

Lecture 4

SAD METHODOLOGIES



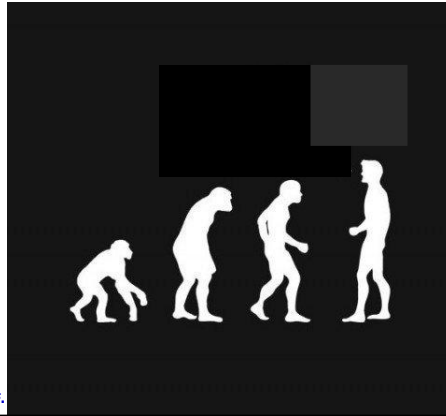
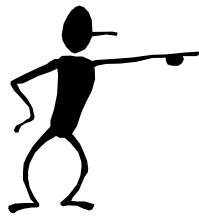
Objectives

- Describe the various methodologies used in system analysis & design, their merits and drawbacks
- Describe stages involved in each of the methodologies of SAD.



Introduction

- Systems have life cycle. They are designed, introduced, evolve (to keep up with time), decay (when no longer viable) and are replaced.



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LIFE HISTORY OF SIMOM MAKONDE



- Simon makonde was born on Monday
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That's the sad story!

- **System analysis and design** is an aspect of problem solving procedure of examining an existing system and improving (replacing) it



Methodologies of SAD

- *System Development Life Cycle (SDLC)*
- *Structured Systems Analysis & Design (SSADM)*
- *Object Oriented Systems Analysis & Design*
- *Rapid Application Development (RAD)*
- *Prototyping*

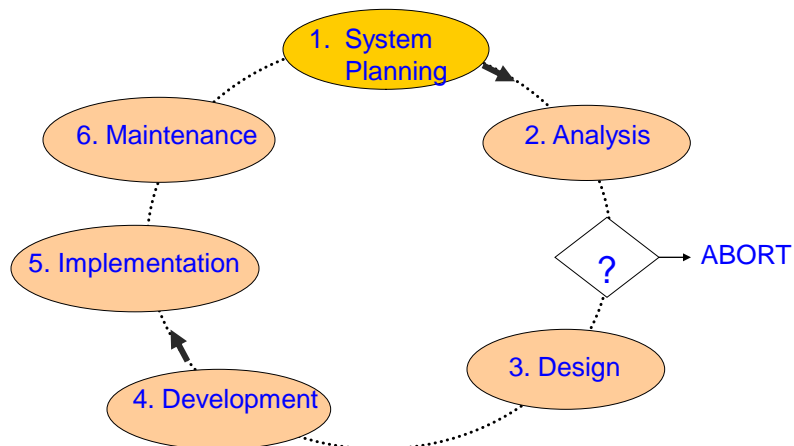


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SYSTEM DEVELOPMENT LIFE CYCLE (SDLC)



- It is a step-by-step processes used to solve system problems. Has 6 phases

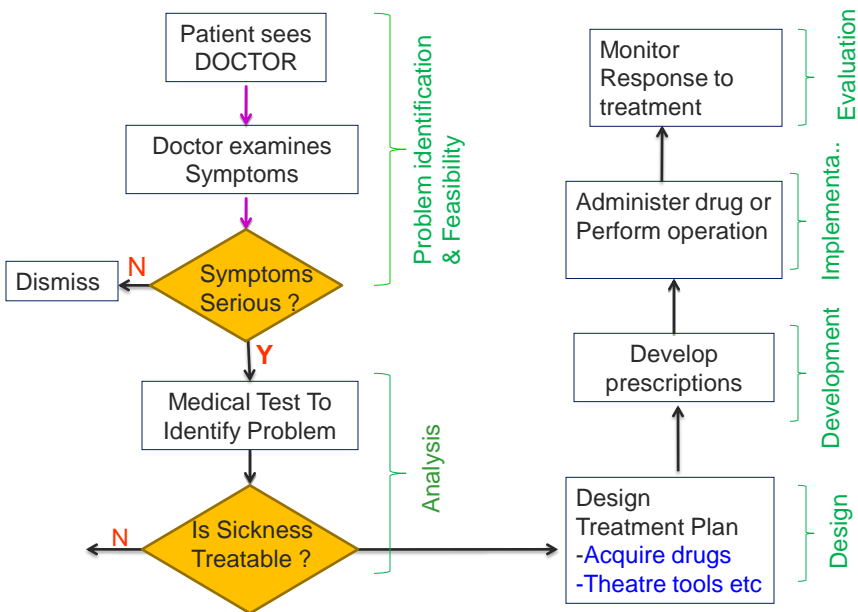


Techniques of SDLC

- SDLC uses flowcharting through the phases of analysis & design



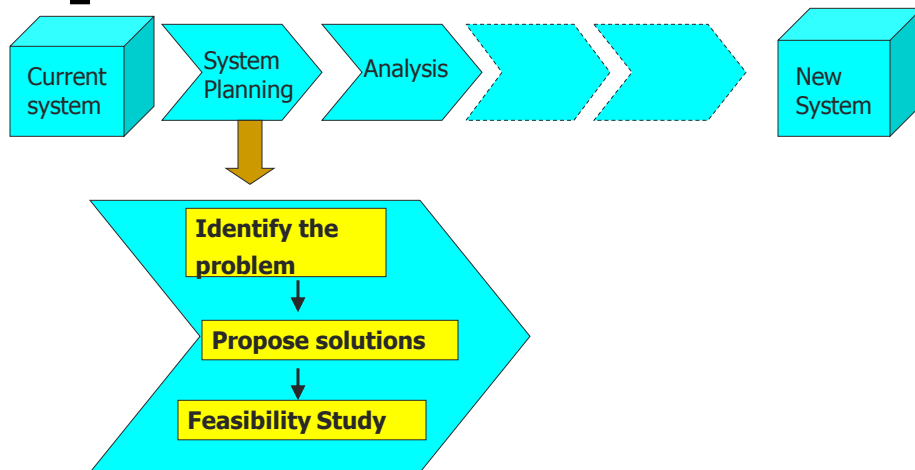
Example of SDLC: Patient Treatment Plan



1. System Planning



What is involved



(a) Problem Identification

- Involves studying present system to **identify & define the problem, its nature, and scope** viz a viz user requirements



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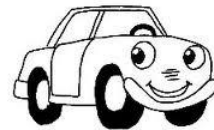
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(b) Propose Solutions

- Propose solutions and describe cost & benefits for each solution e.g., modes of transport for a company



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14

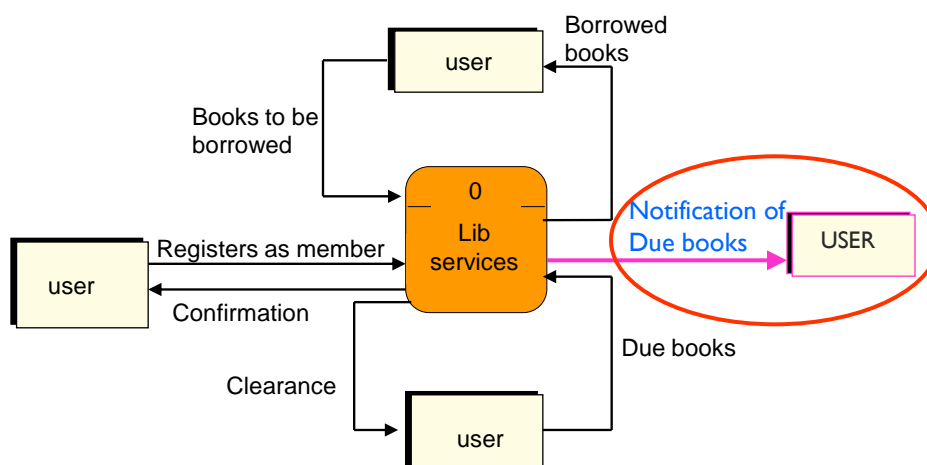
Example: Lib IS

- **Problem:** Management of Overdue books
- **Cause:** Ineffective tracking mechanism for borrowed books
- **Proposed Soln:** Redesign system to manage overdue books



Current situation

PROPOSED SOLUTION



(c) Feasibility Study

- Process of identifying (through evaluation) the best system that meets user requirements
- It assesses the capability of the following areas to support new system
 - **Technical**
 - **Operational**
 - **Financial**



(i) Technical feasibility

- Considers available of technology resources e.g., hardware, software, staff etc capable of supporting the new system



(ii) Operational feasibility

- Assesses whether the new system is compatible with existing practice i.e., concerned with staff attitude (management & users) towards the proposed system
 - Are users in favour of new system vis a vis job redundancy?



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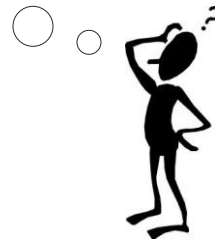
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19

(iii) Financial feasibility

- Evaluates the financial implications (cost-effectiveness) of proposed system compared to present system by considering costs & benefits of the 2 systems (thro' **Cost/Benefit Analysis**).

is the new system profitable?



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20

Cost/Benefit Analysis

■ Type of Costs

- **Development costs:** = one time expenditure that will not recur after the project is completed e.g., *Equipment, Facility cost etc.*
- **Operational costs:** = recurrent expenditure e.g., *Salaries, taxes, Consumables etc*



■ Type of Benefits

- **Tangible/Direct Benefits:** Easy to measure i.e., that which a shilling value can be assigned to it e.g., savings on staff costs by 40% etc.
- **Intangible/Indirect Benefits:** Not easily measured e.g., employee morale/attitude on new system



Methods of Costs/Benefits Analysis

- (a) **Net Benefit Analysis (NBA)**
- (b) **Present Value analysis**
- (c) **Payback Analysis**
- (d) **Return on investment (%)**



(a) Net Benefit Analysis (NBA)

- Given by

$$\text{Net Benefits} = (\text{Total Benefits}) - (\text{Total Costs})$$

- **Example**

Cost/Benefits	Yr 0 (Present)	Year 1	Year 2	TOTAL
Benefits	0	650	4,900	5,500
Costs	-1,000	-2000	-2000	-5000
Net Benefits	-1,000	-1,350	-2,900	550



Disadvantages

- **NBA does not account for the time value of money nor discount future cash flows**

- Time value for money is expressed in form of interest on funds invested to realize a future value

- given by $F = P(1 + i)^n$

- where F = Future value of investment
- P = Present value
- i = interest rate
- n = No. of yrs



Example

- KShs. 300,000.00 invested in treasury bills at 10% for 3 years would have a value at maturity of

$$F = 300,000(1 + 0.1)^3 = \text{KShs } 399,300.00$$



(b) Present Value analysis

- Determines the costs & benefits of the system in terms of today's value of the investment by considering the discount rate.

$$PV = \frac{1}{(1+i)^n} \times F$$

Discount factor



Advantages

- Allows for interest rate/inflation that alter value of investment
- Concept used in calculating insurance premiums



Activity

- If you'll be required to pay 100,000 in school fees in 2015, how much do you need to put aside now that will mature to that value assuming an interest rate of 10% p.a.?



(c) Payback Analysis

- compares cost outlay and benefits of a candidate system to show the profit over a period of time and the **break- even point** (Payback period)
- **Payback period** = point at which accumulated benefits = Lifetime costs



Example

Assuming a monetary benefits of an information system are KShs 90,000 per year, a one time development cost of KShs. 200,000/=, an operation and maintenance cost of 20,000/= per year, a discount rate of 10% p.a., and a 4-year time horizon:

- Fill in the following table
- Determine the pay back period for the project
- Determine the lifetime return of investment and the annual return of investment



10/14/2013 10:05 AM

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31

	Year 0	Year 1	Year 2	Year 3	Year 4	TOTALS
Development cost						
Operation & maintenance						
Discount rate @ 10%						
PV of recurring costs						
Cummulative PV of costs						
Net Economic Benefit						
Discount rate (10%)						
PV of Benefits						
Cummulative PV of Benefits						
Cummulative PV of Benefits + Costs						



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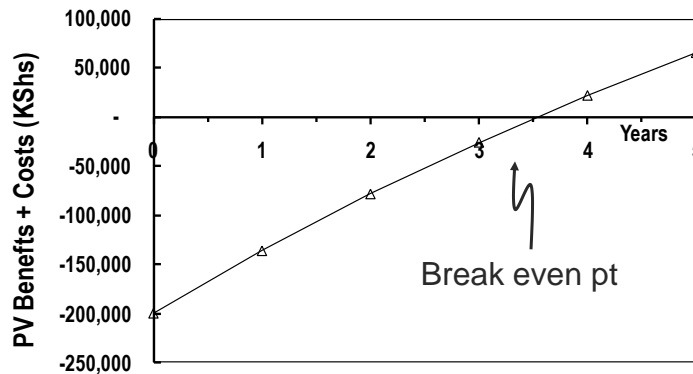
32

Soln

	Year 0	Year 1	Year 2	Year 3	Year 4	TOTALS
Cash Flow Description						
A	Development costs	200,000				
B	Operation & Maintanace		20,000	20,000	20,000	20,000
C	Discount factor @ 10%	1.000	0.909	0.826	0.751	0.683
D	Present Value of Recurring Costs		18,182	16,529	15,026	13,660
E=A+D	Cummulative Present Value Costs	200,000	218,182	234,711	249,737	263,397
F	Net Benefits from New System	-	90,000	90,000	90,000	90,000
G	Discount factor @ 10%	1.000	0.909	0.826	0.751	0.683
H	Present Value of Benefits	-	81,818	74,380	67,618	61,471
I	Cummulative Present Value Benefits	-	81,818	156,198	223,817	285,288
J=I-E	Cummulative PV Benefits + Costs	-200,000	-136,364	-78,512	-25,920	21,891



- **Break even point** can also be obtained from a graph of (Cum PV benefits + costs) Vs. time



(d) Return on investment (%)

$$\begin{aligned}\% ROI &= \frac{(\text{Lifetime benefits}) - (\text{Lifetime Costs})}{\text{Lifetime Costs}} \\ &= \frac{285 - 263}{263} = 8.38\%\end{aligned}$$

- Since ROI is +ve \Rightarrow Project is viable



Activity A

- Kiboko school wishes to start a computerized project with an initial capital outlay of 240,000/=. The benefits estimated for 6 yrs would be 50,000/= pa. The cost of capital is 12%. Showing your workings, determine whether the project is viable



Activity B

- A company is evaluating the viability of a project whose returns are shown below with a 5 yr lifespan. The amount of money to be invested is KShs 10,000/=. Using the net present value analysis, determine its viability at a discounting rate of 25% p.a.

Year	1	2	3	4	5
Returns (Kshs)	1,500	2,000	3,000	4,000	5,000



Lecture Evaluation

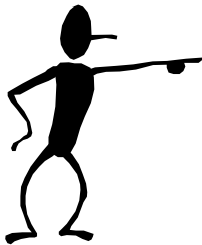
- State 6 reasons for carrying out feasibility study during system development
- Explain the following methods of cost/benefit analysis
 - NBA
 - PVA
 - Payback Analysis
 - ROI



2. System Analysis



Objectives



- Explain the purpose of system analysis and the stages involved
- Describe fact-finding techniques of system analysis, their merits and demerits



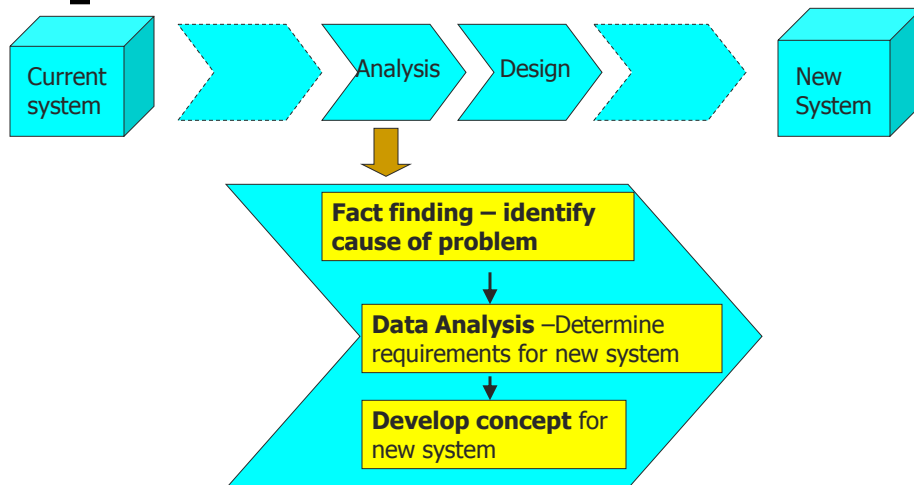
- Analysis is the phase in which the specifications of the proposed system are identified and start of system design

PURPOSE

- To specifies **WHAT** must be done to solve the problem i.e., **WHAT** new system will provide



Stages of Analysis



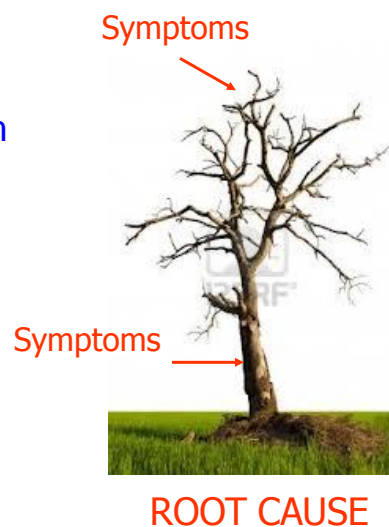
(i) Fact finding

- Involves gathering data/information about current system's operations in order to
 - Understand its nature of operation i.e. business processes, data flow, external and internal data
 - identify root causes of problem/constraints by tracing symptoms to their causes thro' root cause analysis



■ Root cause analysis

- Identify symptoms
- Trace each symptom back to its cause



Information gathering techniques

- ∃ 5 techniques

(i) Interviews:- Used to acquire hard facts, but also opinions, feelings, goals and information on informal procedures

- **TARGET GROUP:**

- Managers, Users, Designers, Analysts etc



(ii) Questionnaires: Used to acquire information not found in hard data or through interview e.g., attitudes, beliefs, behaviours, etc.

- **TARGET GROUP:**

- All stakeholders



(iii) On-site Observations:- Watching people at work

- **PURPOSE:**
 - *Best way to understand how things are done*
 - *Checks validity of information gathered from other techniques*
- **TARGET GROUP:**
 - *Managers*
 - *Users*



(iv) Sampling:- Systematically selecting & analyzing representative elements of a population i.e., documents that might describe the problem.

- **TYPE OF DOCUMENTS**
 - **(i) Written:-** e.g., Memos, mins of meeting, Suggestion box notes etc.
 - **(ii) Documents that describe business functions:-** e.g., Mission statements, strategic plans, Organization objectives etc.



(v) **Joint Applications Design (JAD)**:-
Systematically

- **PURPOSE**: -Existing
- **TARGET GROUP**:
 - Sa



Merits & Demerits of Info gathering techniques

Technique	Merits	Demerits
Interviews	<ul style="list-style-type: none"> ➤ Analyst can probe for details 	<ul style="list-style-type: none"> ➤ Time consuming ➤ Costly
Questionnaire	<ul style="list-style-type: none"> ➤ Convenient ➤ Economical - Can be administered to many people simultaneously + when analyst & respondents are far apart ➤ Less pressure on immediate responses 	<ul style="list-style-type: none"> ➤ No immediate feedback ➤ Low response rate ➤ Analyst does not observe users workplace/practices

Technique	Merits	Demerits
Observation		
Sampling	<ul style="list-style-type: none"> ➤ Gives an insight of the information b4 meeting the users ➤ information is factual ➤ Information can be used for further reference ➤ Information is more structured 	<ul style="list-style-type: none"> ➤ Information may be out of date ➤ Time consuming in selecting suitable documents to inspect ➤ Inaccessibility due to confidentiality

(ii) Data Analysis

- Involves analysis of gathered data to **determine requirements of the new system** i.e., both **logical (data)** & the **physical (process)** requirements.
- Data analysis is best handled using data analysis & modeling tools of **SSADM**



(iii) Develop concept for new system

- involves determining opportunities for improvement i.e., design solutions for “To-be” system.



Lecture Evaluation

- Explain the purpose of System analysis
- Explain the stages in System Analysis
- Explain 5 information gathering techniques used system analysis listing their merits and demerits

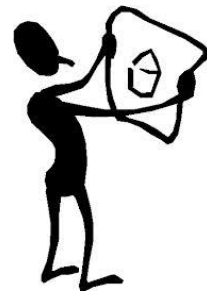


Summary

- The analysis phase aims to identify problems/constraints in the current system and determine requirements of the new system

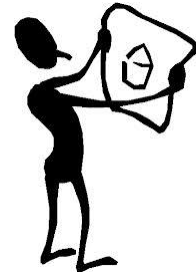


3. SYSTEM DESIGN

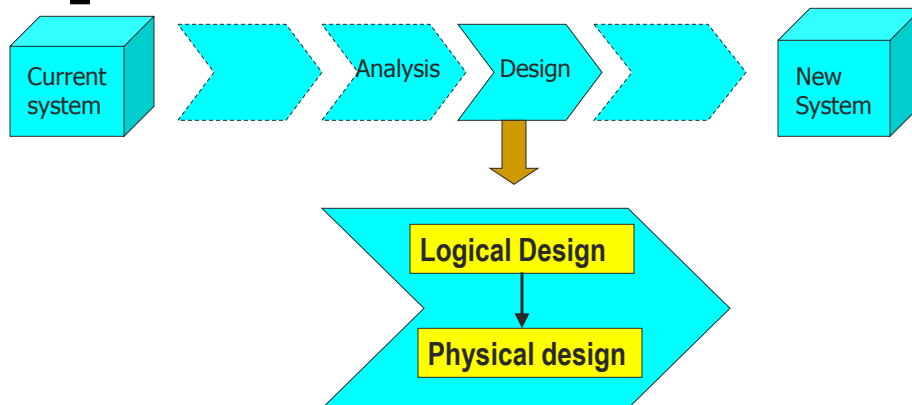


- Design specifies **how** the specifications of the proposed system will be met i.e., **HOW** system will work ?

- It involves creating blueprints/actual plans of proposed system



Stages of Design



(a) Logical design

- Specifies how the data flows within the proposed system, processing requirements etc



(b) Physical design:

- Specifies the physical components for
 - data input/output (i.e forms & GUI design)
 - Processing
 - Storage (File organization & database design)
 - Security
 - Operating and manual procedures that support the system



Activity

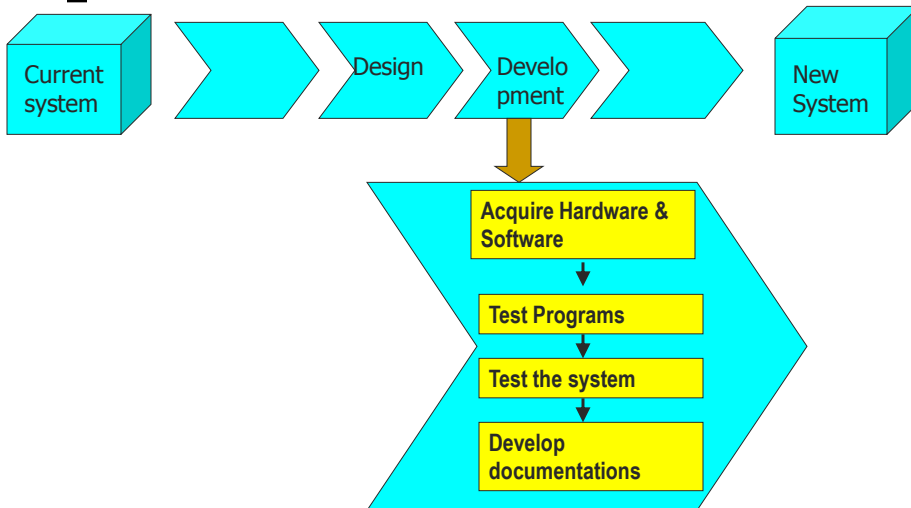
- Explain system design and the activities involved in system design
- Differentiate between Physical and Logical design



4. SYSTEM DEVELOPMENT



Stages of Development



10/14/2013 10:05 AM

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63

System Development

- Physically built the candidate system

Stages:

- Acquire software : custom write or buy off-the shelf
- Acquire hardware: upgrade existing hardware or buy
- write and test programs
- Test the system through
 - Unit testing - Test individual parts of prog separately
 - System testing - Test entire system as a whole
 - User approval -
- Develop user/system documentation



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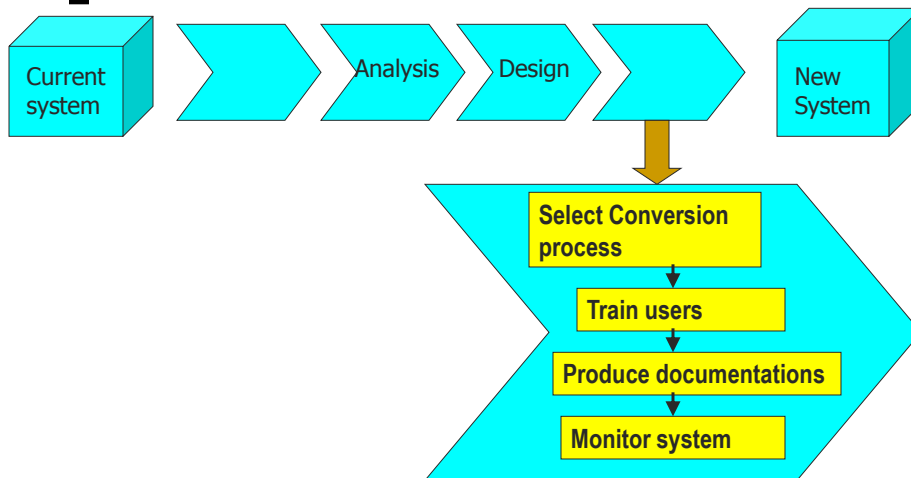
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64

5. SYSTEM IMPLEMENTATION



Stages of Implementation



■ It involves

- Code
- Test
- Installing and coding the system

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67

Implementation

- It is the delivery & the **change over/handover** of the new system

Stages

(a) Selecting conversion approach

- (i) **Direct approach**:-Users stop using the old system immediately and starts using the new one.

- **Advantages:**

- Quick
- Cheap

- **Disadvantages:**

- Less secure i.e., no fall back
- Requires thorough preparation



↑
Change over

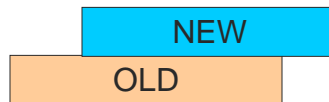


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68

(ii) **Parallel approach**:- Old and new system are operated side by side until the new system has proved to be reliable



■ **Advantages:**

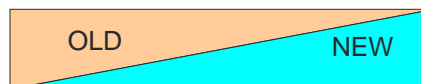
- If new system fails, organization can always *fallback* to the old one

■ **Disadvantages:**

- Expensive to keep 2 systems running simultaneously
- Time consuming



(iii) **Phase/Gradual approach**:-Where Parts of new system are introduced slowly -either in parallel or direct.



■ **Advantages:**

- Cost of changeover is reduced and spread over longer period
- Provides opportunity to learn from previous changeover

■ **Disadvantages:**

- Need to control one system working in two different modes at any given point
- Takes a longer time



(iv) **Pilot**:- where entire system is tried out but only by some users. Once proved reliable, the system is implemented with rest of the intended users



- (b) Train users how to use new system



(c) **Produce documentation**

- User manual
- Operational manual
- Training manual

(d) **Monitor/Evaluate initial running of system:- through (feedback)**



Activity

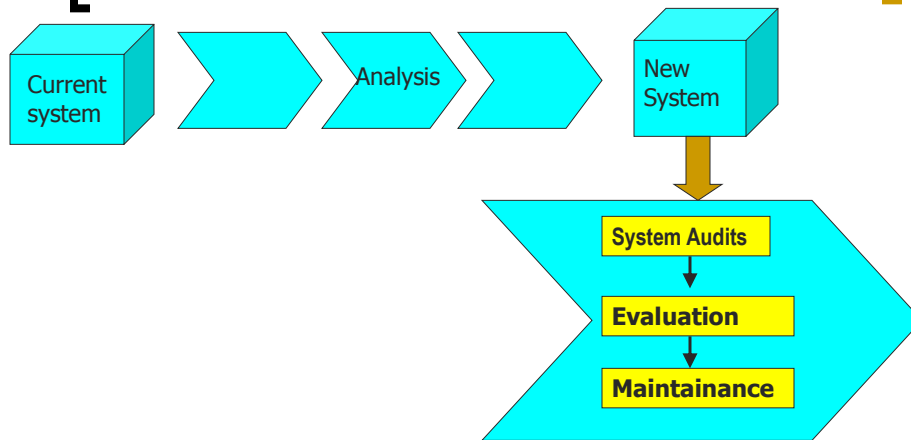
- Which changeover process would you recommend for
 - Patient monitoring system
 - School MIS



6. MAINTAINANCE & EVALUATION



Stages of Maintainance



Maintanance

- It involves systematically repair and improve the IS
- hli



■ Once system is delivered, it must be monitored to ensure no abnormalities occur thro'

(a) **System audits**:- Independent review of IS through feedback to see if all is as it should be i.e., is the system working ok

(b) **Periodic Evaluation**:- Compare system against standards to ensure it is working as per set standards



(c) **Maintainance**:- Refine, redesign parts updating & upgrading the system to keep pace with new developments in terms of products, services, customers operations, security, regulations and other requirements



Activity

- Explain the activities in system maintenance & Evaluation that takes place after system delivery



Limitations of SDLC

1. It is resource intensive
 - SDLC uses flowcharting through the phases of analysis & design \Rightarrow more time is spent on gathering information and preparing detailed specifications S.T. it takes years before a new system is developed
2. is inflexible and inhibits change
 - top-down, step-by-step approach discourages iteration and difficult for users to follow
 - Does not encourage user participation



3. Management and strategic needs ignored

- Not suited for decision oriented applications since system flowcharting is committed more to the **physical implementation** (how the system works) than the **logical implementation** (what system does) thereby rendering decision making process difficult
- Its routine, low-level processing instead of meeting strategic and corporate objectives

4. Not well suited to most of the small desktop systems that are common



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81

Strengths of SDLC

- Emphasis on project control, documentation, standards, and quality control
- Useful for building large transaction processing systems and MIS where requirements are highly structured and well-defined
- Due to these limitations, Data analysis is best handles using SSADM



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82

Lecture Evaluation

- With the aid of a diagram, describe the phases of SDLC
- Explain the limitations of SDLC

