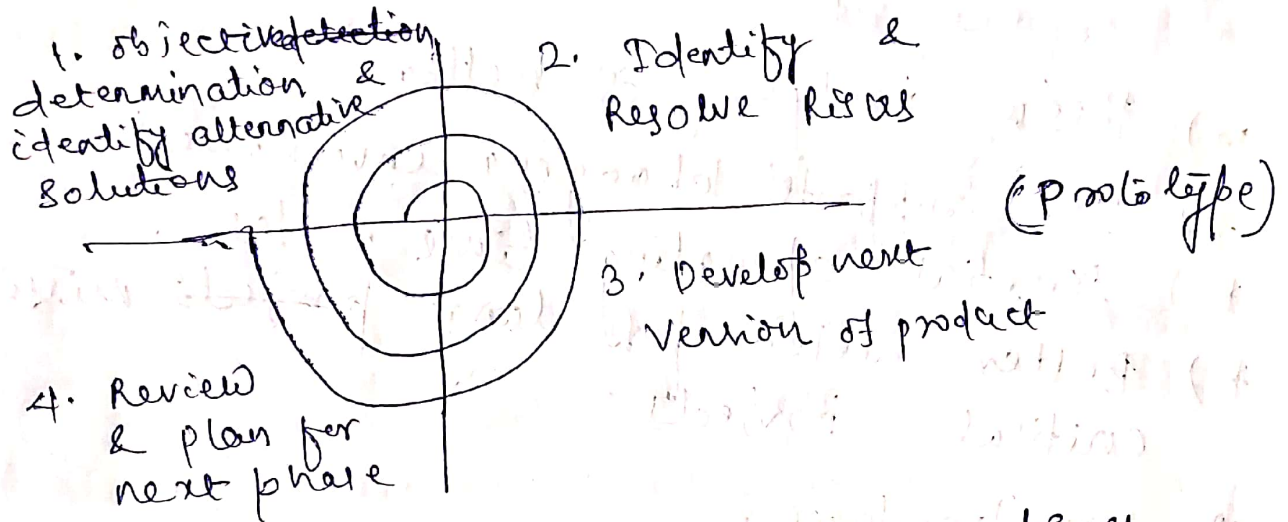# Spiral Model.

*) Risk Handling.
*) Radius of Spiral = Cost
*) Angular dimension = progress.
*) Meta Model.

*) Barry Bohm Recognised the project Risk factor into a life cycle model.

1. objective detection determination & identify alternative solutions

2. Identify & Resolve Risks

(Prototype)

3. Develop next version of product

4. Review & plan for next phase

Advantages

1) Risk Handling
2) Large Projects
3) Flexible
4) Customer Satisfaction

Disadvantages.

1) Complex
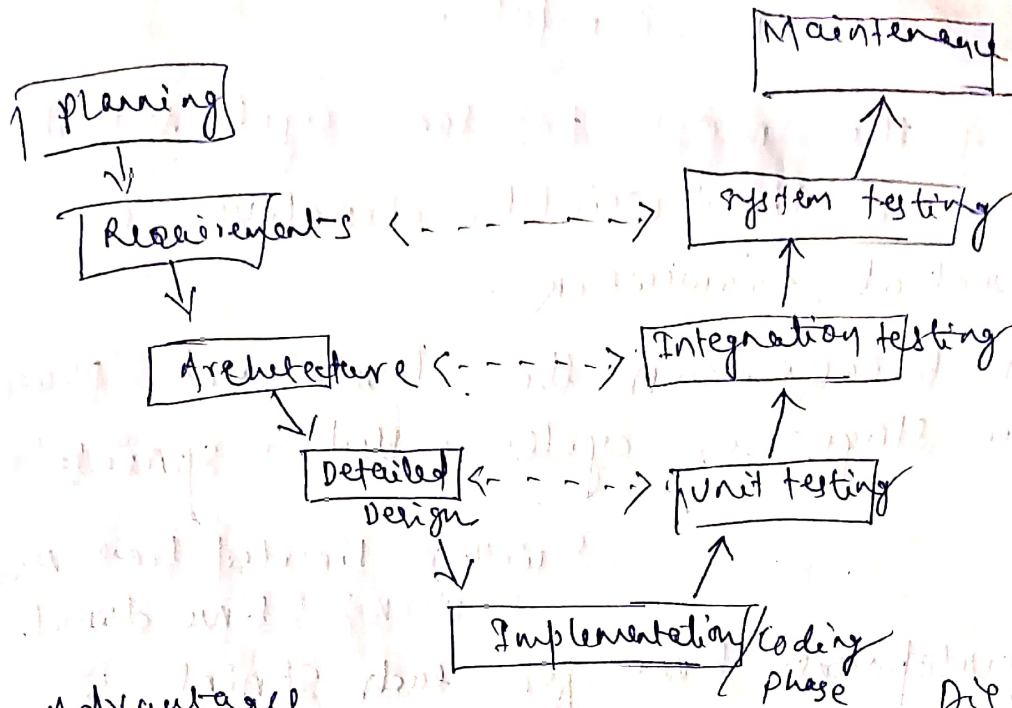2) Expensive
3) Too much Risk analysis
4) Time.

V-shaped Model.

*) Also known as Verification & Validation model.
*) Extension of Waterfall model.
*) Testing is associated in every phase of the life cycle.
*) Verification phase (Req. Analysis, System design, Architecture design, Module design).
*) Validation phase (Unit testing, Integration testing, Acceptance testing).

```
  ┌─────────┐                              ┌──────────────┐
  │ planning │                             │ Maintenance  │
  └─────────┘                              └──────────────┘
       ↓                                         ↑
  ┌──────────────┐          ┌──────────────────┐
  │ Requirements │ <------> │  system testing  │
  └──────────────┘          └──────────────────┘
       ↓                                 ↑
  ┌──────────────┐        ┌──────────────────────┐
  │ Architecture │ <----> │ Integration testing  │
  └──────────────┘        └──────────────────────┘
       ↓                            ↑
   ┌──────────┐        ┌──────────────┐
   │ Detailed │ <----> │ Unit testing │
   │  Design  │        └──────────────┘
   └──────────┘                ↑
       ↓         ┌──────────────────────────┐
                 │ Implementation/Coding     │
                 │           phase           │
                 └──────────────────────────┘
```
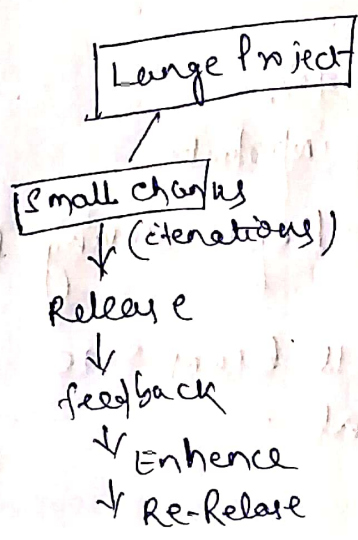
Advantages   **Disadvantages**

*) Time Saving   *) No feedback so
*) Good Understanding of project   less scope of change
   in the begning   *) Risk analysis is
*) Progress can be traced easily   not done
*) proactive defect tracking.   *) Not good for big
                                            or object Oriented
                                            Project.

Agile Model: (2-3 months)

*) It is used by the major companies today
   e.g. Amazon, Google, facebook, Adobe

*) Agile means move quickly.

```
  ┌──────────────┐                Advantages:
  │ Large Project │
  └──────────────┘                1) frequent Delivery
        ↓                         2) Face to face communication
  ┌──────────────┐                   with client
  │ Small changes │               3) changes
  │ (iterations)  │               4) Time
  └──────────────┘
        ↓
     Release                      Disadvantages :– 1) less documentation
        ↓                         11) Maintenance problem.
     feedback
        ↓ Enhance
        ↓ Re-Release
```

Scrum model.

*) One of the most popular agile methodology.

*) Scrum is a light weight, iterative & incremental framework.

*) Scrum breaks down the development phase into a stages or cycles called "sprints"

{ within limited time maxi^m work} {time duration}

*) The development time for each sprint is maximized & dedicated, thereby managing only one sprint at a time.

*) Scrum team has scrum master & product-owner with constant communications on the daily basis.

*) Keywords : Backlog, sprint, Daily Scrum,

{ A place where the basic } {Daily meeting}
{ Requirements designed are} { 10- 15 mins }
{ mentioned}
Scrum master, product owner.

Advantages:

*) Freedom & Adaption
*) High quality, low-Risk product
*) Reduce the development time upto 40%.
*) Scrum customer satisfac^n is very important
*) Reviewing the current sprint before moving to new one

Disadvantages

*) more efficient for small team site
*) No change in sprint.
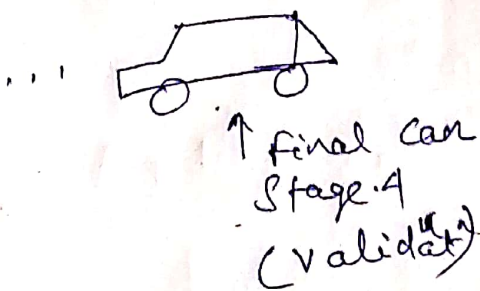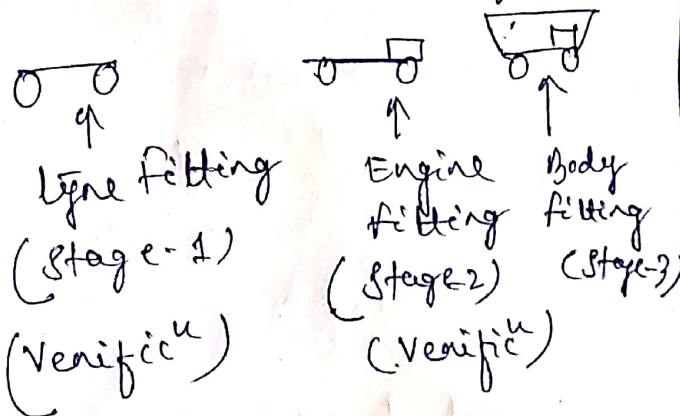
Sprint: { A sprint is a short, time-boxed period when a scrum team works to complete a set amount of work }

Verification & Validation

Verification	Validation
1) Are you building it Right (In process)	1) Have you built the Right thing? (After development)

e.g. Car Manufacturing.

Line fitting (Stage-1) (Verific^n)

Engine fitting (Stage-2) (Verific^n)

Body fitting (Stage-3)

↑ final car Stage-4 (validate^n)

2) check whether an ~~certificate~~ artifact conforms its previous artifact

3) By Developer

4) concerned with phase containment error

5) method involves Review, Inspection, Unit testing & Integration testing

2) check the final product against specification

3) By tester

4) Aim is to make final product error free

5) Involve system testing