Software Development Process

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Let's chat about cooking?

What factors contribute to chaos in a restaurant kitchen?

Consequences:

- Unexpected food quality.
- Inconsistent food quality.
- Increased risk of food contamination.
- Slower service and longer wait times.
- Higher food waste and costs.
- Increased stress among kitchen staff.
- Miscommunication leading to incorrect orders.
- Difficulty in inventory management.
- Potential safety hazards and accidents.
- Difficulty passing health inspections.
- Lower overall customer satisfaction.

Looks better? Why?

Consequences:

- Each person has a specific role.
- Consistent food quality.
- Efficient workflow and faster service.
- Clear communication among staff.
- Reduced food waste and costs.
- Improved safety and fewer accidents.
- Easier inventory management.
- Higher staff morale and teamwork.
- Enhanced cleanliness and hygiene.
- Better adaptability to high-demand periods.
- Increased customer satisfaction.

Agenda

- Software development process
- Why do we need processes?
- Waterfall
- Spiral
- Factors for choosing a specific process model
- Process modeling

Stages in Engineering Software

- Traditional stages in software engineering:
  - Requirements
  - Design
  - Implementation
  - Verification and Validation
  - Maintenance
- In practice, some of these can be further split (e.g., architectural design vs implementation design), and more can be added (e.g., deployment)

What is a Software Development Process?

- Let's revisiting this question in the context of stages
- A software **process model** determines the order of the stages involved in software development and evolution
- It provides answer to the following items:

Do we need a software process?

- Designing simple software (such as homework assignments) has two steps:
  1. Step 1: Think!
  2. Step 2: Code!
- Both steps are creative
  - Programmers are happy doing them

Programmers while reviewing the codes

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Do we need a software process?

- The two-step process **doesn't scale up with complexity**, for example:
  - How do we split the work among a team of people?
  - How do we ensure we know what the customer meant when they ask for feature X?
  - How do we ensure we give them only what they pay for?
  - What about cross-cutting concerns, such as security, accountability, performance, scalability etc.?

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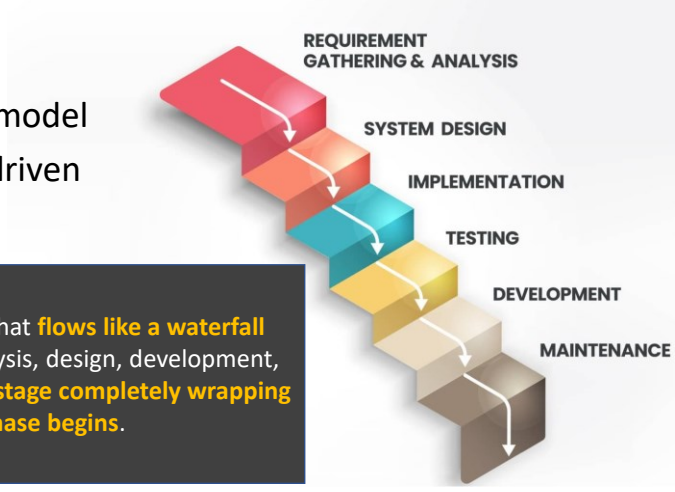
Waterfall

- 1st development process model
- Plan and documentation driven



Sequential development process that **flows like a waterfall** through all stages of a project (analysis, design, development, and testing, for example), with **each stage completely wrapping up before the next phase begins**.

Good points about waterfall?

Bad points about waterfall?

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Waterfall

The Good

- Simple!
- Plenty of documentation, which is good (allows for management of project)
- Still in use since 70s

The Bad

- Testing is towards the end of the model, and it may expose fundamental problems, requiring rework
- Low flexibility level makes it difficult to make changes while developing, or even makes it completely impossible
- Customer is not involved

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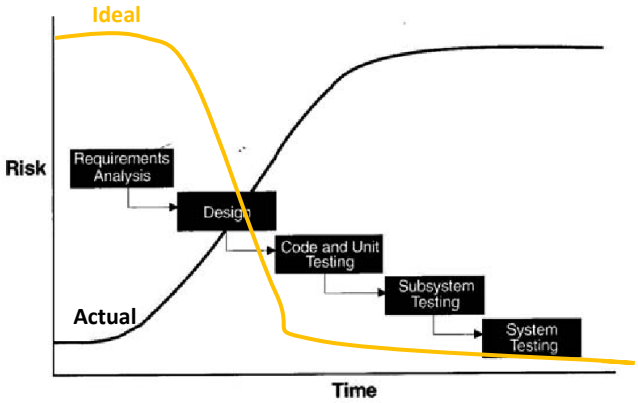
Waterfall – The Bad

- The customer does not have the opportunity to get acquainted with the system in advance, so he does not see the product until the moment of its completion
- In case it becomes clear in the process of development that the product does not meet market requirements, there will be no room for changes.



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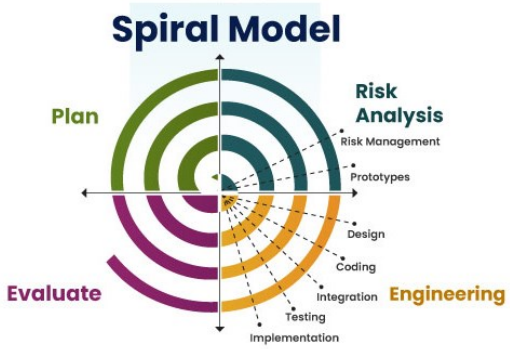
Spiral Model

- Combine plan-and-document with prototypes
- Rather than plan and document all requirements 1st, develop plan and requirement documents across each iteration of prototype as needed and evolve with the project



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Spiral Model

The Good

- Iterations involve the customer before the product is completed
  - Reduces chances of misunderstandings
- Risk management part of the lifecycle
- Project monitoring easy
- Schedule and cost more realistic over time

The Bad

- Iterations 6 to 24 months long
  - Time for customers to change their mind
- Lots of documentation per iteration
- Lots of rules to follow, hard for whole Project
- Cost of process is high
- Hard to meet budget and schedule targets

Which is the most appropriate process model to my context?

- **There is no silver bullet!**
- So, which factors should I consider when choosing a process model?
  - This is a complex task!
  - There are many of them!

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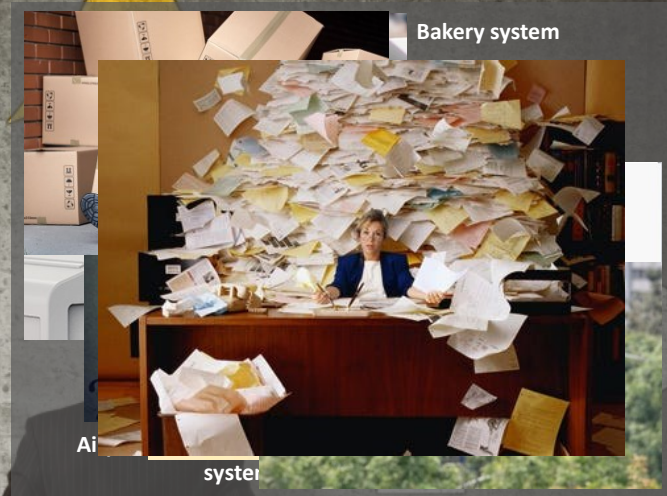
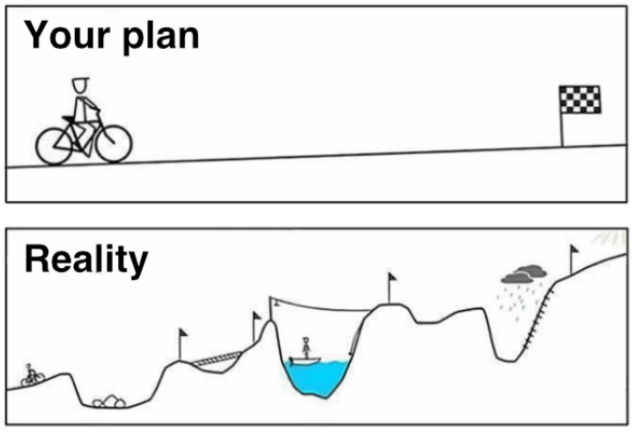
Which factors should I consider when choosing a process model?

Which factors should I consider when choosing a process model?

- Project / application nature
- Team experience and knowledge
- Available tools
- Deliverables of the project
- Culture



Your plan vs. reality



Is there a perfect way to organize software processes?

- **Peres' Law:** "*If a problem has no solution, it may not be a problem, but a fact, not to be solved, but to be coped with over time*."
- *– Simon Peres (winner of 1994 Nobel Peace Prize for Oslo accords)*

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Process Modeling

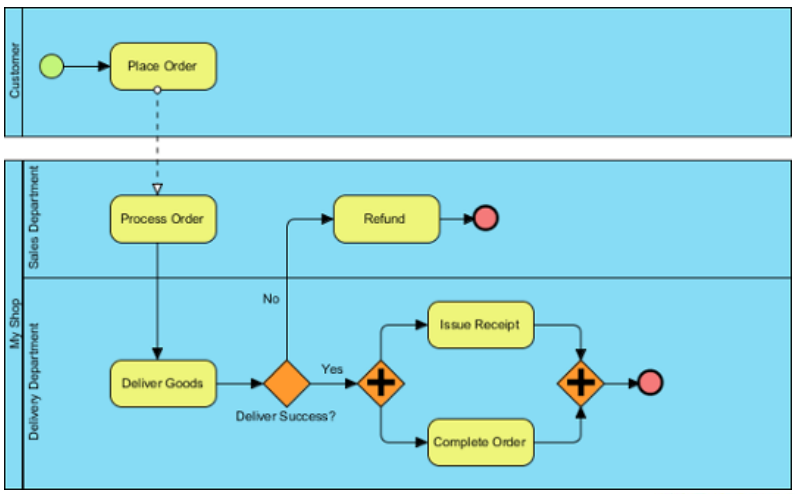
Process Modeling

- Refers to the **graphical representation** of business processes or workflows. Like a flow chart, **individual steps** of the process are drawn out so there is an **end-to-end overview** of the **tasks** in the **process** within the context of the business environment.

Notations

- Activity Diagram from UML
- BPMN (Business Process Model and Notation)
  - is an open standard to diagram a business process
  - it is like a flowchart and uses standardized graphics to represent the participants, choices and flow of the process
  - the diagrams are designed to be detailed, but easy to read without training
    - This allows the same diagram to be used by executives, analysts and technical implementation staff to foster collaboration and understanding between groups

Example - Place Order



Summary

- Software process model determines the order of the stages involved in software development and evolution
- We need processes to scale up with complexity
- There are several types of process models: waterfall, incremental, spiral…
- There is no silver bullet, the context impacts process
- Process modeling helps communicate and share knowledge on how development teams perform their tasks

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