**Summary of Project Methodologies**

**Traditional Project Management Methodologies**

* **Waterfall:**
  + **Concept:** A sequential, linear process where each phase (requirements, design, implementation, testing, deployment, maintenance) must be completed before the next begins.
  + **Best For:** Projects with well-defined requirements, stable technologies, and minimal changes.
  + **Pros:** Clear stages, easy to understand, structured approach.
  + **Cons:** Inflexible, difficult to accommodate changes, limited user involvement until the end.
* **Critical Path Method (CPM):**
  + **Concept**: A technique to schedule project activities. It identifies the "critical path," the sequence of tasks that determines the shortest possible project duration, and focuses on managing those tasks.
  + **Best For**: Projects with interdependent activities where task sequencing and timing are crucial.
  + **Pros**: Efficient time management, identifies critical activities.
  + **Cons**: Can be complex, doesn't handle uncertainty well.
* **Program Evaluation and Review Technique (PERT):**
  + **Concept**: Similar to CPM, but uses probabilistic time estimates (optimistic, pessimistic, most likely) for activities, acknowledging uncertainty.
  + **Best For**: Projects with uncertain activity durations, research and development projects.
  + **Pros**: Handles uncertainty, more realistic estimates.
  + **Cons**: More complex than CPM.

**Agile Project Management Methodologies**

* **Scrum:**
  + **Concept:** An iterative framework that breaks down projects into short "Sprints" (typically 2-4 weeks). Emphasizes collaboration, self-organization, and continuous improvement. Roles include Product Owner, Scrum Master, and Development Team.
  + **Best For:** Projects with evolving requirements, complex problems, and a need for fast feedback.
  + **Pros:** Flexible, adaptive, high customer involvement, rapid delivery of working software.
  + **Cons:** Requires commitment to Agile principles, can be challenging with large teams or fixed-scope projects.
* **Kanban:**
  + **Concept:** A visual system for managing workflow. Tasks are represented on a board (physical or digital) and move through stages (e.g., To Do, In Progress, Done). Limits Work in Progress (WIP) to improve flow and identify bottlenecks.
  + **Best For:** Projects with continuous delivery, operational workflows, and a need for visual management.
  + **Pros:** Visual, flexible, improves flow, reduces bottlenecks.
  + **Cons:** Can be less structured than Scrum, may not be suitable for highly complex projects without adaptation.
* **Extreme Programming (XP):**
  + **Concept:** A set of values and practices for developing high-quality software quickly. Emphasizes pair programming, test-driven development, continuous integration, and close customer collaboration.
  + **Best For:** Small to medium-sized teams developing software with rapidly changing requirements.
  + **Pros:** High code quality, rapid feedback, strong team collaboration.
  + **Cons:** Requires disciplined practices, can be challenging with distributed teams or large projects.

**Hybrid Methodologies**

* **Scrumban:**
  + **Concept:** A hybrid of Scrum and Kanban. Uses Scrum's structure (Sprints, roles) but incorporates Kanban's visualization and flow management.
  + **Best For:** Teams transitioning from Scrum to Kanban, projects that need both structure and flexibility.
  + **Pros:** Combines the strengths of both Scrum and Kanban, flexible, improves flow within Sprints.
  + **Cons:** Can be complex to implement effectively.

**Other Methodologies**

* **Lean:**
  + **Concept**: Focuses on maximizing value while minimizing waste. Emphasizes efficiency, continuous improvement, and respect for people. Can be applied to software development and other types of projects.
  + **Best For**: Projects focused on process optimization, waste reduction, and continuous improvement.
  + **Pros**: Efficient, reduces waste, customer-focused.
  + **Cons**: Requires a strong understanding of value streams.
* **PRINCE2 (Projects IN Controlled Environments):**
  + **Concept**: A structured project management method that provides a framework for managing projects. Defines roles, responsibilities, processes, and documentation.
  + **Best For**: Large, complex projects, especially in government or regulated industries.
  + **Pros**: Structured, controlled, emphasizes documentation.
  + **Cons**: Can be bureaucratic, less flexible than Agile.