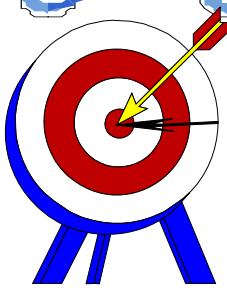
Object-Oriented Systems Development: Using the Unified Modeling Language

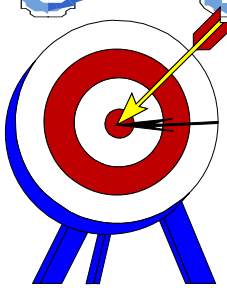
Chapter 3:

Object-Oriented Systems Development Life Cycle



Goals

- **The software development process**
- **Building high-quality software**
- **Object-oriented systems development**



Goals (Con't)

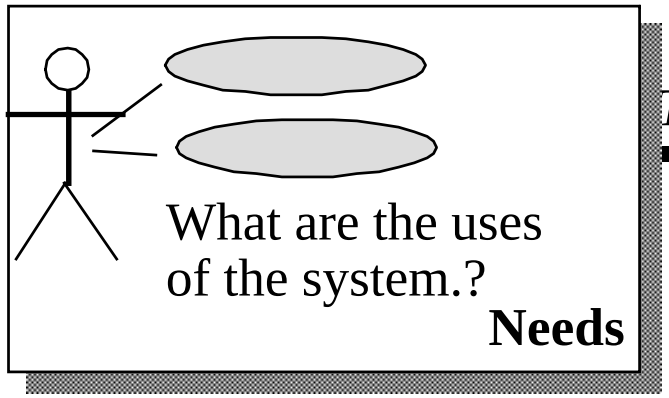
- **Use-case driven systems development**
- **Prototyping**
- **Rapid application development**
- **Component-based development**
- **Continuous testing and reusability**

Software Process

The essence of the software process is the transformation of

- **Users' needs to**
- **The application domain into**
- **A software solution.**

Software Process (Con't)



Transformation 1

Problem

Statements

Analysis

Transformation 2

Design

Implementation

Detail

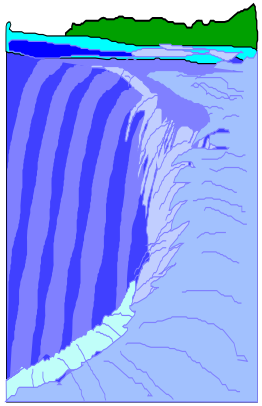
Transformation 3

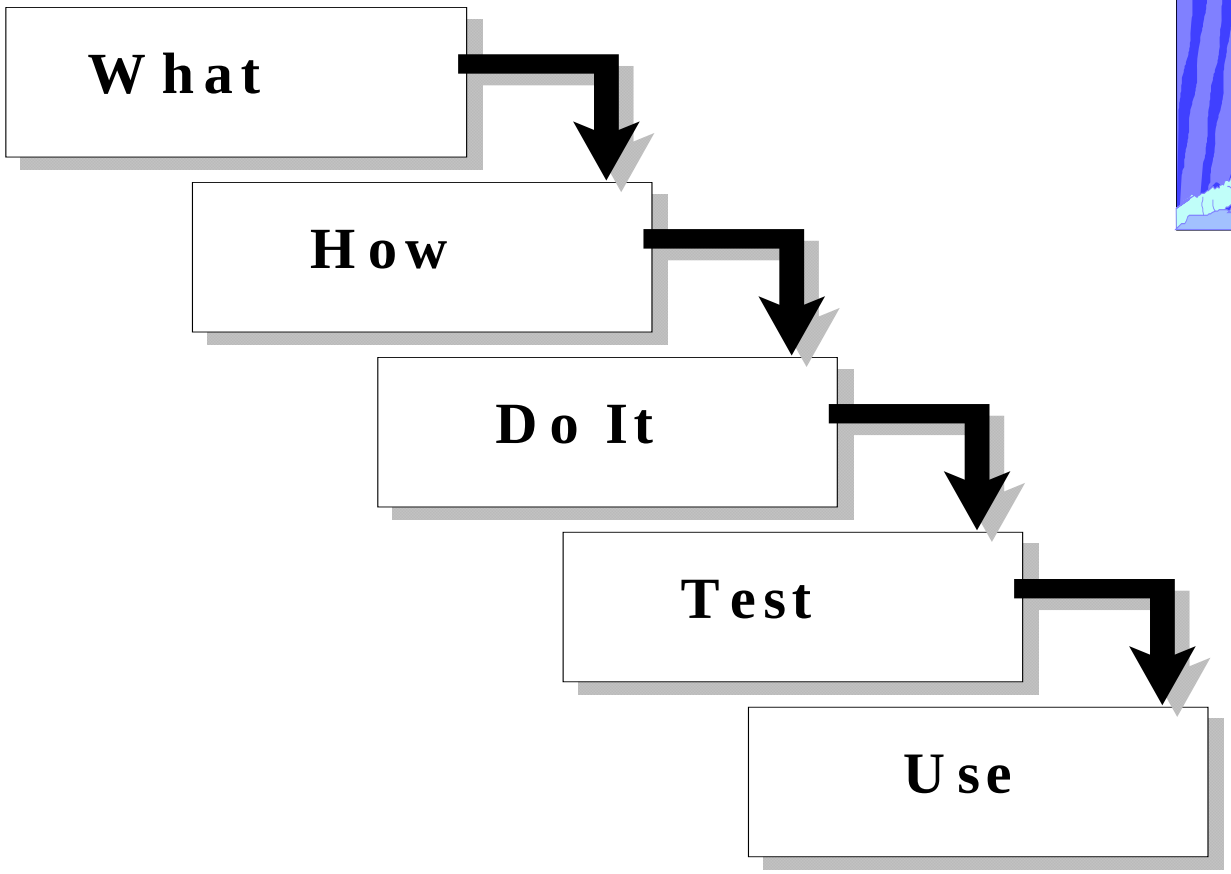
System

Software

Product

Traditional Waterfall Approach to Systems Development



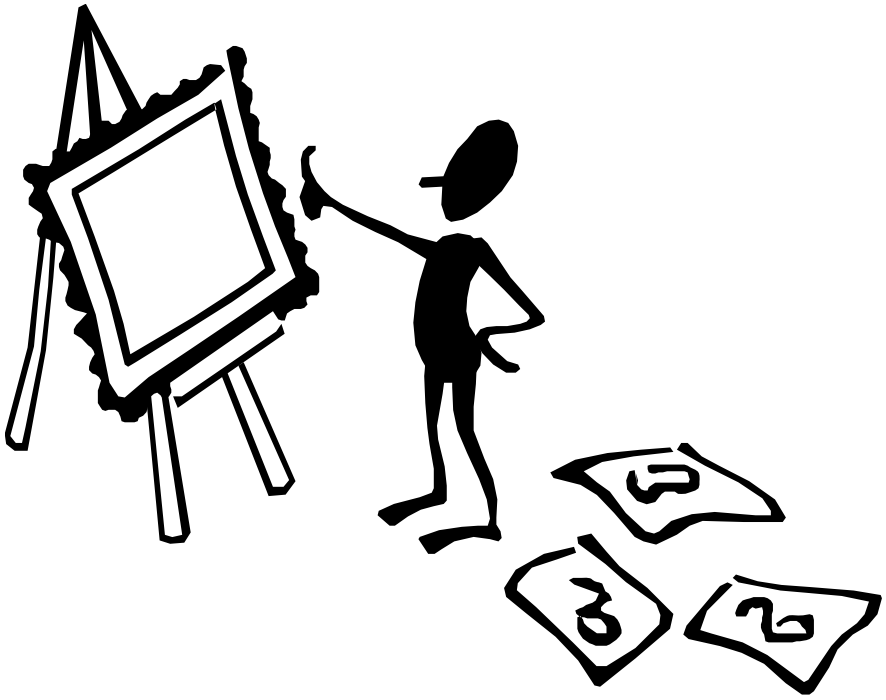


Software Quality

- **There are two basic approaches to systems testing.**
- **We can test a system according to how it has been built.**
- **Alternatively, we can test the system with respect to what it should do.**

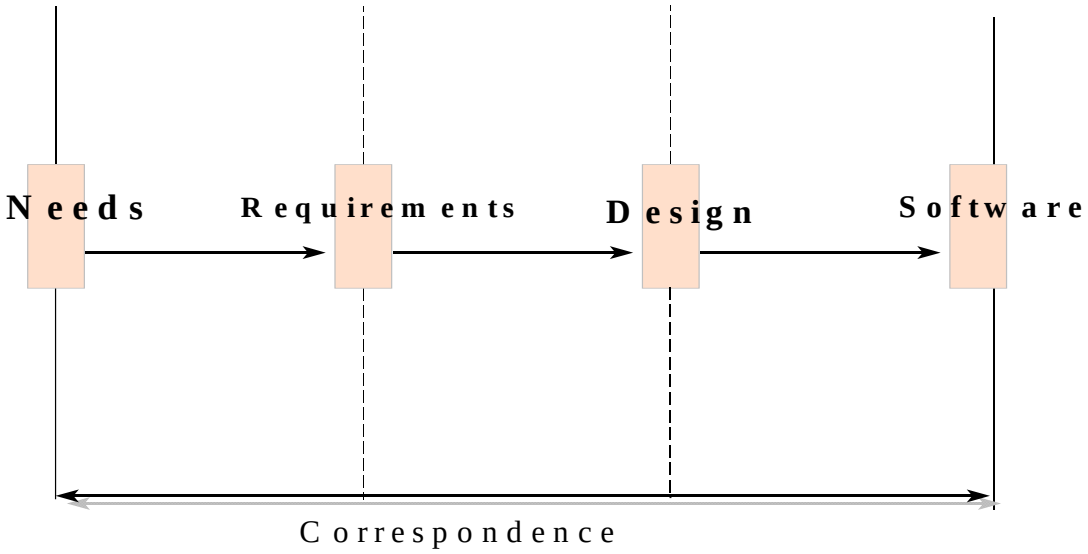
Quality Measures

- **Systems can be evaluated in terms of four quality measures:**
  - **Correspondence**
  - **Correctness**
  - **Verification**
  - **Validation**



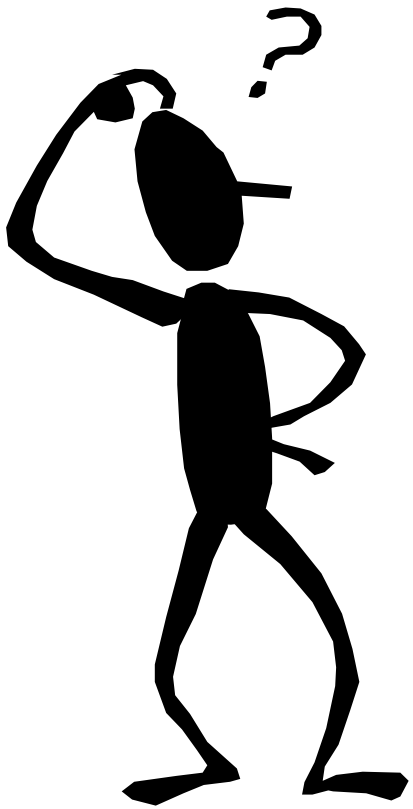
Quality Measures (Con't)

- **Correspondence measures how well the delivered system corresponds to the needs of the operational environment.**



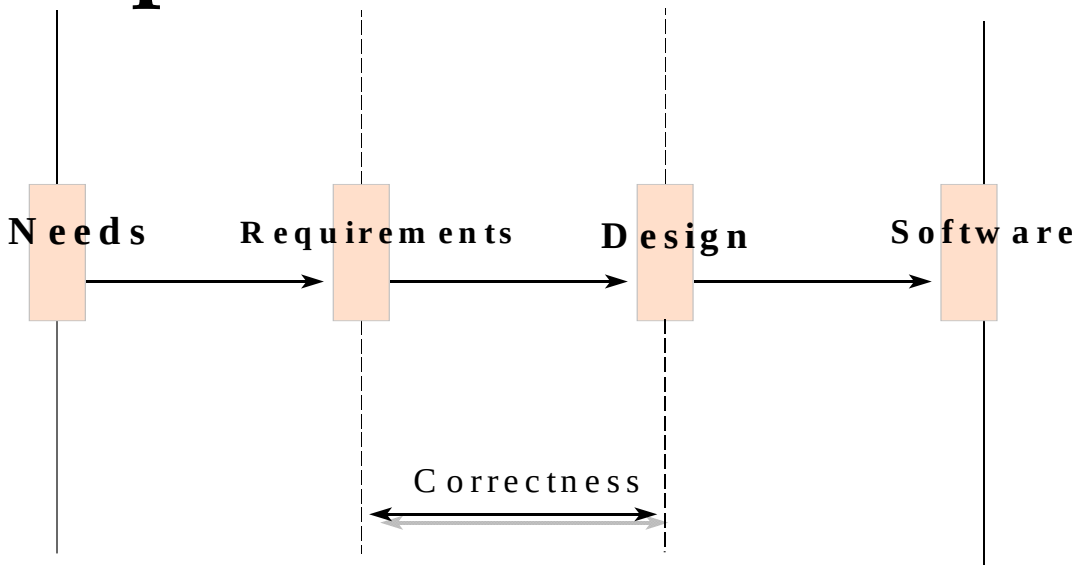
How would you determine Correspondence?

- **It cannot be determined until the system is in place.**



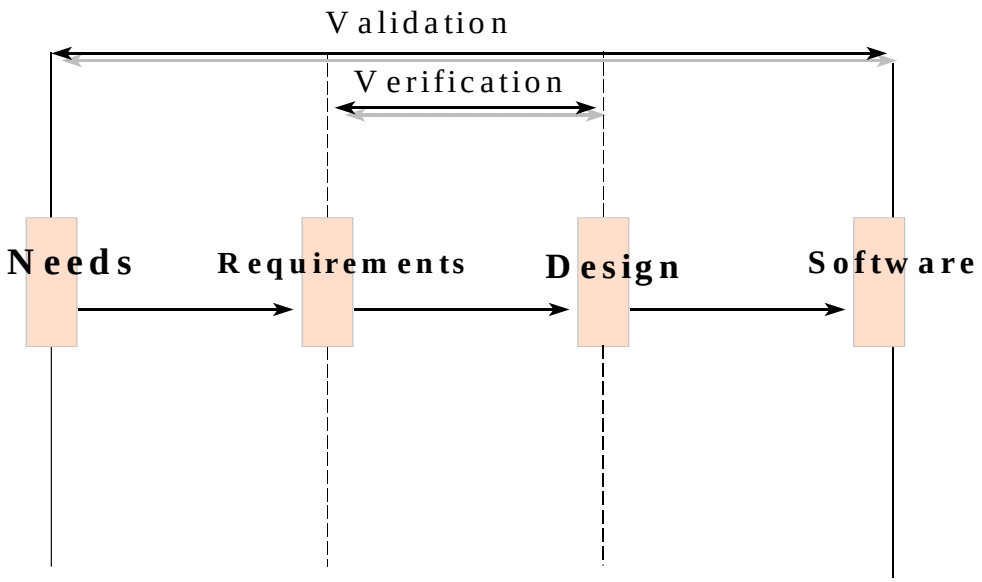
Quality Measures (Con't)

- **Correctness measures the consistency of the product requirements with respect to the design specification.**



Quality Measures (Con't)

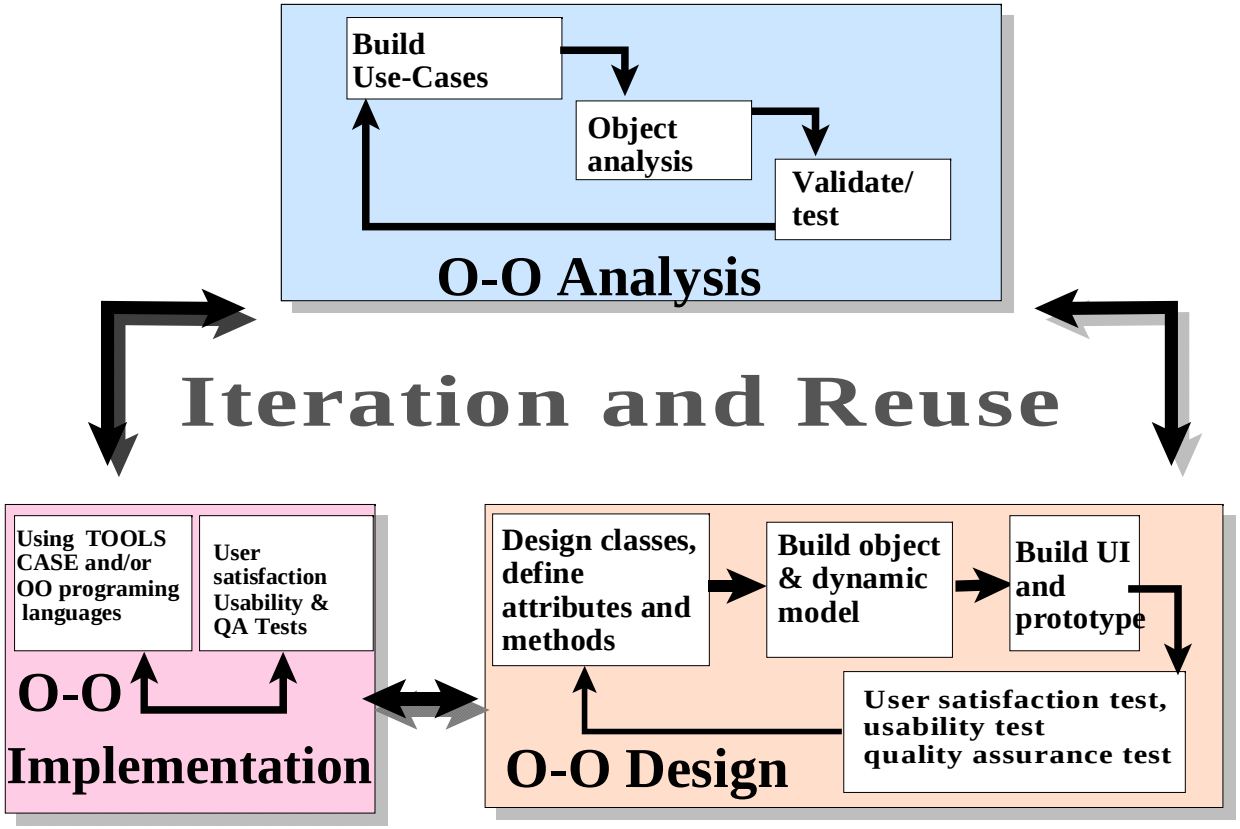
- *Verification* - "Am I building the product right?"
- *Validation* - "Am I building the right product?"



Quality Measures (Con't)

- ***Verification*** **is to predict the correctness.**
- ***Validation*** **is to predict the correspondence.**

Object-Oriented Systems Development Approach

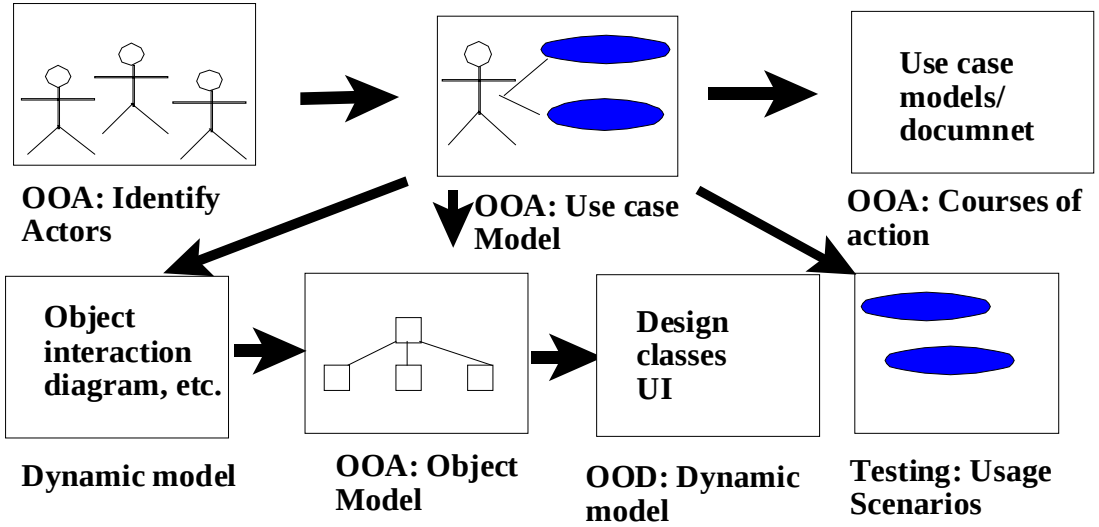


Object-Oriented Systems Development activities

- **Object-oriented analysis.**
- **Object-oriented design.**
- **Prototyping.**
- **Component-based development.**
- **Incremental testing.**

Use-case driven systems development

- ***Use Case*, is a name for a scenario to describe the user–computer system interaction.**



Object-Oriented Analysis

- **OO analysis concerns with determining the system requirements and identifying classes and their relationships that make up an application.**

Object-Oriented Design

- **The goal of *object-oriented design* (OOD) is to design:**
- **The classes identified during the analysis phase,**
- **The user interface and**
- **Data access.**

Object-Oriented Design (Con't)

- **OOD activities include:**
  - **Design and refine classes.**
    - **Design and refine attributes.**
    - **Design and refine methods.**
    - **Design and refine structures.**
    - **Design and refine associations.**
  - **Design User Interface or View layer classes.**
  - **Design data Access Layer classes.**

Prototyping

- **A Prototype enables you to fully understand how easy or difficult it will be to implement some of the features of the system.**
- **It can also give users a chance to comment on the usability and usefulness of the design.**

Types of Prototypes

- **A *horizontal prototype* is a simulation of the interface.**
- **A *vertical prototype* is a subset of the system features with complete functionality.**

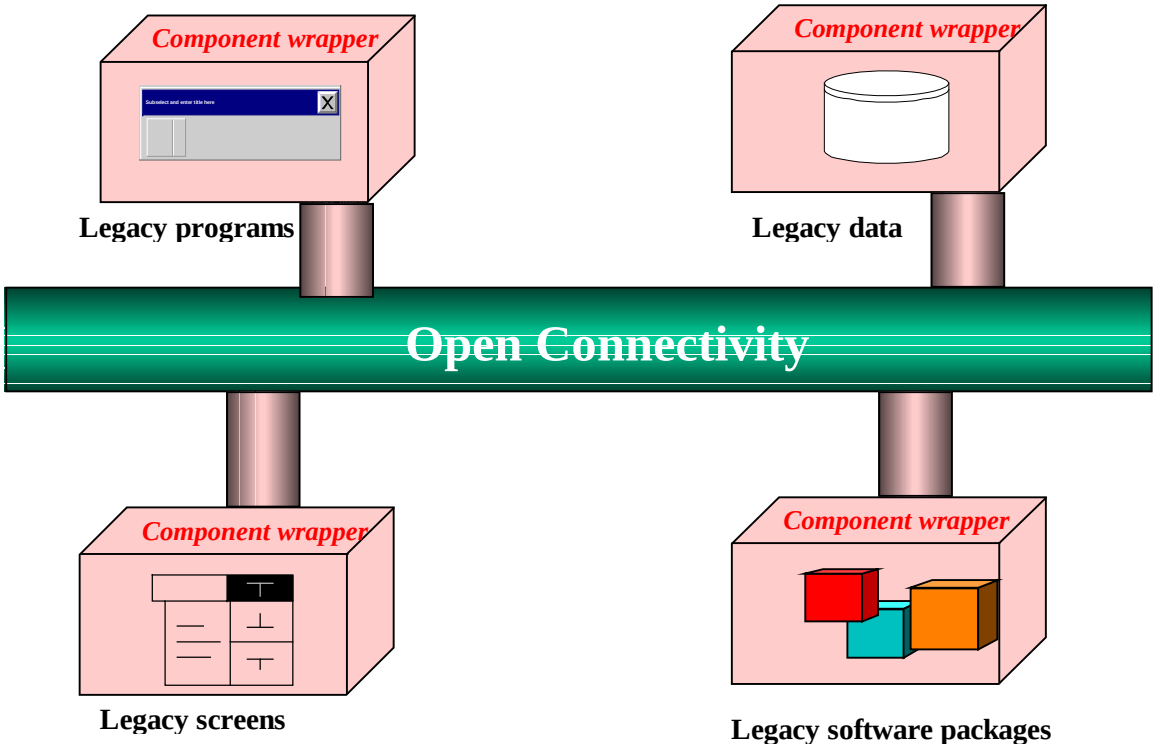
Types of Prototypes (Con't)

- **An *analysis prototype* is an aid for exploring the problem domain.**
- **A *domain prototype* is an aid for the incremental development of the ultimate software solution.**

Component-based development (CBD)

- **CBD is an industrialized approach to the software development process.**
- **Application development moves from custom development to assembly of pre-built, pre-tested, reusable software components that operate with each other.**

Component-based development (CBD) Con't)



Rapid Application Development (RAD)

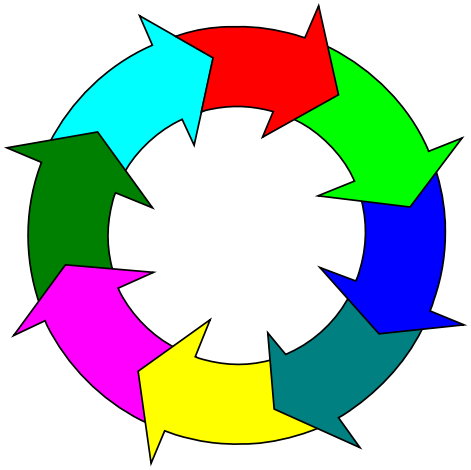
- **RAD is a set of tools and techniques that can be used to build an application faster than typically possible with traditional methods.**

Rapid Application Development (RAD) (Con't)

- **RAD does not replace SDLC but complements it, since it focuses more on process description and can be combined perfectly with the object-oriented approach.**

Incremental Testing

- **Software development and all of its activities including testing are an iterative process.**
- **If you wait until after development to test an application for bugs and performance, you could be wasting thousands of dollars and hours of time.**



Reusability

- **A major benefit of object-oriented systems development is reusability, and this is the most difficult promise to deliver on.**

Reuse strategy

- **Information hiding (encapsulation).**
- **Conformance to naming standards.**
- **Creation and administration of an object repository.**

Reuse strategy (Con't)

- **Encouragement by strategic management of reuse as opposed to constant redevelopment.**
- **Establishing targets for a percentage of the objects in the project to be reused (i.e., 50 percent reuse of objects).**

Summary

- **The essence of the software process is the transformation of users' needs into a software solution.**
- **The O-O SDLC is an iterative process and is divided into analysis, design, prototyping/ implementation, and testing.**