

The **Spiral Model** was designed to include the best features from the **Waterfall** and **Prototyping Models**, and introduces a new component - risk-assessment. The term "spiral" is used to describe the process that is followed as the development of the system takes place. Similar to the **Prototyping Model**, an initial version of the system is developed, and then repetitively modified based on input received from customer evaluations. Unlike the **Prototyping Model**, however, the development of each version of the system is carefully designed using the steps involved in the **Waterfall Model**. With each iteration around the spiral (beginning at the center and working outward), progressively more complete versions of the system are built.(6)

R=Review

### Figure 4. Spiral Model (7)

Risk assessment is included as a step in the development process as a means of evaluating each version of the system to determine whether or not development should continue. If the customer decides that any identified risks are too great, the project may be halted. For example, if a substantial increase in cost or project completion time is identified during one phase of risk assessment, the customer or the developer may decide that it does not make sense to continue with the project, since the increased cost or lengthened timeframe may make continuation of the project impractical or unfeasible.

The **Spiral Model** is made up of the following steps:

- **Project Objectives.** Similar to the system conception phase of the **Waterfall Model**. Objectives are determined, possible obstacles are identified and alternative approaches are weighed.
- **Risk Assessment.** Possible alternatives are examined by the developer, and associated risks/problems are identified. Resolutions of the risks are evaluated and weighed in the consideration of project continuation. Sometimes prototyping is used to clarify needs.
- **Engineering & Production.** Detailed requirements are determined and the software piece is developed.
- **Planning and Management.** The customer is given an opportunity to analyze the results of the version created in the Engineering step and to offer feedback to the developer.

## Problems/Challenges associated with the Spiral Model

Due to the relative newness of the **Spiral Model**, it is difficult to assess its strengths and weaknesses. However, the risk assessment component of the **Spiral Model** provides both developers and customers with a measuring tool that earlier **Process Models** do not have. The measurement of risk is a feature that occurs everyday in real-life situations, but (unfortunately) not as often in the system development industry. The practical nature of this tool helps to make the **Spiral Model** a more realistic **Process Model** than some of its predecessors.

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(6) Linda Spence, University of Sutherland, "Software Engineering," available at [http://osiris.sunderland.ac.uk/rif/linda\\_spence/HTML/contents.html](http://osiris.sunderland.ac.uk/rif/linda_spence/HTML/contents.html)

(7) Kal Toth, Intellitech Consulting Inc. and Simon Fraser University, from lecture notes: Software Engineering Best Practices, 1997.