CSE 333 – Software Engineering

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Lecture 04

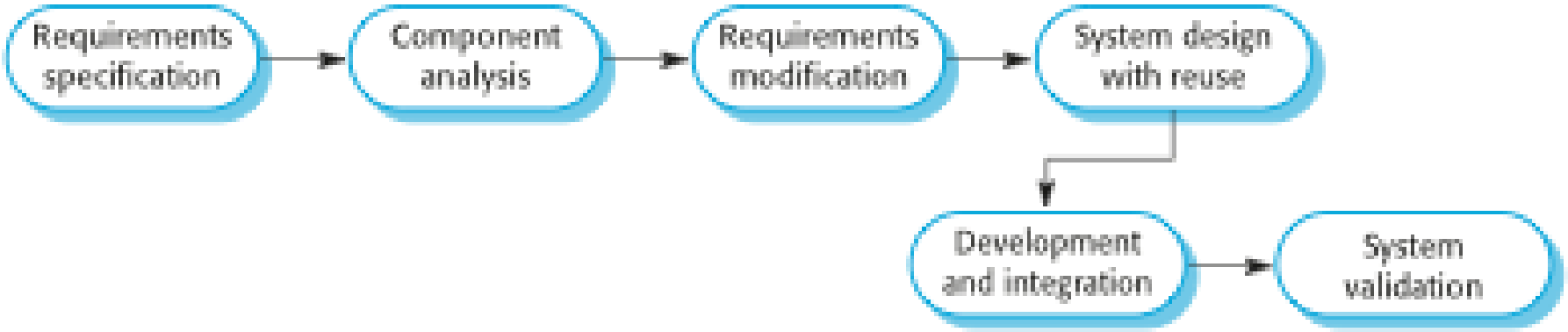
Outline

- Software process models
- Software process activities
- Coping with change
- The Rational Unified process

Reuse-oriented software engineering

- Based on systematic reuse where systems are integrated from existing components or COTS (Commercial-off-the-shelf) systems.
- Process stages
  - Component analysis;
  - Requirements modification;
  - System design with reuse;
  - Development and integration.
- Reuse is now the standard approach for building many types of business system
  - Reuse covered in more depth in Chapter 16.

Reuse-oriented software engineering



Types of software component

- Web services that are developed according to service standards and which are available for remote invocation.
- Collections of objects that are developed as a package to be integrated with a component framework such as .NET or J2EE.
- Stand-alone software systems (COTS) that are configured for use in a particular environment.

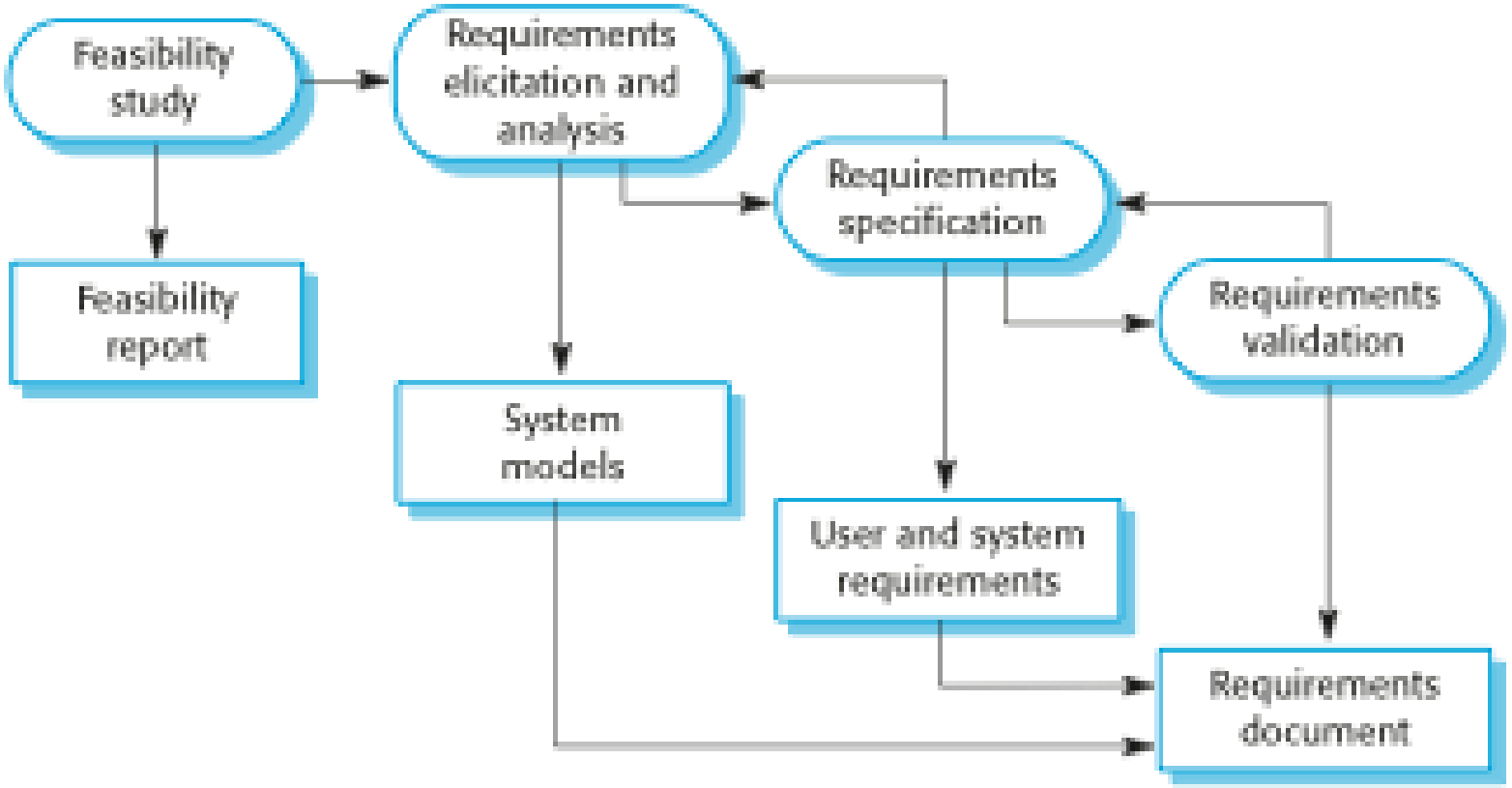
Process activities

- Real software processes are inter-leaved sequences of technical, collaborative and managerial activities with the overall goal of specifying, designing, implementing and testing a software system.
- The four basic process activities of specification, development, validation and evolution are organized differently in different development processes. In the waterfall model, they are organized in sequence, whereas in incremental development they are inter-leaved.

Software specification

- The process of establishing what services are required and the constraints on the system's operation and development.
- Requirements engineering process
  - Feasibility study
    - Is it technically and financially feasible to build the system?
  - Requirements elicitation and analysis
    - What do the system stakeholders require or expect from the system?
  - Requirements specification
    - Defining the requirements in detail
  - Requirements validation
    - Checking the validity of the requirements

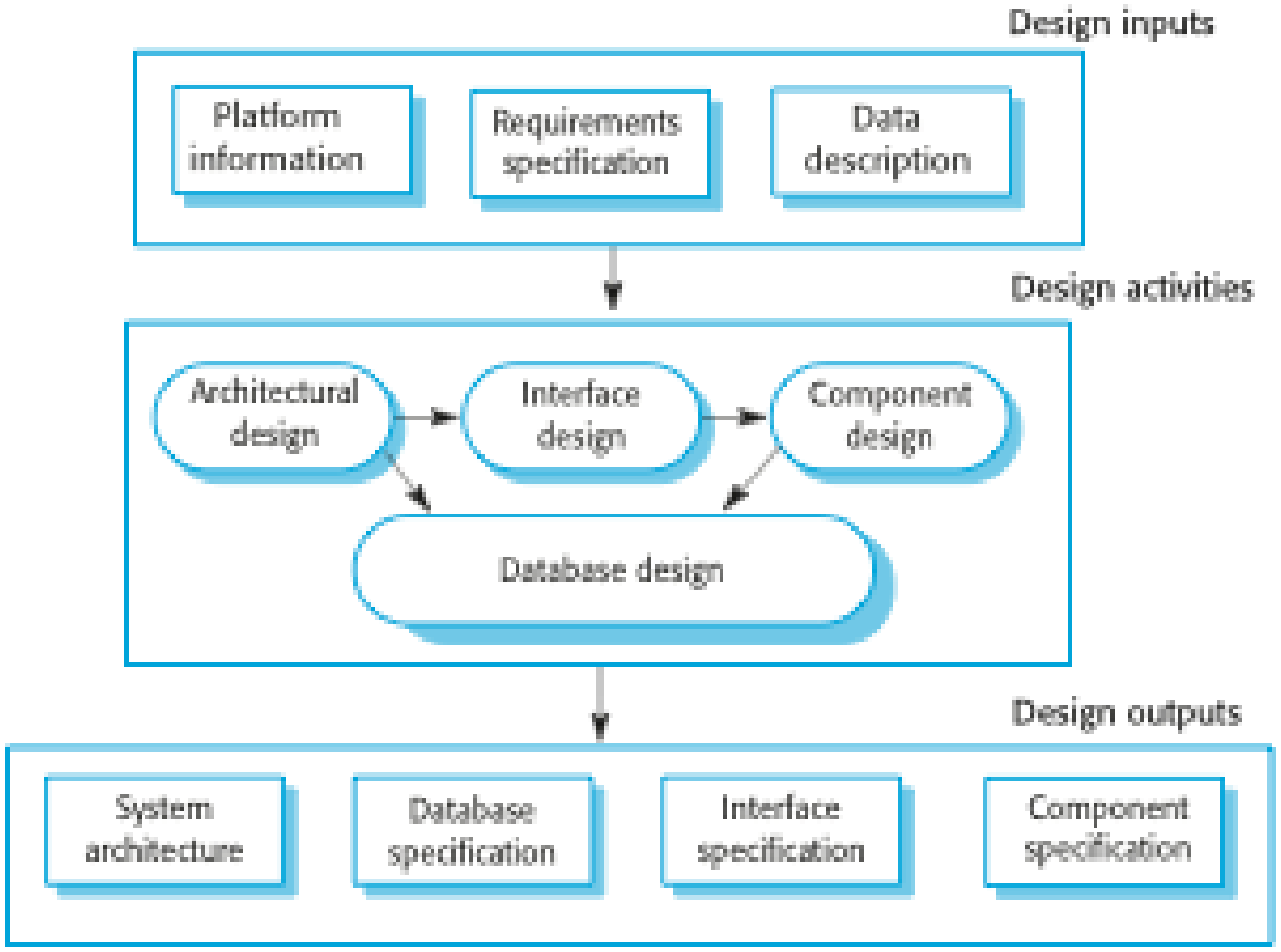
The requirements engineering process



Software design and implementation

- The process of converting the system specification into an executable system.
- Software design
  - Design a **software structure** that realises the specification;
- Implementation
  - Translate this structure into an **executable program**;
- The activities of design and implementation are closely related and may be inter-leaved.

A general model of the design process



Design activities

- *Architectural design*, where you identify the overall structure of the system, the **principal components** (sometimes called sub-systems or modules), **their relationships** and how they are distributed.
- *Interface design*, where you define the interfaces between system components.
- *Component design*, where you take each system component and design how it will operate.
- *Database design*, where you design the system data structures and how these are to be represented in a database.

Software validation

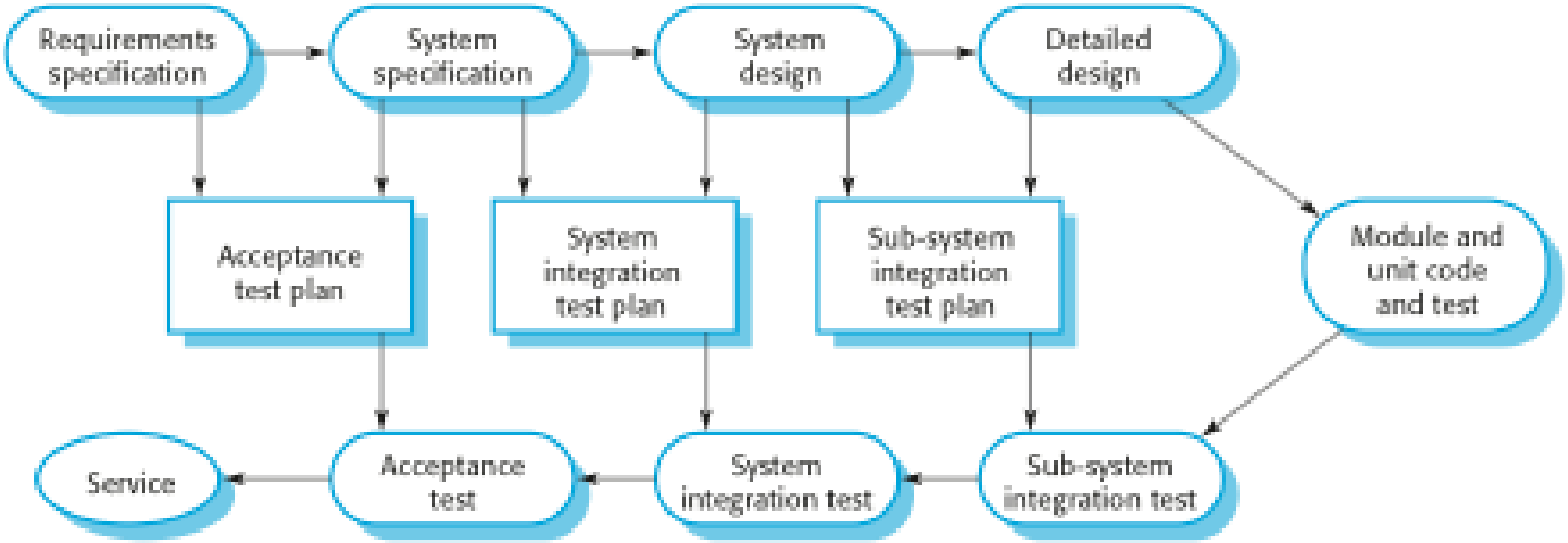
- Verification and validation (V & V) is intended to show that a system conforms to its specification and meets the requirements of the system customer.
- Involves checking and review processes and system testing.
- System testing involves executing the system with test cases that are derived from the specification of the real data to be processed by the system.
- Testing is the most commonly used V & V activity.

Stages of testing

Testing stages

- Development or component testing
  - Individual components are tested independently;
  - Components may be functions or objects or coherent groupings of these entities.
- System testing
  - Testing of the system as a whole. Testing of emergent properties is particularly important.
- Acceptance testing
  - Testing with **customer data** to check that the **system meets the customer's needs**.

Testing phases in a plan-driven software process



Thank you!!