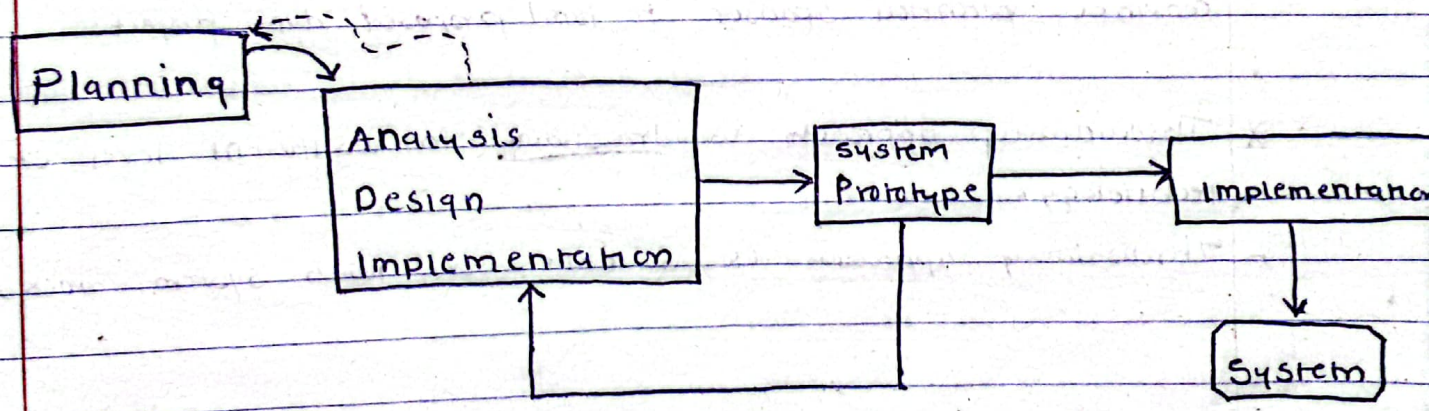
b **Prototyping.**

- It perform analysis, design and implementation phase ~~once~~ concurrently and repeatedly till system is complete.
- In these methodologies, basis of analysis and design are performed; and work start immediately on (system prototype)

= System prototype - quick-and-dirty program that provides minimal amount of feature.

- First prototype is first part of system that is used).

- This process continues till user and sponsor agree that Prototype provide enough functionality for it to be installed and be used in organisation.



Analysis, Design, Implem } concurrently till complete.

Adv

1 Provide system for user to interact c

DIS

- Prototypes undergoes some poor significant changes.

Throwaway prototyping

- Same as prototype since all first dvlp prototype but throwaway is done in different parts of SDLC.

* in Throwaway prototype; each prototype perform different function from one above <previous> and hv different appearance.

* As it is named; immediately after working τ a certain prototype; it is abadoned.

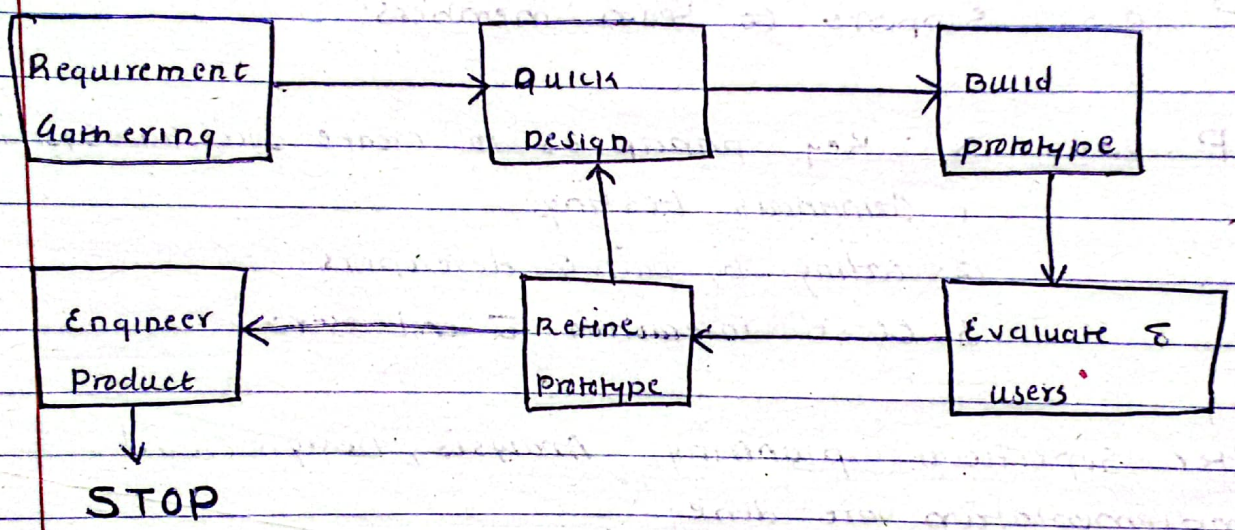
* Deside ex slt one pper, tranfer to comp; throw paper —
* Throwaway prototype is mostly appropriate in project acquisition stage.
where prototype demonstrate feasibility of new concept and convince potential sponsor to fund proposed dvnt project.

* Throwaway approach is drawback for insufficient level of technology.
* Throwaway approach is suitable for rough system mockups.

Evolutionary prototyping. / Acc users

* In this concept of system will be developed as project progresses.

* First dvlp most visual aspect of project.
* present to customer;
* continue t project as per customer feedback.
* when agreed by you and customer "Good enough" release it to final product.



→ memodology t very few rules and easy to follow.

Agile development: - few rules and easy to follow.

* Methodology t very few rules and fairly easy to follow.
* Focuses on streamlining SDLC by:
  1. Eliminating much modelling and documentation.
  2. Limiting time spend.
* Eg of ~~Agile~~ Angile dvpnt is eXtreme Programming, Dynamic System Development Method (DSDM)

eXtreme Programming

1- Extreme Programming (XP)

founded on;

i communication

2 Simplicity

3 feedback.

4 Courage.

- XP developers use above 4 values to dvlp System.

- First provide feedback to end user.
- Second XP developer follow **KISS** principle.
- Third developer must make incremental changes to grow System.
- Forth - developer must hv quality - first mentality.

XP also supports ~~to~~ team members.

- XP uses 3 Key principles to create succesful systems.
  1. Countinous testing
  2. coding by pair of developers.
  3. Close interaction w end user.

- After superficial planning, Analysis, Design and Implementation are done.

Planning

Analysis
Design
Implementation

System

Selecting appropriate Dvpnt methodology.

- Its not simple to select since no methodology is always best.
-

PROJECT MANAGEMENT:

First manager or analysts sees an opportunity to improve bis ✓

A **project identification.**

- when some in bis identifies bis need thus building system.

Example of bis needs.

1 Reaching new customers

2 improving supplier & interaction.

- Sometimes, need may raise from -ve way:
  1. Drop in market share.
  2. Poor customer service level.
  3. Increased competition.

Emerging technology is key also in organization

Project management

System request:

* Document showing why ~~to~~ bis is building new system and value expected to bring.
* Filled by project sponsor.

Elements of system Request. To be included in document:

1. BIS sponsor.
2. BIS Need.
3. BIS Requirements.
4. BIS Value
5. special issues.

1 **Sponsor** - describes person who will serve as primary contact of project and reason for project.

2 **BIS requirement** - capabilities that bis is needed to have

3 **BIS value** describe benefits organization shld expect from project

4 **BIS need** - Present reason for prompting project

5 **Special issue** - included as catch-all for other information to be considered in project.

eg - Specific project deadline.

- Any special ~~nature~~ circumstance ~~arising~~ ~~from~~ affecting system ou

C Feasibility Analysis

- This ~~defines~~ gives more details to better understanding and opportunity associated ī project
- It guides organisation in determining wether or not to proceed ī project.
- It also give risks associated ī project.

Sponsor need require value

Feasibility techniques

value - sponsor - primary need requirement especial

1. Technical feasibility.
2. Economical feasibility.
3. Organizational feasibility.

- Results of this is combined in feasibility study.

Need: special value sponsor

1 Economic Feasibility

- Also called cost-benefit analysis.
- Second feasibility technique.
- It checks financial risks associated with project.

Technical economic organisation

* It answers should we build project?
- Calculated by getting cash flow and return on investment of project.
- The more expensive ~~the~~ project; the more detailed analysis should be.

sponsor value req need

Identifying Cost and Benefits.

- Before anything is done in project, first identify cost and benefit the project will hv.
- cost in project can be divided into:

1. Development cost.
2. Operational cost.
3. ~~Tag~~ Tangible ~~cost~~ benefits
4. Intangible ~~cost~~ benefits

⊛ Development cost: Tagible expense occuring during System construction eg salaries, hardware + software ~~cost~~ expense.

- Its usually thought of one-time cost.

⊛ Operational cost - tagible cost required to operate system. Salary for operation team, software licensing fee, equipment upgrade fee.

⊛ Its usually though as Countinous / Ongoing fee.

* Tangible cost: profit from project
Revenue generated by system to organisation eg increased sales.

⊛ Intangible cost:
Based on intuition.

✓ Assigning value to cost and benefit.
- Assigning specific dollar value to types of costs and benefits.

✓ Organizational Feasibility.
* Final stage in feasibility analysis.
* How well system will be accepted by its users.
* It answers; If we build it, will they come?
* One way to asses Organizational feasibility of project is to understand how well the goal of project align w/ b/s objective.
* Strategic alignment - fit b/w project and b/s strategy.
* The greater the alignment, the less the risky the project will be.

Project Selection.

- Incase an organisation hv 3 project to ~~decid~~e on minds to decide on; but its only one project to be approved; So; committee examin Costs, expected benefit, risks, strategic alignment of 3 projects.
- Mostly primary focus is on; ⊛ Increasing sales in retail stores
  - ⊛ Internet system.
  - ⊛ Kiosk project
- Incases projects equalize in risk and Internet order.
- mngmnt may fund Internet Sales System.

Project Management.

Process of planning and controlling system dvnt ~~E less cost~~ within specified time, minimum cost and under right functionality.

✓ Project manager – Has primary responsibility for managing a lot of tasks. which is profession nowdays.

(planning, controlling, cost, nicetime, functionality, Good)

~~management~~

Project management software.

1. Microsoft project.
2. Plan view.
3. PM office

} Support mngmnt activities.

size, plan, state

Four Key steps in managing project.

* Identify size of project.
* Create and manage work plan.
* Staffing project.
* Coordinate project activities.

Project mngmt.
✓ Planning & controlling.
✓ short time.
✓ minimum cost.
✓ Good functionality.

✓ Size
✓ work plan
✓ Staff
✓ cord,

Size

plays around 3 main concepts:

1. Size of system
2. Time to complete project.
3. cost of project.

Size
- Cost
- time
- size

✓ functionality
✓ Time
✓ cost

} project mngmt.

Software
- Plan view
- PM office
- project

Technical
Organizational
Economical

Tangible
Intangible

Project Estimation.

Process of assigning projects values for time and effort.

Work plan main

Project Estimation using function Point Approach.

uses more complex approach.

* Manager estimates size by checking number of coded lines required.
* Size is ~~transformed~~ now measured according to effort required.
* Effort estimate is converted to time to finish

Size → Effort → Time

lines to code. person-month months

Create and manage workplan

- once workplan is project idea ~~is~~ of size and shedule is oky; workplan is made.
- work plan it lists each ✓ task, it
  - ✓ Important Information abt task
  - * Time, person, results expected.
- Detail and information in workplan depends on need of project

* Work plan is main component of Project management system

THE WORK PLAN.

INFORMATION	EXAMPLE
Name of task	Perform economic feasibility
Start ~~time~~ date	Jan 05, 2005
Completion date	Jan 19, 205
Person assigned	Project sponsor; Kitonga Daniel
Deliverable	cost - benefit analysis
Completion status	open
Priority	~~Open~~ High
Resource Needed	Spreadsheet
Estimated time	16 hours
actual time	14.5 hours

Gantt Chart

Identifying tasks:

- Manager to identify tasks in project to meet the objective

Project work plan.

✓ Mechanism used to manage tasks listed in work breakdown structure.

✓ Done by project manager.

1 **Gantt chart** - Project work plan represented in graphical way.

Gantt / Graphical

- Created using Spreadsheet package; Graphics; project mngnt Package

work plan in graphical rep.

2 **Pert chart**:

Pert / flowchart

Representation of project work plan in flowchart approach.

PERT - Project Evaluation and Review Technique

- PERT - uses 3 time estimates
  1. Optimistic.
  2. Most likely.
  3. Pessimistic.

Gantt chart

+ Refining Estimates

+ Managing scope
  1. Scope creep.
  2. JAD + Prototyping.
  3. Formal change approval.
  4. Additional requirements.

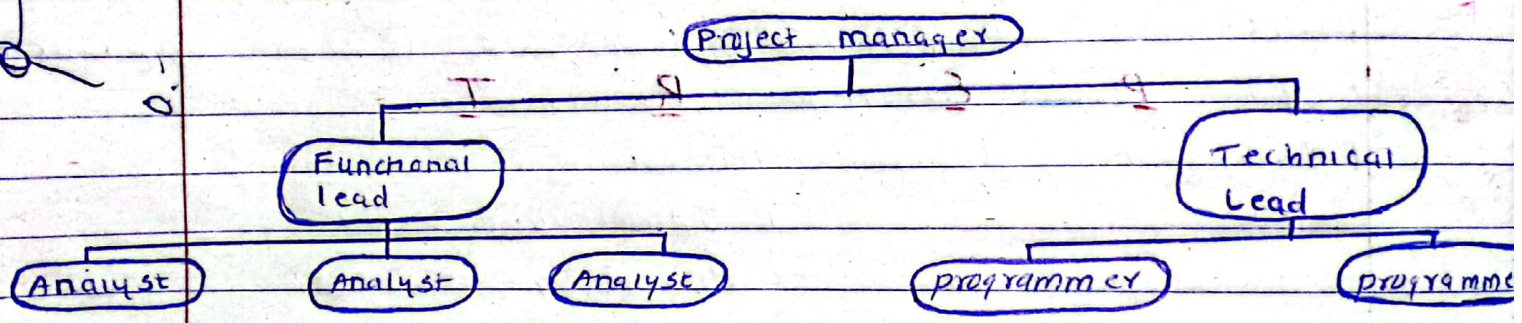
+ Time boxing
  ✓ Fixed deadline
  ✓ Reduced functionality.
  ✓ Fever.

Staffing project.

- Determining pple to be assigned to project, ~~match~~ matching each T skills, motivating pple, minimizing conflict.
- Hierarchical structure can be reduced by using team of 8-10 to reduce complexity.

Key Definitions.

1. Staffing plan - Kind of pple working on project.
2. Project charter - Describe project objective and rules
3. Functional lead - Manage group of analysts.
4. Technical lead - Oversee progress of programmers and technical members.
5.



Motivation.

- Assignment is not enough but also motivation is needed.
- Determining motivation approach is so difficult.
- manager should avoid money giving and bonus motivation coz workers will

Handling conflicts.

- Third duty of staffing is to minimize conflict among group members.

Coordinating Project Activities.

Case Tools

Computer - Aided Software Engineering <CASE>

- Software that automates all or part of ~~software~~ dvpmnt process

- CASE software used during analysis phase.

* **Upper CASE** - CASE software packages used in analysis phase to create integrated diagram of system and store information.

* **Lower CASE** - CASE - software to create diagram and generate code for database tables and system functionality.

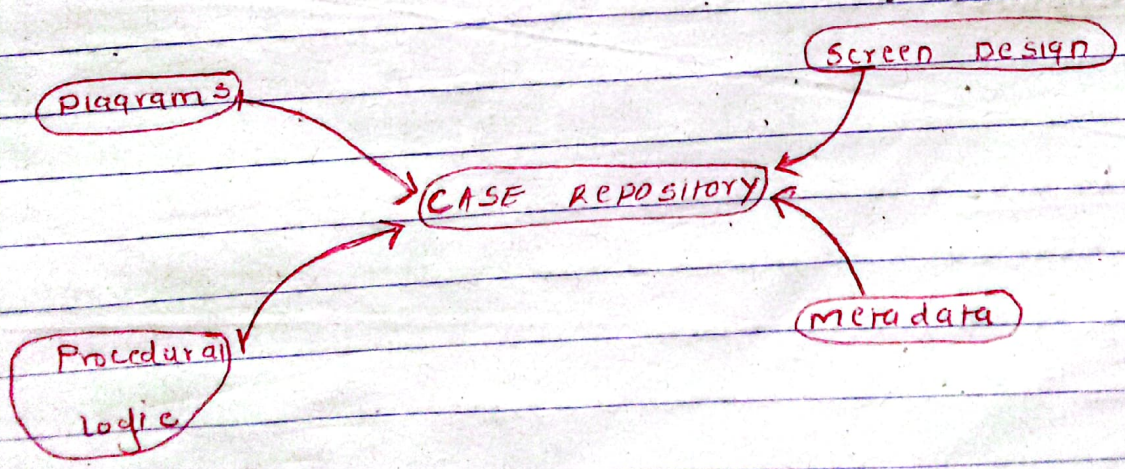
* **I-CASE** - Integraged CASE contain functionality found in upper CASE And Lower CASE tools. It supports SDLC throughout.

CASE TOOLS

Planning	Analysis	Design	Implementation.
upper CASE		lower CASE	

Intergrated CASE

CASE components



Standards.

- Standards of project matters alot to avoid confussion.

Documentation.

- Final technique by project team.
- This include detailed information about SDLC tasks.
- Documentation is stored in project binders

Managing risk.

✓ Process of assigning and addressing ~~its~~ risk associated with project developing.

✓ Sources of risk.

1. Weak personel.
2. Scope creep.
3. Poor design.
4. Over Optimistic

LEC 5:

Repository - location where system analyst, system designer and system ~~designer~~ builder keep all documentation associated to projects.

LABELS.

✓ Container / Th can be put some text ~~to~~ for user.
✓ Object or class Label.

eg
✓ Network directory of computer generated files
✓ CASE tools dictionary
✓ Printed documentation <binders>
✓ Intranet website interface to above components.

System Environment.

* Environment understanding:

✓ **Economic.** <Internally> < Externally>
- Economic factors on services provided.

✓ **Technical**
Technical consideration divided into:
✓ + Those affecting firm -
✓ + ~~Tos~~ Those relating to computer -

✓ **Social** < How pple will be working
Third consideration

It involve issues as Job satisfaction, and industrial relation

System investigation. <Studying of your System>

B4 anything is done to project. first project is done to establish requirements and constraints.

Scope of fact finding <Investigation>

Investigation is concerned ~~the~~ what is known now; discovery of previous unknown and finding of fact about known area and unknown ones.

- System investigation include activities like;
  - ✓ Mode building
  - ✓ Brainstorming
  - ✓ Interviewing
  - ✓ Questionaire
  - ✓ observation

  } <methodologies to undergo System investigation>

Features of fact-finding techniques *

a Problems

- Most essential feature.
- The comm containing facts must be interpreted by person receiving it, and interpretation may distort the truth.

b) Source of information

- Users are most sources of information
- Most investigations start by looking ~~for~~ at Curent System.
- It's documantation vary greatly in quality.

c What facts are Required

System analysts must use their common sense when following guidlines below to see facts

15
5
20

1. Organization's range.

- This include: ✓ product or services supplied
  ✓ Number of pple employed.
  ✓ Number of Supplier's and customers' account
  ✓

2. Details of item in range.

These are quantities, values, description and fluctuations of items. and also type of code numbers.

3. volume.

Once data type is recorded;
Volume, receipt, documents peak and troughs in data flow must be recorded.

4. Calculations.

very important to record calculations performed. particularly in regard to fraction, round off and degree of accuracy.

5. movement.

show mvnt of documents to, from and within organization from ~~to~~ sinior to junior

6. Exception.

check on exception since they occur unpredictably.

7. Staff.

Have all staff grades in a chart.

nom are you working?

* All these facts are gathered through:
  - interview, questionaire, focus groups
  - Observation, document analysis

Feasibility analysis Study: - what will we do next?

- ~~Fe~~ Feasibility study is drawn from result of gathering and analyzing facts about existing system.

a Technical <feasibility>

Current state of hardware and software technology capable for supporting system's idea.

(A) Do we hv enough software + Hardware to ??

b. Personel feasibility:

- Expertise involved in dvnt of system.

(B) Do we hv enough specialist??

c Finance feasibility

- Even if investment is not well laid, is there capital to ~~outly~~ outlay project?

Determining Main requirements of System

- Requirements are gathered ~~for~~ analyst to have a total scope of problem.
- Initially, the team will conduct survey of all interested parties to find exactly what's required.

(B) Do we hv enough funds to start bis.

a) Main characteristics.

- Defined in terms of output information required.
- The team finds out:
  - Volume of output required.
  - Frequencies of output.
  - Geographical location of receiver.
  - Response times to request for information if on-demand output is required
  - limitation of your system.

b Main constraints.

- limitation caused by associated existing system.
- financial and staffing consideration
- IT policies governing inclusion of ultra-new technology

3 Time mostly when information must be available at a particular time

4 Accuracy of output information.

c Input Data.

- All input data are ~~here~~ discussed here.
- It indicates
  - > Type of data
  - > Quantity of data
  - > Frequency of data.

d Output Information.

- All output are specified here.
- The:
  - > Element of information required.
  - > Frequency of information.
  - > Volume of output.
  - > Medium of output presentation.

e Validation Requirements. <How is everything in the system>

- All input data in any system must be correct.
- This section deals ~~c~~ validation ~~of~~ procedures adopted and value range.
- Incase system is to receive data from keyboard; method indicating errors and actions to be taken by system shld be specified

f File requirements.

- The System designer must hv file requirements unless its using files from other systems.
- File details are included in this section.

g ~~Eh~~ Enhancements.

- Check on your system's future
- If its working now, what about 7 years from now??

Requirement Specifications.

- This is output from System Analysis Phase.
- Shld contain all information required for next Phase: System design.
- Shld include enough details for designer to design comp ~~System~~ processing, database, navigation and user interface.

- In structured analysis, these would be supplied by!!!
  - > Requirement catelogue.
  - > Set of required dataflow diagrams.
  - > Required entity relationship diagram.
  - > Entity descriptions.
  - > User roles.
  - > Function definitions.
  - > Matrix linking user to functions.
  - > Input/output structure diagrams.
  - > Entity life histories.

> From these documents and diagrams, designer can construct a logical design of system.

= Object-Oriented will use different techniques eg:

1. It incorperates use cases instead of data flow diagram
2. It incorperates class diagrams instead of entity relationship diagrams

Types of Analysis

1 model-driven analysis.

Traditional approaches:

- Structured analysis.

- Focuses on flow of data through process.
- Keymodel: Dataflow diagrams.

- Information engineering

- Focus on structure of stored data.
- Keymodel - entity relationship diagram.

Object - Oriented Approach:

- Intergrates data and process Concern into objects.

2 ~~Accell~~

2 Accelerated System Analysis: <ASA>

- Concerned ~ Construction of prototype.

Prototype - Small-Scale, Incomplete but working sample of desired system.

ASA approaches

> Discovery prototyping

> Rapid Architected Analysis

3 Agile methods:

> Intergration of various approaches of system analysis and design for application

- Most Commercial methodologies do not impose single approach Structure analysis, IE, OOA on System analyst.
- Instead they incorperate all popular approaches to agile methods
- Hypothetical FAST methodology operates this way:

FAST System Analysis

* Scope Definition phase.

  * Is project worth looking at??

* Problem Analysis phase:

  * is a new system worth building??

* Requirement Analysis phase.

  * What do users need and want from new System??

* Logical Design phase.
  What must new System do?
* Decision Analysis phase:
  What is best solution?

Typical System Proposal Outline.

* Introduction.
  - purpose of report.
  - Background of ~~re~~ project.
  - Scope of report.
  - Structure of report.

* Tools and techniques used:
  - Solution generated.
  - Feasibility analysis (cost-benefit).

* Information System requirements
* Alternative solution and feasibility analysis
* Recomentation
* Appendices.

Data modelling.

- model is rep of (real world.) object and events.

Data model - Integrated Collection of concepts for describing and manipulating data.

Components of data model.

1. Structural part - Set of rules according to Ch System can be constructed.

2. Manipulative part - Type of Operation allowed on data.
3. Set of Integrity Constraints - Ensures data is accurate

Categories of data models.

1 Object based data model.

concepts like.

* Entity → Distinct object in organization that is to be represented in system. (lecturer)
* Attribute → Property that describes some aspects of objects to be recorded (Students)
* Relationship → Association btn entities. (lecturer vs students)
* Entity-relationship -
* Semantic -
* Functional -
* Object-Oriented -

2 Record-based data models. (Tabulated)

Principal types of record-based logical data model -

* Relational data model. (Tables < Rows vs Columns >)
* Based on concept of mathematical ~~to~~ relation.
* In this data and relationship are rep in tables. each τ number of columns and unique name
* Branch (branchNO, street, city, postcode).
* Staff (staffNo, fName, lName, position, sex, DOB, salary, branchNO)

* Network data model.

Data is rep as collection of records and ~~rep~~ relationship are represented by sets. (Nodes / edges)

- Records are organized as graph structures τ ~~records~~ records appearing as nodes (segments) and sets as edges in graph.

c Hierarchial data model:

- Restricted type of network model.

Data rep in records

Relationship rep in sets

1 But in hierarchial, allows node to have only one parent.

- Hierarchial model can be rep as tree graph: c̄ records appearing as nodes / segments and sets as edges

3 Physical data models

- This describe how data is stored in comp. representing infor such as record structures, record ordering, access paths
- links on how to interact c̄ the system.

LEC 6: SYSTEM DESIGN:

obj

1. Describe design phase in terms of information building blocks.
2. Diff several system design strategies
3. describe design phase tasks in term of comp-based solution of house dvnt project.
4. Describe design phase as comp-based solution involving procurement of commercial system software solution.

System design (physical design):

Is the specification of a detailed computer-based solution.

- System analysis emphasizes the business problem.
- System design emphasizes the technical or implementation concern of system.

System design approaches

① model driven - design approaches.
- modern structured design
- information engineering
- prototyping
- Object-Oriented

② RAD

③ JAD

Model-driven approaches.

model-driven strategy - System design approach that emphasize drawing system models to document technical

Split System in small parts which can be easily managed.

modern structured design =

System design techique that decomposes systems processes into mancegeable components

- ✓ Synonyms
- ✓ Design in a top-down hierarchy of modules.
- ✓ Easier to implement and maintain. ✓
- ✓ Modules shld be highly cohesive.
- ✓ " " " loosely coupled.

37/12/23

Information engineering <IE>

model driven and data centered but process-sensitive technique for planning, analyzing and designing information system.

- Primary tool of A IE is data model diagram.

3 Prototyping. Simple, small, incomplete ~~and~~ but working sample of desired system

Key benefits.

1 Requires end user participation
2 Iteration accomodates end-user what tend to change their mind.
3 Activate model that end-user can interact ~~th~~ with.
4 Errors can be detected earlier.
5 Accelerates several phases of life cycle.

Disadvantages.

1 May lead to maintenance nightmares
2 Still need System Analysis but so easy to skip
3 Prototyping doesn't address numerous design issues ✓
4 Can reduce design creativity ✓
5 Suffer from slower performance due to language consideration.

4 Object-Oriented Design OOD.

- Technique used to refine object requirements definition identified earlier during system analysis.

* Extention of object-oriented analysis
* Attempts to ~~separate~~ eliminate separation of concern about data and process.

Evaluation.

29) Check on your vandors proposals
2 lap $\angle^{12}_{42}$ } will I have additional cost?

2022.

Faster

RAPID APPLICATION DEVELOPMENT (RAD).

* Developes system quickly by utilizing structured, prototyping and JAD technique.

* Data-driven information engineering.
* Prototyping -
* Joint Application development. JAD

- All to make quick steps.

1 JAD.

Complements other system analysis and design techniques by emphasizing participative development among system owners, users, designers, builders.

* JAD - Joint Application Development
* It incorperates system designers, analysts, users, builders for quick development.
- In JAD system designer take part of facilitator.

SYSTEM ANALYSIS AND DESIGN TOOL

Requirement Specification to implementation.

+ Data flow diagram.
- Graphical rep of flow of data in an information system.
- It incorperates incoming data flow, outgoing dataflow and stored data

1 Data Flow Diagram differ from Flowchart

DFD and F

DFD → Deals ~~t~~ flow of data in the system at various levels while

Flowchart - Deals ~~t~~ flow of control in program modules

Types of DFD.

classified either logical or physical.

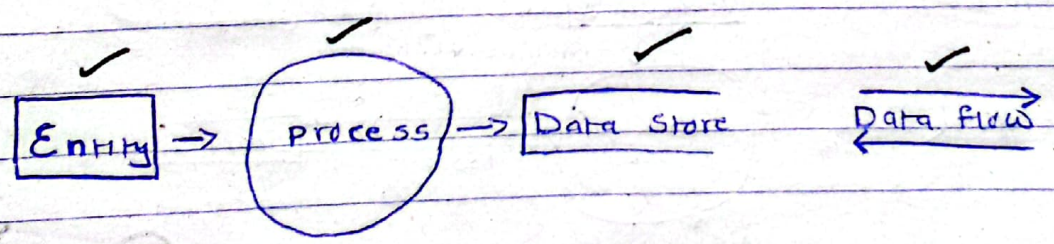
1 Logical DFD - Concentrates on system process and flow of Data in system.

2 Physical DFD - ~~Deals~~ ~~Sh~~ ~~t~~ shows how data flow is actually implemented in system.

- Its more specific and close to implementation.

Components of DFD.

DFD can rep Source, Destination, Storage + Dataflow.



1 Entity → Rep in rectangle.

→ Are source and destination of information data.

2 Process → Rep in circle

→ Activity or Action taken on data.

3 Data Storage - Rep in open sided rectangle.

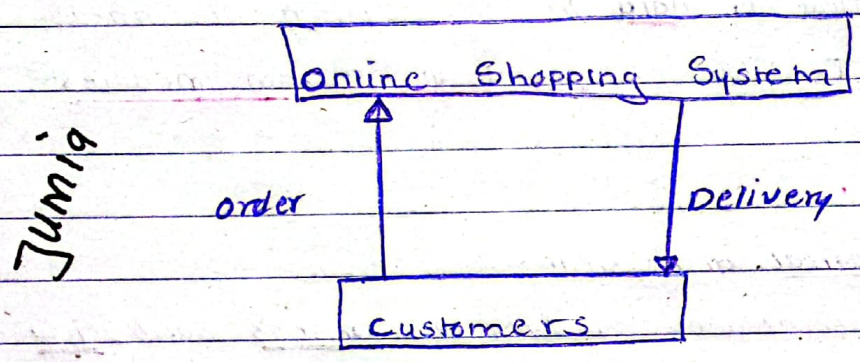
4 Data flow - Movement of data.

- Rep in to and from arrows.

Levels of DFD

1 Level 0 - This is hieghest abtraction level.

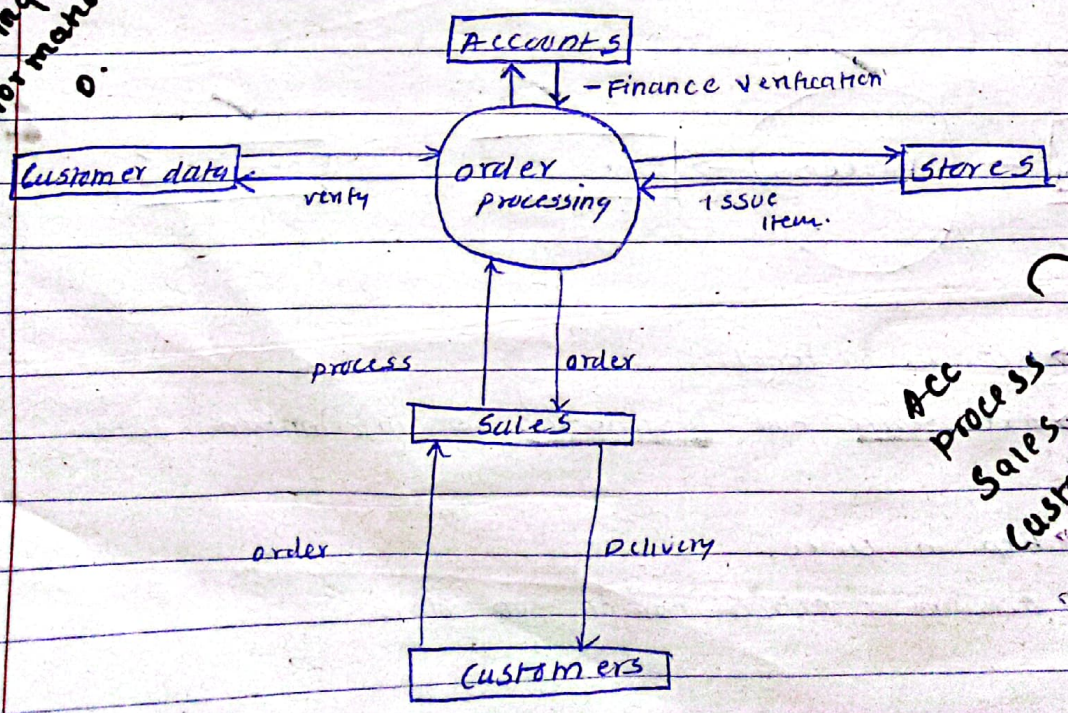
- Shows entire Information System as one diagram concealing all underlying details.
- Also known as Context level. ✓



2 Level 1 - Breaking down level 0 to specific leads to level 1

- Deals ē basic modules in system and flow of data among various modules.
- It also mentions basic processes and sources of information.

Adding more information to level 0. down



modules.
Acc
Process
Sales
Customer

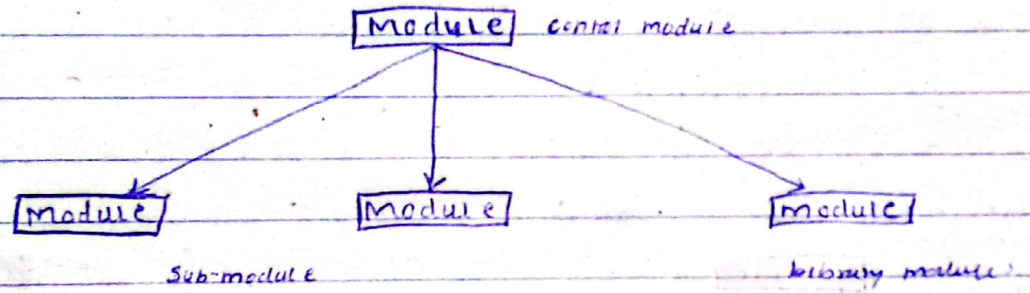
3 level 2 - Shows how data flow inside modules in level 1.

2 Structure charts:

- This is a structure derived from Data Flow Diagram.
- Describes data in more details than DFD.
- Breaks down entire system into lowest functional modules.

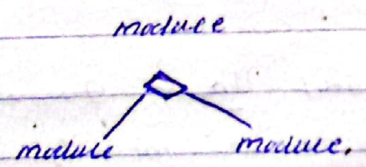
Symbols in Structured charts:

1. **Module** - rep process or task.
   - It may branch to more modules.
   - Library modules are re-usable and invokable from any module.

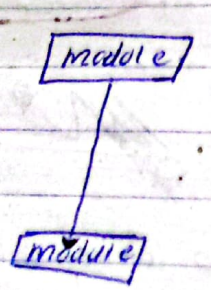


2. **Condition** → Rep in ~~diag~~ diamond diagram.
   - Show condition to choose any 0 module.

⊗ condition gives th model to follow.

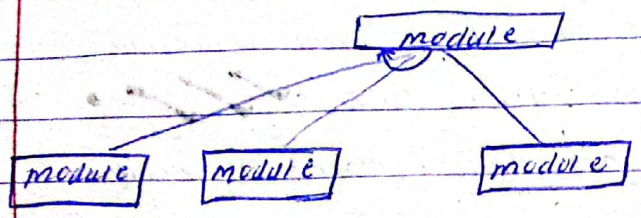


3. **Jump** - Its arrow ~~show~~ points inside module.
   - Shows that control will jump middle of sub-module.



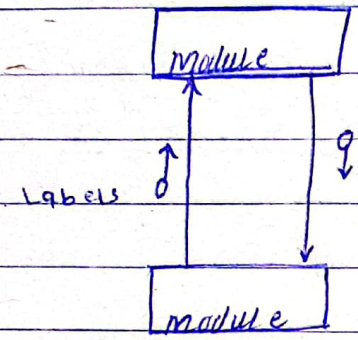
⊗ points inside model.

4 **Loop**. curved arrow rep loop. in module.
- Show modules repeating execution of module.



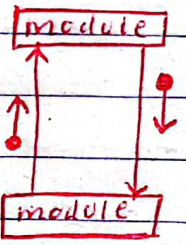
* Repeating modules.

5 **Data Flow** - Empty arrows.



Shows how data is flowing.

6 Control Flow. - Its arrow is filled.



* shows controls in modules.

3 **HIPO diagrams**. (Hierarchial Input Output Process Output)
- These are combination of 2 organized method;
  * To analyze system.
  * provide ~~docu~~ means of documentation.
- ~~HIPO~~ HIPO was developed by IBM in 1970.
- HIPO diagrams gives high-level view of System function.
- Shows function performed by system. ✓
- Good for documentation purpose. ✓

Shows how data is arranged.

Flow of control and data.

// IPO vs HIPO → IPO shows flow of control and data while HIPO doesn't provide any information about data flow

and control:

4 Structured English // **Pseudo - code**

- Gives description of what is required to code and how to code
- its highly understood than other pseudo-code more other approaches
- Structured English is english-like code:

example

- IF - ELSE - THEN.
- DO - WHILE - UNTILL

what a code should be able to do but using English.

Enter Name SEEK Customer - Name in Customer - Name - DB file IF Customer - Name found THEN call procedure USER_PASSWORD_AUTHENTICATE () ELSE PRINT error message, call procedure NEW_CUSTOMER_REQUEST() ENDIF

- Structured English is like day to day spoken English.

- Rules of each condition
- Rules
- Action of rules

x Pseudo

5 pseudo - code

- more close to prog language than Structured English.
- They avoid variable declaration but written in actual prog lang as Fortran, C, pascal.

write prog to print Fibonacci up to n numbers.

```
Void function Fibonacci
Get value of n;
set a to 1;
set b to 1;
initialize i to 0 for (i=0; i<n; i++) { if a > b { increase b by a;
print b }
else if b > a { increase a by b;
print a; }}
```

6 Decision table/tree.

* table giving descriptive actions and conditions taken.
* It is powerful tool to debug and prevent errors.
- Group similar information into ~~similar~~ single table

Steps to create decision tables.

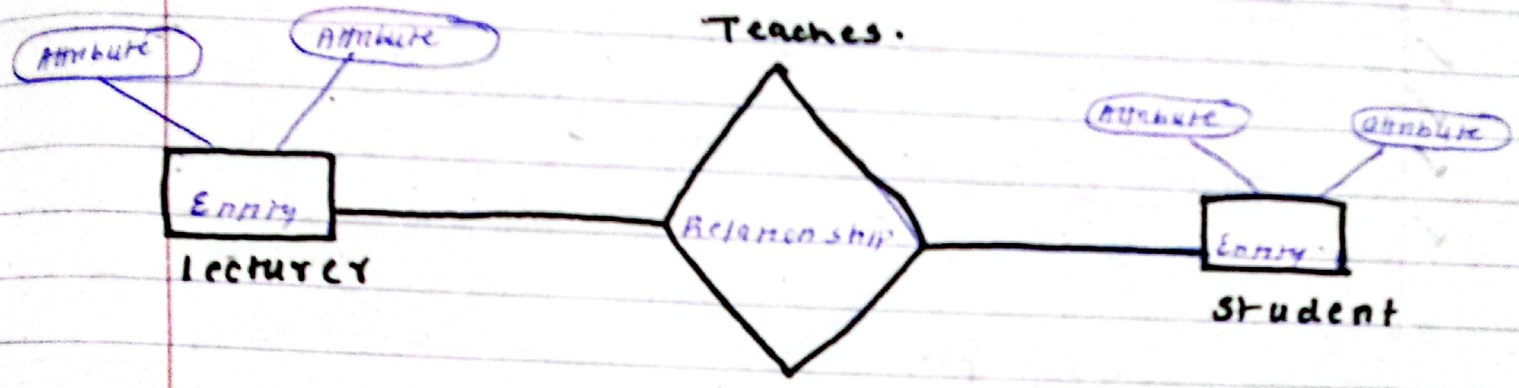
* i. Identify all conditions
* ii. Identify action to conditions
* iii. Create Maximum posible rules
* iv. Define action to each rule.

- Verify table by removing/eliminating all duplicates rules and actions.

~~Exit~~

7 Entity - Relationship model:

Type of database model based on notion of real world entities and their relationship



* Entity - This is real world body in E-R <lecturer>
  - It has properties called attributes
  - eg Student is entity & properties like Name, age, id (Attributes)

Attribute. Student

* Relationship - Relates b/w two entities
  - uses mapping cardinalities.

Mapping cardinalities:

1 → 1

1 — many

Many — 1

Many — Many.

8- Data Dictionary

- Centralized collection of information about data.
- Stores meaning, origin of data, data relationships ...
- Data dictionary is also called (meta - data) - (data about data) dictionary

Requirements of data - dictionary:

- It should remove any changes of ambiguity.

Data dic shld contain:

i Content:

shld hv information abt:

✓ Data flow

✓ Data structure

✓ Data elements

✓ Data Store

✓ Data processing.

Data flow is rep in DFDs.

= Composed of

[] Repetition

() Optional

+ And

[/] Or

eg

✓ Address = House No + (street / Area) + City + State

✓ Course ID = course No! + Course Name + Course level + Course Grades

ii Data elements:

It consist of Name and description of Data and Control Items:

Internal or External data store ---

✓ Primary Name

✓ Secondary Name

✓ Use-Case (How and where to use)

✓ Content description

✓ Supplementary Information (preser value, constraints.

✓

III Data Store :

✓ e Stores information from where data exists in and ~~from~~ exists as a system: ✓✓

- Data Store includes:

I Files

* Internal to software
* External to Software but to same machine
* External to Software and System.

II Tables *Name of table || Index of table.

Naming Convention :

Indexing Property :

Data processing -

Types

i Physical - As Software sees it.

ii Logical - As User sees it

⊛ physical - what software is seeing.

⊛ Logical - What you are seeing.

STANDARDS AND DOCUMENTATION.

> Standards are uniform practices governing methods - by which systems are developed and operated.

> Gives clear understanding of what is required to both management and data processing staff..

Types of standards.

1 Development control.

* Standard Th specify method of planning and controlling progress of and quality of ~~dvpt~~ system dvlpnt.

2 performance standards

* This standard set base-lines against Th actual performance is measured.

* It doesn't estimate how long task will take but how long task should take.

3. Operating standards.

- This covers:

i. Physical security procedure

ii. File " "

iii. Work log "

iv Error " "

v) Definition of staff responsibilities

vi) Data flow procedures

vii) Comp operating procedures

> Operation standards.
> Development control.
> performance standards.

Benefits of Standards.

1 Saving time

- Standards reduces amount of repetition work leaving more time 4 dvpt.

2 Management control.

Monitoring progress of work is easy since all task follow defined sequence as per standards.

3 Improved System Design and Development:

Provide checklist ensuring important aspects of dvpmnt are not ignored.

4 Comp operation.

* Standards ensure all comp operations are fully, reliably and correctly carried out.

5

User Documentation.

1 This is reference manual for experienced users, who will need to refer to incase queriesor exceptional circumstances arises.

- It also give basic training to new staff.

- Modern - on-line system include "Help" facility T reduce documentation but not eliminating it.

- Documentation kits:

1. What System does and how it works
2. Gives basic training to new staff.
3. Provides reference material.
4. How to put input data to system and how to control it
5. How to identify and correct errors.

7 Reference.
7 Training.

Content of documentation.

1. Give overview of system.
2. Running system & how to switch on equipment, how to end sessions...
3. Input requirements of system
4. Output of system
5. Error messages - shld give error th maybe encountered and action upon the errors.
6. Logging procedures - Each installation shld be full detailed.
7. Glossary of terms used -
8. Index

Implementation process:

- Putting theoritical design into practice
- can be installation of complete system or introduction of subsystems.

- Purpose of this is to implement fully-documented operational system ~~th~~ meets original requirements according to design given in system design specification.

Implementation involves:

1. Writing documentation and testing all programs required.
2. Creation of all master files required.
3. Commisioning of new system
4. Educating staff who will interact c̄ system.
5. Preparation of user and data processing departments

1 System testing.

- Checking output of each programs.
- Errors ~~to~~ that may come in es -

* misinterpretation of design specification.

eg System requiring 3-digit data thus 12 will be 012.

2 File creation and/ Conversion.

Before system bcm operational, create master files.

3 Educating and Training

- Educate all staff associated c̄ system.
- This is to give them knowledge on how system will operate.
- Training should be supported by adequate documentation.

Implementation planning.

~~Fore~~ For successful implementation; following should be catered for:

1 Project control monitoring Time, Cost, quality of output.
2 Managerial commitment of all levels
3 Good communicater analysts
3. Users' knowledge of and agreement to system objective
5 Recognition of user responsibilities in system
6 Comp manager capable for getting user support.

User Involvement

In all stages, involve users.

Changeover strategies

From Development environment to Maintainance environment.

Changeover implies

changing from clerical — computerized
central ~~to~~ to distributed computing
one type of machine to another
- Staff also need to resent changes and incase of any affected individual be told personaly.

* Its analyst's responsibility to ensure staff information is complete and accurate

Methods of changeover.

1 Direct changeover.
- Old system is switched off and new system is switched on
Adv - resources are spared.
→ New system must be fully tested first. to minimise risks of initial operation.
→ Incase new system has issues, no way old one to be retrieved.

2. Parallel changeover:

- Old and new systems are run τ same data till there's confidence in new system τh will automatically lead to old system dropout
- This gives comparison ~~of~~ of outputs
- This commone changeover method.

3. Phased changeover:

last two methods were basic ones. τb hv number of variations

- In this, new system is introduced in stages., ~~un~~ each stage is implemented until whole system is put into operation.
- Its used in large systems with complex components
- Implementation of each stage is controlled and risks taken
- This ensure easy transfer of staff.

4. Pilot running:

- New system is run under controlled condition using old data. ~~τth~~
- Small representative part of old system is used as test area
- Similar to parallel changeover but less disruptive.
- Data from one or more previous period is run first on old system then on new one for testing.