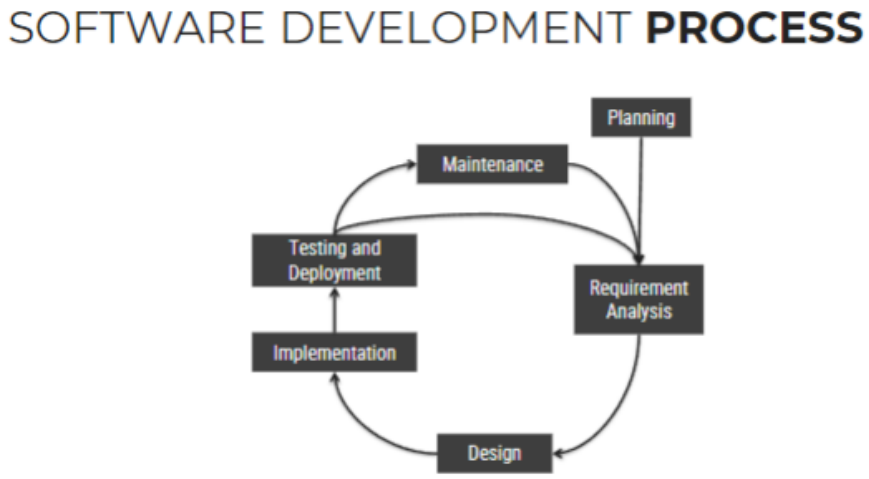
# Summary of Lecture 2: Sequential and Iterative/Incremental Models

### Software Development Process Overview

- The software development lifecycle consists of **Planning, Requirement Analysis, Design, Implementation, Testing & Deployment, and Maintenance**.




- The development process depends on the **complexity and length** of software projects.

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## Sequential Models

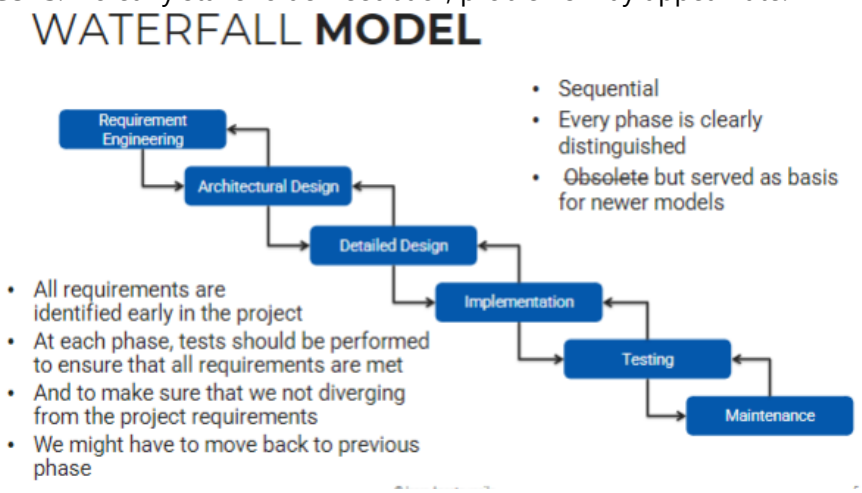
### Pros

- Phases are well-defined and **executed sequentially**
- We will **not proceed** to the next phase unless the **current one is done**
- Each phase has **specific deliverables** and **review process**
- Easy to manage and understand
- Easy to quote prices and cash-out

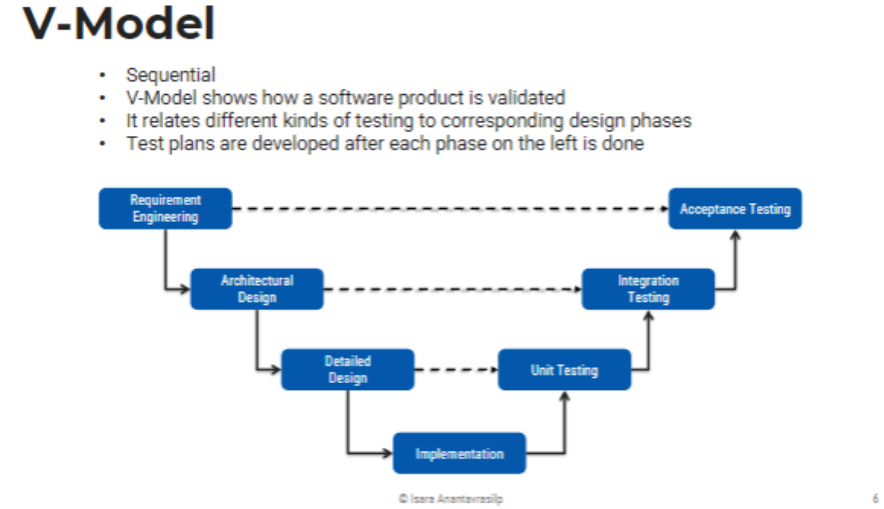
### Cons

- **Requirements must be known beforehand**:
  - Does not work with projects we don't know shit about
- **No feedback from stakeholders until testing phases**
- **Problems might not be discovered until testing**
- **Lack of parallelism**:
  - team members must wait until other teams finish their work

1. **Waterfall Model**:
    - Follows a strict phase-by-phase approach.
    - All requirements are identified early.
    - Testing ensures adherence to initial requirements.
    - **Pros**: Simple, structured, easy to manage.
    - **Cons**: No early stakeholder feedback, problems may appear late.




2. **V-Model**:
    - A sequential model that emphasizes validation and verification.
    - Each design phase is linked to a corresponding testing phase.
    - **Pros**: Clear test planning, structured.
    - **Cons**: Inflexible, costly to change requirements.

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## Iterative and Incremental Models

1. **Spiral Model**:
    - Combines Waterfall with a risk-driven approach.
    - Includes multiple iterations, with risk assessment at each cycle.
    - **Pros**: Risk management, adaptable, good for large projects.
    - **Cons**: Requires expertise, expensive risk analysis.

2. **Prototyping**:
    - A partial implementation to test key concepts before full development.
    - **Types**:
        - **Illustrative Prototype**: UI mockups for client feedback.
        - **Functional Prototype**: Minimal viable product, expanded over time.
        - **Exploratory Prototype**: Created to explore new ideas.
    - **Pros**: Identifies risky areas early.
    - **Cons**: Costly and complex if overused.

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## Software Development Risks

- **Schedule Risks**: Delays due to poor estimation, changing requirements, or resource issues.
- **Budget Risks**: Costs exceeding estimates due to mismanagement or unforeseen expenses.
- **Operational Risks**: Problems in team management, collaboration, or workflow efficiency.
- **Technical Risks**: Issues with software functionality, new technologies, or changing requirements.

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## Prototyping (from the slides)

### Definition

Prototyping is a **risk-management technique** involving a **partial implementation** of the target product before full-scale development.

### Uses of Prototyping

- Identifying **risky parts** of the project.
- Understanding **customer requirements** more clearly.
- Gathering **look-and-feel feedback** for GUI design.

### Types of Prototypes

1. **Illustrative Prototype**
    - Develops the **user interface** with storyboards.
    - Can be implemented on paper or using a UI builder.
    - Good for **early client discussions**.
2. **Functional Prototype**
    - Builds a **working system** with minimal functionality.

    - More features are added incrementally.
3. **Exploratory Prototype ("Hack")**
    - Implements part of the system to learn more about requirements.
    - Useful for **paradigm-breaking** projects.

**Pros & Cons**

✅ **Advantages**

- Helps identify risks early.
- Useful for gathering feedback before full-scale development.
- Can clarify requirements before full implementation.

❌ **Disadvantages**

- Can be **expensive** and complex if not well managed.
- Should only be built if the **development cost is low** and the expected value is high.

## Keywords

- Software Development Process
- Sequential Model
- Waterfall Model
- V-Model
- Iterative Model
- Incremental Model
- Spiral Model
- Prototyping
- Risk Management
- Schedule Risks
- Budget Risks
- Operational Risks
- Technical Risks