



# Elements of Software Engineering

## 5-P's of Software Engineering



# Learning Objectives

The learning objectives are to

- To explain basic elements of software engineering
- To understand evolution of DevOps in the historical context.





# Running Example-1 : OTP\_Assignment

Write a program in Python to send one time password to a given contact. A contact may be valid mobile number or an email ID





## Running Example-1 : Birthday greeting messenger

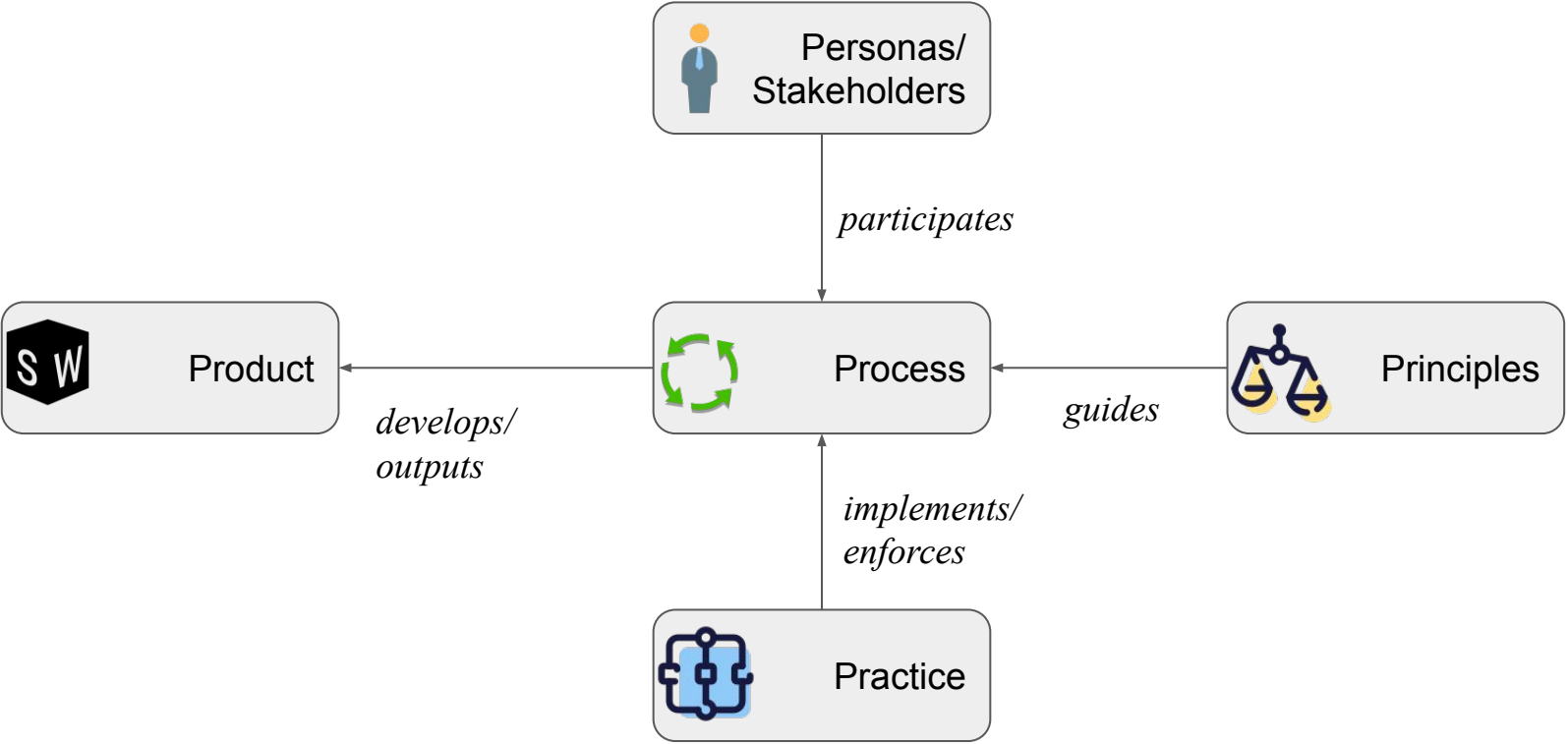
Develop an application that will send the contact name, email id, mobile no, date of birth.

The application should send a birthday greeting message to all the contacts on their birthday



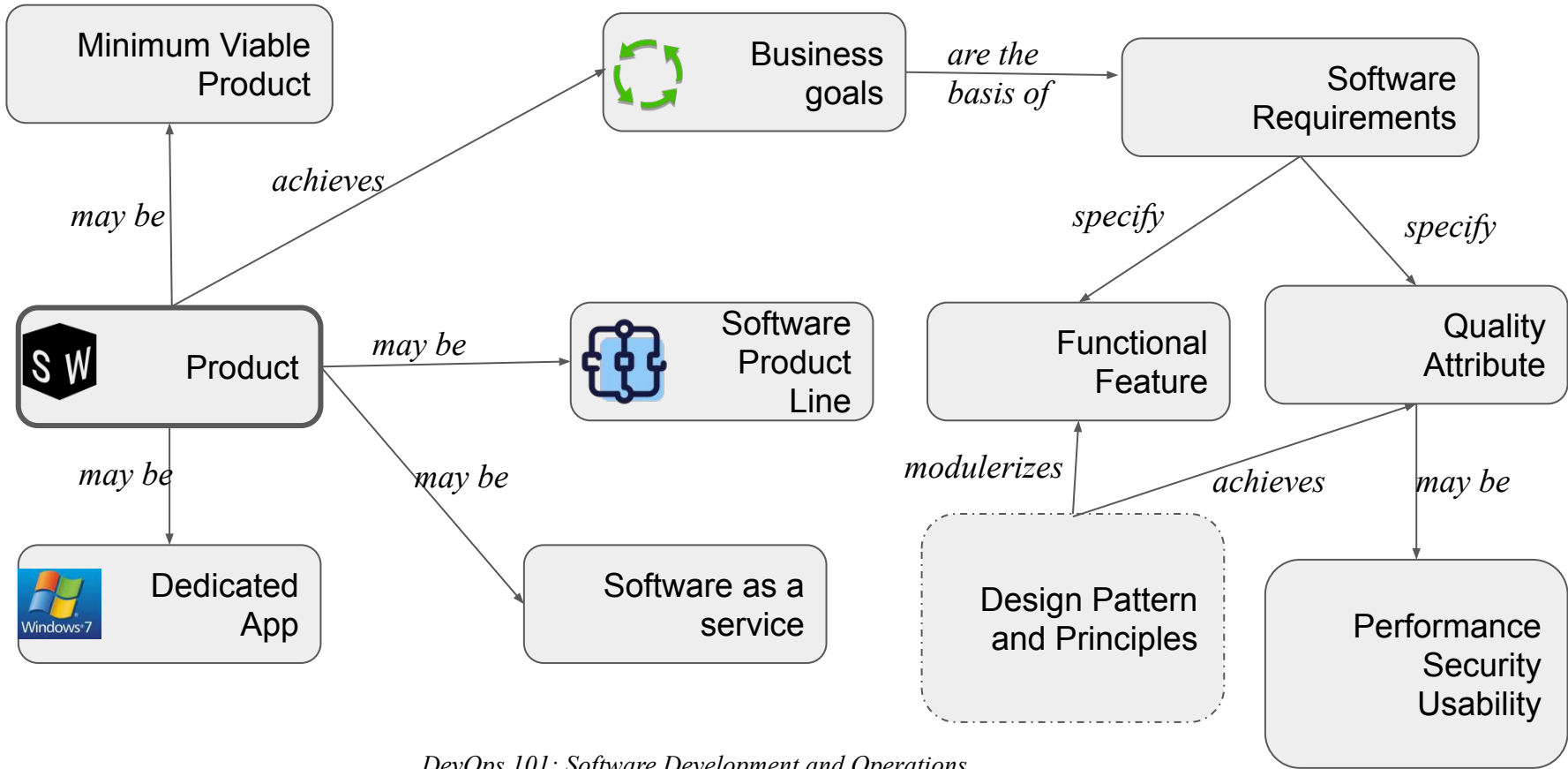


# 5 P's of Software Engineering



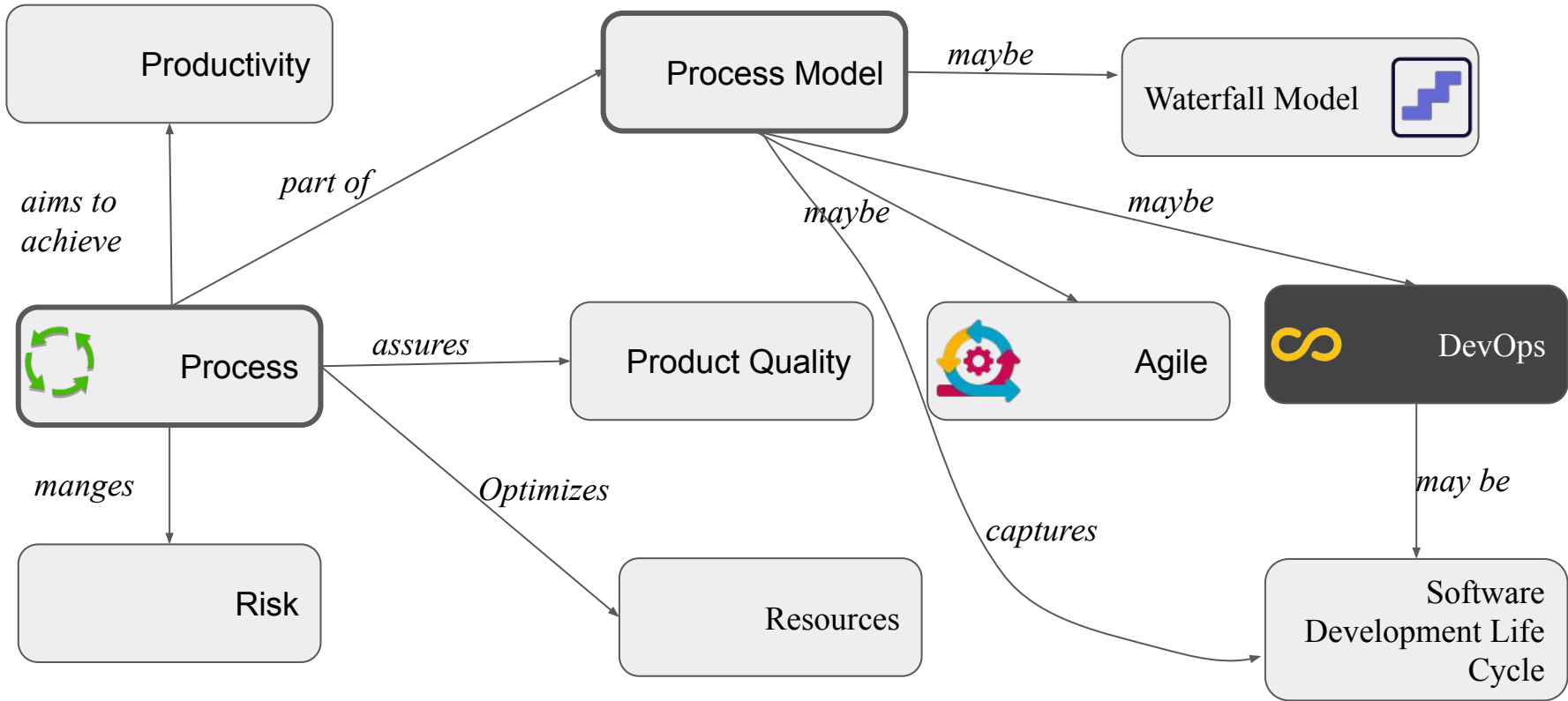


# Product Perspective





# Process Perspective





# Nature of Software Processes

- Software Engineering as a *problem solving* process.
- It specifies *information-system* based solution to a problems

**Information  
Transformation  
Process**





# Software Processes

**Requirement Analysis**

- To understand the application domain
- To Identify Functional and Non-Functional Requirements

**Software Design**

**To specify technology independent solution**

**Coding/ Implementation**

**To specify technology dependent solution**

**Testing**

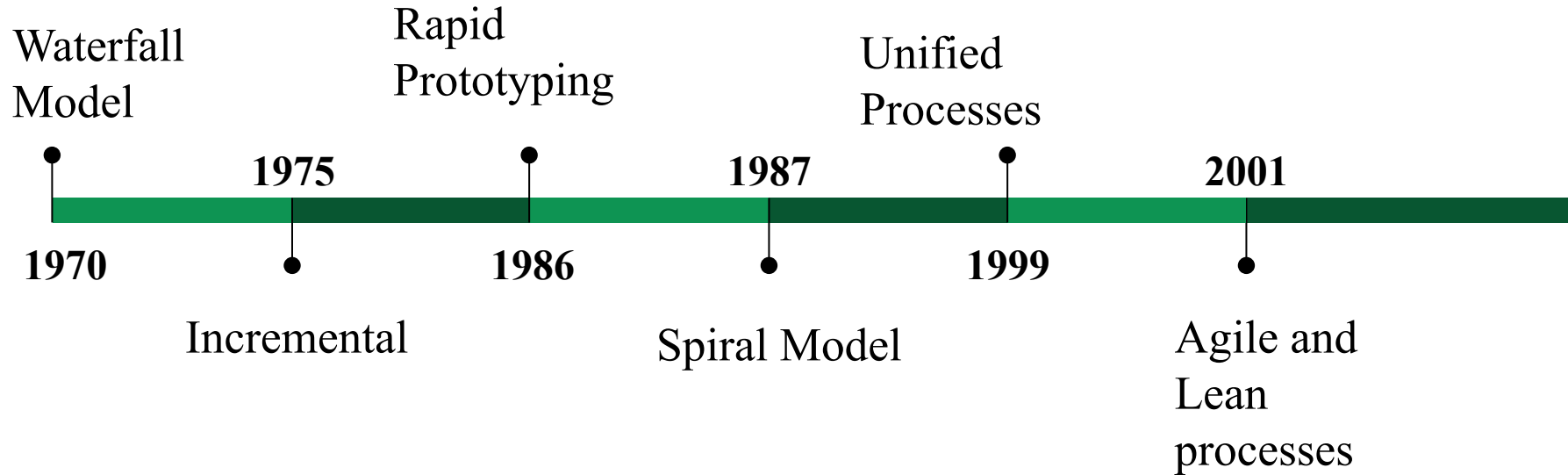
**To check correctness of implementation**

**Software Delivery**

**To validate working of application from end user**

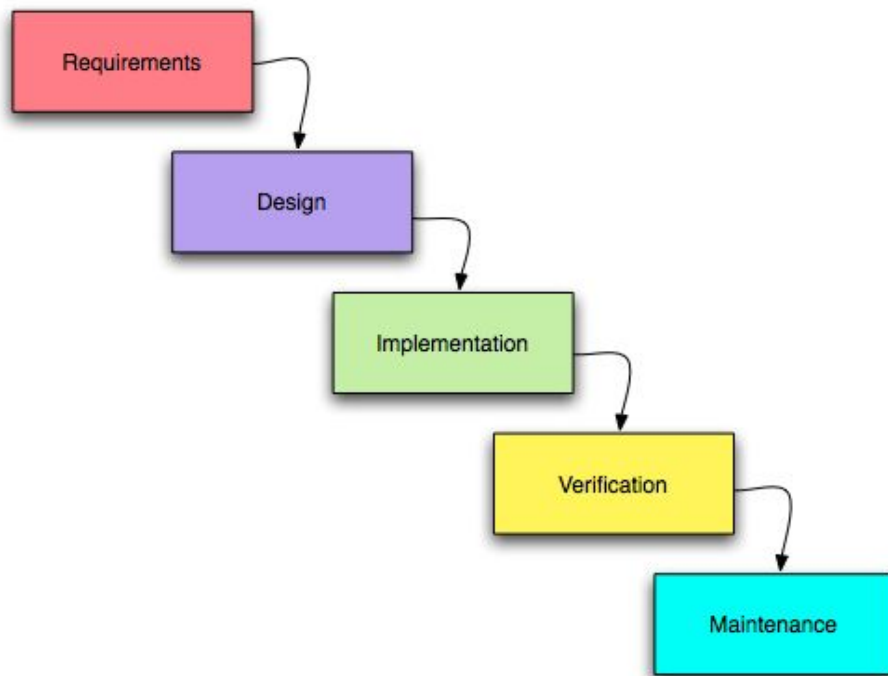


# History and Evolution of Software Process Models





# Waterfall Model





# Software process models: Characteristics

**Waterfall Model**

- Sequential Model
- Output of preceding stage drives next stage

**Incremental**

**Software is delivered in multiple increments**

**Rapid Prototype**

**Requirements are validated.**

**Spiral**

**Risk management and iterative model.**

**Agile and lean**

**Programming first and customer feedback**



# SE Personas and their responsibilities



## Developer Team

- Front End Developer
- Back End Developer
- Full stack developer
- UI/UX Designer
- Data Analyst
- Machine Learning Engineer



## Product Team

- Software Architect
- Release Manager
- Scrum Master
- Business Analyst
- QA Engineer
- DevOps Engineer



## Operation Team

- System Administrator
- DB Admin
- Cloud Architect
- Site Engineer
- Security Engineer
- Technical Support/ Help desk



# SE Principles

## Modularity

Break down a complex software system into smaller, and self-contained modules or components

## Abstraction

Focus on essential details while hiding complexity

## Encapsulation

Bundle data and the methods into a single unit.

## Single Responsibility

Assign only one well-defined responsibility to a module.

## Separation of Concern

Divide a software system into non-overlapping modules.



# SE Practices @ FANG

Innovation and  
Experimentation

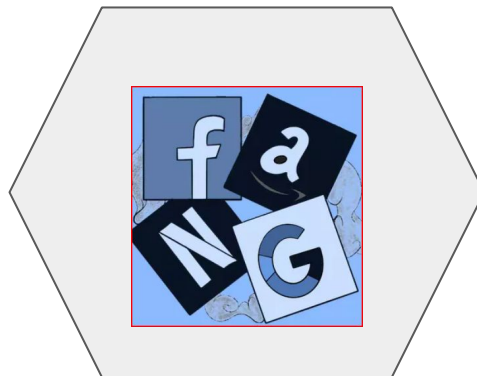
User Centric Design

Data-Driven Decision  
Making

Scalability and  
Performance

Adopt Agile and  
DevOps

Monetize Product





# SE Practices @ Startup

Validate Problem

Focus UX

Build MVP

Continuous  
Improvement

Iterate and Product  
design

Adopt Agile  
Methodology

Pivot if necessary







Quiz time

**Minimum Viable Product is normally used** (more than one may be correct)

1. To get customer feedback before product release.
2. To validate design before actual implementation.
3. To validate requirement and new business idea.
4. To get traction in the competitive market.





Quiz time

**Software Product Line is - (more than one may be correct)**

1. A set of software delivered in small increments
2. A set of software developed by a same developers
3. A set of software that are developed from a shared set of software assets
4. A set of similar softwares deployed on diverse platforms.





Quiz time

**Risk Management is the a distinct feature of - (more than one may be correct)**

1. Spiral model
2. DevOps
3. Agile
4. Waterfall





Quiz time

**Rachana has joined as graduate trainee in a startup. She has assigned the task of writing HTML pages to collect feedback from customers. She is playing the role of**

1. Customer Support Engineer
2. Front End Developer
3. Back end Developer
4. Full Stack developer





Quiz time

**Prof Code Guru is grading a student assignment in which the student has written a Python code to generate and send OTP in the same function.**

**He has to give feedback to student about the software principles that are violated in the program. Which software principles it violates**

1. Abstraction
2. Single Responsibility Principle
3. Modularity
4. Encapsulation





Quiz time

**DevOps as software process model is preceded by which of development methodology**

1. Waterfall
2. Rational Unified Process
3. Agile/Scrum
4. Rapid Application Development

