

# **SOFTWARE ENGINEERING (CSE 2014)**

## **Module 3**

### **Agile Principles & Devops**

Department of Computer Science and Engineering

School of Engineering,

**PRESIDENCY UNIVERSITY**



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# Module 3

- Agile: Scrum Roles and activities, Sprint Agile software development methods - Scaling, User Stories, Agile estimation techniques, Product backlogs, Stake holder roles, Dynamic System Development Method.
- Devops: Introduction, definition, history, tools.



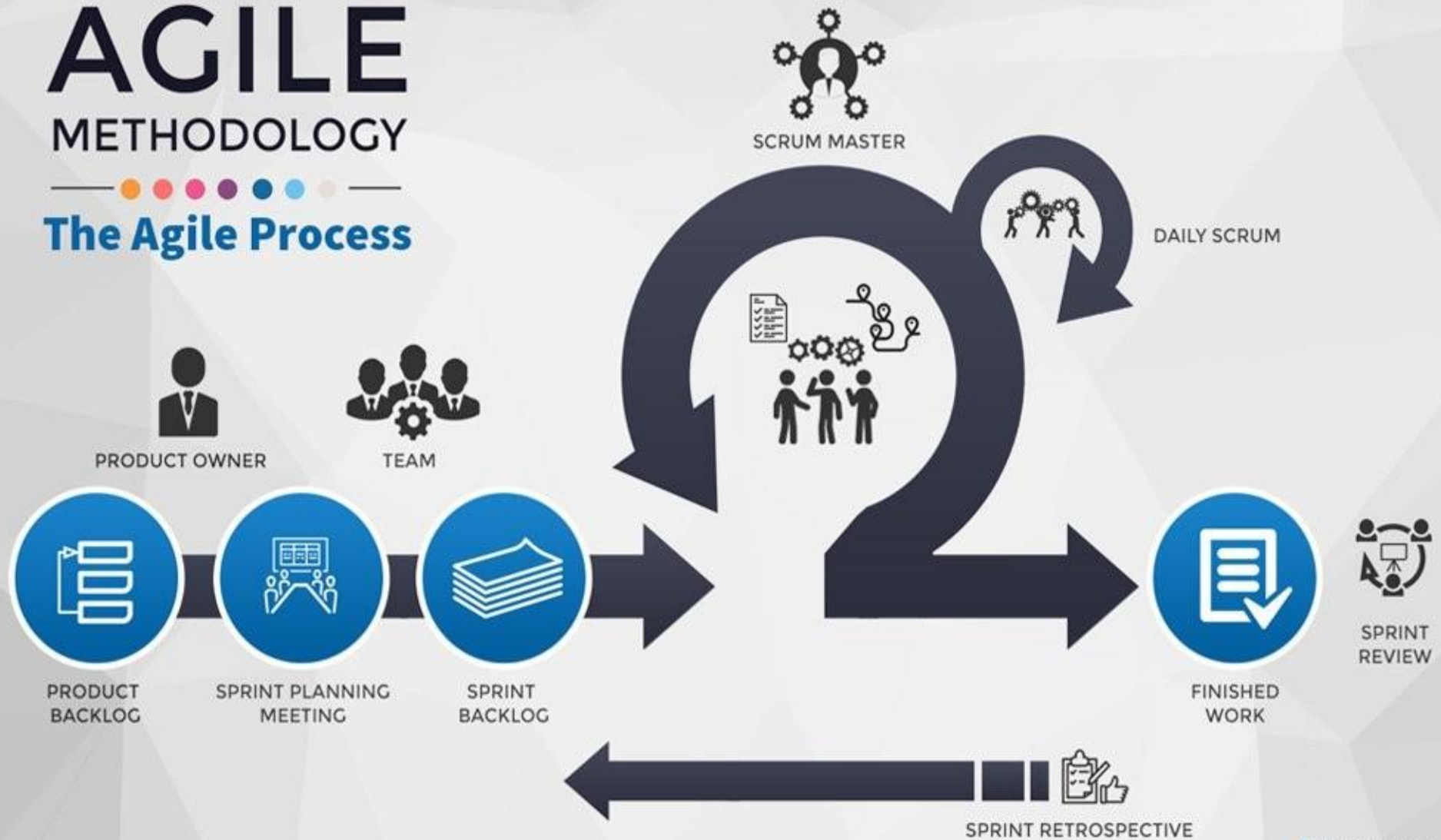
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# AGILE METHODOLOGY

## The Agile Process



BYDREC



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**40**  
YEARS  
OF ACADEMIC  
WISDOM

# Agile Technology

- The Agile methodology is **a way to manage a project by breaking it up into several phases**. It involves constant collaboration with stakeholders and continuous improvement at every stage.
- Once the work begins, teams cycle through a process of planning, executing, and evaluating.

## **The Key Values and Principles of the Agile Manifesto**

- Individuals and interactions over processes and tools.
- Working software over comprehensive documentation.
- Customer collaboration over contract negotiation.
- Responding to change over following a plan.



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# SCRUM Roles

## 1. Scrum Master

- A Scrum Master is responsible for ensuring a Scrum team is operating as effectively as possible with Scrum values.

Some of the responsibilities are

- Facilitate daily Scrum meetings (also called “daily standups”)
- Lead sprint planning meetings
- Conduct “retrospective” reviews to see what went well and what can be improved for the following sprint
- Keep a pulse on team members, through individual meetings or other means of communication.
- Manage obstacles that arise for the team by communicating with stakeholders outside of the team



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# SCRUM Roles

## 2. Product owner

A product owner ensures the Scrum team aligns with overall product goals. They understand the business needs of the product, like customer expectations and market trends.

Some of the responsibilities are

- Manage the product backlog by ordering work by priority
- Set the product vision for the team
- Communicate with external stakeholders and translate their needs to the team
- Make sure the team is focused on hitting product needs through communication and evaluating progress



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# SCRUM Roles

## 3. Development team

A development team is composed of professionals who do the hands-on work of completing the tasks in a Scrum sprint. This means development team members can be computer engineers, designers, writers, data analysts, or any other role needed to reach sprint goals.

Some of the responsibilities are

- Help in sprint planning and goal setting
- Lend expertise to program, design, or improve products
- Use data to find best practices for development
- Test products and prototypes, plus other forms of quality assurance



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# SCRUM Activities

- There are five **Scrum Events**,
- **Sprint**
- **Sprint Planning**
- **Daily Scrum**
- **Sprint Review**
- **Sprint Retrospective.**



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# Sprint Planning

- The Sprint Planning event takes place on the first day of the Sprint.
- Its purpose is to plan the work to be done during the Sprint and the whole Scrum Team is involved in this event.
- Sprint Planning should have roughly three parts. Topic One should focus on the “Why?”. The outcome should be a defined Sprint Goal. Topic Two covers the “What?”. During this topic, the developers should work to decide which Product Backlog Items are going to be worked on during the Sprint, and if necessary, refine the Sprint Goal to reflect this. Finally, Topic Three deals with the “How?”. During this final stage of the meeting, the developers create an actionable plan to get the work done.



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# Daily Scrum

- The Daily Scrum is the moment where the Developers step back for 15 minutes, analyze where they are in respect to the Sprint Goal, and collectively decide what is the most important thing each Developer has to do in the next 24 hours to get closer to the Sprint Goal.
- It is a planning meeting, not a generic synchronization meeting.
- It is important to focus the conversation on the most important Sprint Backlog Items, not on individuals stating what they have done.
- The Daily Scrum is not a status report meeting. The SM should help create the right environment to encourage open communication, identify obstacles, and promote quick decision-making.



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# Sprint Review

- The sprint review is a **Scrum event that takes place at the end of the sprint, just before the retrospective.**
- The purpose of the review is to evaluate the latest features and to consider the plan for the product in the future.
- The purpose of the Sprint Review is to **inspect the outcome of the Sprint and determine future adaptations.**
- The Scrum Team presents the results of their work to key stakeholders and progress toward the Product Goal is discussed.



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# Sprint Retrospective

- The final Scrum Event is the Sprint Retrospective.
- The Sprint Retrospective is the only event in Scrum that is exclusive to the Scrum Team.
- The intention is to create a safe space where everyone in the Scrum Team feels comfortable to openly share their observations and express their views and ideas.
- The purpose of the event is to inspect how the last Sprint went and plan ways to increase quality and effectiveness.



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# Scrum vs. sprint

- Scrum is the specific, framework used under the Agile umbrella to develop complex products. The term *scrum* is also used to describe the daily, standup meetings that occur during a sprint.
- Sprints are time-boxed periods of one week to one month, during which a product owner, scrum master, and scrum team work to complete a specific product addition. During a sprint, work is done to create new features based on the user stories and backlog. A new sprint starts immediately after the current sprint ends.



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## Roles



Product Owner:  
Set priorities



ScrumMaster:  
Manage process,  
remove blocks



Team: Develop  
product



Stakeholders:  
observe & advise

## Key Artifacts

### Product Backlog

- List of requirements & issues
- Owned by Product Owner
- Anybody can add to it

### Sprint Goal

- One-sentence summary
- Declared by Product Owner

### Sprint Backlog

- List of tasks
- Owned by team

### Blocks List

- List of blocks & unmade decisions
- Owned by ScrumMaster

### Increment

- Version of the product
- Shippable functionality (tested)

## Key Meetings

### Sprint Planning Meeting

- Hosted by ScrumMaster; 1/2-1 day
  - In: Product Backlog, existing product, business & technology conditions
1. Select highest priority items in Product Backlog; declare Sprint Goal
  2. Team turns selected items into

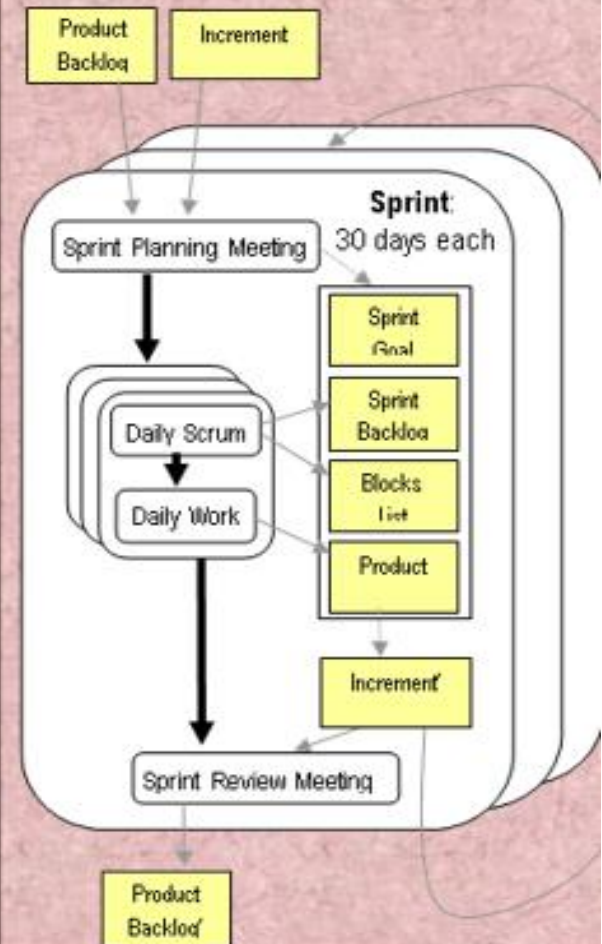
### Daily Scrum

- Hosted by ScrumMaster
- Attended by all, but Stakeholders don't speak
- Same time every day
- Answer: 1) What did you do yesterday? 2) What will you do today? 3) What's in your way?
- Team updates Sprint Backlog;

### Sprint Review Meeting

- Hosted by ScrumMaster
- Attended by all
- Informal, 4-hour, informational
- Team demos Increment
- All discuss
- Hold retrospective
- Announce next Sprint Planning

## Development Process



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# Agile Estimation

- Agile estimation is **the process for estimating the effort required to complete a prioritized task in the product backlog**. This effort is usually measured with respect to the time it will take to complete that task, which, in turn, leads to accurate sprint planning.
- Agile estimation helps for proper planning, management and estimation of the total efforts that will be used for implementing, testing and delivering the desired product to the customers in terms of time within the specified deadlines. A well-prepared preliminary estimate is essential.



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# Agile Estimation Techniques

- Three-point estimate
- Planning poker
- Affinity grouping
- Random distribution
- T-shirt sizes (Estimation units)
- Buckets
- Large, small, uncertain
- Dot voting



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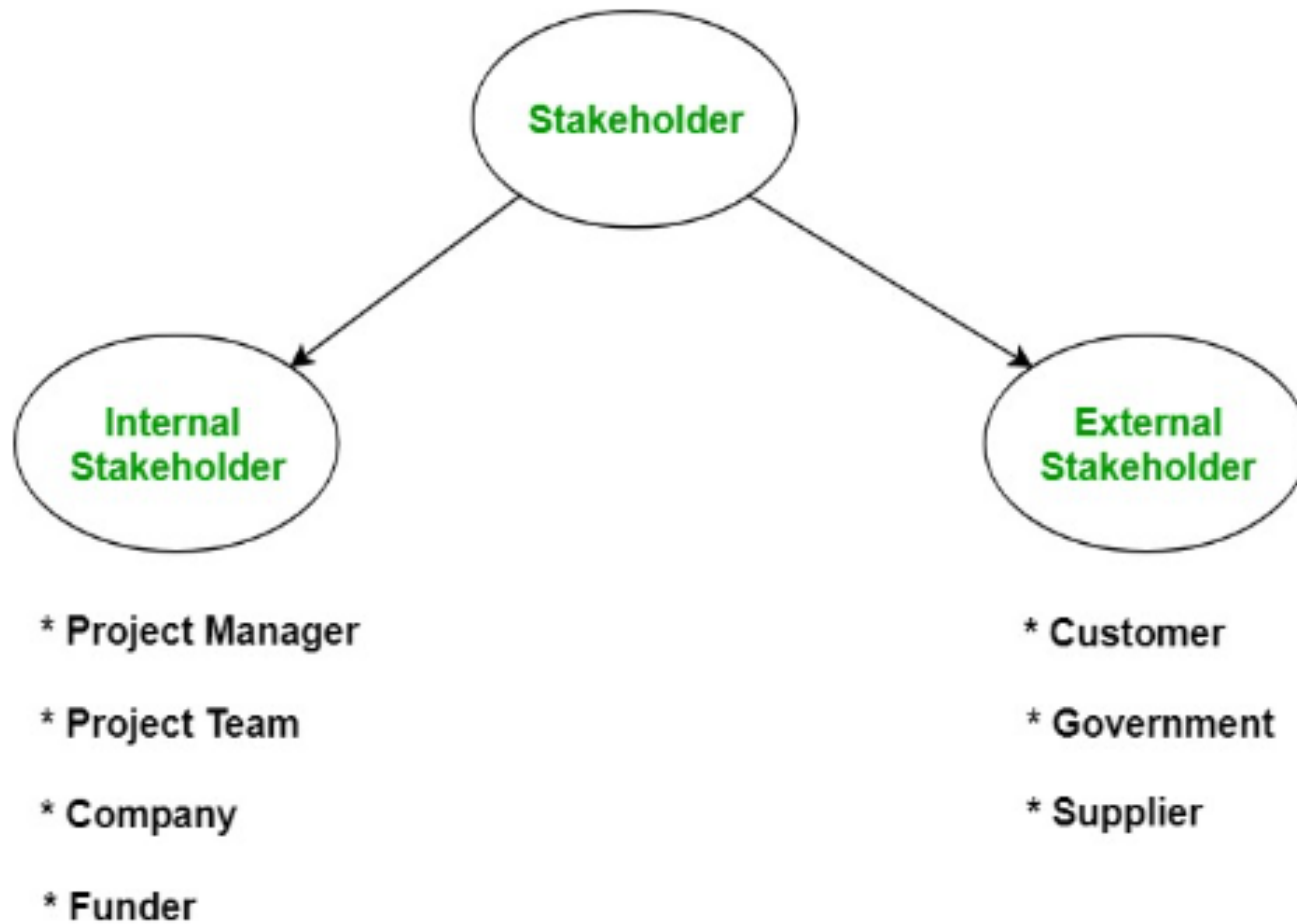
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# Stakeholder Roles

- In simple words, anyone having any type of relation/interest in the project is known as stakeholder. The term **Software Project Stakeholder** refers to, “a person, group or company that is directly or indirectly involved in the project and who may affect or get affected by the outcome of the project”.
- **What is Stakeholder Identification?**  
It is the process of identifying a person, group or a company which can affect or get affected by a decision, activity or the outcome of the software project. It is important in order to identify the exact requirements of the project and what various stakeholders are expecting from the project outcome



# Type of Stakeholders:

## **1.Internal Stakeholder:**

An internal stakeholder is a person, group or a company that is directly involved in the project.

### **a)Project Manager:**

Responsible for managing the whole project. Project Manager is generally never involved in producing the end product but he/she controls, monitors and manages the activities involved in the production.

### **b)Project Team:**

Performs the actual work of the project under the Project Manager including development, testing, etc.



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**c)Company:**

Organisation who has taken up the project and whose employees are directly involved in the development of the project.

**d)Funders:**

Provides funds and resources for the successful completion of the project.

**2. External Stakeholder:**

An external stakeholder is the one who is linked indirectly to the project but has significant contribution in the successful completion of the project.

For example,

**a)Customer:**

Specifies the requirements of the project and helps in the elicitation process of the requirement gathering phase. Customer is the one for whom the project is being developed.

**b)Supplier:**

Supplies essential services and equipment for the project.

**c)Government:**

Makes policies which helps in better working of the organization.



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# Dynamic Systems Development Method (DSDM)

- The **Dynamic Systems Development technique (DSDM)** is an associate degree agile code development approach that provides a framework for building and maintaining systems.
- The DSDM tool ([www.dsdm.org](http://www.dsdm.org)) could be a worldwide cluster of member companies that put together tackle the role of “keeper” of the strategy. The pool has outlined AN [Agile Development Model](#), known as the DSDM life cycle that defines 3 different unvarying cycles, preceded by 2 further life cycle activities:
- **Feasibility Study:**  
It establishes the essential business necessities and constraints related to the applying to be designed then assesses whether or not the application could be a viable candidate for the DSDM method.

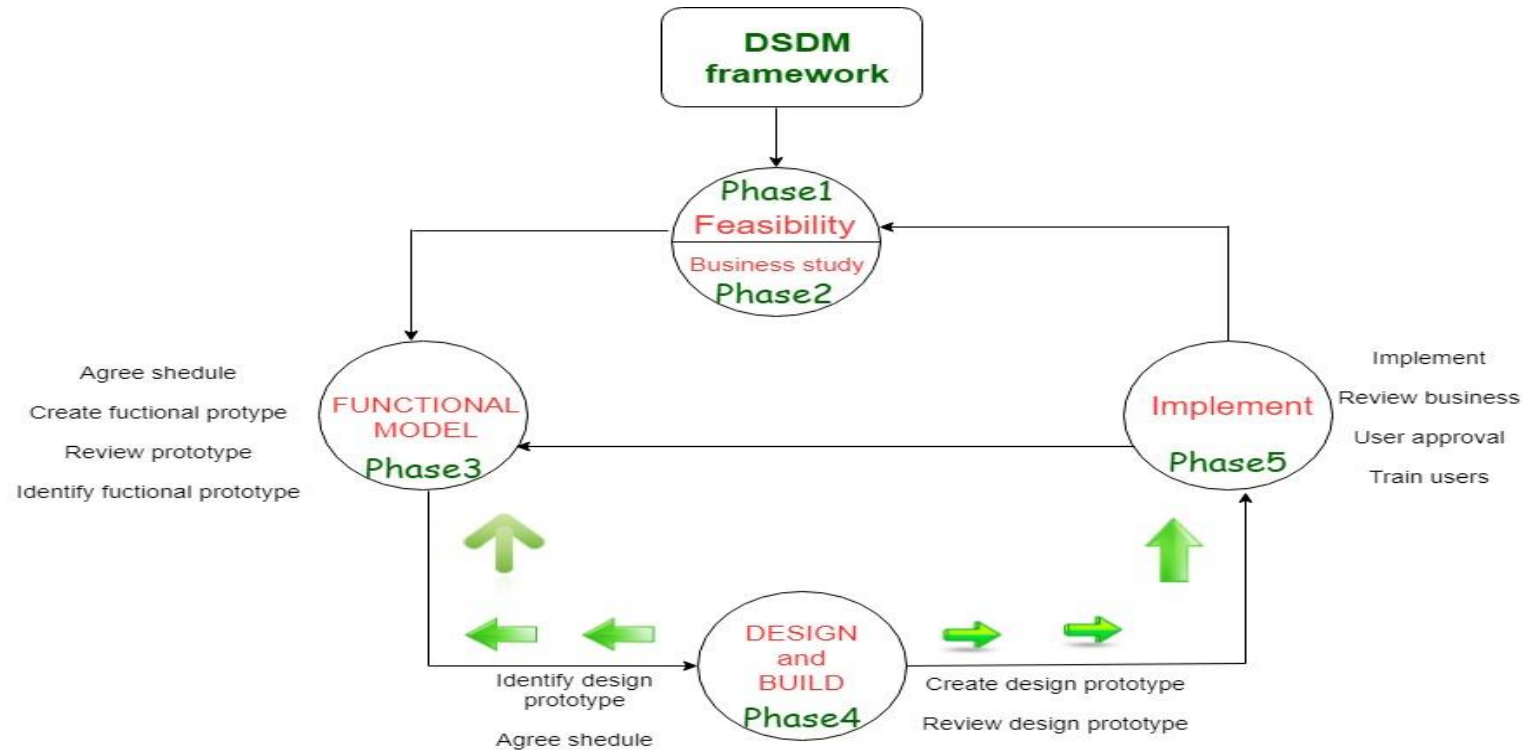


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# DSDM life cycle



Dynamic Systems Development Method life cycle



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- **Business Study:**

It establishes the use and knowledge necessities that may permit the applying to supply business value; additionally, it is the essential application design and identifies the maintainability necessities for the applying.

- **Functional Model Iteration:**

It produces a collection of progressive prototypes that demonstrate practicality for the client.

- The intent throughout this unvarying cycle is to collect further necessities by eliciting feedback from users as they exercise the paradigm.



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- **Design and Build Iteration:**

It revisits prototypes designed throughout useful model iteration to make sure that everyone has been designed during a manner that may alter it to supply operational business price for finish users. In some cases, useful model iteration and style and build iteration occur at the same time.

- **Implementation:**

It places the newest code increment (an “operationalized” prototype) into the operational surroundings. It ought to be noted that:

- **(a)** the increment might not 100% complete or,
- **(b)** changes are also requested because the increment is placed into place. In either case, DSDM development work continues by returning to the useful model iteration activity.



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- DSDM is often combined with XP to supply a mixed approach that defines a solid method model (the DSDM life cycle) with the barmy and bolt practices (XP) that are needed to create code increments. additionally, the ASD ideas of collaboration and self-organizing groups are often tailored to a combined method model.



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# Agile software development methods

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# Agile software development

- Agile software development -- is a type of development methodology that anticipates the need for flexibility and applies a level of pragmatism to the delivery of the finished product.
- Agile software development requires a cultural shift in many companies because it focuses on the clean delivery of individual pieces or parts of the software and not on the entire application.

# Scaling

The process of translating established Agile methods, like Scrum and Kanban, to larger groups of people.

Traditional Agile teams, according to the Scaled Agile Framework (SAFe), work best with groups of five to eleven members.

As companies see success in these small groups, they often want to replicate it at a larger team, department, or organizational level.

That's where scaling Agile comes in.

Scaling Agile is a systematic approach for achieving enterprise wide goals, by extending an organization's existing implemented agile framework to multiple teams.

# There are two conventional ways

Bottom up and Top down

- For a bottom up approach, you need to start scaling from the team level and go upwards to other teams and management in the organization. This works perfectly for teams that are independent of each other's work. But if the teams are dependent on each other, then you need to reevaluate your strategy.
- The top down approach is when the agile transition is embraced by the higher management first, and then it trickles down to the team level. This can be better achieved by hiring a consultant or an agile coach that can guide you towards transitioning to scaling agile.



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## Popular Scaling Agile models

- **Scaled Agile Framework (SAFe):** implementing agile practices at enterprise scale.
- **Disciplined Agile (DA):** providing you with an insight into what's going on in other organisations.
- **Large Scale Scrum (LeSS):** LeSS is a framework for scaling agile development to multiple teams. It provides simple structural rules and guidelines on how to adopt Scrum in large product development.



# Benefits of Scaling Agile

- Following consistent process and practices
- Getting executive support from stakeholders
- Using common tools across the teams
- Consultation or help from agile coaches
- Strong foundation of contextual agile knowledge
- Shorter time to market
- More flexible and responsive work environment
- Mutual respect for co-workers
- Increased overall productivity
- Decentralized decision making



# User Stories

- In Agile software development and product management User Story refers to a short, informal, and simple description of software features that are required by the end-users in the software system.
- Its main purpose is to provide software features that will add value to the customer requirements.
- User stories are considered an important tool in Incremental software development.
- Mainly a user story defines the type of user, their need, and why they need that.
- So in simple, a user story is a simple description of requirements that needs to be implemented in the software system.



# Pattern of User Story

User stories are completely from the end-user perspective which follows the Role-Feature-Benefit pattern.

As a [ type of user ], I want [ an action ], so that [ some reason ]

For example :

As the project manager of a construction team, I want our team-messaging app to include file sharing and information update so that my team can collaborate and communicate with each other in real-time as a result the construction project development and completion will be fast.



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# Writing User Stories

- User stories are from a user perspective. So when user stories are written, users are given more importance during the process.
- Some points outlined which are taken into consideration during writing user stories like
  - 1.Requirements
  - 2.Tasks and their subtasks
  - 3.Actual user
  - 4.Importance to user words/feedback
  - 5.Breaking user stories for larger requirements



# Importance of creating User stories

1. Stories clear idea about requirements
2. Makes it easy to understand the features
3. Delivers higher customer satisfaction
4. Fasten development process
5. Creates an effective work environment
6. Enables collaboration between teams
7. Delivery of valuable software



# DEVOPS

**1. Introduction**

**2. Definition**

**3. History**

**4. Tools**



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# What is DevOps?

- The word DevOps is a combination of two words Development and Operations.
- Before getting into what DevOps is, let us get an idea about the two teams involved in software development.
- The **development team** is responsible for developing, designing, and building the application.
- The **operation team** deals with the deployment and testing of the application.
- If there are problems with the application, the operation team also provides feedback to the development team.



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# History of Devops

Let us see some important events of DevOps :

- **2007-2008:** The DevOps idea was started
- **2009:** In the initial stage the first conference was "Deploys a day: Dev and Ops cooperation of flicker." Another conference called "DevOps Days in Ghent, Belgium" also happened.
- **2010:** DevOps days conference happened in the United States at mount view, calif.



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# History of DevOps

- **2012:** Allana browns at puppet creates a state of DevOps report
- **2014:** Publishing the annual “State of DevOps report”
- **2017:** Forrester Research calls 2017 “[The Year of DevOps](#)”
- **2018:** 30 DevOps day conferences were scheduled across the united states.



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# Why did we need DevOps?

- As we know about the problems faced in traditional models like in the waterfall model there is a problem of a one-way stream of work.
- Due to which if there is any mistake the whole process repeats and there is no interaction with customers.
- Now, this is solved in agile by splitting the whole development plan into several iterations for a better level of production efficiency.



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# Why did we need DevOps?

- The agile model also includes customer interaction with the company to rectify the mistakes. But there is another problem faced in Agile too.
- Here, the problem arises when the development team continuously changes the code for better performance and sends the code to the operations team for testing.
- But there may be a delay in the operations team feedback in situations like if the developers sent code for review at night but due to the unavailability of the operations team, there will be a delay in the project feedback.



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# Why did we need DevOps?

- So, DevOps is the solution to this problem.
- DevOps is a practice or a methodology in which the development team and operations team work together by including automation at the initial stages.
- So they can work on rapidly changing systems, fix bugs, and help to deliver a good quality of software in time.

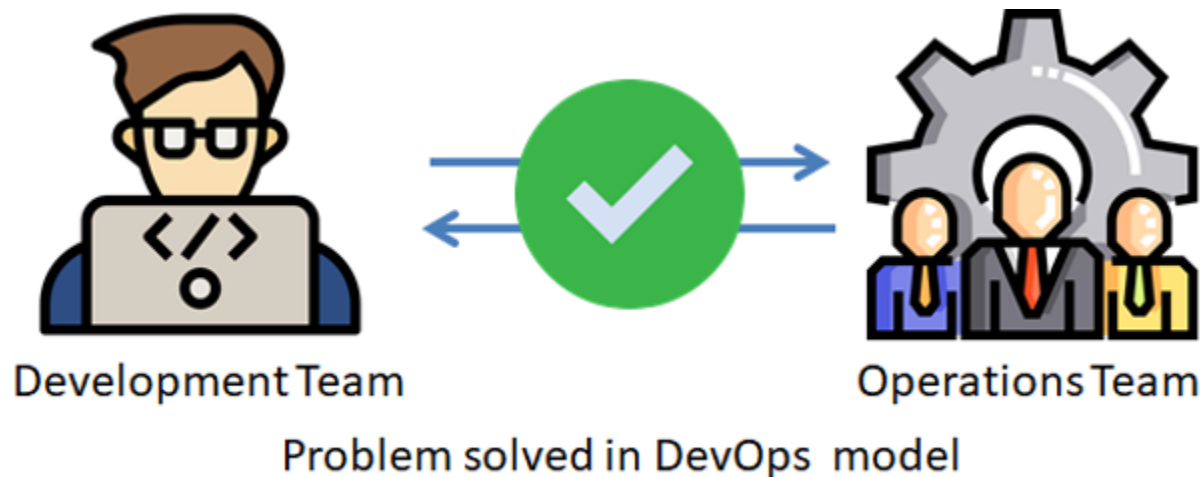


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# Why did we need DevOps?



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# DevOps Architecture:



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# DevOps Architecture:

- **Plan** – In DevOps planning plays an important role. In this stage, all the requirements of the project and everything regarding the project like time for each stage, cost. etc are discussed.
- **Code** – In this Stage the code is written over here according to the client's requirements. Here the code is divided into small codes called Units. Some of the examples of the tools used are Git, JIRA
- **Build** – In this stage Building of the units is done. Some of the examples of the tools used are maven, Gradle.



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# DevOps Architecture:

- **Test** – Testing of all units is done in this stage. So we will get to know where exactly the code is having bugs and if there are mistakes found it is returned. Some of the examples of the tools used are Selenium, Pytest
- **Integrate** – In this stage, all the units of the codes are integrated. That means in this step we will be creating a connection between the development team and the operation team to implement Continuous Integration and Continuous Deployment. An example of the tool used is Jenkins.
- **Deploy** – In this stage, the code is deployed on the client's environment. Some of the examples of the tools used are AWS, Docker.

# DevOps Architecture:

- **Operate** – Operations are performed on the code if required. Some of the examples of the tools used are Kubernetes, open shift.
- **Monitor** – In this stage monitoring of the application is done over here in the client's environment. Some of the examples of the tools used are Nagios, elastic stack.

# How is DevOps different from Agile?

## DevOps

DevOps deals with filling the time gap between the development team and the operations team.

Here the feedback will be coming from the Operations team to the development team.

It focuses on constant testing and delivery.

Some of the tools used in DevOps: Puppet, AWS

## Agile

Agile methodology deals with filling the gap between customers and the company.

Here the feedback will be coming from the customers to the company.

It focuses on constant changes.

Some of the tools used for Agile: JIRA, Bugzilla, Kanboard



# DevOps automation tools

- These are some of the popular DevOps automation tools:
- Jenkins. Jenkins. Jenkins is an open source and free automation server that helps automate software development processes such as building, facilitating CI/CD, deploying, and testing. ...
- Docker. Docker. ...
- Puppet. Puppet. ...
- Apache Maven. Apache Maven. ...
- Gradle. Gradle.



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• **END OF MODULE**



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