SOFTWARE ENGINEERING

Defenition

It is the process of analyzing customers needs and designing, constructing, and testing end user applications that will satisfy these needs through the use of **software** programming languages.

AIM

Production of quality software.

Software that is delivered on time .

Within budget.

And also satisfy requirements.

Programs :

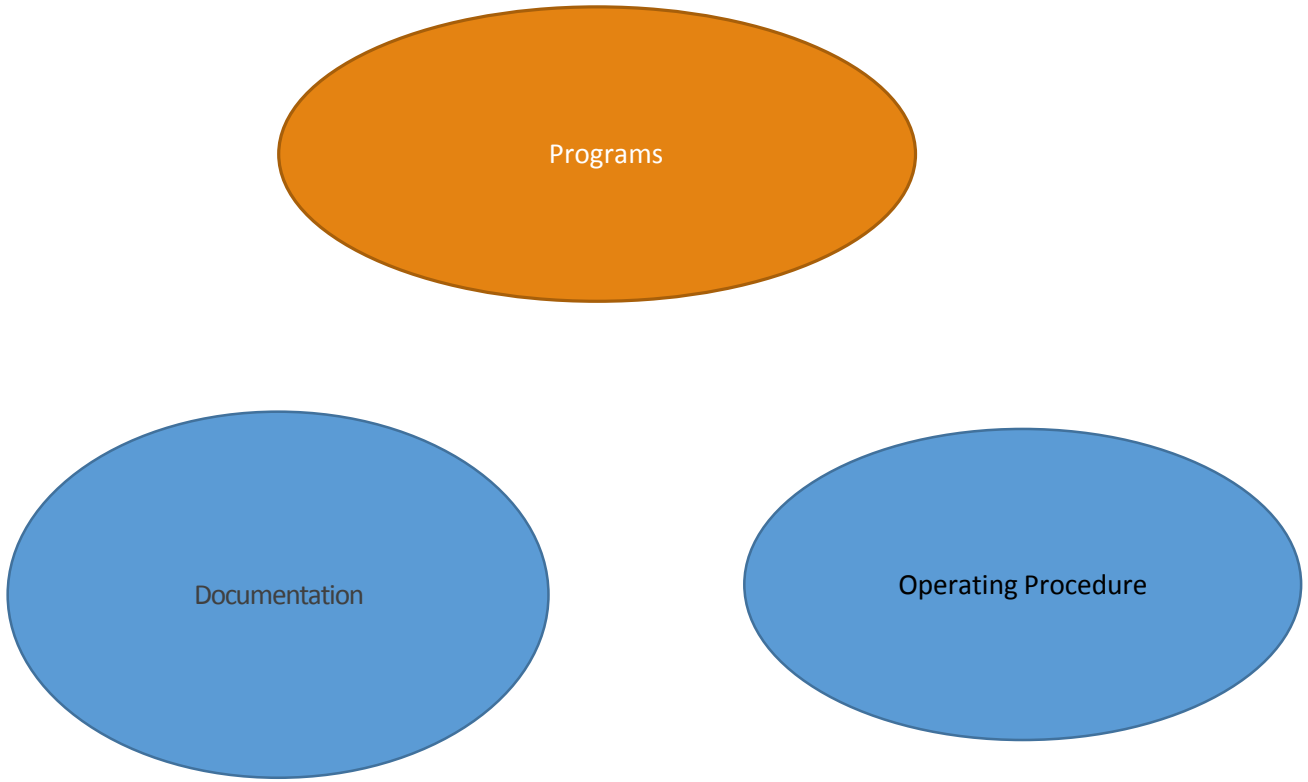
Contains set of instructions.

Software:

Collection of Programs.

Any program is a subset of software and it becomes software only if documentation and operating procedure manuals are prepared.

Components Of Software



SOFTWARE PROCESS

It is the way in which we produce software. It differs from organization to organization.It is not an easy task because…

Not enough time

Lack of knowledge

In sufficient commitment

Wrong Motivation

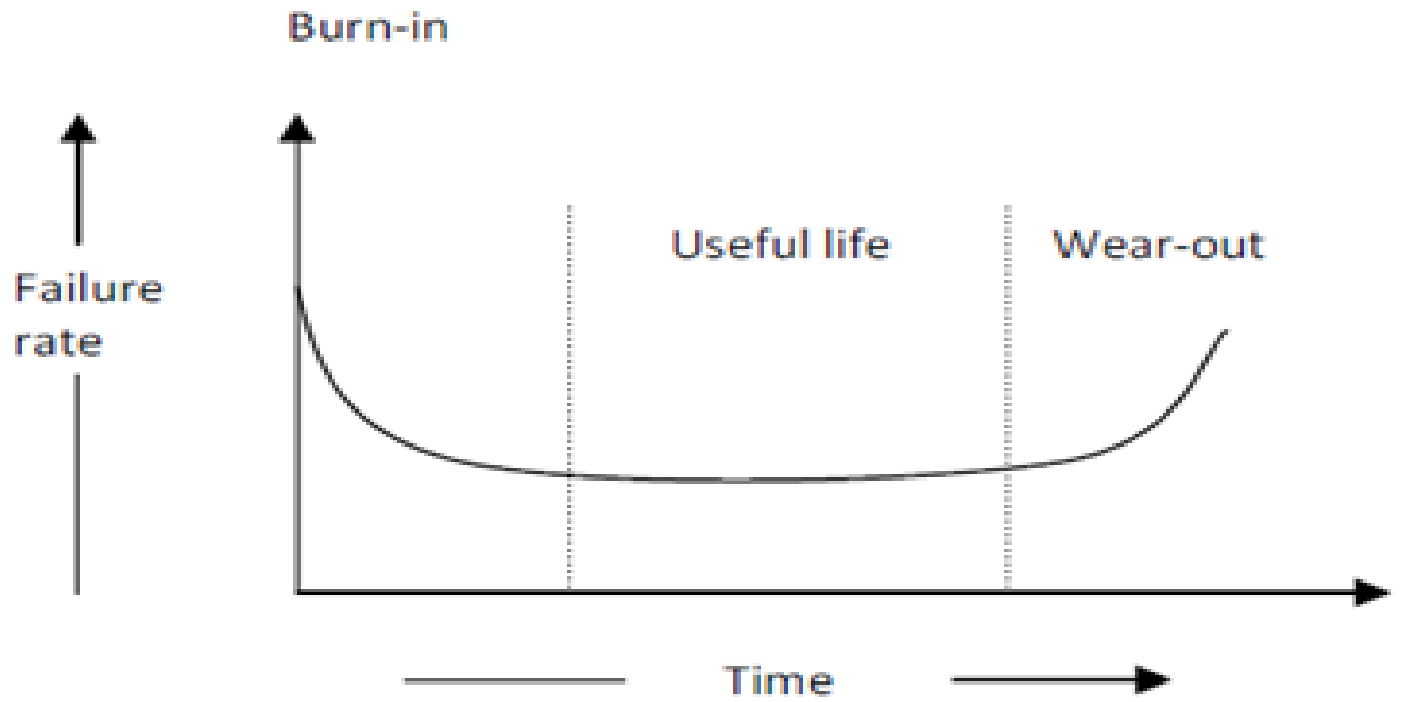
Software applications are grouped into…

1.System Software	- Compilers,OS etc
2.Real time software	- weather forecasting
3.Embedded Software	- security system,signaling system.
4.Business Software	- payroll ,file monitoring system,employee management.
5.Personal Computer Software	- Word ,computer graphics.
6.Artificial Intelligence Software	- Expert system, artificial Neural network
7.Web based Software	- HTML,Java
8.Engineering and scientific software	- CAD/CAM, Circuit analyzer

Software Characteristics

Software Doesn’t Wearout

- (Bath tub curve)



Reusability of components.

Software is not manufactured.

Software is flexible.

Process metrics

Software metrics are used to quantitatively characterize different aspect of software process or software product .Process metrics quantify the attributes of software development process and environment.

Examples of process metrics include productivity, quality, failure rate efficiency etc

Product metrics

Product metrics are measures for the software product.

examples of product metrics are
size,reliability,complexity functionality etc.

SOFTWARE LIFE CYCLE MODELS(SDLC)

SDLC Consists of following stages

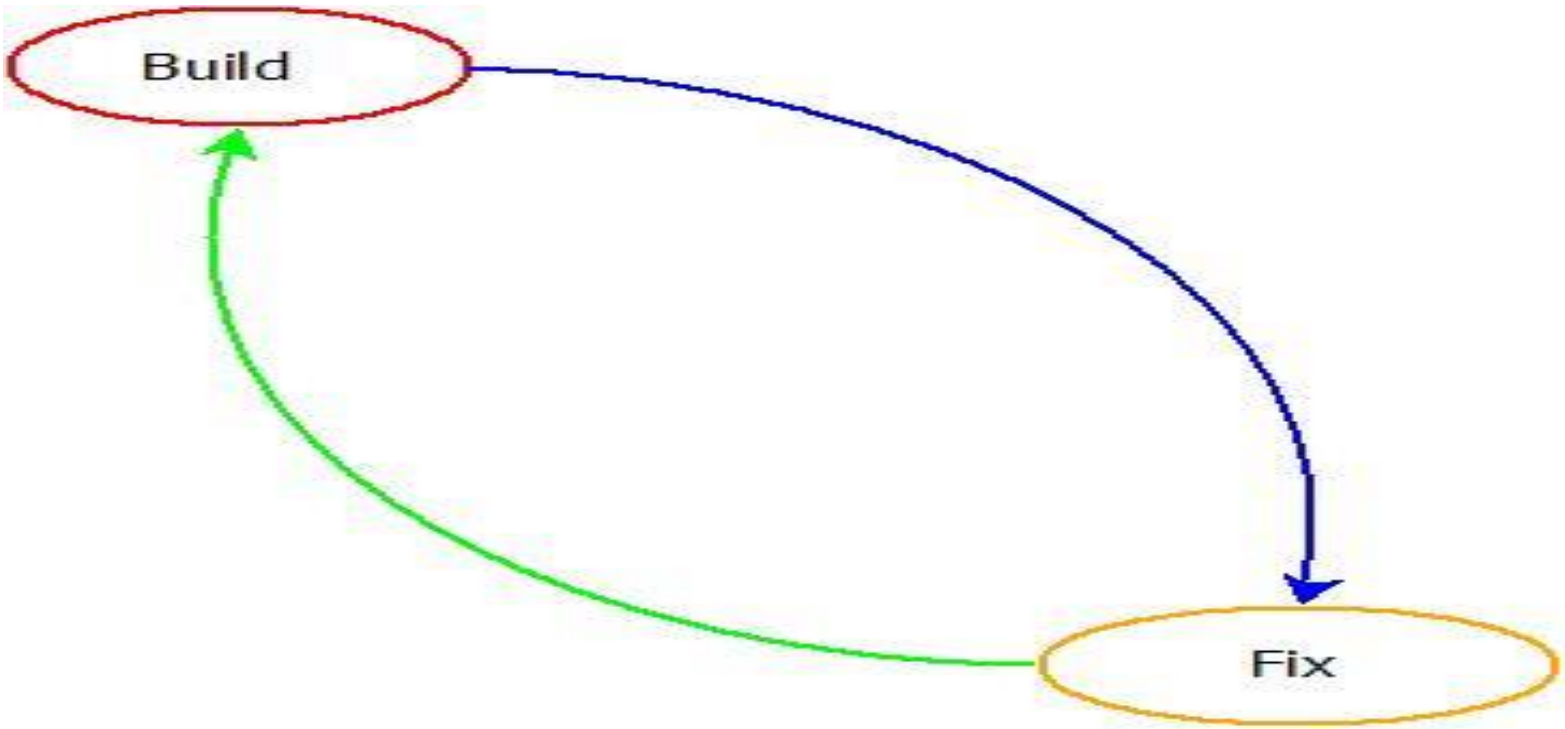
1. Planning & requirement analysis
2. Design the product architecture
3. Developing the product
4. Testing the product
5. Deployment in the market and maintenance.

SDLC Models

1. Build and Fix model :

Build and fix model is an approach and model used for building a software product, consisting of only two phases.

- The Build Phase.
- The Fix Phase.


Build
Fix

Build & Fix

ADVANTAGES

Only two phases means less complex.

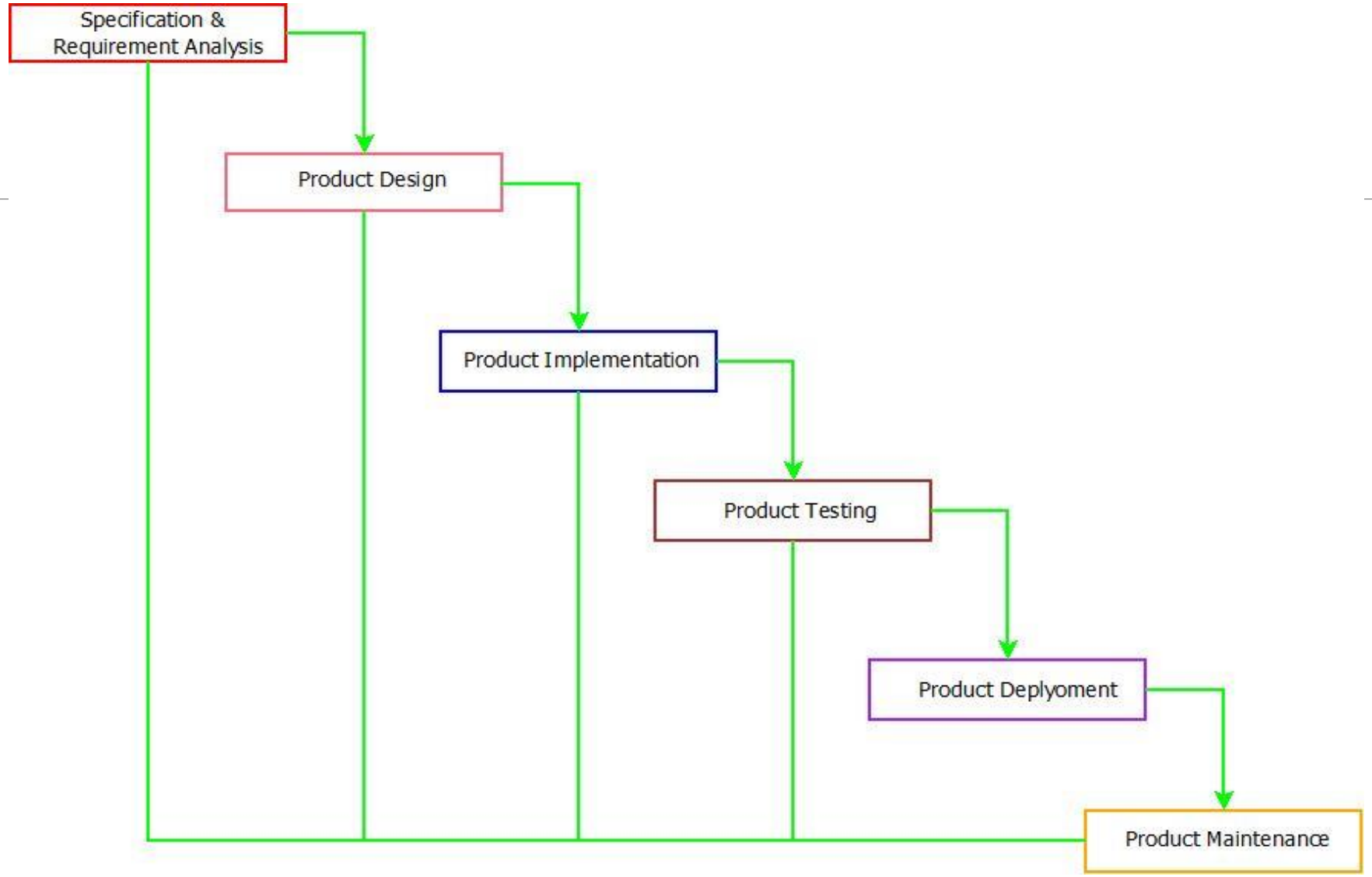
Can be used for small projects.

DISADVANTAGES

- No software document is generated before developing the software product.
- Not advisable for large software projects.
- Higher cost and time consumption.
- Quality of software is not up to the mark if build and fix model is used.
- Maintenance is not possible/very difficult.

Waterfall Model

- It is also referred to as **linear sequential life cycle model**
- This model was named as waterfall model because of its structure like a “Waterfall”.
- Each phase must be completed before the next phase can begin and there is no overlapping in the phase.
- These divisions of phases are done according to the document made before developing the software called as **software requirement specification (SRS) document.**


Specification &
Requirement Analysis
Product Design
Product Implementation
Product Testing
Product Deplyoment
Product Maintenance

- Specification and Requirement Analysis :

  In this phase, **requirement gathering is done** for the software product.

- Product Design :

Flowcharts and blueprint of the software product is made accordingly to the given specification.

The flow charts depicts the whole flow of working of software product .

The blue print depicts the overall structure of the software product.

- Product Implementation : The software product is coded. It means, whole software is divided into smaller modules and these modules are individually developed by the help of various programming languages.

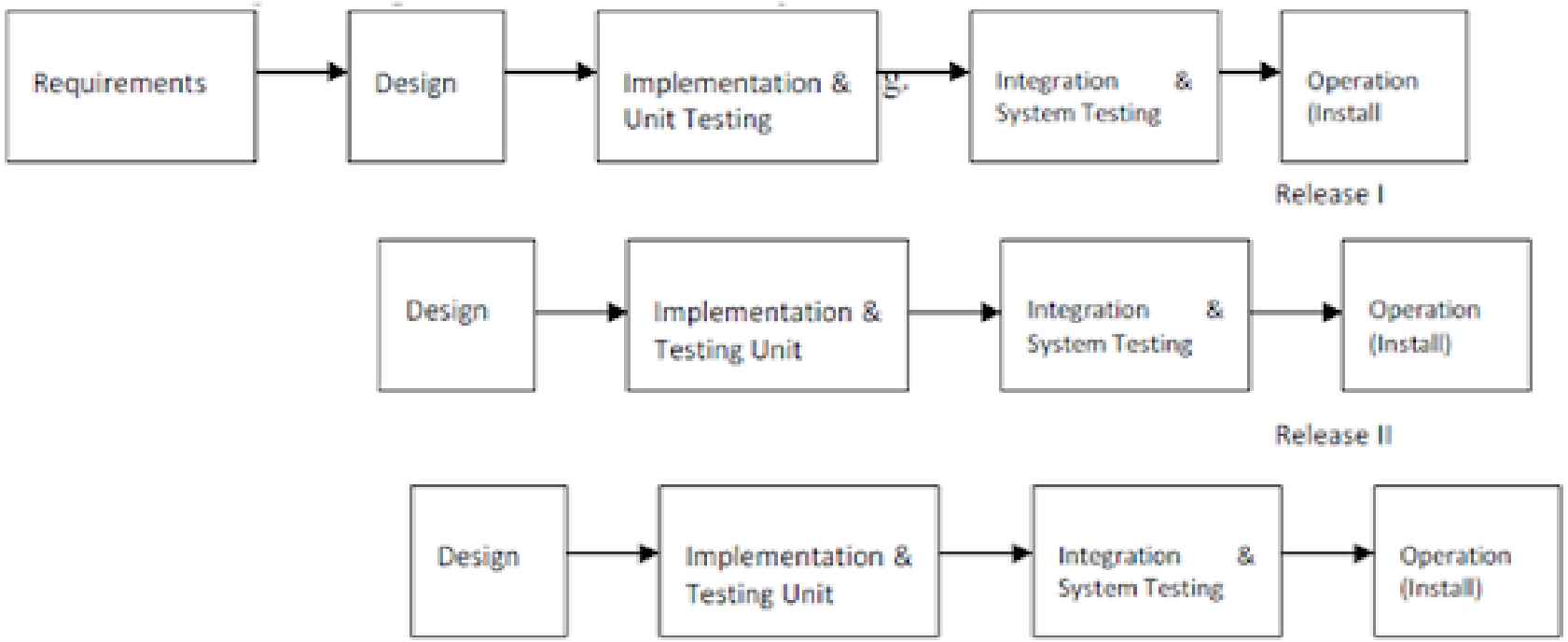
- Product Testing : In this phase after implementation is done, all the modules are first individually tested using concept of unit and then all the modules are connected together and system testing is performed on it. This testing phase reveals the possible bugs, errors and crashes in the software product.

- Product deployment : This software product being successfully tested and implemented, it is deployed as per clients/customer requirement. This process is called product deployment.

- Product Maintenance : After regular interval of time, the software product is checked further for bugs, errors and crashes. Also, if any feature needs to added, up-gradation on the software can be done to. This support is provided by the maintenance team of the software development company.

3:INCREMENT PROCESS MODELS

(i) Iterative Enhancement Model



- These model has the same phase as the waterfall model.
- Project is break into small modules which can be delivered.
- Working version of software is produced during the first module.
- Each subsequent release of the module adds functionality to the previous release. The process continues till the complete system is achieved.

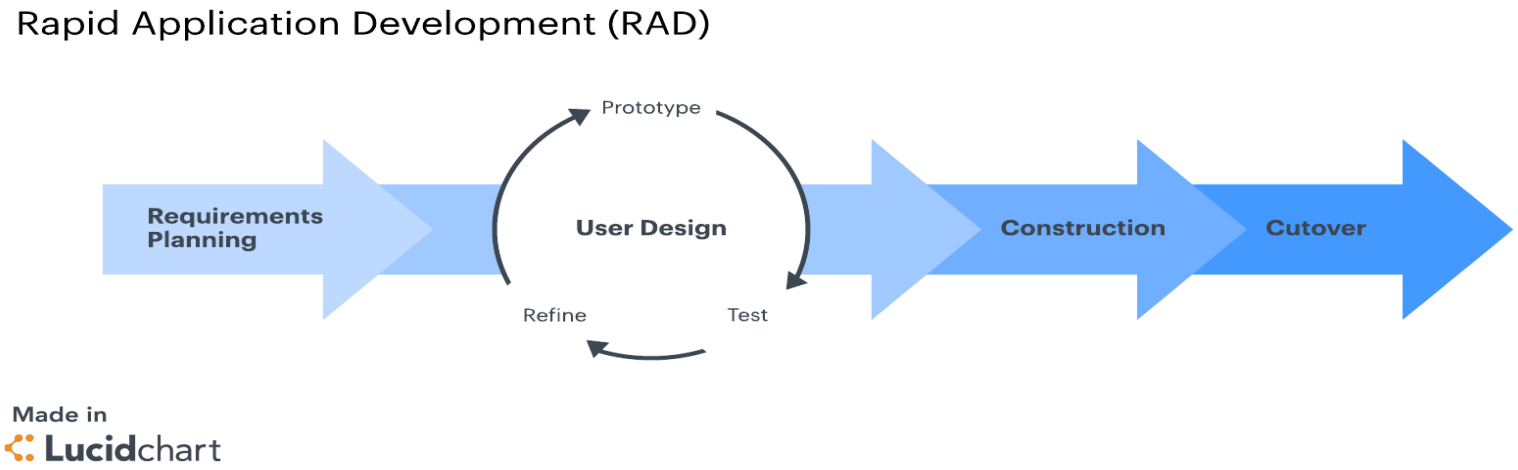
Rapid Application Development (RAD) Model

The process is started with a rapid prototype and is given to user for evaluation.

Feedback is obtained and prototype is refined.

Process continues till the requirements are finalized.

4 Phases in this model



- Requirements Planning Phase

During this stage, developers, customers, and team members communicate to determine the goals and expectations for the project as well as current and potential issues that would need to be addressed during the build.

User Description

Joint team of developers and users are constituted to prepare, understand and review the requirements.

Construction Phase

This phase combines the detailed design,coding and testing phase of waterfall model.Here we release the product to the customer.

4.Cut Over Phase

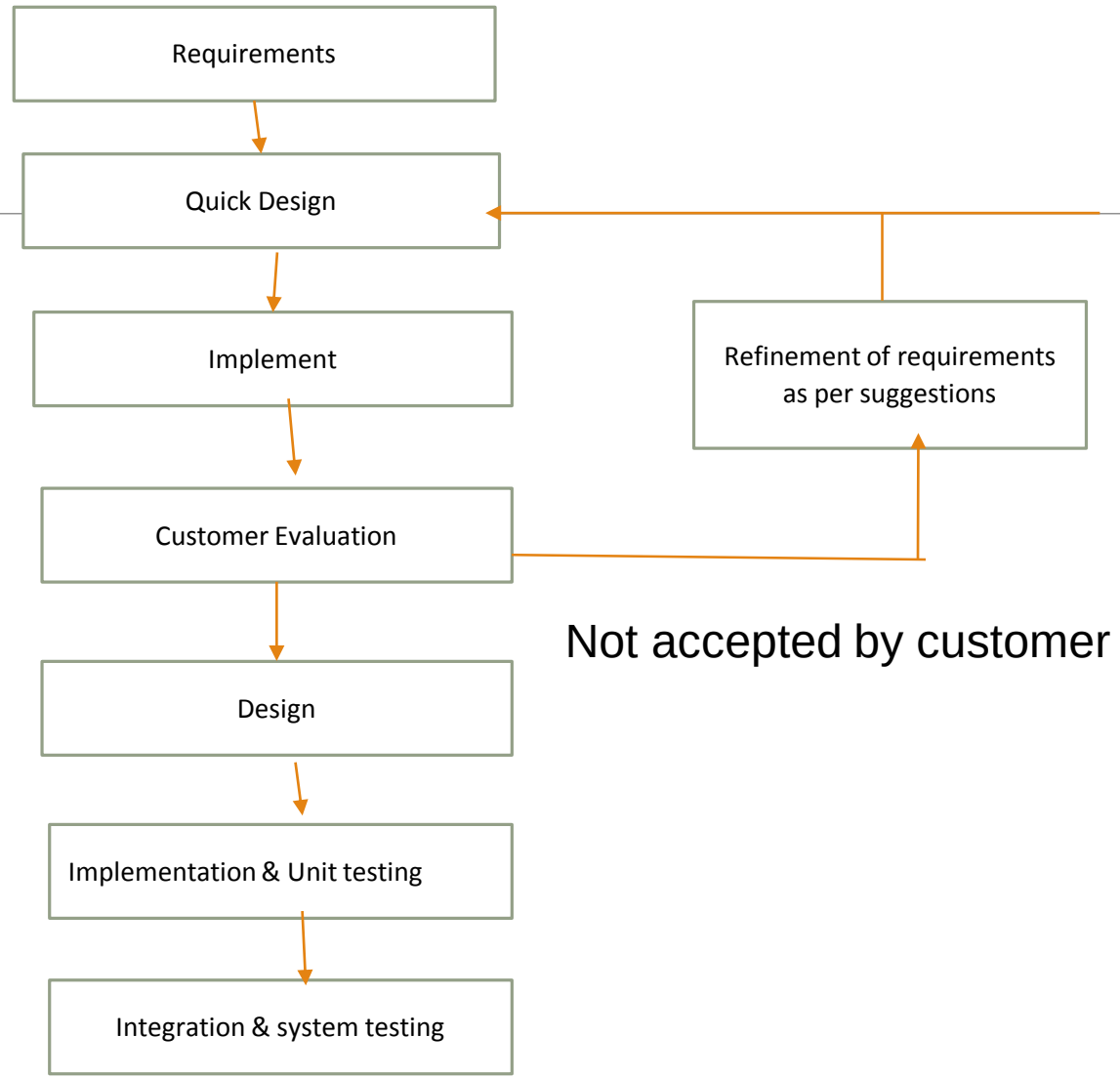
This phase incorporate acceptance testing by the users, installation of the system, and user training.

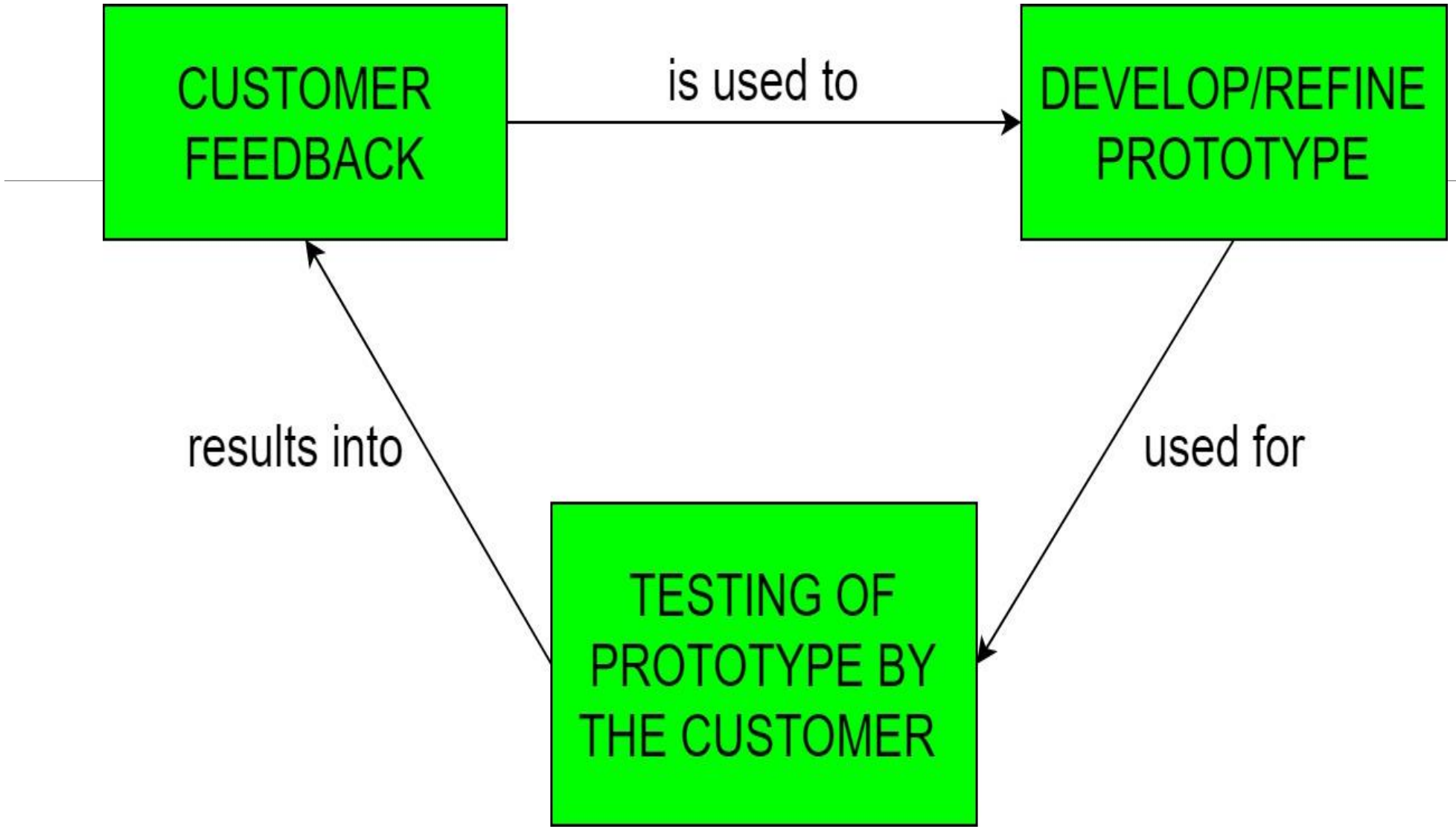
Evolutionary Process Model

- Occurs in cyclic fashion.
- Used for complex projects.
- Useful for projects using new technologies .

Prototyping Model

In this model, a prototype of the end product is first developed, tested and refined as per customer feedback repeatedly till a final acceptable prototype is achieved which forms the basis for developing the final product.


Requirements
Quick Design
Implement
Customer Evaluation
Design
Implementation & Unit testing
Integration & system testing
Refinement of requirements as per suggestions
Not accepted by customer


CUSTOMER FEEDBACK
is used to
DEVELOP/REFINE PROTOTYPE
results into
used for
TESTING OF PROTOTYPE BY THE CUSTOMER

SPIRAL MODEL

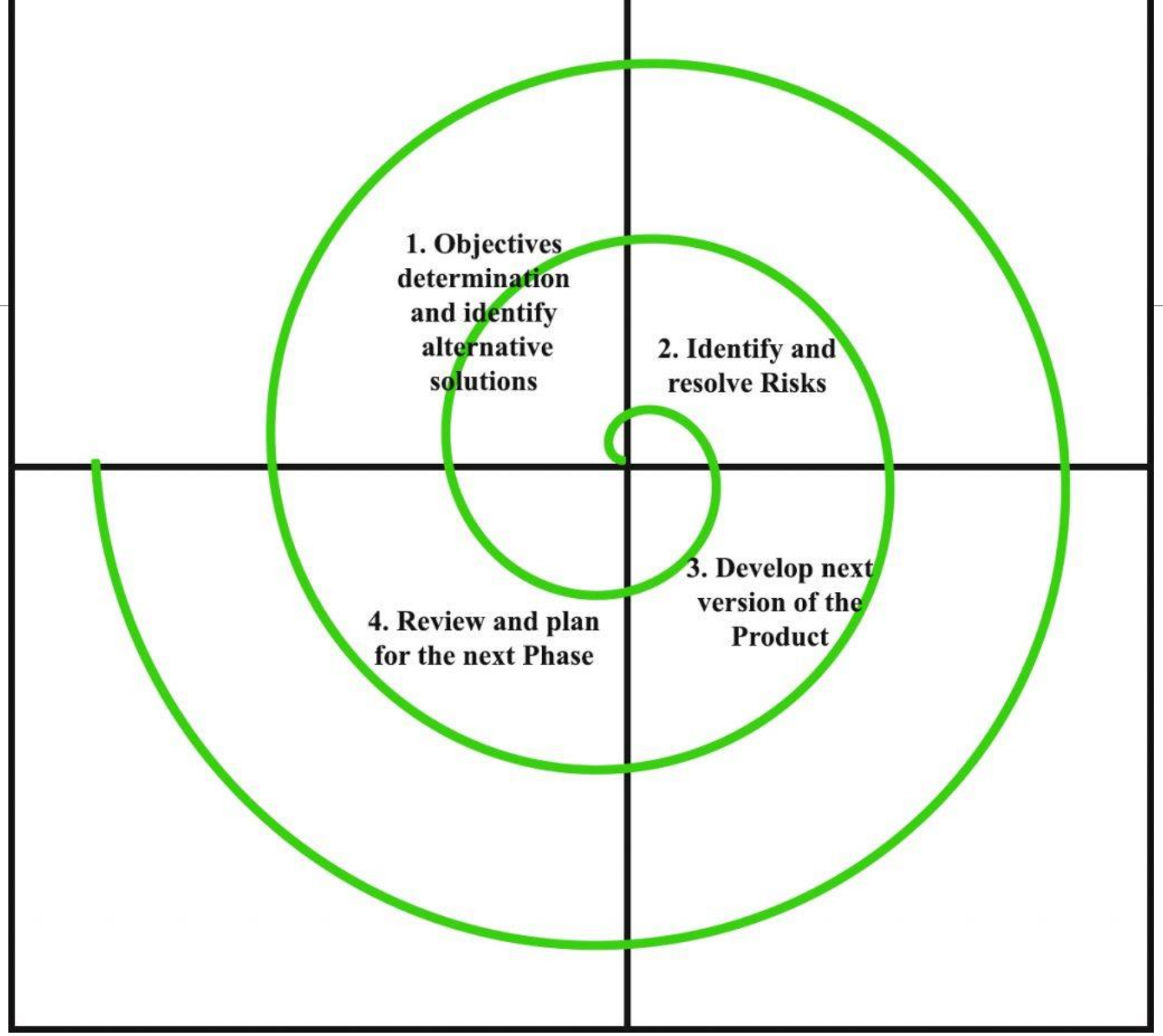
- Provides support for Risk handling.

it looks like a spiral with many loops.

Each loop of the spiral is called a Phase of the software development process. The exact number of phases needed to develop the product can be varied by the project manager depending upon the project risks. As the project manager dynamically determines the number of phases, so the project manager has an important role to develop a product using spiral model.

The Radius of the spiral at any point represents the expenses(cost) of the project so far, and the angular dimension represents the progress made so far in the current phase.

Below diagram shows the different phases of the Spiral Model:


1. Objectives determination and identify alternative solutions
2. Identify and resolve Risks
3. Develop next version of the Product
4. Review and plan for the next Phase

Each phase of spiral model is divided into 4 quadrant

1.Planning

2.Risk Analysis

3.Development

4.Assessment

The functions of these four quadrants are discussed below-

Objectives determination and identify alternative solutions(Planning): Requirements are gathered from the customers and the objectives are identified, elaborated and analyzed at the start of every phase. Then alternative solutions possible for the phase are proposed in this quadrant.

Identify and resolve Risks: During the second quadrant all the possible solutions are evaluated to select the best possible solution. Then the risks associated with that solution is identified and the risks are resolved using the best possible strategy. At the end of this quadrant, Prototype is built for the best possible solution.

Develop next version of the Product: During the third quadrant, the identified features are developed and verified through testing. At the end of the third quadrant, the next version of the software is available.

Review and plan for the next Phase: In the fourth quadrant, the Customers evaluate the so far developed version of the software. In the end, planning for the next phase is started.