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INTRODUCTION TO SOFTWARE ENGINEERING

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AGILE MODEL

- The meaning of Agile is swift or versatile.“
- Agile is an iterative way of managing projects and developing software that makes it easier for teams to deliver value to their customers more quickly and effectively.
- More focus on process adaptability and customer satisfaction through the timely delivery of working software.
- The agile method split the project into small iterations, and these iterations do not directly involve long-term planning.

AGILE PRINCIPLES

To make a process Agile, the following 12 principles need to be satisfied in the Agile Manifesto.

1. Customer Satisfaction

The customer needs to be satisfied with the quick delivery of the product.

2. Welcome Change

Even late in the development process, changing needs need to be addressed.

3. Deliver Frequently

Focus on a shorter timescale, and ensure products are delivered frequently.

4. Work Together

The business and development team need to work together through the course of the project.

5. Motivated Team

Team members must be motivated and trusted to complete the project successfully and on time.

6. Face-to-face

Having face-to-face interactions is one of the most effective forms of communication.

7. Working Software

Working software is the primary measure of progress

8. Constant Pace

Agile promotes sustainable development.

9. Good Design

Continuous attention to technical excellence and good design

10. Simplicity

The amount of time where work isn’t being done needs to be reduced.

11. Self-Organization

These types of teams provide the best designs, requirements, and architectures.

12. Reflect and Adjust

Regularly, the team reflects on how to become more effective and adjusts accordingly

KEY AGILE CONCEPTS

Here are a few essential Agile concepts.

- **User Stories:** The team divides the work into functional units known as "user stories" in consultation with the client or product owner. Each user story must add something valuable to the final product.
- **Daily Meeting:** The team meets every day at the same time to update everyone on the information necessary for coordination:
- **Personas:** When the project requires it, the team creates in-depth, fabricated biographies of hypothetical users of the intended product.
- **Team:** A small group of individuals assigned to the same project or effort, almost all of whom work full-time, is referred to as a "team" in the Agile context.

KEY AGILE CONCEPTS

- **Incremental Development:** Agile teams prefer to use an incremental development strategy, which in an Agile setting means that each iteration of the product improves on the one before it by including user-visible functionality.
- **Iterative development:** Agile projects intentionally permit "repeating" software development activities and the potential for "revisiting" the same work products, known as iterative development.
- **Milestone Retrospective:** After a project has been running for a while, the team dedicates one to three days to examine the key moments.

Phases of Agile Model:

Following are the phases in the Agile model are as follows:

1.Requirements gathering

2.Design the requirements

3.Construction/ iteration

4.Testing/ Quality assurance

5.Deployment

6.Feedback

1. Requirements gathering: In this phase, you must define the requirements. You should explain business opportunities and plan the time and effort needed to build the project. Based on this information, you can evaluate technical and economic feasibility.

2. Design the requirements: When you have identified the project, work with stakeholders to define requirements. You can use the user flow diagram or the high-level UML diagram to show the work of new features and show how it will apply to your existing system.

3. Construction/ iteration: When the team defines the requirements, the work begins. Designers and developers start working on their project, which aims to deploy a working product. The product will undergo various stages of improvement, so it includes simple, minimal functionality.

4. **Testing:** In this phase, the Quality Assurance team examines the product's performance and looks for the bug.
5. **Deployment:** In this phase, the team issues a product for the user's work environment.
6. **Feedback:** After releasing the product, the last step is feedback. In this, the team receives feedback about the product and works through the feedback.

An Agile View of Process

- Agile software Engineering combines a philosophy and a set of development guidelines. The philosophy encourages customer satisfaction and early incremental development of software.
- Software engineers and other project stakeholders (managers, end-users, customers) work together as an agile team-A team that is self-organizing and in control of its own destiny.
- An agile team fasters communication and collaboration among all who serve on it.
- Agile software engineering represents a reasonable alternative to conventional software engineering for certain classes of software and certain types of software projects.

- Agile development is best termed as "Software Engineering lite" the basic frame work activities - Customer Communication, Planning, Modeling, Construction, delivery, and Evolution.
- Customers and Software Engineers who adopted the agile philosophy have the same view-the only really important work products is an Operational "Software increment" that is delivered to the customer and appropriate commitment date.
- If the agile team agrees that the process works and team produces deliverable software increments that satisfy the customer.

What is Agility (Quickness)?

- An agile team is a nimble team able to appropriately respond to changes.
- Support for changes should be built-in everything we do in software.
- An agile team recognizes that software is developed by individuals
- It encourages team structures and attitudes that make communication more facile.
- It emphasizes rapid delivery of operational software and de-emphasizes the importance of intermediate work products.
- It recognizes that planning is an uncertain world has limits and that a project plan must be flexible.

SOME AGILE METHODS

- **Scrum**
- **Adaptive Software Development (ASD)**
- **Extreme Programming (XP)**

SCRUM

The Scrum Guide defines scrum as:

"A framework within which people can address complex adaptive problems, while productively and creatively delivering products of the highest possible value."

- In simple terms, scrum is a **lightweight agile project management framework** that can be used to manage iterative and incremental projects of all types.
- The concept here is to break large complex projects into smaller stages, reviewing and adapting along the way.

With scrum you:

- Write fewer plans and do more in short iterations or cycles that we call sprints
- Work as one dedicated and committed team, instead of working on separate groups
- Constantly deliver functioning products at the end of each sprint
- Receive continuous feedback from your customers and improvise your product

People & Parts of Scrum Framework

The Scrum Framework is made of three distinct categories, which are:

- Scrum Roles
- Events in Scrum
- Scrum Artifacts

Scrum Roles

There are three distinct roles defined in Scrum:

- **Development Team (Scrum Team)**
  - Motivate the team to achieve the goal.
  - It take input from others but when it comes to *making major decisions*, ultimately he/she is responsible.
- **Scrum Master**
  - ensures that all the team members follow scrum's theories, rules, and practices.
  - It sure the Scrum Team has whatever it needs to complete its work, like removing roadblocks that are holding up progress, organizing meetings, dealing with challenges and bottlenecks

- **Product Owner**
    - Working together to deliver products
    - Scrum development teams are given the freedom to organize themselves and manage their own work to maximize the team's effectiveness and efficiency.

Events in Scrum

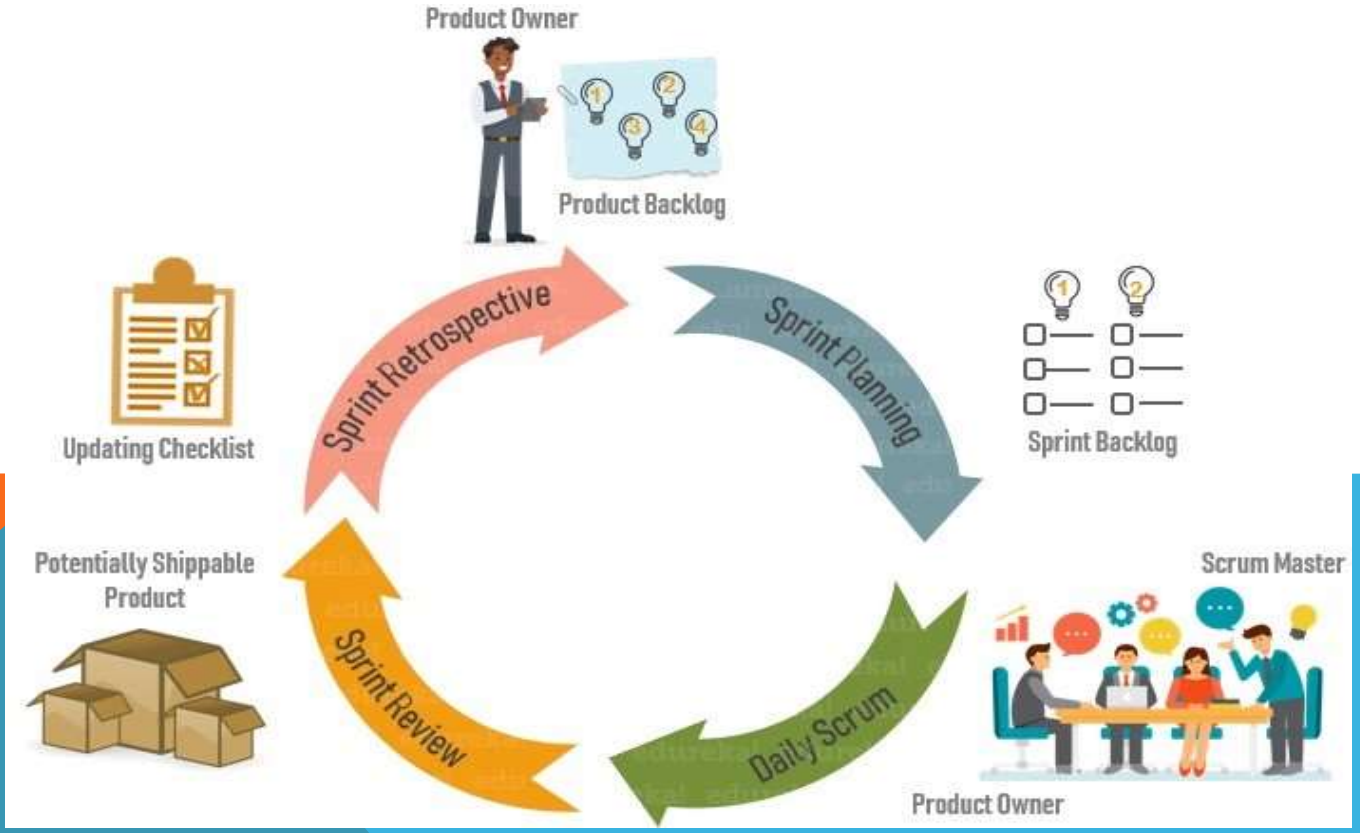
There are four events that you will encounter during the scrum process.

Events in Scrum

We should be aware of what sprint is before we proceed any further

A sprint basically is a specified time period during which a scrum team produces a product.

There are four events that you will encounter during the scrum process.



- **Sprint Planning:** It is a meeting where the work to be done during a sprint is mapped out and the team members are assigned the work necessary to achieve that goal.
- **Daily Scrum:** Also known as a stand-up, it is a 15-minute daily meeting where the team has a chance to get on the same page and put together a strategy for the next 24 hours.
- **Sprint Review:** During the sprint review, product owner explains what the planned work was and what was not completed during the Sprint. The team then presents completed work and discuss what went well and how problems were solved.
- **Sprint Retrospective:** During sprint retrospective, the team discusses what went right, what went wrong, and how to improve. They decide on how to fix the problems and create a plan for improvements to be enacted during the next sprint.

Scrum Artifacts

Artifacts are just physical records that provide project details when developing a product.

Scrum Artifacts include:

- **Product Backlog:** It is a simple document that outlines the ***list of tasks and every requirement that the final product needs***. It is constantly evolving and is never complete. For each item in the product backlog, you should add some additional information like:
  - Description
  - Order based on priority
  - Estimate
  - Value to the business

- **Sprint Backlog**: It is the **list of all items from the product backlog that need to be worked on during a sprint**. Team members sign up for tasks based on their skills and priorities. It is a **real-time picture of the work** that the team currently plans to complete during the sprint.

- **Burndown Chart:** It is a graphical representation of the amount of **estimated remaining work.**

- **Product Increment:** The most important artifact is the product improvement, or in other words, the sum of product work completed during a Sprint, combined with all work completed during previous sprints.

How does a Scrum Process Work?

Step1: Scrum process begins with a ***product owner***. Product Owner creates a ***product backlog,*** a list of tasks and requirements the final product needs. The important part is that product backlog must be **prioritized.**

Step2: The scrum team gets together for ***sprint planning***, which is when the team decides together what to work on first from the product backlog. This subset of items from the product backlog becomes the **s*print backlog*.**

Step3: During the sprint, the team meets to communicate progress and issues, this meeting is called the ***daily scrum.*** It is overseen by the ***scrum master*** who ensures that all the team members follow scrum's theories, rules, and practices.

Step4: At the end of the sprint, the **sprint review** meeting is organized by the product owner. During the meeting, the ***development team*** demonstrates what they completed since the last sprint. Then the product owner gives information about what is remaining on the product backlog and estimated time to complete the project if needed.