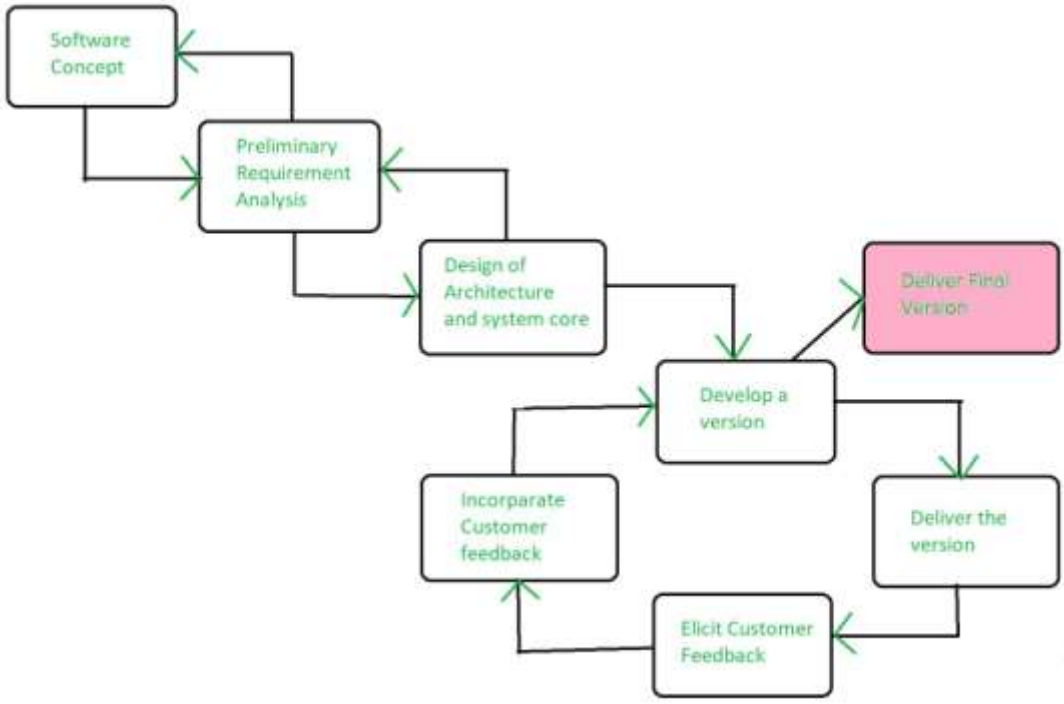
Lecture: 4

Evolutionary and Spiral Model

Evolutionary Model:

- Evolutionary Model is a combination of iterative and incremental model of software development life cycle.
    - Iterative waterfall model can be thought of as incorporating the necessary changes to the classical waterfall model to make it useable in practical software development projects.
    - The iterative waterfall model provides feedback paths from every phase to its preceding phases, which is the main difference from the classical waterfall model.
- It is better for software products that have their feature sets redefined during development because of user feedback and other factors.
- The Evolutionary model divides the development cycle into smaller, incremental waterfall models in which users are able to get access to the product at the end of each cycle.
- Feedback is provided by the users on the product for planning stage of the next cycle and the development team responds, often by changing the product, plan or process. Therefore, the software product evolves with time.



- This model allows for changing requirements as well as all work in broken down into maintainable work chunks.

- **Application of Evolutionary Model:**
  - It is used in large projects where you can easily find modules for incremental implementation. Evolutionary model is commonly used when the customer wants to start using the core features instead of waiting for the full software.
  - Evolutionary model is also used in object oriented software development because the system can be easily portioned into units in terms of objects.
- **Advantages:**
  - In evolutionary model, a user gets a chance to experiment partially developed system.
  - It reduces the error because the core modules get tested thoroughly.
- **Disadvantages:**
  - Sometimes it is hard to divide the problem into several versions that would be acceptable to the customer which can be incrementally implemented and delivered.

Spiral Model:

- The spiral model is used for risk management that combines the iterative development process model with elements of the Waterfall model.
- The spiral model is favored for large, expensive and complicated projects.
- When viewed as a diagram, the spiral model looks like a coil with many loops. The number of loops varies based on each project and is often designated by the Project Manager.
- *The spiral model enables gradual releases and refinement of a product through each phase of the spiral as well as the ability to build prototypes at each phase.*
- Each phase of the Spiral Model is divided into four quadrants as shown in fig.:
  - **Objectives determination and identify alternative solutions:** 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 are identified and the risks are resolved using the best possible

strategy. At the end of this quadrant, the 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.

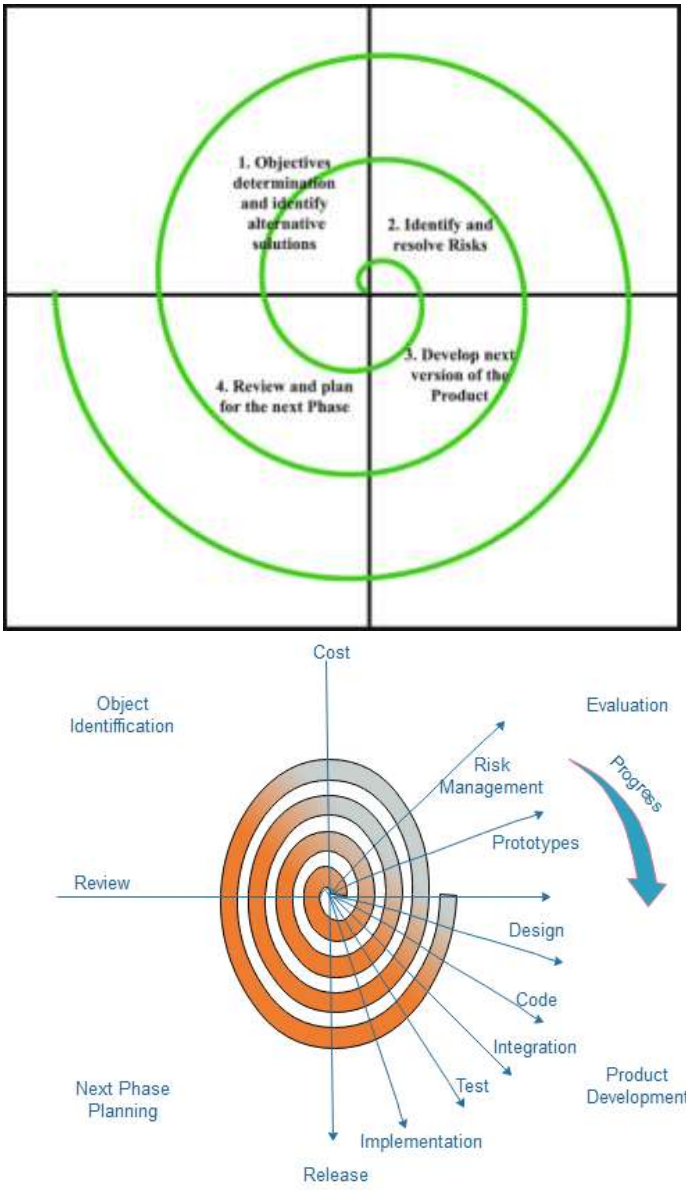


Fig. Spiral Model

- When looking at a diagram of a spiral model, the radius of spiral represents the cost of the project and angular degree represents the progress made in the current phase.

Spiral model is also called a meta-model because it subsumes all the other SDLC models. e.g. a single loop spiral actually represents the Iterative Waterfall Model. The spiral model incorporates the stepwise approach of the Classical Waterfall model. The spiral model uses the approach of the Prototyping Model by building a prototype at the start of each phase as a risk-handling technique.

Advantages of Spiral Model:

- Better Risk Handling
- Good for large projects
- Flexibility in Requirements
- Customer Satisfaction

Disadvantages of Spiral Model:

- Complex
- Expensive
- Too much dependability on Risk Analysis
- Difficulty in time management