**Write a summary on different project methodologies**

**1.Waterfall**

**Approach:** Linear, sequential phases (Requirements → Design → Development → Testing → Deployment).  
**Pros:**  
✔ Clear milestones.  
✔ Easy to manage for small, well-defined projects.  
**Cons:**  
✖ Inflexible to changes.  
✖ Late testing = high risk of costly rework.  
**Best For:** Construction, manufacturing, or projects with fixed scope.

**2️. Agile (Scrum, Kanban, XP)**

**Approach:** Iterative, incremental delivery with cross-functional collaboration.  
**Key Variants:**

* **Scrum:** Sprints (2-4 weeks), roles (PO, Scrum Master), ceremonies (Standups, Retrospectives).
* **Kanban:** Visual workflow (WIP limits), continuous delivery.
* **XP (Extreme Programming):** Pair programming, TDD, frequent releases.  
  **Pros:**  
  ✔ Adaptable to change.  
  ✔ Customer feedback integrated early.  
  **Cons:**  
  ✖ Requires high team collaboration.  
  ✖ Less predictable timelines.  
  **Best For:** Software development, dynamic projects with evolving requirements.

**3️. Lean**

**Approach:** Maximize value by minimizing waste (overproduction, delays, unused talent).  
**Pros:**  
✔ Efficient resource use.  
✔ Focus on customer value.

**Cons:**  
✖ Requires cultural buy-in.  
✖ Less structured than Agile/Waterfall.  
**Best For:** Manufacturing, startups, process optimization.

**4️. PRINCE2 (Projects IN Controlled Environments)**

**Approach:** Process-driven, with stages (Initiation → Planning → Execution → Closure).  
**Pros:**  
✔ Highly documented.  
✔ Scalable for large projects.  
**Cons:**  
✖ Bureaucratic overhead.  
✖ Less flexible.  
**Best For:** Government, large enterprises, regulated industries.

**5.Hybrid (Waterfall + Agile)**

**Approach:** Combines Waterfall’s planning with Agile’s flexibility (e.g., Agile phases in a Waterfall structure).  
**Pros:**  
✔ Balances predictability and adaptability.  
✔ Good for mixed teams.  
**Cons:**  
✖ Risk of "worst of both worlds" if poorly implemented.  
**Best For:** Projects with clear milestones but uncertain details (e.g., product launches).

**6️. Critical Path Method (CPM)**

**Approach:** Maps task dependencies to identify the longest path (critical path) for timeline estimation.  
**Pros:**  
✔ Visualizes task priorities.

✔ Optimizes schedules.  
**Cons:**  
✖ Complex for large projects.  
✖ Static (hard to adjust mid-project).  
**Best For:** Construction, engineering, event planning.

**7️. Critical Chain Project Management (CCPM)**

**Approach:** Focuses on resource bottlenecks, adds buffers to protect deadlines.  
**Pros:**  
✔ Reduces multitasking.  
✔ Improves on-time delivery.  
**Cons:**  
✖ Requires cultural shift.  
**Best For:** Resource-constrained projects (e.g., R&D).

**How to Choose?**

* **Unclear Requirements?** → Agile or Hybrid.
* **Strict Compliance?** → PRINCE2 or Waterfall.
* **Resource Constraints?** → Lean or CCPM.
* **Fixed Deadline?** → CPM.

**Visual Idea:** Use a **spectrum** from "Predictability (Waterfall)" to "Flexibility (Agile)" with other methods plotted in between!