

## INTRODUCTION TO SYSTEMS CONCEPTS AND SYSTEMS ANALYSIS

### Systems Analysis and Design

- What is Systems Analysis and Design?
- Systems Analyst
- Systems Development Life Cycle
- Preliminary Investigation
- Analysis
- Design
- Development
- Implementation

### Systems Analysis and Design *Concepts*

- System
  - organized set of related components established to accomplish certain task
  - Natural
  - Planned and placed by people
- Computer system
  - A system that has computers as one of its components

### Systems Analysis and Design *Concepts*

- Systems analysis
 

Process of studying an existing system to determine how it works and how it meets user needs
- Systems design
 

Process of developing a plan for an improved system, based upon the results of the systems analysis

### Systems Analysis and Design *Concepts*

- Impetus for change
  - Internal force
  - External force
- Authority for change
  - Approval of higher management

### Systems Analyst

- Professional computer employee who performs analysis and design
- Change agent
  - Overcome reluctance of users to change
- Typical career path
  - Programmer
  - Programmer / Analyst
  - Systems Analyst

### Systems Analyst Functions

#### Coordination

- Schedules and system-related tasks
- Personnel
  - Manager
  - Programmers
  - Users
  - Vendors of computer equipment
  - Mail room employees
  - Contractors



### Systems Analyst Functions

#### Communication

- Oral presentations
- Written documentation

#### Planning and design

- Plans and designs new system
- Involved from beginning of project through final implementation of the system



### Systems Analyst Personal Qualities

- Analytical mind
- Good communication skills
- Self-discipline
- Self-direction
- Organizational skills
- Creativity
- Ability to work without tangible results



### Systems Development Life Cycle SDLC

- Preliminary investigation
- Analysis
- Design
- Development
- Implementation



### Preliminary Investigation

- Feasibility study / System survey
- Determine the problem
- Describe the problem
- Understand management decisions
  - Organizational chart
  - Informal hierarchy
- Produces rough plan and what to do



### SDLC Preliminary Investigation

#### Problem Definition

- Nature of the problem
  - What is the problem?, Separate problem from symptoms of problem. Where is the opportunity?
- Scope of the project
  - Budget and schedule, exactly what is the area of study
- Objectives of the project
  - What user thinks system should do or what should the system be able to do



**SWIFT SPORT SHOES: PROBLEM DEFINITION**

**True Nature of the Problem**  
The nature of the problem is the existing manual inventory system. In particular:

- Products are frequently out of stock
- There is little interstore communication about stock items
- Store managers have no information about stock levels on a day-to-day basis
- Ordering is done haphazardly

**Scope**  
The scope of the project will be limited to the development of an inventory system using appropriate computer technology.

**Objectives**  
The new automated inventory system should provide the following:

- Adequate stock maintained in stores
- Automatic stock reordering
- Stock distribution among stores
- Management access to current inventory information
- Ease of use
- Reduced operating costs of the inventory function

**SDLC Preliminary Investigation**

**Report**

- What you have found
- Recommendations
- Financially feasible

**SDLC Preliminary Investigation**

**Resulting Management Decision**

- Drop
- Fix a simple problem
- Authorize the analysis phase

**SDLC Analysis**

- Understand the existing system
  - Gather data
  - Analyze data
- Establish system requirements

**SWIFT SPORT SHOES: REQUIREMENTS**

**The requirements for the Swift Sport Shoes inventory system are as follows:**

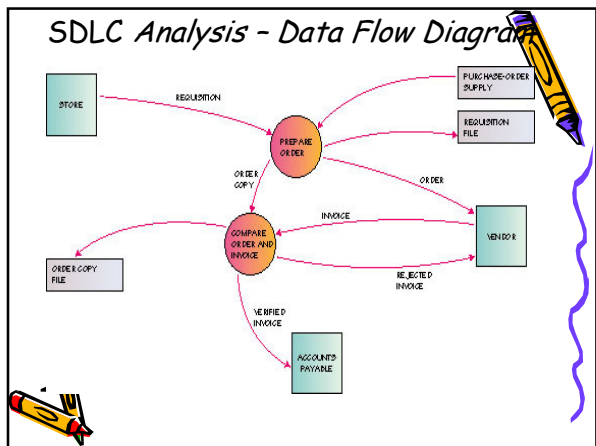
- Capture inventory data from sales transactions
- Implement automatic inventory reordering
- Implement a standardized interstore transfer system
- Provide both on-demand and scheduled management reports
- Provide security and accounting controls throughout the system
- Provide a user-oriented system whose online usage can be learned by a new user in one training class
- Reduce operating costs of the inventory function by 20%

**SDLC Analysis - Data Gathering**

- Written documents
- Interviews
  - Structured
  - Unstructured
- Questionnaires
- Observation
  - Visits by appointment
  - Participant observation
- Sampling

**SDLC Analysis - Analyze Data**

- How the current system works
- Determine system requirements
- Basis for documentation
- Tools
  - Data flow diagram (DFD)
  - Decision tables



### SDLC Analysis - Decision Tables

Heading: Rules (1-5), Condition entries (Y, N, —), Action entries (X, —)

Order procedure	1	2	3	4	5	6
Valid requisition	Y	Y	Y	Y	Y	N
Available warehouse	Y	N	N	N	N	—
Available another store	—	Y	N	N	N	—
Required order volume	—	—	Y	N	N	—
Special customer order	—	—	—	Y	N	—
Transfer goods from warehouse		X				
Transfer goods from store		X				
Determine vendor			X			
Send purchase order			X			
Hold requisition				X	X	
Send back order notice				X		
Repeat requisition						X

- ### SDLC analysis - System Requirements
- Detailed list of things the system must be able to do
  - Design is based upon system requirements
  - Agreement upon requirements is needed before proceeding

- ### SDLC Analysis - Report to Management
- Summarize problems
  - Describe requirements
  - Cost analysis
  - Recommendations for next step
  - Obtain authorization to proceed

- ### SDLC Design
- Planning the new system
  - Two phases
    - Preliminary design
    - Detail design

- ### SDLC Preliminary Design
- Major system aspects
- Centralized or distributed
  - Online or batch
  - PC-based?
  - How will input be captured?
  - Necessary reports

### SDLC Preliminary Design

- Make or buy decision
- Packaged software
  - Meet at least 75% of requirements?
  - Change business procedures for part or all of remainder?
  - Customize for part of all of remainder?
- Custom software
  - Programmers write code
- Outsourcing
  - System is developed by external organization



### SDLC Preliminary Design

- Create an overall plan
- Offer alternatives that meet requirements
- Explain differences
- Evaluate costs



### SDLC Preliminary Design

- Build a prototype
  - Limited working system of subset
- Does not need true functionality
  - Output looks like anticipated system output
- Working model that can be modified and fine-tuned
  - Uses high-level software tools - CASE
  - Best for small-scale systems



### SDLC Preliminary Design

#### CASE tools

#### Computer-Aided Software Engineering

- Supports specific analysis and design tasks
- Integrated environment that supports the entire systems development process



### SDLC Preliminary Design

#### Presentation

- All alternatives
- Selected plan
- Prototype of the system
- Obtain authorization to proceed



### SDLC Detail Design

#### Parts of detail design phase


- Output requirements
- Input requirements
- Files and databases
- Systems processing
- Systems controls and backup



### SDLC Detail Design

Output requirements


- Medium
- Type of reports
- Contents



### SDLC Detail Design

Input requirements


- Medium
- Content
- Input forms
- Validation
- Volume



### SDLC Detail Design

Files and Databases


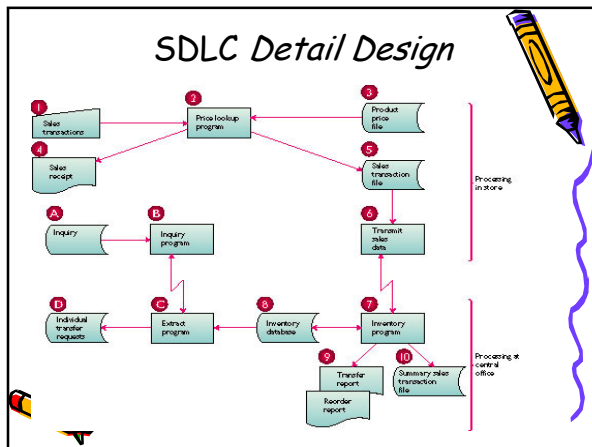
- Organization
- Access
- Format of records
- Coordinate with database administrator regarding external databases and updating



### SDLC Detail Design

Symbol	Example	Symbol	Example
	Update detailed file → Classified ad master file		Update inventory file
	Q2 → B1 → D4 To page 2 From page 1		Current account balance
	Sort customer transactions → Sort by file with customer number		Edit data—operator console
	Query license file → License status		Edit transactions → Requested transactions report


Flowchart Symbols

### SDLC Detail Design

Systems Controls and Backup


- Insure that input is processed correctly
- Prevent fraud and tampering
- System journals
- Backup of system files



### SDLC Detail Design


Report to Management

- Detailed design specifications report
- Presentation
- Obtain authorization to proceed



### SDLC Development


- Doing the work to bring the new system into being
- Scheduling



Task	Start Week	End Week
Program specifications	0	5
Programming	3	15
Unit testing	4	17
Documentation	5	19
System testing	7	19
File conversion	9	17
Training	11	19


### SDLC Development

- Programming
  - Refine the design
  - Detailed logic flowcharts and pseudocode
- Testing
  - Unit testing
  - System testing
  - modular testing




### SDLC Implementation

- Converting to the new system
- Training
- Equipment conversion
- File conversion
- System conversion
- Auditing
- Evaluation
- Maintenance




### SDLC Implementation - Training

- Begin during testing
- User's manual (Technical Writers)
- Hands-on
- Training consideration
  - Space
  - Equipment
  - Data
  - User's schedules



### SDLC Implementation - Conversion

- Equipment
  - Planning
  - Installation of new equipment
- File
  - Manual to electronic
  - Special programs to convert old format to new



## SDLC Implementation - Conversion

- System
  - Direct conversion
  - Phased conversion
  - Pilot conversion
  - Parallel conversion



## Direct conversion

- discontinuing the old system when the new system is introduced.
- Most appropriate when the old system has no value or the new system is so different that comparisons between the systems would be meaningless.
- Inexpensive but leaves no backup system in case of a problem.
- Unless the system has been carefully developed and properly tested, direct conversion has a high risk of failure.



## Parallel conversion:

- means operating the old system and the new system simultaneously (parallel) for a period of time.
- The outputs of the two systems could then be compared, difference reconciled and problems with the new system corrected.
- After a period of time when the new system has proved itself, the old system could be discontinued.



## Parallel conversion

- Parallel processing protects companies from failure and errors caused by the new system (reason Parallel processing has gained widespread popularity)
- but it is costly and stressful to process all transactions twice.



## Phase-in conversion

- the old system is gradually replaced by elements of the new system.
- For example a company could first implement its inventory, then its disbursements system, then its sales collection system and so forth until the whole system is functional.



## Phase-in conversion


- Advantages: drastic changes are avoided and costs of converting old data files are minimized.
- Disadvantages: cost of creating the temporary interfaces between the old and the new systems and the time required to make the gradual changes.






### Modular conversion:

- a new system is implemented in only a portion of the organization, such as one of the company's locations.
- For example a shop could install its new POS system at one of its stores using a direct, parallel or phase-in approach.




### Modular conversion:

- Advantage: localizes conversion problems and allows users and operators to be trained in a live environment.
- Disadvantages: long conversion time and the need for interfaces between the old and new systems, which coexist until all locations have been converted.




### SDLC Implementation - Auditing

- Audit trail
- Trace output back to source




### SDLC Implementation - Evaluation


- Working
- Meets original requirements
- Benefits
- Meets budget
- Improvements



### SDLC Implementation - Maintenance



ongoing activity for life of system



### Questions

