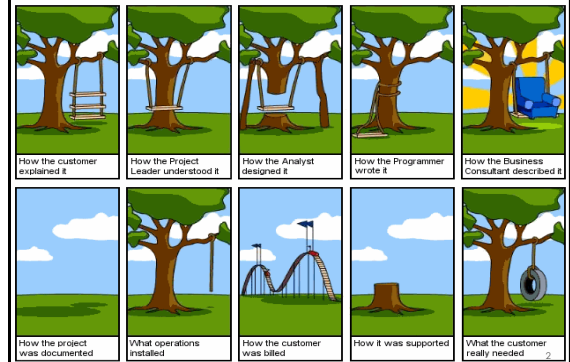


# Traditional Development v/s OO Development

Topic # 3

## Modeling to OO



## Software Crisis

"The 'software crises' came about when people realized the major problems in software development were ... caused by **communication difficulties and the management of complexity**" [Budd]



What kind of language can alleviate difficulties with communication & complexity?

## What is a model and why to use it?

- A model is a simplification of reality.  
E.g., a miniature bridge for a real bridge to be built  
– Well...sort of...but not quite
- A mental model is our simplification of our perception of reality
- A model is an *abstraction* of something for the purpose of *understanding*, be it the problem or a solution.
- To understand *why* a software system is needed, *what* it should do, and *how* it should do it.
- To communicate our understanding of why, what and how.
- To detect commonalities and differences in your perception, my perception, his perception and her perception of reality.
- To detect misunderstandings and miscommunications.

## OO Analysis → OO Design → OO implementation

- The purpose of OO analysis and design can be described as –
- Identifying the objects of a system.
- Identifying their relationships.
- Making a design, which can be converted to executables using OO languages.

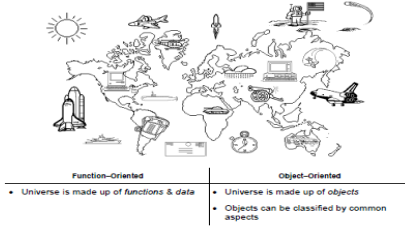
## Advantages of Object Oriented

- Simplicity
- Reusability
- Increase quality
- Faster development
- Maintainability
- Modifiability

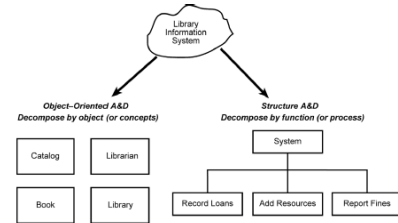
## OOAD v/s SAD

### Object- & Function-Oriented Perspectives

Look around. What do you see?



## Code structures resulting from OOAD & SAD



## Structured Analysis and Design

What is the SAD?

Divide and Conquer

Traditional systems development technique that is time tested and easy to understand

Uses set of process models to describe a system graphically

Divide large, complex problem into smaller, more easily handled ones.

Top Down Approach

Functional view of the problem

## Structured Analysis and Design

What is SAD?

Establish complete requirement documentation

Establish concrete requirement specification

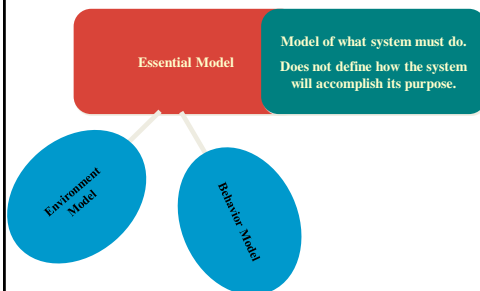
Structured analysis is a set of techniques and graphical tools that allow the analyst to develop a new kind of system specification that are easily understandable to the user. Analysts work primarily with their wits, pencil and paper."

Improve Quality and reduce risk

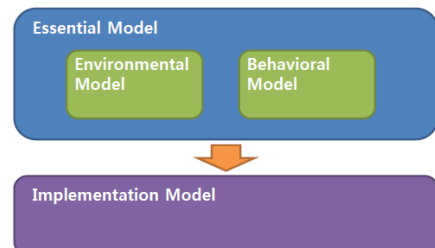
Focus on reliability, flexibility & maintainability

## Structured Analysis and Design

Elements of Structured Analysis and Design?



## Structured Analysis and Design



## Structured Analysis and Design

### Environmental Model

- Defines the scope of the proposed system.
- Defines the boundary and interaction between the system and the outside world.
- Composed of: Statement of Purpose, Context Diagram, and Event List.

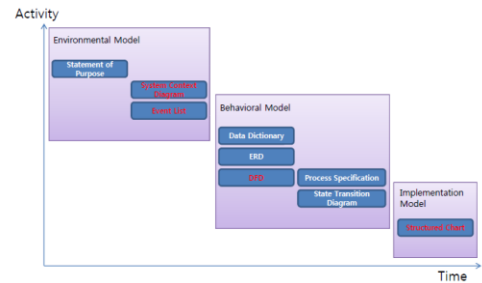
### Behavior Model

- Model of the internal behavior and data entities of the system.
- Models the functional requirements.
- Composed of Data Dictionary, Data Flow Diagram, Entity Relationship Diagram, Process Specification, and State Transition Diagram.

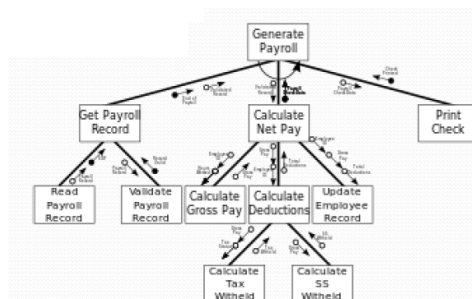
### Implementation Model

- Maps the functional requirements to the hardware and software.
- Determines which functions should be manual and which should be automated.
- Defines the Human-Computer Interface.
- Defines non-functional requirements.
- Tool: Structure Charts

## SAD Activity



## Implementation Model



## Structured Analysis and Design

### Advantages

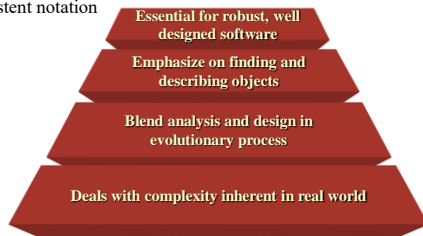
- Visual, so it is easier for users/programmers to understand
- Makes good use of graphical tools
- A mature technique
- Process-oriented approach is a natural way of thinking
- Flexible
- Simple and easy to understand and implement

### Disadvantages

- Not enough user-analyst interaction
- It depends on dividing system to sub systems but it is to decide when to stop decomposing.

## Object Oriented Analysis and Design

Object-Oriented analysis and design thoroughly represent complex relationships, as well as represent data and data processing with a consistent notation



## Object Oriented Analysis and Design

### Analysis Phase

- Model of the real-world application is developed showing its important properties.
- Model specifies the functional behavior of the system independent of implementation details

### Design Phase

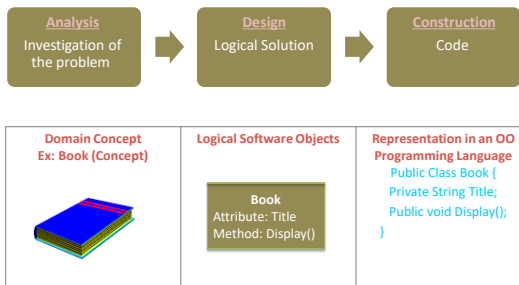
- Analysis model is refined and adapted to the environment.
- System design: Concerned with overall system architecture
- Object design: Implementation details are added to system design

### Implementation Phase

- Design is implemented using a programming language or database management system

## Object Oriented Analysis and Design

### From Analysis to Implementation

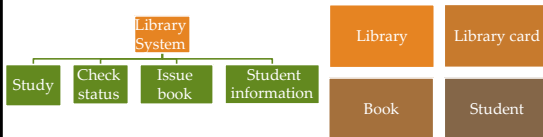


## Similarities and difference between SAD and OOAD

- ❑ Both SAD and OOAD had started off from programming techniques.
- ❑ Both techniques use graphical design and graphical tools to analyze and model the requirements.
- ❑ Both techniques provide a systematic step-by-step process for developers
- ❑ Both techniques focus on documentation of the requirements

- ❑ SAD is Process-Oriented
- ❑ OOAD combines data and the processes

## Similarities and difference between SAD and OOAD



## OOAD v/s SAD

Object-Oriented Methodology (OOM) represents an evolution in software development relative to Function-Oriented Methodology

Function-Oriented Methodology formalized top-down functional decomposition

Function-Oriented Methodology codified software development principles:

- Abstraction
  - Functional/procedural
  - Data (structure)
- Functional/procedural modularity
- "Basic" data localization (local or global)
- Parameter passing
- Functional/procedural information hiding
  - Local data
  - Internal algorithm

## OOAD v/s SAD

OOM applies principles of hardware component design to software

e.g. Each car is built from components (objects)  
Each computer is built from components (objects)

- OOM builds a system from components (objects)

OOM formalizes fundamental relations between:

- Data & operations (procedures & functions) that manipulate them
- Concurrent processes & the operations they perform upon request
- Concurrent processes and data

OOM emphasizes concept of "Responsibility-based Collaboration"

- Modularity of behavior & structure
- Components working together

## Similarities and difference between SAD and OOAD

Key Differences Between Structured and Object-Oriented Analysis and Design

	Structured	Object-Oriented
Methodology	SDLC	Iterative/Incremental
Focus	Process	Objects
Risk	High	Low
Reuse	Low	High
Maturity	Mature and widespread	Emerging (1997)
Suitable for	Well-defined projects with stable user requirements	Risky large projects with changing user requirements

## **END OF TOPIC 3**

- COMING UP!!!!!!
- Requirement Engineering
- UML & Use cases

25