

Software Development Lifecycle

ESC108A Elements of Computer Science and Engineering

B. Tech. 2017

Course Leaders:

Roopa G.

Ami Rai E.

Chaitra S.



Objectives

- At the end of this lecture, student will be able to
 - identify the stages in software development lifecycle
 - identify the purpose and practices in requirements analysis stage
 - identify the purpose and practices in design stage
 - identify the purpose and practices in implementation stage
 - identify the purpose and practices in testing stage



Contents

- Software Engineering
- Development Life cycle phases (SDLC)
- Stages of Waterfall model



Software Engineering

Definition of Process: a series of steps involving activities, constraints, and resources that produce an intended output of some kind

Requirements and design documents, source code, review results, test cases, test results, and productivity metrics

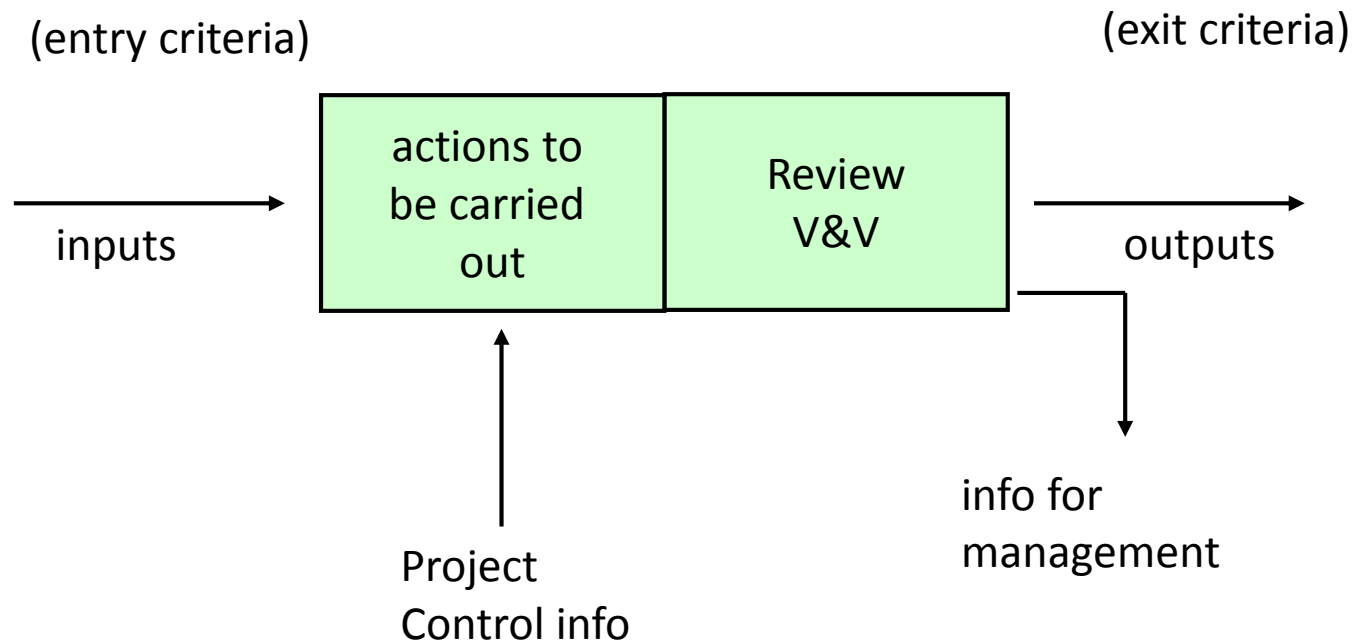


software engineering- analysis, design, implementation, review, and testing phases



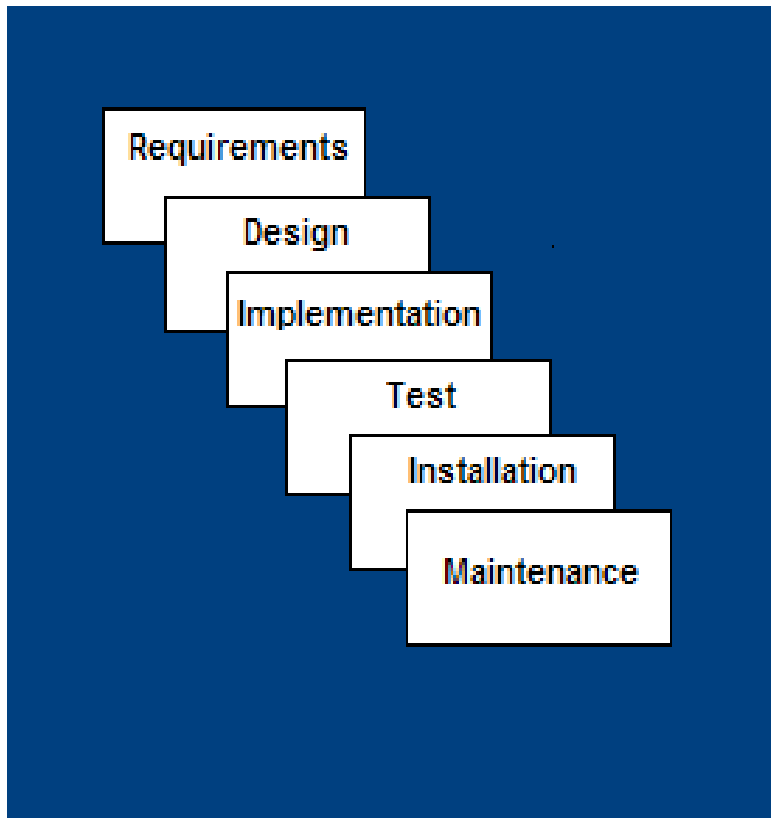
Software Process

- A step ends in a review (V&V)
 - Verification: check consistency of outputs with inputs (of the step)
 - Validation: check consistency with user needs



Software Development Life Cycle

A framework that describes the activities performed at each stage of a software development project



- the main steps
 - Problem Definition
 - Feasibility Study
 - Analysis
 - System Design
 - Detailed Design
 - Implementation
 - Testing
 - Maintenance

Problem Definition

- To answer: 'What is the Problem'
- Where and by whom is the problem felt?
- Meet users and Management and obtain their agreement that there is a problem
- If problem exists, and it needs to be solved
 - It becomes a project
 - Commitment of funds implied
- Prepare a brief statement of problem
 - Avoids misunderstandings
 - Get concurrence from user/management
 - Usually short : 1 or 2 pages
- Estimate cost to give users a sense of project scope and schedule for the next feasibility step
- This step is short; lasts a day or two



Feasibility Study

- To get better understanding of problems and reasons by studying existing system, if available
 - Are there feasible solutions?
 - Is the problem worth solving?
- Consider different alternatives
- Essentially covers other steps of methodology (analysis, design, etc.) in a 'capsule' form
- Estimate costs and benefits for each alternative
- Make a formal report and present it to management and users; review here confirms the following:
 - Will alternatives be acceptable?
 - Are we solving the right problem?
 - Does any solution promise a significant return?
- Users/management select an alternative



Requirements Analysis

- Objective: determine what the system must do to solve the problem (without describing how)
- Done by Analyst (also called Requirements Analyst)
- Produce Software Requirements Specifications (SRS) document
- Incorrect, incomplete, inconsistent, ambiguous SRS often cause for project failures and disputes



Requirements Analysis contd.

- A very challenging task
 - Users may not know exactly what is needed or how computers can bring further value to what is being done today
 - Users change their mind over time
 - They may have conflicting demands
 - They can't differentiate between what is possible and cost-effective against what is impractical (wish-list)
 - Analyst has no or limited domain knowledge
 - Often client is different from the users



System Design

- Objective : To formulate alternatives about how the problem should be solved
- Input is SRS from previous step
- Consider several technical alternatives based on type of technology, automation boundaries, type of solutions , including make or buy
- Propose a range of alternatives : low-cost, medium cost and comprehensive high cost solutions



System Design contd.

- For each alternative, prepare high-level system design (in terms of architecture, DB design, ...); prepare implementation schedule, carry out cost-benefit analysis
- Prepare for technical and management review
 - Costs rise sharply hereafter
 - Costs can be quantified better at this stage
 - Technical review uncovers errors, checks consistency, completeness, alternatives, ...
- Phase ends with a clear choice



Detailed Design

- Specific implementation alternative already selected in previous step giving
 - Overall software structure
 - Modules to be coded
 - Database/file design
- In this step, each component is defined further for implementation
- Deliverables include
 - Program specifications (e.g. psuedo-code)
 - File design (organization, access method...)
 - Hardware specifications (as applicable)
 - Test plans
 - Implementation schedule
- Ends in technical review



Implementation

- Programs are coded, debugged and documented
- Initial creation of data files and their verification
- Individual modules as well as whole system is tested
- Operating procedures are designed
- User does acceptance of the system
- System is installed and switch-over affected



Testing

- Objective of testing: discover faults
- A test is successful only when a fault is discovered
- Fault identification
 - Process of determining what fault caused the failure
- Fault correction
 - Process of making changes to the system so that the faults are removed



Operations & Maintenance

- Systems must continue to serve user needs correctly and continuously
- Maintenance activities consist of
 - Removing errors
 - Extending present functions
 - Adding new functions
 - Porting to new platforms



Summary

- Software processes are the activities involved in producing and evolving a software system
- They are represented in a software process model
- Software development practice is a staged approach having: requirements elicitation, analysis, software design, software development, software testing and maintenance
- Each phase has a well defined task and a deliverable
- Feasibility establishes alternatives and carries out cost-benefit analysis
- Requirements analysis is very challenging and SRS forms the first baseline
- Design step consists of architecture, database and interface design
- Testing efforts are generally equal or higher than development

