# CSE 470
# Software Engineering

## SDLC

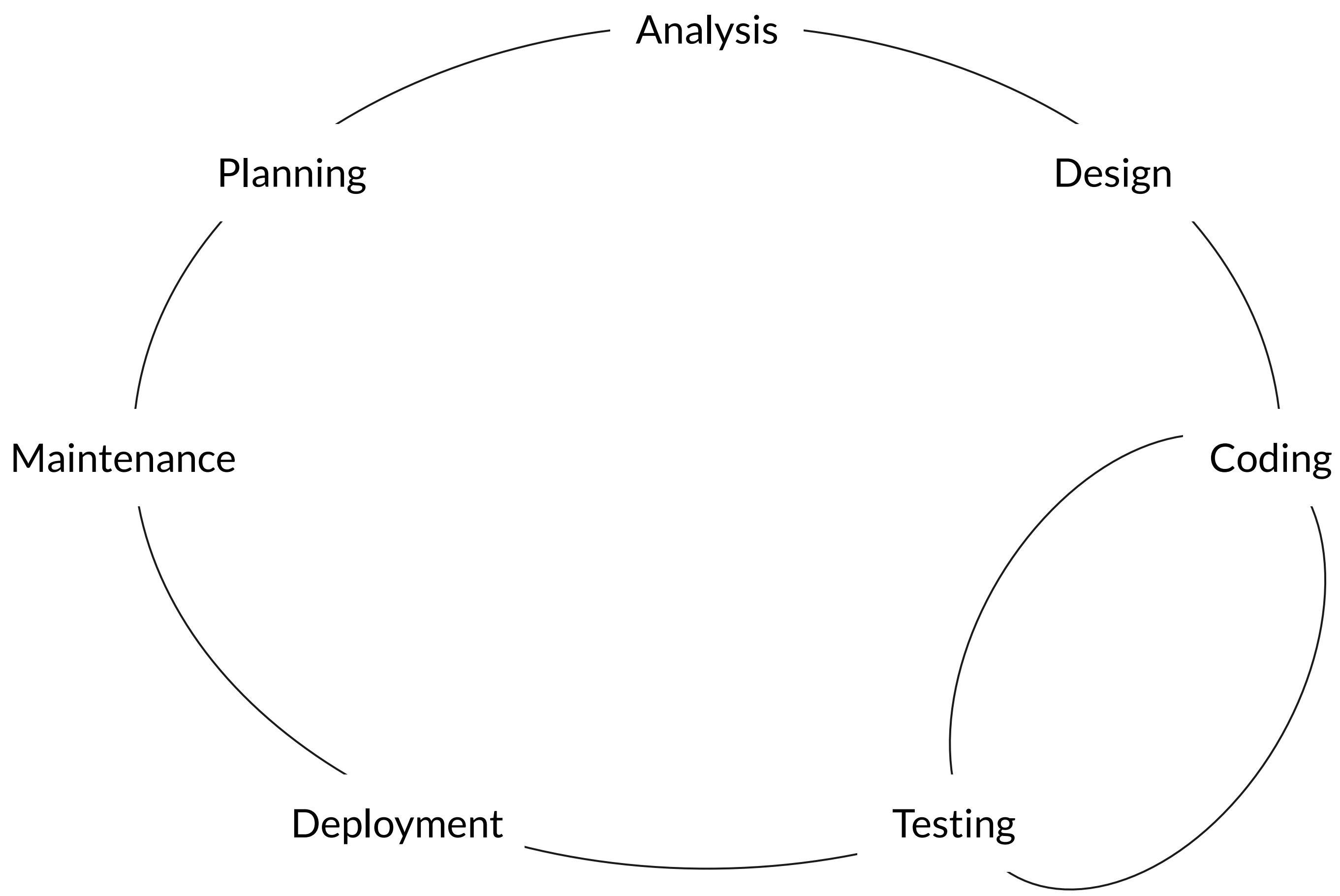
Imran Zahid
Lecturer
Computer Science and Engineering, BRAC University

## Recap

# Software Development Lifecycle

- We discussed the Software Engineering tasks, but how does the software pass from one of these tasks to another?
- Software Development Lifecycle (SDLC) structured process that is used to design, develop, and test good-quality software.
- The life cycle defines a method for improving the quality of software and the all-around development process.

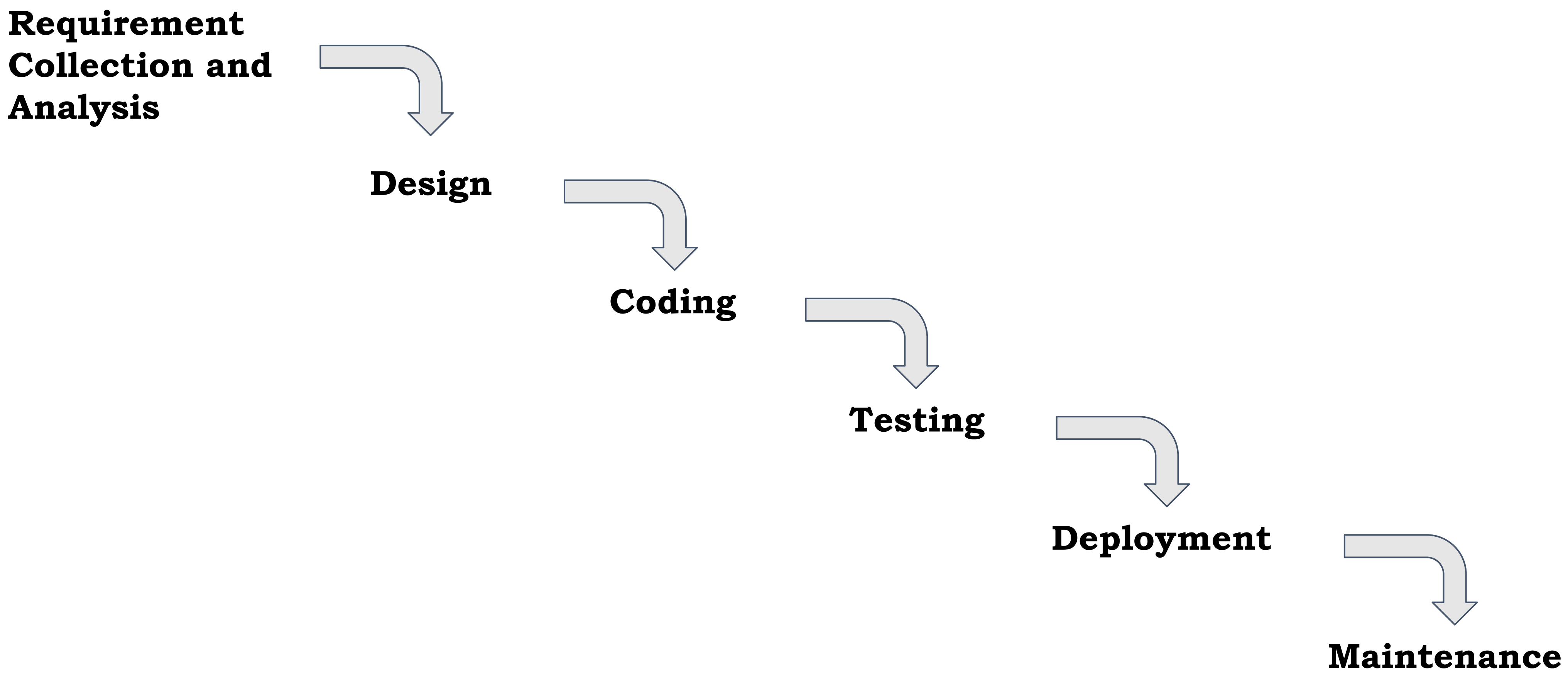
# Why is it termed Lifecycle?



## So how do you choose an SDLC?

- Suppose your team lead has gotten a new project.
- How does he decide which SDLC to use? It depends on -
    - The scale of the software (e.g. how complicated will it be)
    - The size of the user base
    - How well the client understands what they want
    - How clearly the client can convey what they want

## The most basic SDLC - Waterfall Model



## Pros

- Simple to Use and Easy
- Stages go one by one, so sudden changes can not create confusions
- Any changes are done only in development stage, so no need to get back and change everything.

## Cons

- While completing a stage, it freezes all the subsequent stages.
- No way to verify the design
- Once in testing phase, no more features can be added
- Code reuse not possible

## V-Model

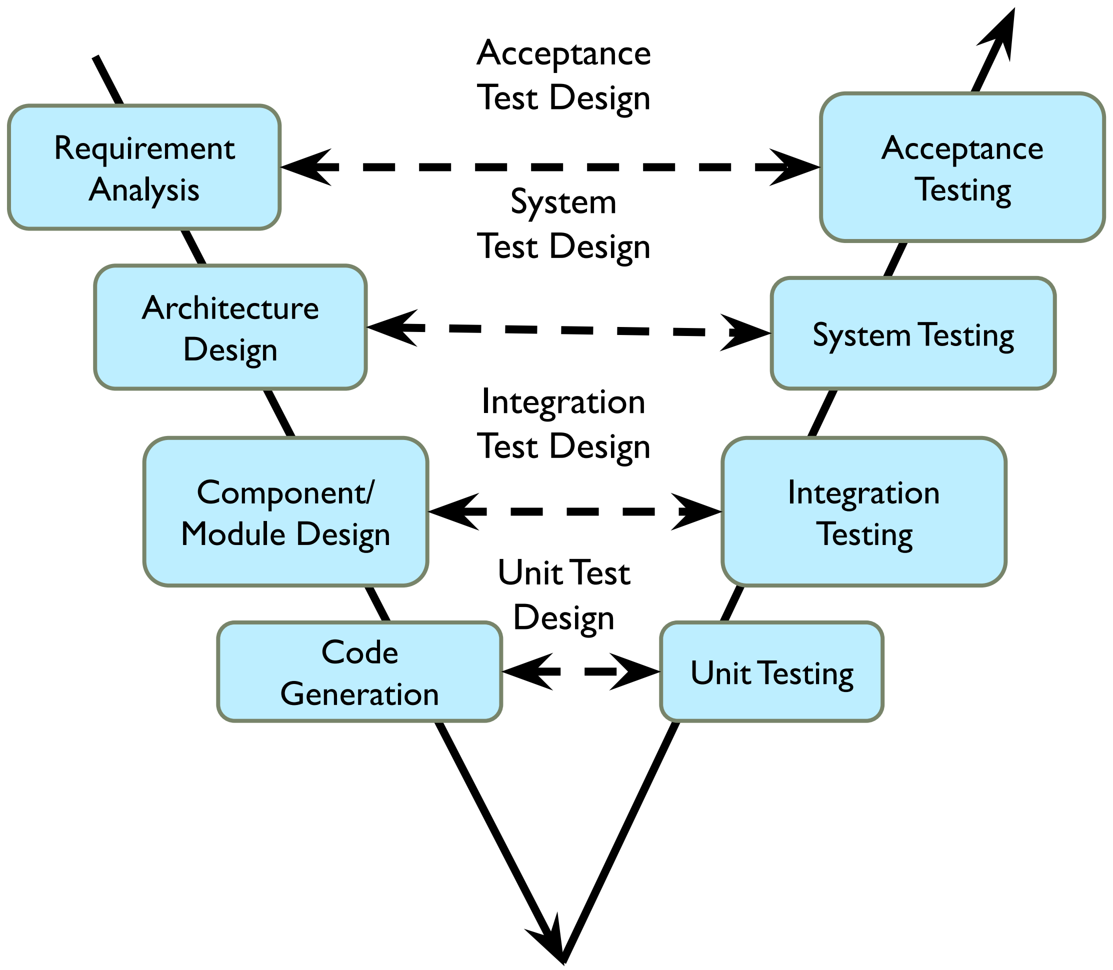
## V Model

- Suppose you have received a small accounting project.
- The requirements are rigid
- But the customer asked to put emphasis on proper testing of the accounting project.
- Waterfall Model isn’t suitable here, so we use the V Model.

## V Model

- V Model is another sequential software development process model.
- It’s also known as an extension of waterfall model, due to providing earlier and detailed software testing.

# V Model



Requirement Analysis
Acceptance Test Design
Acceptance Testing
Architecture Design
System Test Design
System Testing
Component/ Module Design
Integration Test Design
Integration Testing
Code Generation
Unit Test Design
Unit Testing

# Verification and Validation

- Suppose, you have received a request for developing an android app.
- In this regard, you met the clients, collected requirements, documented the requirements, created designs to build it and finally coded it as per the design.
- That means you are trying to follow the standard approaches in order to develop the app properly.

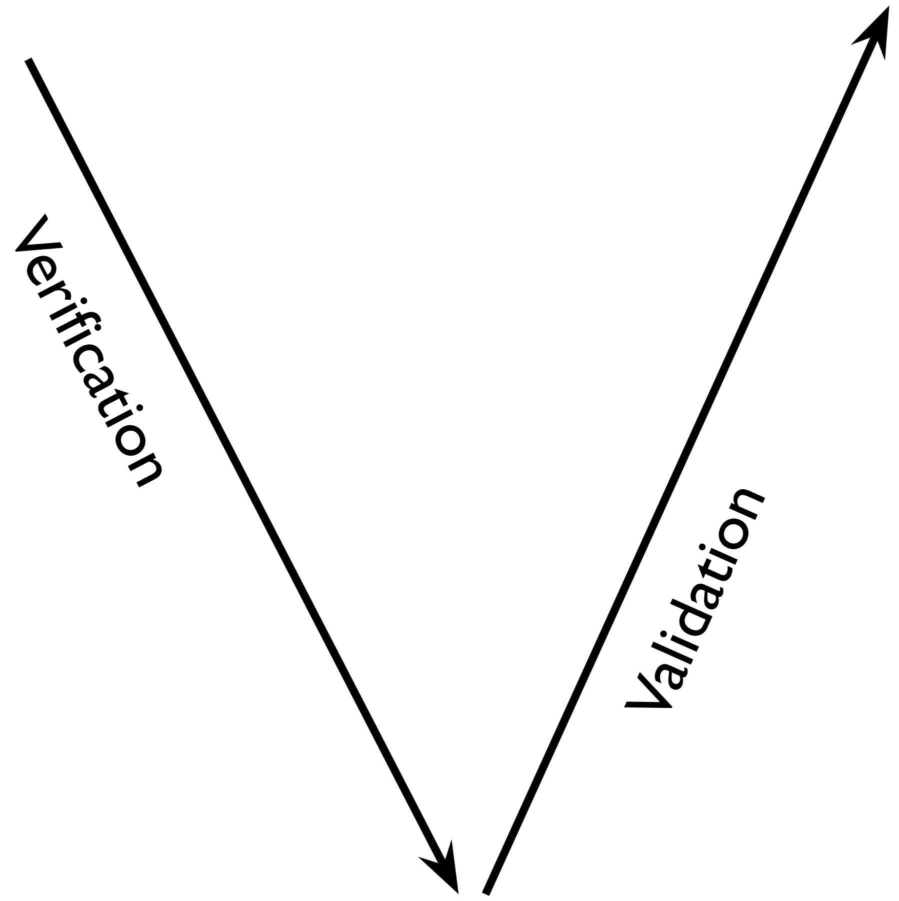
Building the product in the right way is called “Verification”.

## Verification and Validation

- After completion of the app’s development, you sent it to the testing phase.
- Various tests are performed to ensure whether the app meets the customer requirements. That is you try to check whether the right app was developed.

Building the right product is called “Validation”.

## Verification and Validation



## Pros

- Along with waterfall advantages, it emphasizes planning for verification and validation (V&V) of the product from the very beginning of requirement collection.
- Test activities planned before testing
- Saves time over waterfall, higher chance of success

## Cons

- Changes are not welcomed
- Software developed at end of all phases, so no dummy prototypes can be found
- If any test fails, then test document and code both needs to be updated

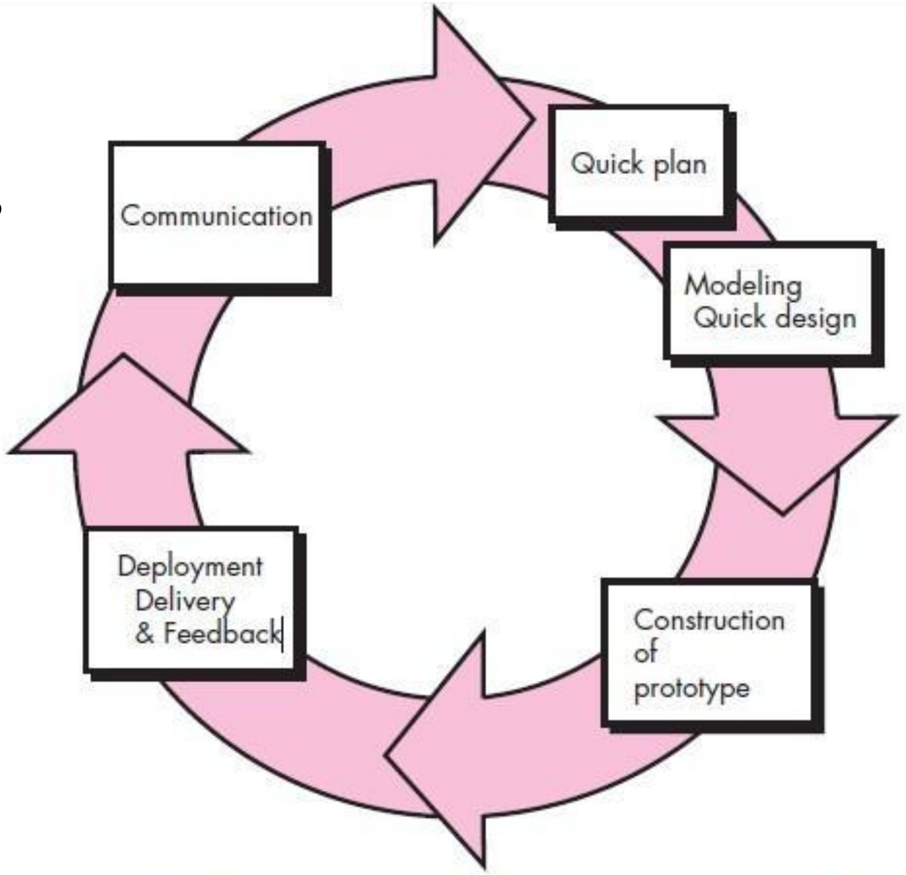
## Classes of SDLC Model

# Classes of SDLC Model

- Sequential Process Model
  - Suitable when clients know what they want, i.e. requirements are pre-determined and not likely to change.
  - Not suitable when clients don’t know what they want

# Classes of SDLC Model

- Evolutionary Process Models
  - Can change requirements as you want.
  - Can go back to previous phases, such as after coding, we can go back to communication phase for requirement collection again.



## Incremental Model

## Incremental Process Model

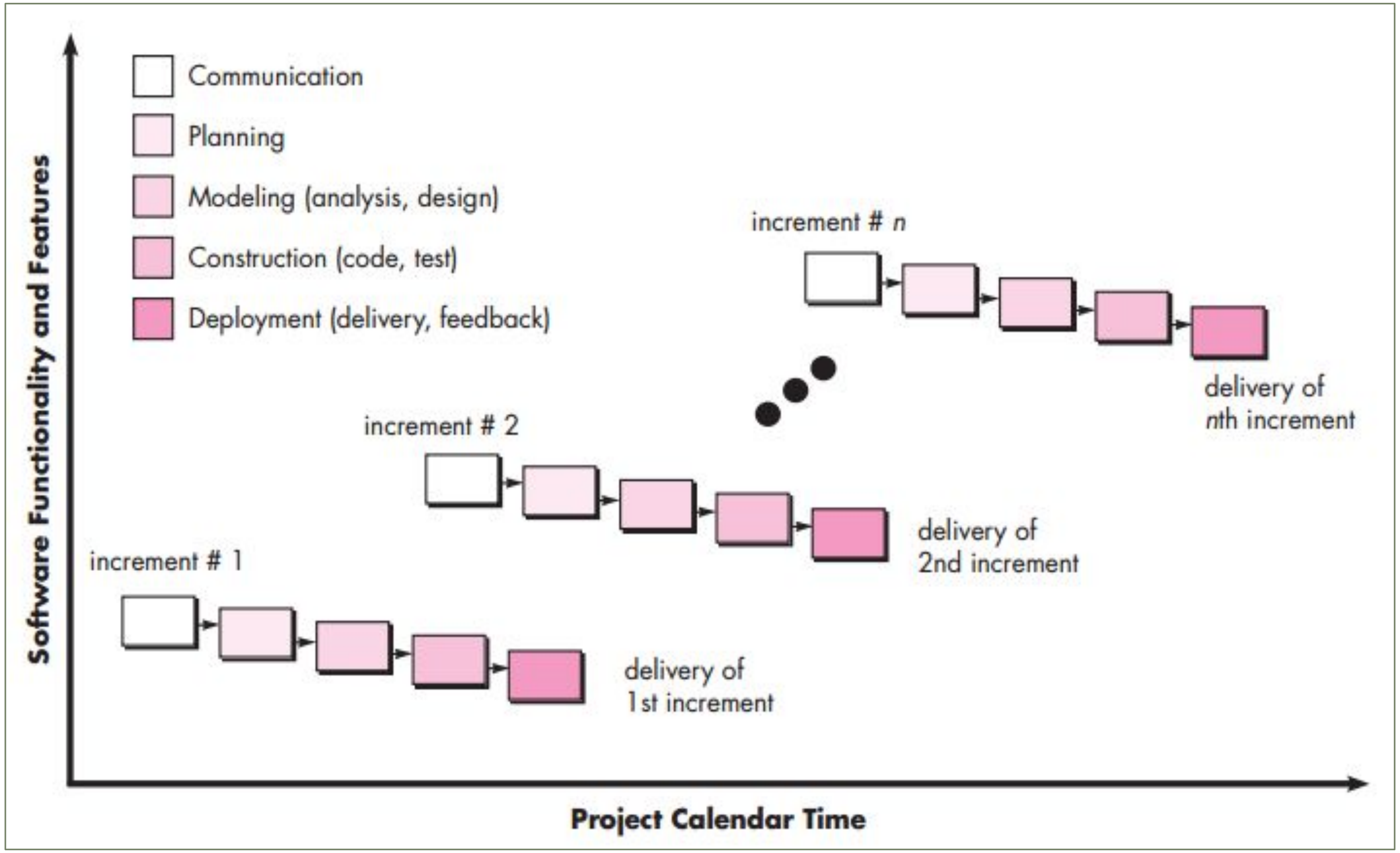
The incremental model applies the waterfall model incrementally.

- Customer wants to use the software from the very beginning of the project
- Customer is quite well-known about the requirements
- The software is divided into fixed number of releases (increments) to be delivered to customers

## Incremental Process Model

- The series of releases is referred to as “increments," with each increment providing more functionality to the customers.
- After the first increment, a core product is delivered, which can already be used by the customer.
- Based on customer feedback, a plan is developed for the next increments, and modifications are made accordingly. This process continues, with increments being delivered until the complete product is delivered.

# Incremental Process Model

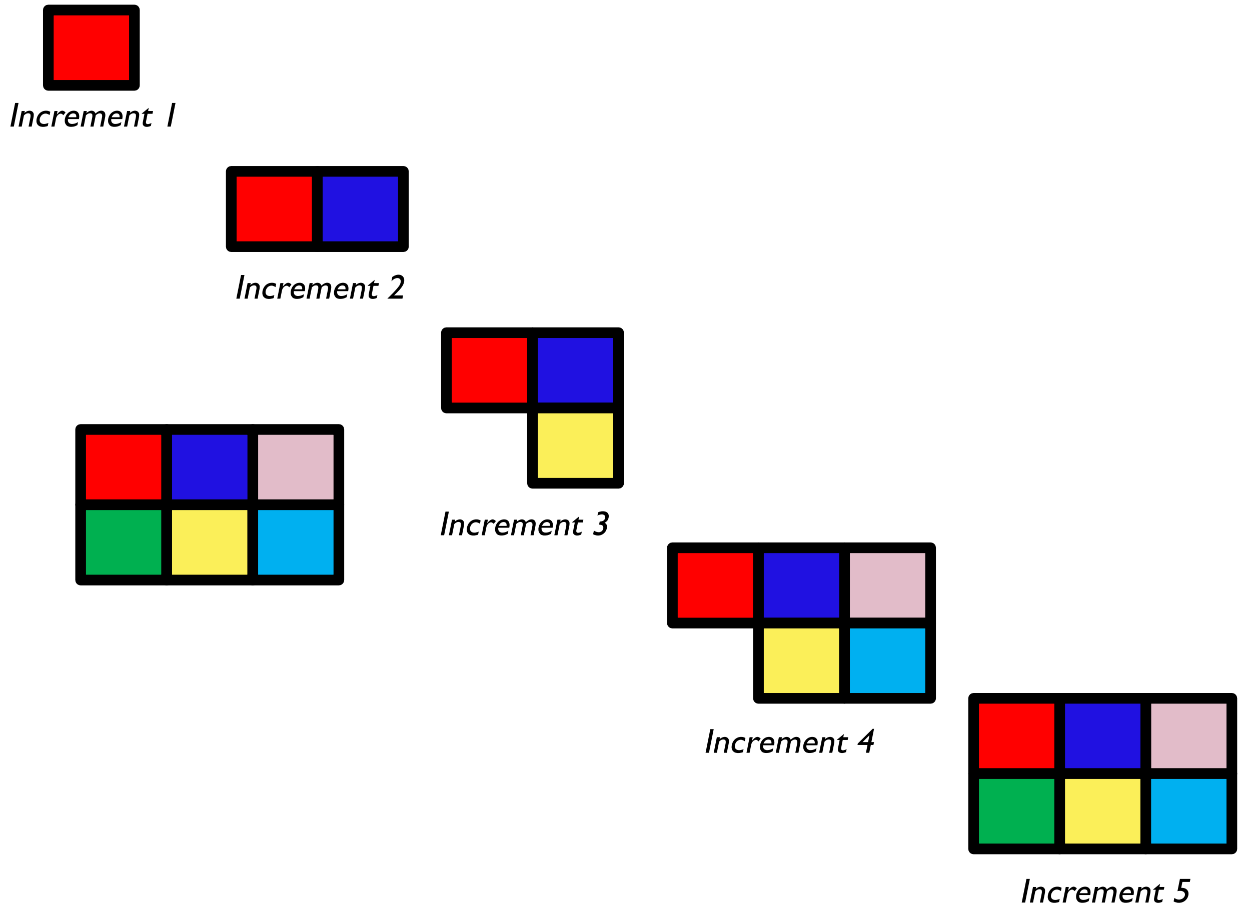


Communication
Planning
Modeling (analysis, design)
Construction (code, test)
Deployment (delivery, feedback)
increment # n
delivery of nth increment
increment # 2
delivery of 2nd increment
increment # 1
delivery of 1st increment
Software Functionality and Features
Project Calendar Time

# Incremental Process Model

- For example, in first increment Login module is delivered.
- In second increment, another new module such as Navigation module is also added.
- In third, one more added.

That is, this model "adds onto" new section as increments.



## Pros

- After each iteration, during testing, faulty elements of the software can be quickly identified.
- It is generally easier to test and debug because relatively smaller changes are made during each iteration.
- Customers can respond to features and review the product for any needed or useful changes.
- Initial product delivery is faster and costs less.
- Parallel stages such as requirement collection, planning etc. can take place.

## Cons

- The resulting cost may exceed the cost of the organization.
- As additional functionality is added to the product, problems may arise related to system architecture which were not evident in earlier prototypes.

# Incremental Process Model - When to Use?

- The software can be conceptualized as thin slices of the overall software.
- Customer wants prototype version of the software from the beginning of the project
- Increments needs to be prioritized by customers, so better chance of success
- Better for small or medium size projects

# Thank you