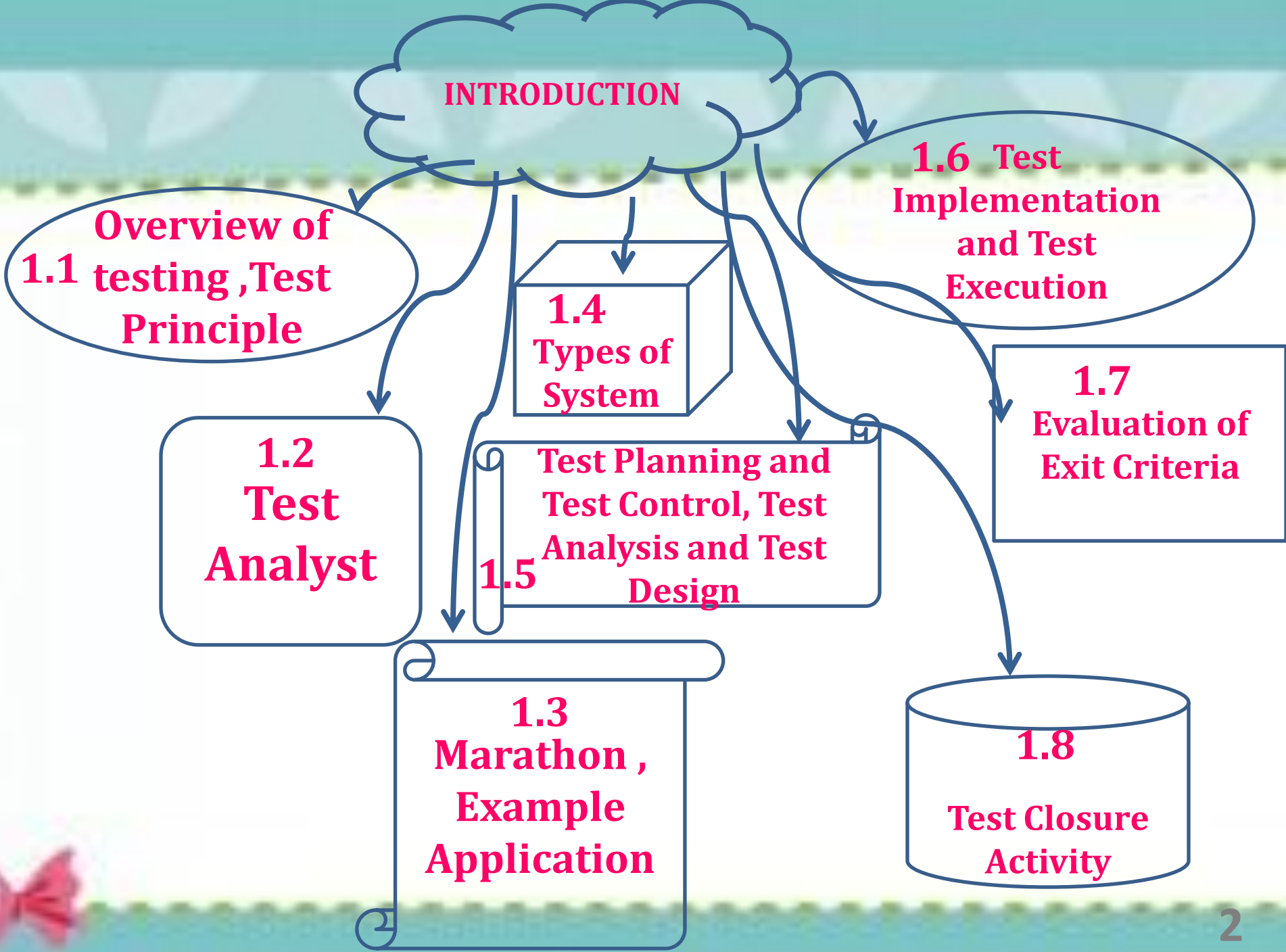


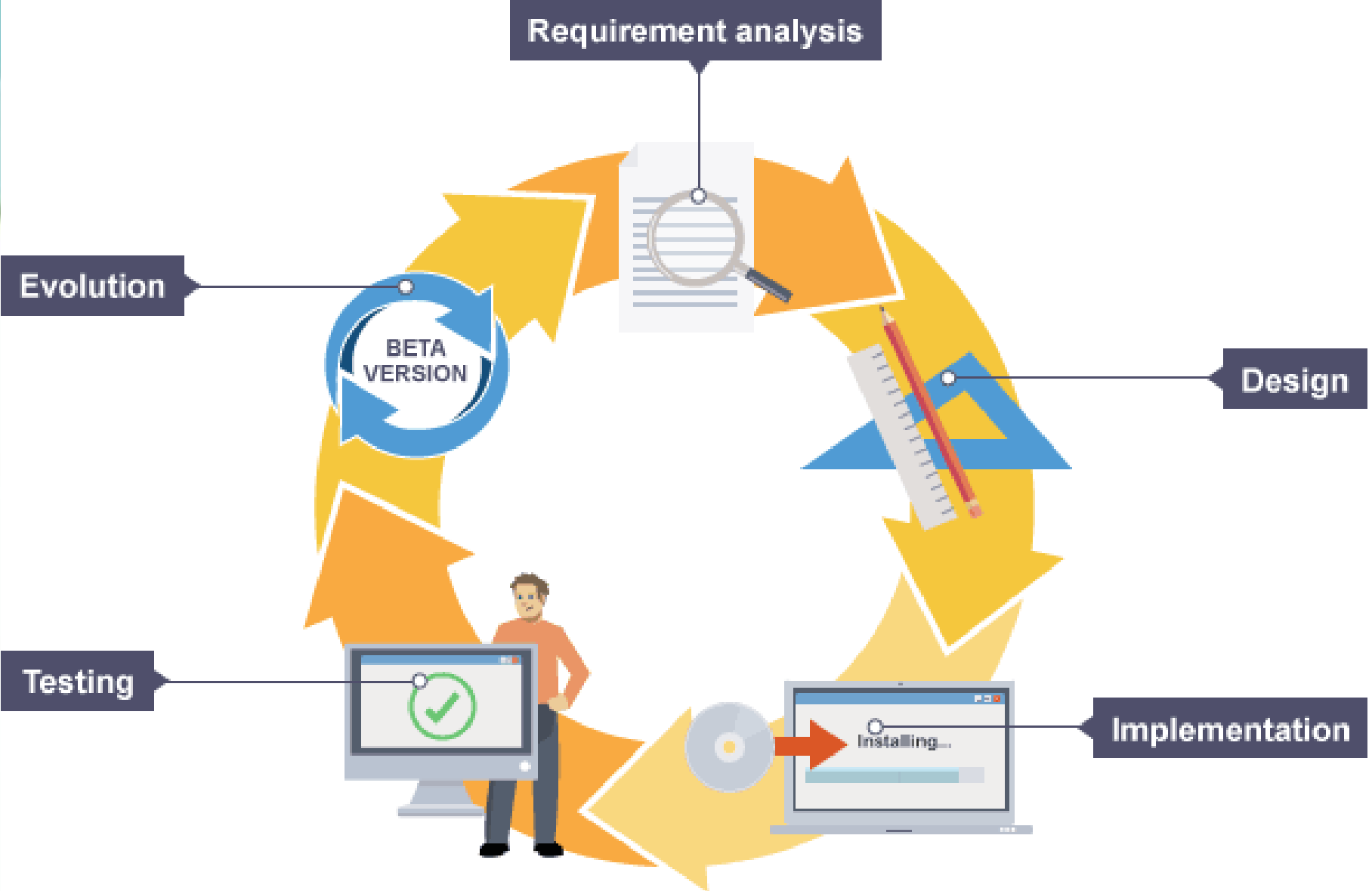


# UNIT 1

## INTRODUCTION







## Software Development Process

# Why need Testing ?

- Testing is a process to identify the correctness, completeness and quality of developed computer software.
  - Execute program under Positive and negative condition.
  - For find **Error or Mistake** ( a human action that produce an incorrect result), **Defect or bug or fault** (a flaw in a component or system that can cause the component or system to fail to perform its required function), **Failure**( Deviation of the component or system from its expected delivery, service or result).

## Con..

- Testing is a process rather than a single activity.
- Testing is static and dynamic.
- Testing is planning.
- Testing is preparation.
- Testing is evaluation.
- Testing is determine that they satisfy specified requirement.
- Testing is demonstrate that they are fit for purpose.
- Testing is detect defect.

# Test Principle

- There are seven principle of testing ,listed below :
  1. Testing show presence of defects.
  2. Exhaustive testing is impossible.
  3. Early Testing.
  4. Defect Clustering.
  5. Pesticide paradox.
  6. Testing is context dependent.
  7. Absence-of-errors fallacy.

# 1. Testing shows presence of defects

- Testing can show that defects are present, but can not prove that there are no defect.
- Testing reduces the probability of undiscovered defects remaining in the software but even if no defects are found, it is not a proof of correctness.

## 2. Exhaustive testing is impossible

- Testing everything (all combination of inputs and precondition)is not feasible except for small cases.
- Instead of exhaustive testing, risk analysis and priorities should be used to focus testing efforts.



### 3. Early Testing

- Testing activities should start as early as possible in the software or system development life cycle and should be focused on defined objectives.

## 4. Defect Clustering

- A small number of modules contain most of the defects discovered during pre-released testing or are responsible for the most operational failures.

## 5. Pesticide Paradox

- If the same tests are repeated over and over again, eventually the same set of test cases will no longer find any new defects.
- To overcome this 'pesticide paradox', the test cases need to be regularly reviewed and revised, and new and different tests need to be written to exercise different parts of the software or system to potentially find more defects.

## 6. Testing is Context Dependent

- Testing is done differently in differently contexts.
  - For Example,
    - Safety-critical software is tested differently from an e-commerce site.

## 7. Absence-of-errors fallacy

- Finding and fixing defects does not help if the system built is unusable and does not fulfill the users needs and expectations.

# Test Analyst

- Working in a testing environment, access products, checking for quality and accuracy, or creating tests scripts is the responsibility of a Test Analyst.
- Also known as **Test manager or Test leader or Tester .**
- **Test Analyst** means **Domain Test Analyst**

## Con..

- Test Analyst perform following task :
  - **Preparing** and maintaining test plans
  - **Providing** feedback to the development teams
  - **Scheduling** projects
  - **Conducting** risk assessments
  - **Doing** continuous testing and upgrades
  - **Providing** budget forecasts
  - **Communicating** with suppliers, teams and team leaders
  - **Preparing** test scripts
  - **Creating** new test strategies

## Con..

- The test analyst position is defined into two roles according to the *advanced syllabus and industry practices*.
  - **The Technical test analyst:**
    - Focuses on technical s/w characteristics such as reliability and efficiency.
    - Applies structure based testing techniques.
    - Performs static and dynamic analysis also able to implement test automation effectively.
    - Apply tools for efficiency testing, such as performance, and for analysis.
  - **The Domain test analyst:**
    - Focus on functional, domain-specific s/w characteristics such as functionality and usability.
    - Applies review techniques on domain-specific documents, such as requirements and use cases.



# Marathon Example

- From book and chalk and talk

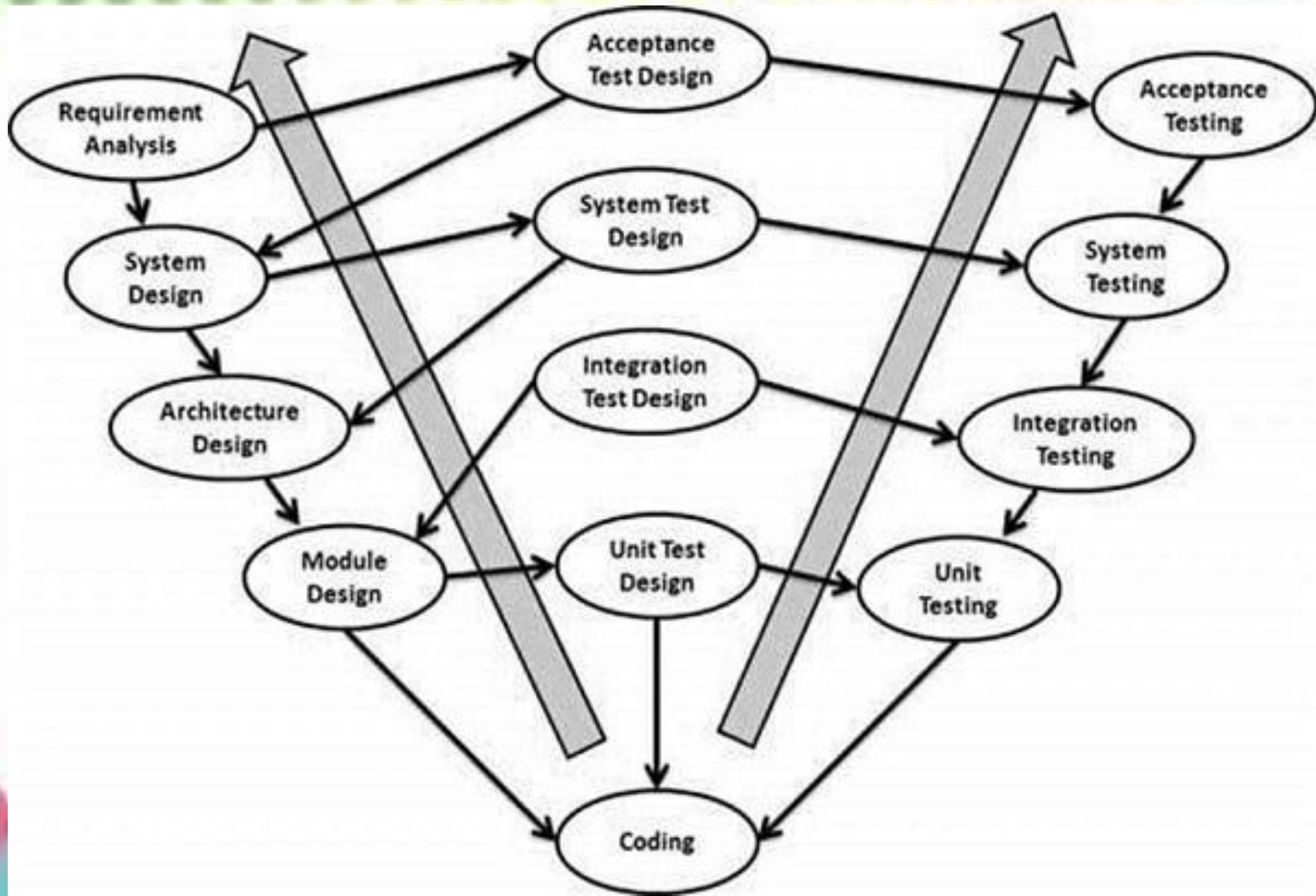
# Types of Systems

- Testing strategies are influenced by the type of system under test.
  - Following type of system :
    - Systems of Systems
    - Safety-critical systems
    - Real-time and embedded systems

# Systems of Systems

- The components of the overall system of systems typically consist of various s/w applications or services, communications infrastructure and h/w devices
- Systems of systems are developed using a “**building block**” concept.
- Cost of testing which may increase considerably due to:
  - High level of complexity
  - The time and effort needed to localize defects
  - More integration testing may be required
  - Higher mgt. overhead
  - Lack of overall control.

# V-Model



# Safety-Critical Systems

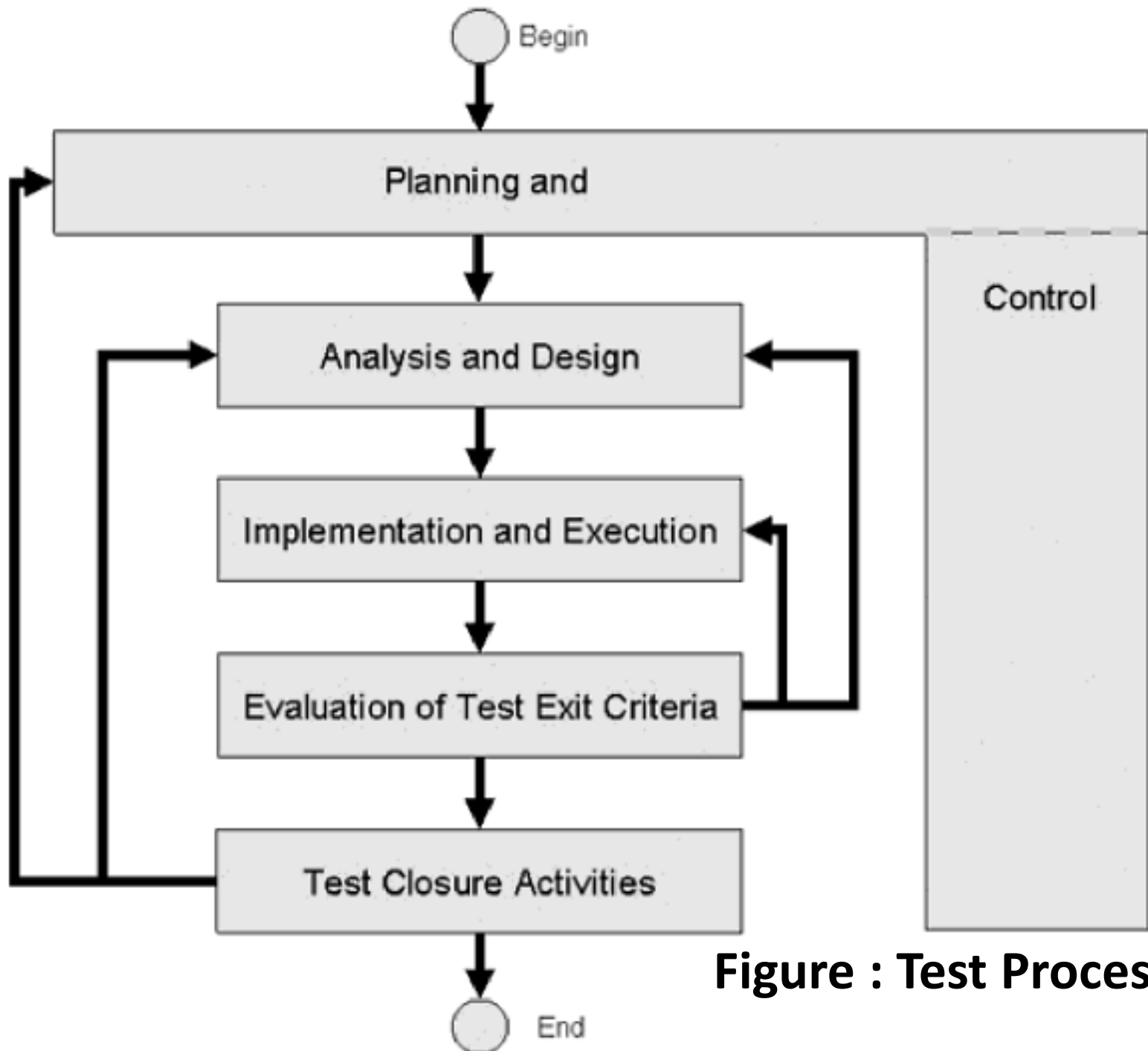
- A safety-critical system is one that may in danger life or lead to other serious losses in the event of failure.
- Some strategies are:
  - Performing explicit safety analysis
  - Performing testing according to the s/w development model such as **V-model**
  - Conducting failover and recovery
  - Performing reliability testing for low failure rates and high level of availability.
  - Retaining test data, results, or test environments
  - Create full test documentations
- **Industry standards often apply to safety-critical system**
  - Space industry: European cooperation on space standardization(ECSS)
  - Food and drug industry: Food and Drug Administration (FDA)
  - Aircraft industry: International joint aviation authorities (JAA)

# Real-Time and Embedded Systems

- There are usually particular components presents whose execution times are critical to the correct functioning of the system.
- S/w that needs to functions in real-time is often “embedded” within a h/w environment. also it's challenging for the technical test analyst.

# Test Process

- Test analysts and technical test analysts are a critical part of a successful test process implementation.
- Managing the test process is the job of the test manager.



**Figure : Test Process**



# Test Planning and Test Control

- At the test planning stage, the test manager is determining the testing approach, planning the resources, setting the strategy, creating the test schedule, and determining the metrics that will be needed for control and monitoring of the project.
- Risk management is usually the responsibility of the **test manager**.
- We need to consider the two risk types: **Project risk and product risk**.
- **Project risks** are sometimes called planning risks and are oriented toward anything that could cause the overall project to fail to meet its objectives. Project risks include such things as personnel issues (vacations, training, and availability), vendor or third party issues, or delivery schedule issues.
- **Product risks** are the risks within the product itself, such as unfound defects. Testing and following good quality practices are ways we mitigate product risk.

# Con..

- **The IEEE 829 *Test Plan Specifications* provides the following outline for the test plan document:**
  1. Test plan identifier
  2. Test items (including version/revision and documentation such as requirements)
  3. Features to be tested
  4. Features not be to tested
  5. Approach (activities, techniques, tools)
  6. Item pass/fail criteria
  7. Suspension criteria and resumption requirements
  8. Test deliverables
  9. Testing tasks
  10. Environmental needs (facilities, hardware, software, network, supplies, level of security, special tools)
  11. Responsibilities
  12. Staffing and training needs
  13. Schedule (test milestones and item transmittal events)
  14. Risks and contingencies
  15. Approvals

# Evaluation of Exit Criteria & Reporting

- IEEE 829 Test Summary Report
  1. Test summary report identifier
  2. Summary (evaluation of test items)
  3. Variances
  4. Comprehensiveness assessment
  5. Summary of results
  6. Evaluation (per test item)
  7. Summary of activities
  8. Approvals

# Test Clauser Activity

- The test closure activities occur after the release has been shipped out.
- Now is the time to do any wrap-up reporting, document and archive the test environments, archive the test documents and data, and generally clear the decks for the next project.
- These test closure activities **are often under budgeted and receive inadequate attention** because the next project is already waiting.
- It is important for the test manager to hold firm on these activities and to ensure that they are done correctly.
- Only in this way will we be able to return quickly to this project for maintenance releases or patches.