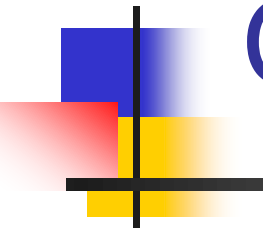
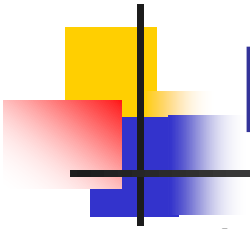


Chapter 3

Software Development Life Cycle



Review

- A development process consists of various phases, each phase ending with a defined output.
- The phases are performed in an order specified by the process model being followed.
- The software development process goes through several phases:
  - Requirement Specifications
  - Analysis
  - Design
  - Implementation
  - Testing
  - Conversion
- A process is a particular method of doing something, generally involving a number of steps or operations.
- The Software development process consists of the following processes:
  - Development Processes
  - Project Management Processes
  - Software Configuration Management (SCM) Processes
  - Process Management Processes

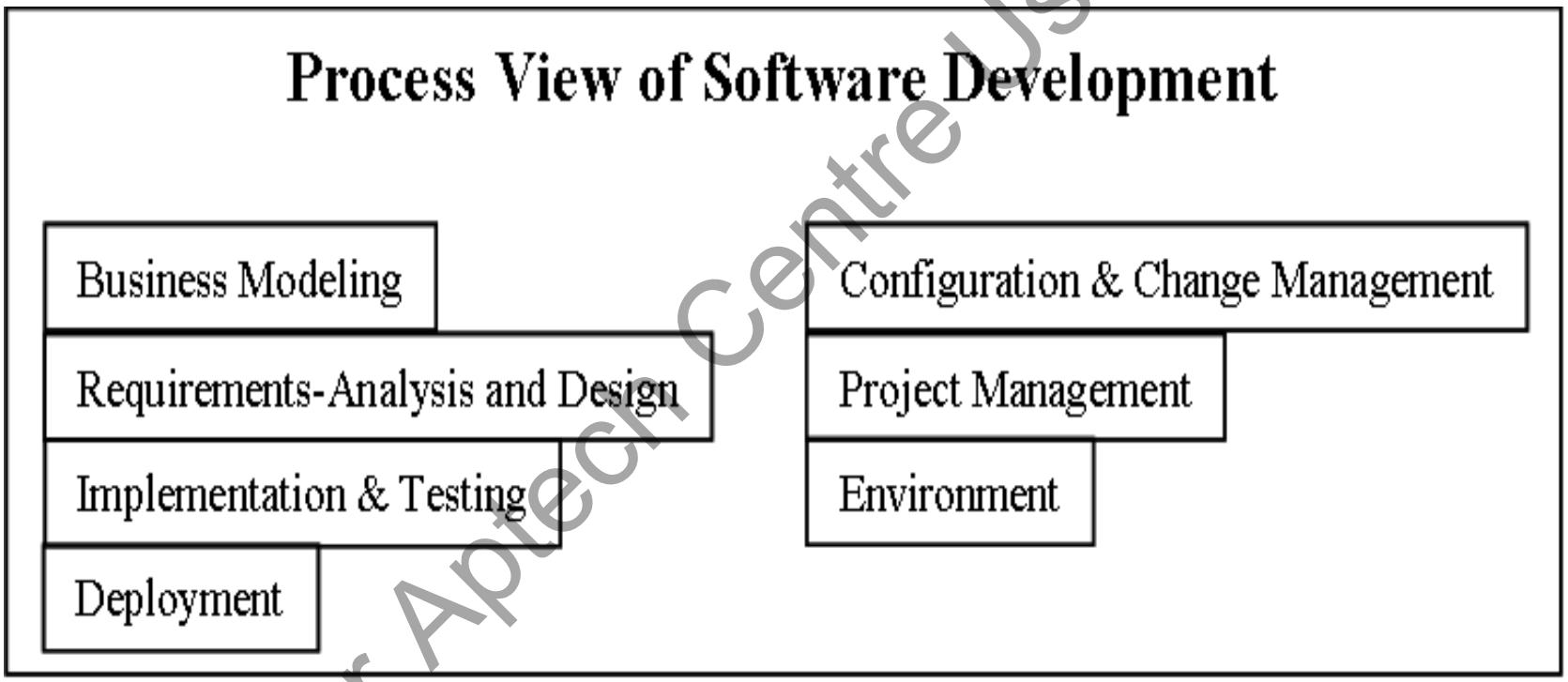
Objectives

- *Compare how software development companies organize their development process*
- *Explain the essentials of any process models*
- *Discuss the advantages and disadvantages of various process models*
- *Describe the criteria for choosing the appropriate process models*
- *Describe the process model for the Web and the process technology*

Essentials of any Process Model

- Requirements Definition
- Requirements Analysis
- Preliminary Design
- Detailed Design
- Implementation
- System Testing
- Maintenance and Operation

Software Development
A Process View



Process Models

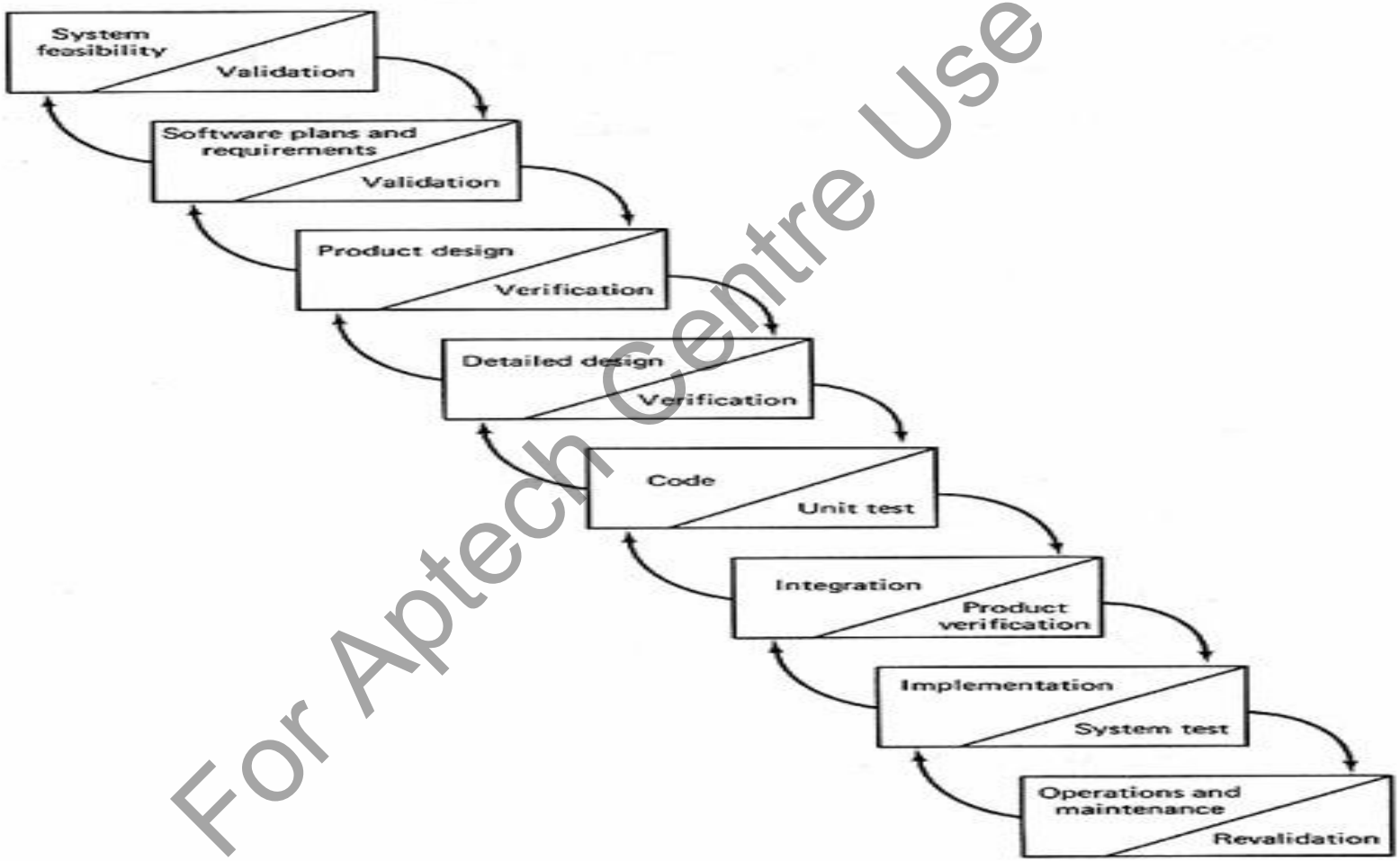
- Linear Process Models
  - Waterfall Model
  - Prototyping Model
- Evolutionary Software Process Models
  - Incremental Model
  - Spiral Model
  - Component Assembly Model

Waterfall Model

- Suggests a systematic, sequential approach to software development

- Phases
  - System/ Information engineering and modeling
  - Software requirements analysis
  - Software Design
  - Detailed Design
  - Coding
  - Testing
  - Integration
  - Operations and Maintenance

Waterfall Model Contd...



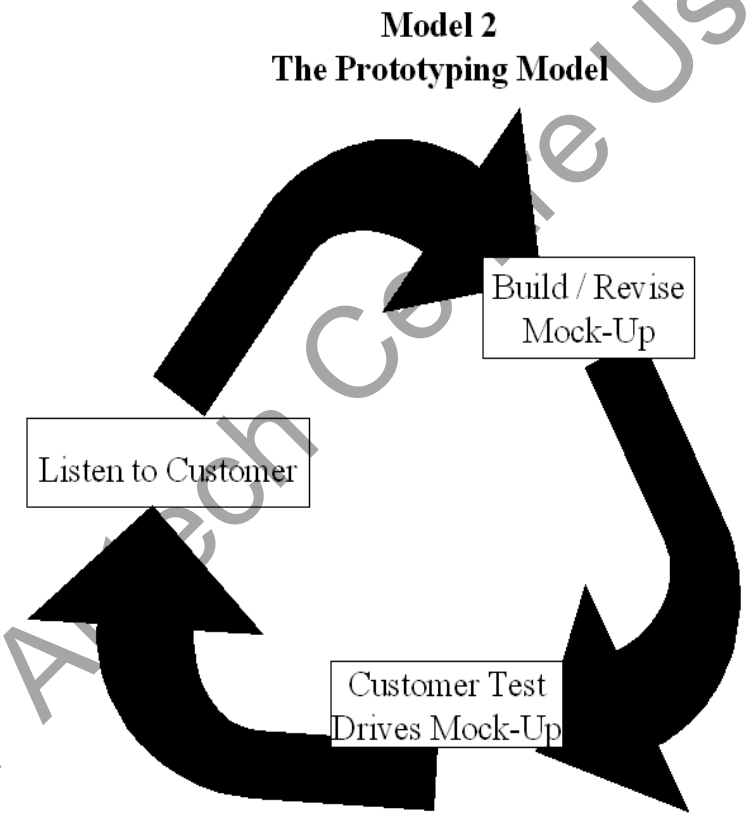
Waterfall Model - Shortfalls

- Real projects rarely follow the sequential flow that the model proposes
- Often difficult for the customer to state all requirements explicitly
- Customer must have patience

Prototyping Model

- Allows for reduced functionality or limited performance version of the eventual software
- Delivered in the early stage of project lifecycle
- Helps to make the user requirement more concrete

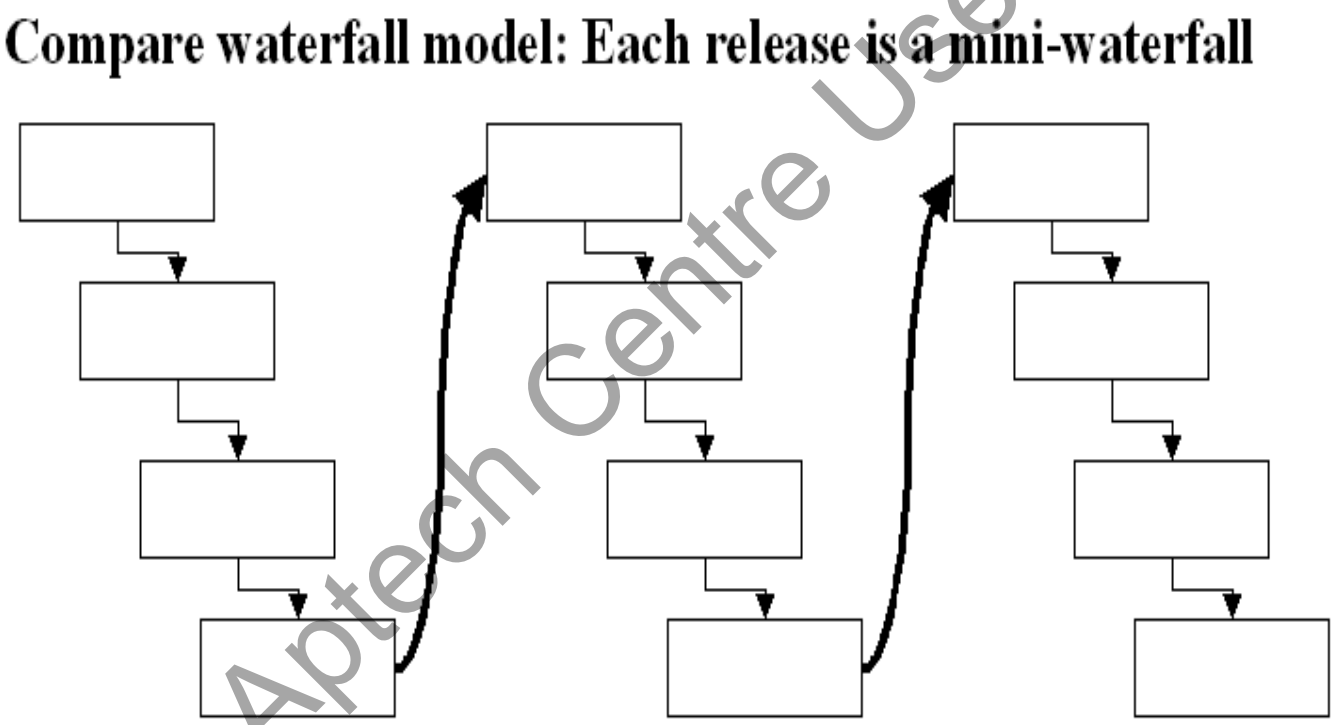
Prototyping Model Contd...



Incremental Model

- Combines
  - Elements of the linear sequential model
  - Iterative philosophy of prototyping

Incremental Model Contd…



Incremental Model – Benefits

- Tolerates changing requirements
- Elements are integrated progressively
- Risks are mitigated earlier
- Allows the organization to learn and improve
- Facilitates reuse
- Results in a more robust product
- Process itself can be improved and refined along the way
- Accommodates changes

Incremental Model – Benefits Contd…

- Provides a way in which management can perform tactical changes to the product
- Allows technological changes on the way
- Increasing reuse
- Easier to take advantage of commercial-off-the-shelf (COTS) products
- Learning
- Higher quality
- Results in a more thoroughly tested product

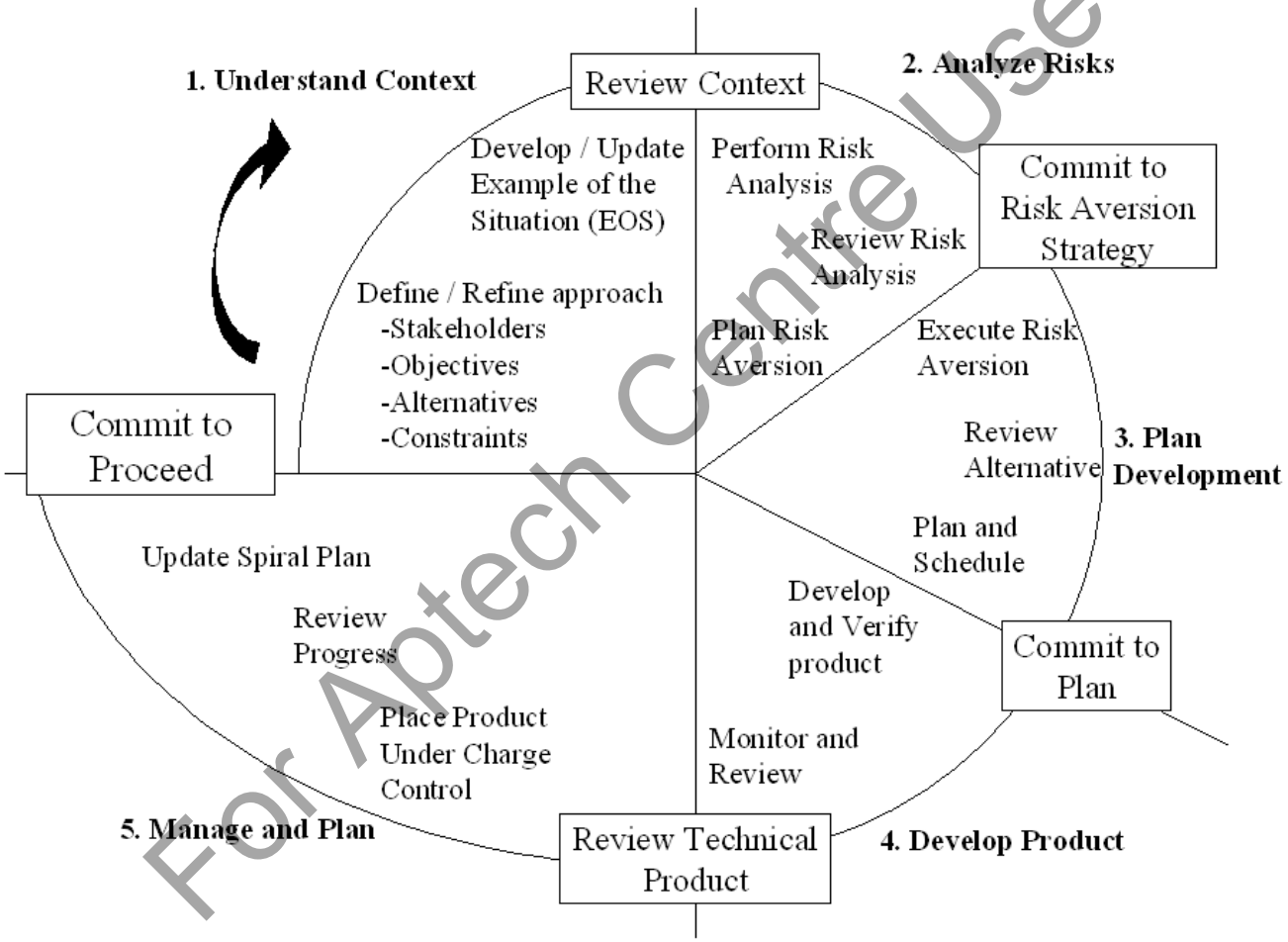
Incremental Model – Problems

- Inflexible point-solutions
- High-risk downstream capabilities
- Off-target initial release

Spiral Model

- Views software development as a spiral process
- Divided into framework activities, called, task regions
  - Understanding the Context
  - Planning-tasks
  - Risk analysis-tasks
  - Engineering-tasks
  - Construction & release
  - Customer Evaluation-tasks
- Task regions vary from 3 to 6

Spiral Model Contd...



Spiral Model – Explanation

- Inner cycles represent the early phases of requirement analysis along with prototyping
- Outer spirals are progressively representative of the classic software life cycle

Component Assembly Model

- Application is built from discrete executable components
- Application may be upgraded in smaller increments
- Components may be shared between applications

Choosing a Process Model – The Criteria

- Time frame available
- Execution of project
- Type of product/project being developed
- Detail in which specifications are available
- Having previous experience with similar projects

Process Tailoring

- The process of adjusting the standard process of an organization
- Obtains a process that is suitable for the particular business or technical needs of a project
- Happens at
  - Macro Level
  - Micro level

Process Tailoring-Criteria

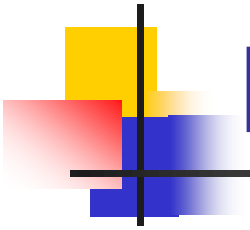
- Scope
- Formality
- Frequency
- Granularity

Process Tailoring- Influencing Factors

- Skill level of the team
- Peak team size
- Criticality of the application

Web Engineering

- An adaptable and incremental process
- Populated by a set of framework activities
  - Formulation
  - Planning
  - Analysis
  - Modeling
  - Page generation and testing
  - Customer evaluation



Process Technology Tools

- Help software organizations
  - Analyze their current process
  - Organize work tasks
  - Control and monitor progress
  - Manage technical quality
- Example - Rational Unified Process
  - Implements incremental approach
- Allow a software organization to build an automated model of
  - Common process framework
  - Task sets
  - Umbrella activities

Summary

- Software engineering is a discipline that integrates process, methods, and tools for the development of computer software.
- A number of different process models for software engineering have been proposed, each exhibiting strengths and weaknesses, but all having a series of generic phases in common.
- Any process model goes through:
  - Requirements definition
  - Requirement analysis
  - Preliminary design
  - Detailed design
  - Coding
  - Testing
  - Integration
  - Operations and maintenance
- The software process models can be broadly categorized into Linear process models and Evolutionary software process models.