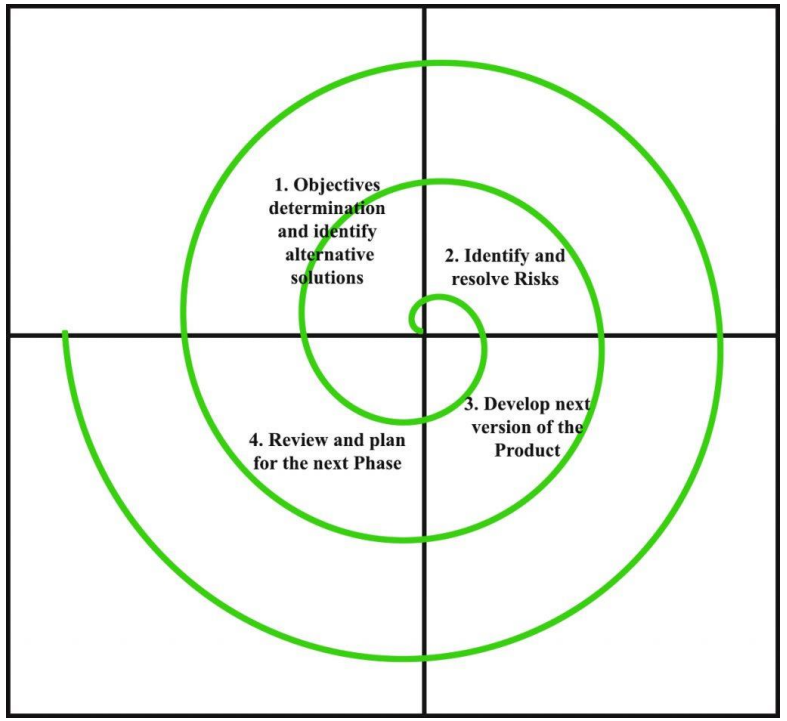
SPIRAL MODEL

ECE 811 – SOFTWARE ENGINEERING

Monday, July 28, 2025

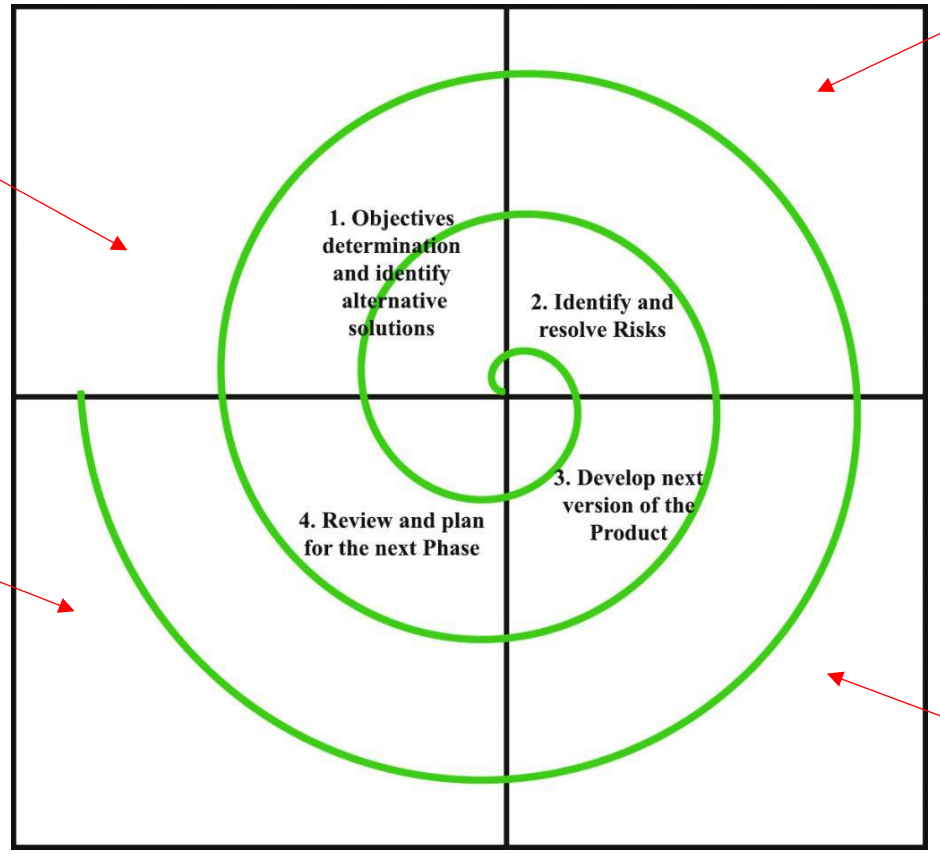
WHAT IS A SPIRAL MODEL?

1. A spiral model follows a loop with each loop forming a phase of the software development process.
2. The loop goes through four quadrants, i.e
   a) Objective determination,
   b) Risk identification and analysis.
   c) system development and testing,
   d) Reviewing and planning for the next version.
3. Spiral model is one of the most important Software Development Life Cycle models, which provides support for Risk Handling.
4. 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.



Phase 1: Objectives determination

1. Requirements are gathered from the customers.
2. Objectives are identified, elaborated and analyzed at the start of every phase.
3. Possible solutions for the phase are proposed.



Phase 2: Identify and resolve Risks:

1. During 2nd quadrant all the possible solutions are evaluated to select the best possible solution.
2. Risks associated with solution is identified and resolved using the best possible strategy.

Phase 4: Review and plan:

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

Phase 3: Develop and Test version:

During the 3rd quadrant, the identified features are developed and verified through testing to produce the next version of the software is available.

ADVANTAGES OF THE SPIRAL MODEL

1. **Risk Handling:** The projects with many unknown risks that occur as the development proceeds, in that case, Spiral Model is the best development model to follow due to the risk analysis and risk handling at every phase.
2. **Good for large projects:** It is recommended to use the Spiral Model in large and complex projects.
3. **Flexibility in Requirements:** Change requests in the Requirements at later phase can be incorporated accurately by using this model.
4. **Customer Satisfaction:** Customer can see the development of the product at the early phase of the software development and thus, they habituated with the system by using it before completion of the total product.

DISADVANTAGES OF SPIRAL MODEL

1. **Complex:** The Spiral Model is much more complex than other SDLC models.
2. **Expensive:** Spiral Model is not suitable for small projects as it is expensive.
3. **Too much dependable on Risk Analysis:** The successful completion of the project is very much dependent on Risk Analysis. Without very highly experienced expertise, it is going to be a failure to develop a project using this model.
4. **Difficulty in time management:** As the number of phases is unknown at the start of the project, so time estimation is very difficult.

COMPARISON BETWEEN WATERFALL & SPIRAL MODELS

	WATERFALL	SPIRAL
1	Waterfall model works in sequential method.	Spiral model works in evolutionary method.
2	Model errors or risks are identified and rectified after the completion of stages.	Model errors or risks are identified and rectified earlier.
3	Waterfall model adopted by customers.	Spiral model adopted by developers.
4	Waterfall model is applicable for small project	While Spiral model is used for large project.
5	Requirements and early stage planning is essential	Requirements and early stage planning not essential
6	Flexibility to change in waterfall model is Difficult	Flexibility to change in spiral model is not Difficult.
7	There is high amount risk in waterfall model.	There is low amount risk in spiral model.
8	Waterfall model is comparatively inexpensive.	While cost of spiral model is very expensive.