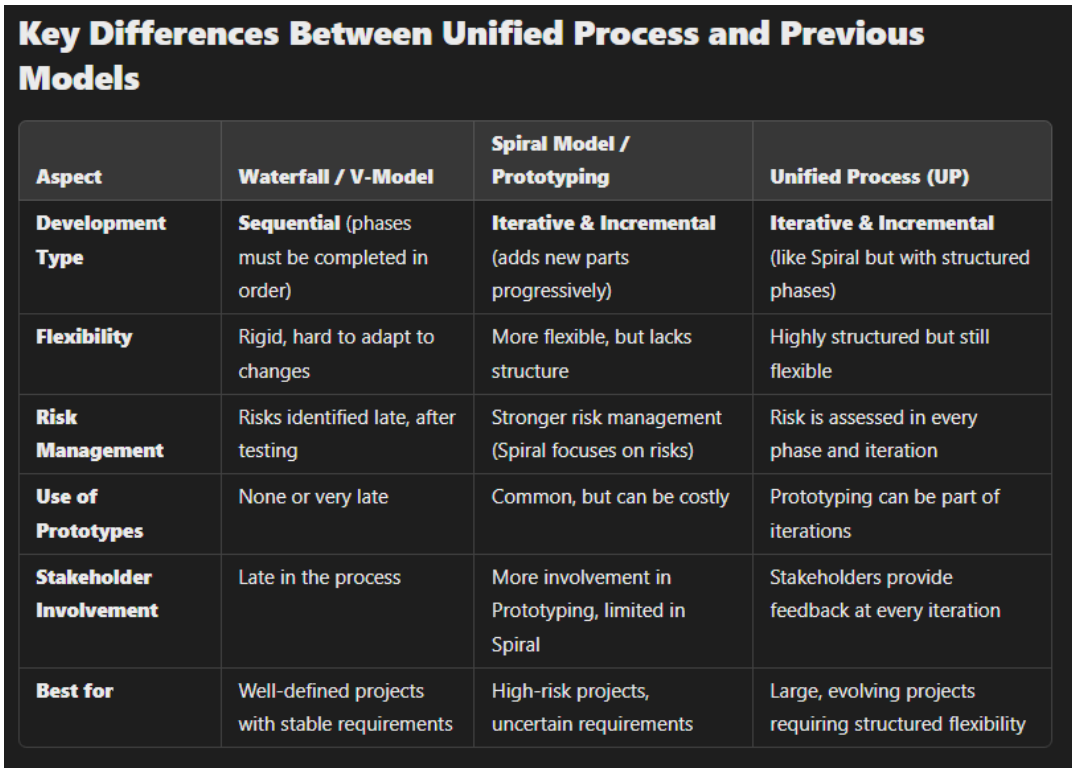
< Start of differences

Key Differences Between Unified Process and Previous Models

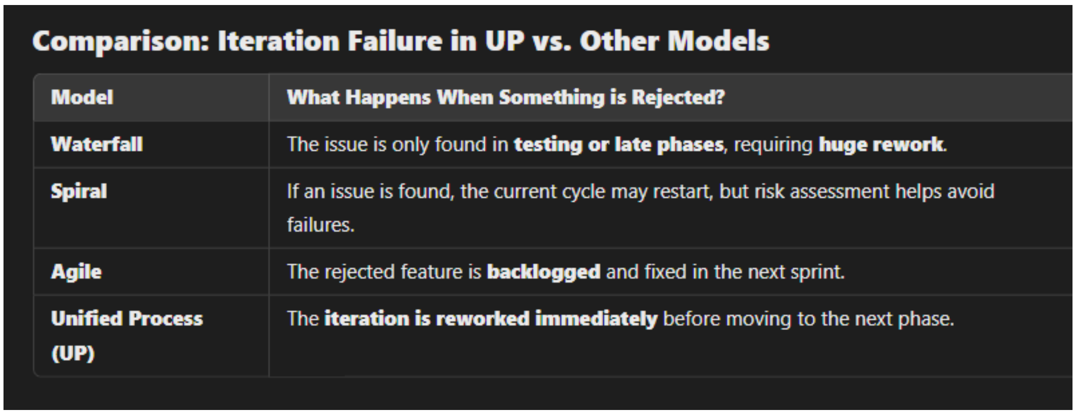
Is Unified Process (UP) Better?

It depends on the project.



Key Differences Between Unified Process and Previous Models

Aspect	Waterfall / V-Model	Spiral Model / Prototyping	Unified Process (UP)
Development Type	**Sequential** (phases must be completed in order)	**Iterative & Incremental** (adds new parts progressively)	**Iterative & Incremental** (like Spiral but with structured phases)
Flexibility	Rigid, hard to adapt to changes	More flexible, but lacks structure	Highly structured but still flexible
Risk Management	Risks identified late, after testing	Stronger risk management (Spiral focuses on risks)	Risk is assessed in every phase and iteration
Use of Prototypes	None or very late	Common, but can be costly	Prototyping can be part of iterations
Stakeholder Involvement	Late in the process	More involvement in Prototyping, limited in Spiral	Stakeholders provide feedback at every iteration
Best for	Well-defined projects with stable requirements	High-risk projects, uncertain requirements	Large, evolving projects requiring structured flexibility



Comparison: Iteration Failure in UP vs. Other Models

Model	What Happens When Something is Rejected?
Waterfall	The issue is only found in **testing or late phases**, requiring **huge rework**.
Spiral	If an issue is found, the current cycle may restart, but risk assessment helps avoid failures.
Agile	The rejected feature is **backlogged** and fixed in the next sprint.
Unified Process (UP)	The **iteration is reworked immediately** before moving to the next phase.

✅ **UP is better than Waterfall & V-Model** for:

- Large, complex projects with evolving requirements.
- Projects requiring frequent feedback and risk management.

✅ **UP is better than Spiral/Prototyping** for:

- Teams needing **structured** iterations and **defined workflows**.
- Projects where management, planning, and documentation matter.

❌ **UP is NOT better for:**

- **Small projects** (too complex, requires UP expertise).
- Projects needing **quick, informal iterations** (Agile may be better).

How New is Unified Process?

- Waterfall: **1970s**
- Spiral: **1988**
- Unified Process: **1999** (by Booch, Jacobson, and Rumbaugh)
- Agile: **2001** (Agile Manifesto)

UP is **newer than Waterfall & Spiral**, but older than **Agile**. It was designed as a **structured alternative to Agile** with more emphasis on **planning and management**.

End of difference >

Summary of Lecture 3: Unified Process (UP)

Key Characteristics of Unified Process (UP)

- **Use-case driven**: Use cases define development activities.
- **Iterative & incremental**: Each iteration adds new features through multiple cycles.
- **Phased approach**: UP is divided into distinct **stages and iterations**.

UP Stages and Phases

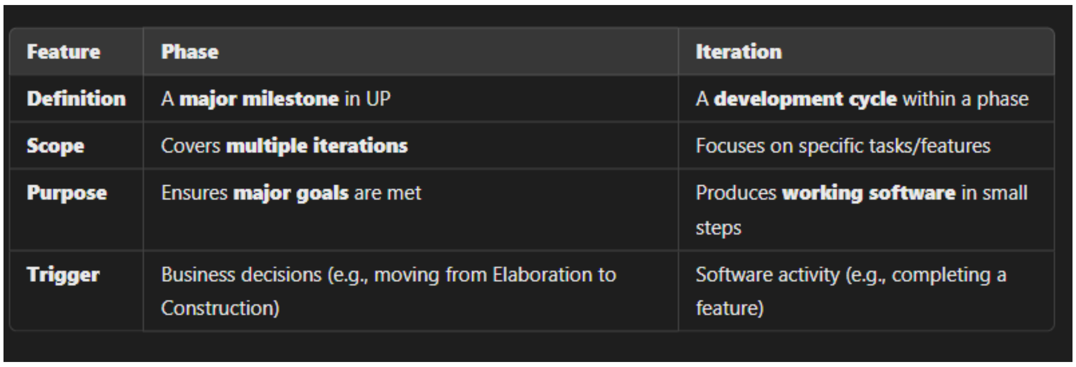
UP is divided into **two major stages**:

1. **Engineering Stage** (Smaller, less predictable teams, focusing on design):
   - **Inception phase**
   - **Elaboration phase**
2. **Production Stage** (Larger, more predictable teams, focusing on construction & deployment):

    - **Construction phase**
    - **Transition phase**

Each phase consists of **one or more iterations**, with each iteration representing a **set of milestones** and **work products (artifacts)**.

Phase vs iteration



Feature	Phase	Iteration
Definition	A **major milestone** in UP	A **development cycle** within a phase
Scope	Covers **multiple iterations**	Focuses on specific tasks/features
Purpose	Ensures **major goals** are met	Produces **working software** in small steps
Trigger	Business decisions (e.g., moving from Elaboration to Construction)	Software activity (e.g., completing a feature)

UP Phases in Detail

1. Inception Phase

Objectives:

- Define **project scope**, key use cases, and acceptance criteria.
- Estimate **cost, schedule, and potential risks**.
- Evaluate at least one **candidate software architecture**.

Activities:

- Formulate **project scope** and **requirements**.
- Define **software architecture**, including design trade-offs.
- Plan and prepare a **business case**.

Evaluation:

- Stakeholders must **agree** on scope, cost, and schedule.
- The **architecture and requirements** should be clear.
- A **prototype** may be used for evaluation.

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2. Elaboration Phase

Objectives:

- Establish a **baseline for software architecture**.
- Confirm that the architecture meets **requirements** at an acceptable cost.

- Define a **project management plan** for the next phase.

Activities:

- Refine **problem statement** and work on **critical use cases**.
- Set up the **software infrastructure** and tools.
- Define **milestones and evaluation criteria**.
- Address **make-or-buy** decisions.

Evaluation:

- Ensure **architecture stability** and **risk resolution**.
- Confirm that the **construction plan** is credible.
- Compare **actual vs. planned resource usage**.

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3. Construction Phase

Objectives:

- **Minimize development costs** through efficient resource use.
- Achieve **adequate quality** as quickly as possible.
- Release working versions (Alpha, Beta, etc.) early.

Activities:

- Manage **resources and processes** efficiently.
- Complete **component development and testing**.
- Assess product releases against **acceptance criteria**.

Evaluation:

- Check if the product is **stable and ready** for user deployment.
- Ensure **pending changes** do not block release.
- Verify if **stakeholders are ready** for system transition.

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4. Transition Phase

Purpose:

- Begins when the **system is built and documented**.
- Marks the **deployment** of the software to users.

For some projects, this phase starts a **new software version** (back to **Inception Phase**), while for others, it means **final delivery**.

Objectives:

- Ensure users can **support themselves**.

- Finalize a **deployment baseline**.
- Deliver the final software as **efficiently as possible**.

Activities:

- Integrate **development increments** into a **single deployment baseline**.
- Handle **commercial packaging, production, and training**.
- Test deployment against **acceptance criteria**.

Evaluation:

- Confirm **user satisfaction**.
- Compare **actual vs. planned expenditures**.

Artifacts in Unified Process

An **artifact** is a **work product** in a standard format (e.g., UML, Java code, documentation). **Artifact sets** are developed and reviewed together.

The **five key artifact sets**:

1. **Management Set**: Project planning and operational artifacts.
2. **Requirements Set**: Vision document, requirement models.
3. **Design Set**: Architectural models, test models.
4. **Implementation Set**: Source code, executables.
5. **Deployment Set**: Integrated software, documentation.

Each artifact set is **emphasized at different UP phases**.

Advantages & Disadvantages of Unified Process

✅ **Advantages:**

- Covers **business models, project management, development, and deployment**.
- **Widely used and mature** framework.

❌ **Disadvantages:**

- **Too complex for small projects** due to heavy overhead.
- Requires **UP expertise** to tailor it effectively.
- Going through **all workflows in each iteration** can be time-consuming.

📌 **Note**: UP is **flexible** and can be adapted to specific project needs.

Keywords

- **Unified Process (UP)**
- **Unified Software Development Process (USDP)**
- **Rational Unified Process (RUP)**
- **Use-case driven development**
- **Iterative and incremental**
- **Inception Phase**
- **Elaboration Phase**
- **Construction Phase**
- **Transition Phase**
- **Software artifacts**
- **Management Set**
- **Requirements Set**
- **Design Set**
- **Implementation Set**
- **Deployment Set**