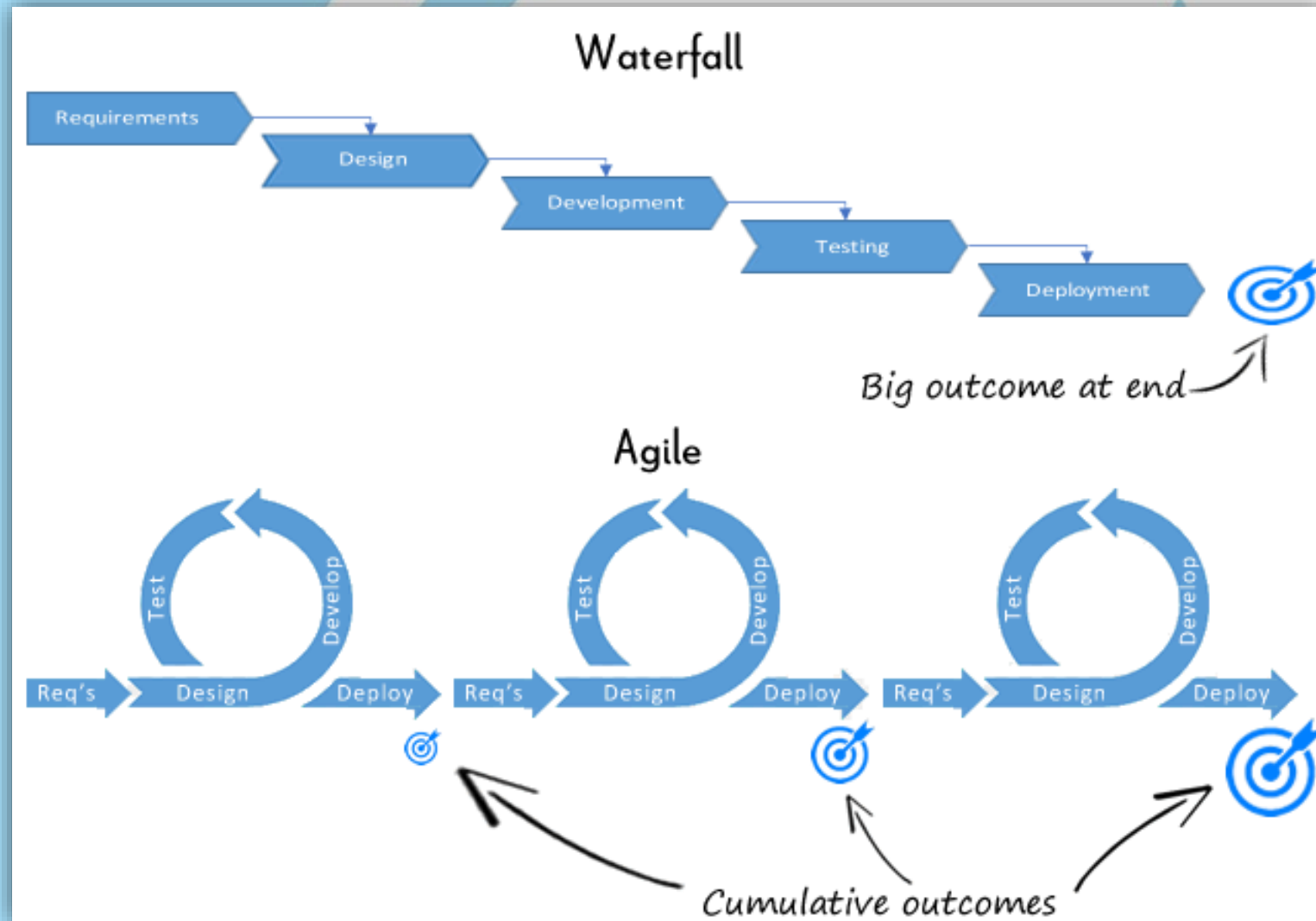


# Module 1 Day 14

Unit Testing

# Software Development Life Cycle (SDLC)



# Testing Methods

- Manual

- Easy to start
- Can evaluate subjective qualities (user-friendliness)
- Difficult to be execute consistently and frequently
- Good for Exploratory Testing
  - exploring functionality, looking for defects, missing features, improvement opportunities

- Automated

- Higher cost to get started
- Fast, efficient and frequent
- Consistent and accurate, repeatable
- Good for Regression Testing
  - validating that existing functionality continues to operate as expected

# Types of Testing

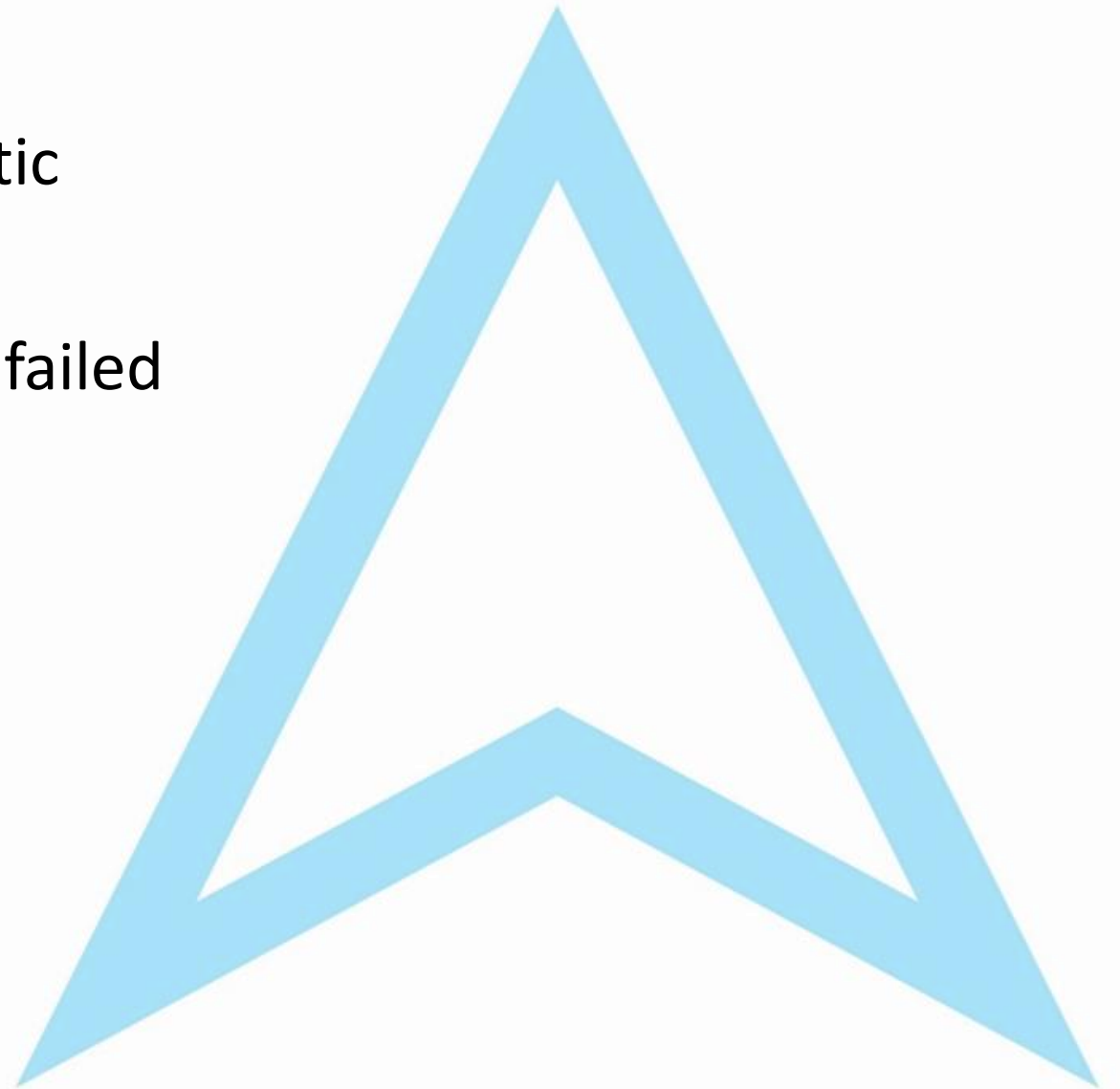
- Unit Testing
  - Verifies parts of an application independently from other parts (isolated)
  - Narrow scope (focused)
  - Tests many cases (deep)
  - Fast!
- Integration Testing
  - Verifies interactions between multiple components
  - Broader scope
  - More difficult to test thoroughly
- End-to-end Testing (E2E)
  - Verifies interaction from end-user through a transaction and back to end-user
  - Broadest scope
  - Most difficult to test all possible combinations of scenarios
  - Slowest to run (for both setup and execution)

# Other Types of Testing

- User Acceptance Testing (UAT)
- Performance / Scalability
- Security
- Usability
- Accessibility

# Unit Testing should be...

- Fast (milliseconds each)
- Reliable & Repeatable; Deterministic
- Independent of other tests
- Obvious; Easy to determine why it failed



# Unit Test Structure – The 3 A's

- Arrange
  - begin by arranging the conditions of the test, such as setting up test data
- Act
  - perform the action of interest, i.e. the thing we're testing
- Assert
  - validate that the expected outcome occurred by means of an assertion



# How and What to Test

- “Happy Path”
  - Test with expected inputs for expected results
- Boundary cases (Edge cases)
  - Is there an if statement?
    - Test around the condition that the if statement tests
  - Is there a loop?
    - Test arrays in the loop that are empty, only one element, lots of elements
  - Is an object passed in? A string? A number?
    - Pass in null, an empty object, an object missing values that the method expects
    - Pass in an empty or null string
    - Pass in negative numbers or zero



# xUnit Testing Framework

- Microsoft.VisualStudio.TestTools.UnitTesting namespace
- Creating a Test Project
- Test Classes
  - Generally one for each class under test
  - [TestClass] attribute
- Test Methods
  - Represent a test case or scenario
  - [TestMethod]
- Data Test Methods
  - Allow you to execute a test method multiple times with different data
  - [DataTestMethod]
  - [DataRow]

# Assert Class

- <https://docs.microsoft.com/en-us/visualstudio/test/using-the-assert-classes?view=vs-2015>
- AreEqual / AreNotEqual
- IsTrue / IsFalse
- IsNull / IsNotNull
- ThrowsException
- CollectionAssert class
- And many more