# 1. Waterfall Methodology

**Definition:** Waterfall is a linear and sequential software development methodology where each phase must be completed before the next phase begins.

**Meaning:** It follows a step-by-step process similar to a flowing waterfall.

### Advantages:

1. Easy to understand and manage
2. Clear documentation
3. Well-defined stages

### Disadvantages:

1. Not flexible to changes
2. Late testing phase
3. High risk for complex projects

**Why we need it?** It provides a structured and disciplined approach.

**Where it is used:** Used in government projects, banking systems, and small fixed-scope projects.

**When it is used:** When requirements are clear and unlikely to change.

**Why it is useful in projects?** Helps in planning, scheduling, and documentation control.

# 2. Agile Methodology

**Definition:** Agile is an iterative and incremental approach that focuses on flexibility, collaboration, and customer feedback.

**Meaning:** Development happens in small cycles with continuous improvement.

### Advantages:

1. Highly flexible
2. Early delivery
3. Customer satisfaction

### Disadvantages:

1. Less documentation
2. Requires experienced team
3. Difficult cost estimation

**Why we need it?** To adapt quickly to changing requirements.

**Where it is used:** Used in startups, web applications, and mobile app development.

**When it is used:** When requirements change frequently.

**Why it is useful in projects?** Improves quality and reduces project risk.

# 3. Scrum Framework

**Definition:** Scrum is an Agile framework used to manage complex projects through short development cycles called sprints.

**Meaning:** It divides work into small manageable parts with frequent reviews.

### Advantages:

1. Fast delivery
2. High transparency
3. Team collaboration

### Disadvantages:

1. Needs trained team
2. Not suitable for large teams
3. Scope creep risk

**Why we need it?** To manage work efficiently with frequent feedback.

**Where it is used:** Used in software product development and IT companies.

**When it is used:** When rapid delivery and frequent updates are required.

**Why it is useful in projects?** Ensures continuous improvement and faster value delivery.