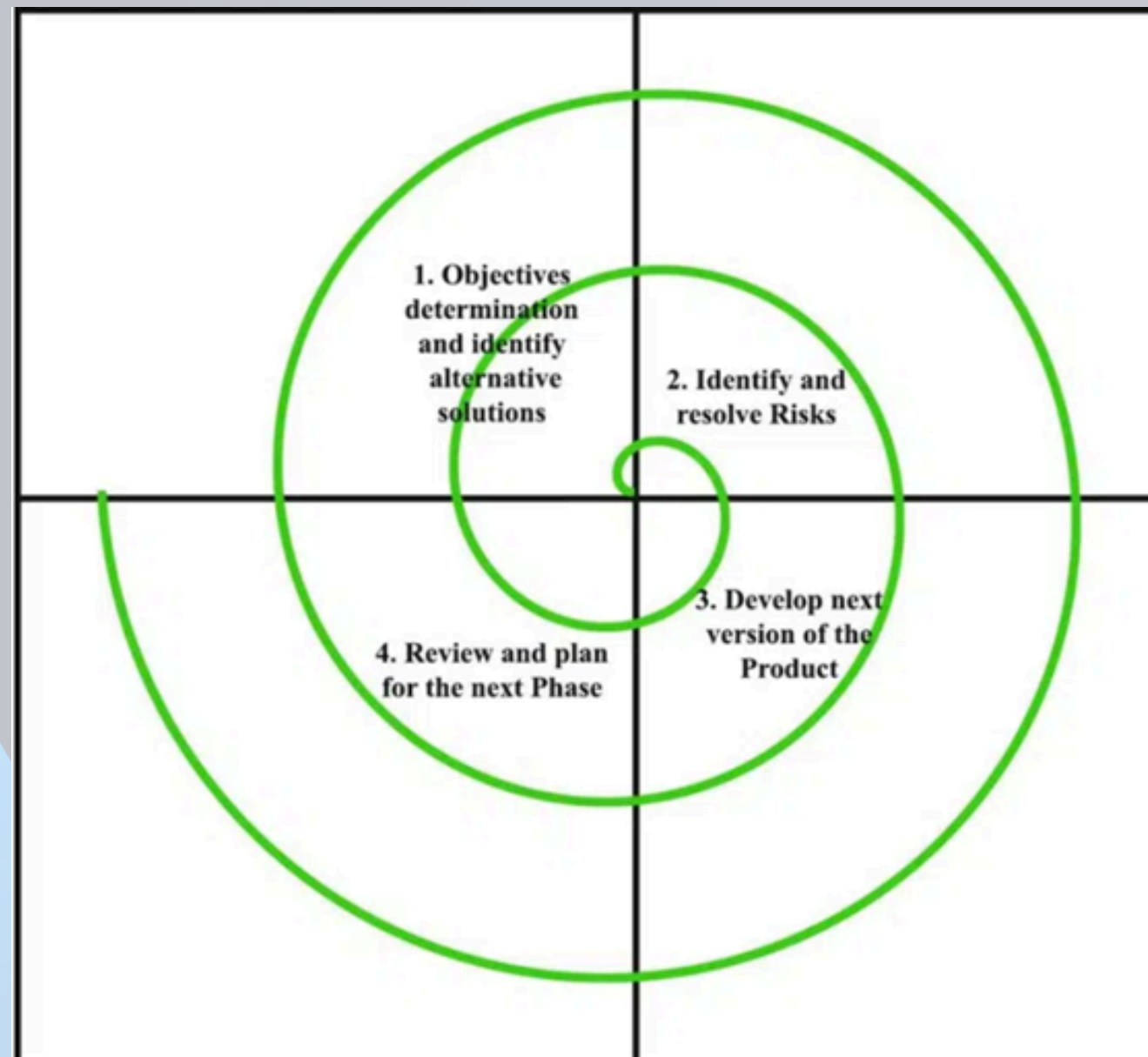# SPIRAL METHODOLOGY

Group A4

INTRODUCTION

The Spiral Model is a **risk-driven** software development methodology that combines the **iterative development process model** with the **systematic aspects of the waterfall model.**

STRUCTURE

The Spiral Model is visualized as a spiral with multiple loops, each representing a development phase of the project and every iteration results in a progressively refined version of the system.

Each loop consists of four quadrants, which represent the key activities performed in that phase

STRUCTURE

QUADRANT 1

Determine objectives

- Requirements are gathered from the customers
- Objectives are identified, elaborated, and analyzed at the start of every phase.
- Alternative solutions possible for the phase are proposed.

QUADRANT 2

Identify & resolve risks

- All the possible solutions are evaluated to select the best possible solution.
- The risks associated with that solution are identified and resolved
- The prototype is built for the best possible solution.

STRUCTURE

QUADRANT 3

Develop & test

- The identified features are developed through coding and integration.
- Verified through testing techniques.
- At the end, the next version of the software is available.

QUADRANT 4

Review & plan next phase

- The customers evaluate the so-far developed version of the software.
- In the end, planning for the next phase is started by setting new objectives, identifying alternatives and assessing risks.

ADVANTAGES

Risk management
Helps to identify and mitigate potential issues early.

Flexibility in Requirements
They can evolve and be refined as the project progresses.

Customer Feedback
Ensures that the final product aligns with user expectations.

Better Cost Estimation
Early risk analysis and iterative development help estimate costs more accurately.

Early Prototyping
Prototypes built in each phase allow stakeholders to visualize the system before full-scale development.

Improved Quality
Testing is conducted in every cycle, ensuring that defects are identified and resolved early.

DISADVANTAGES

- Complex and costly
- Time-consuming
- Requires strong risk management

- Not suitable for small projects
- Difficult to estimate costs and time
- Dependency on customer feedback

- High documentation requirements
- Risk of scope creep

WHEN TO USE SPIRAL

Spiral is used for large complex projects with high risk factors where frequent releases are needed

Aerospace and Defense systems

Healthcare systems such as patient monitoring systems

Game development

INDUSTRIES

- **Aerospace & Defense** – NASA and military software use it for its focus on risk assessment.
- **Healthcare Systems** – Electronic Health Records (EHR) software development, where security and accuracy are critical.

- **Banking & Finance** – Large financial software requiring high security and reliability.
- **AI & Machine Learning Projects** – Where models improve over multiple iterations.
- **Game Development** – Since game mechanics and features often evolve based on user feedback.

CONCLUSION

- The **Spiral Development Methodology** is a powerful model that balances structured development with iterative refinement, making it ideal for complex and high-risk projects.
- When used effectively, the spiral model helps teams manage uncertainty and deliver high-quality software through a structured yet flexible approach.