

CptS 322- Software Engineering Principles I

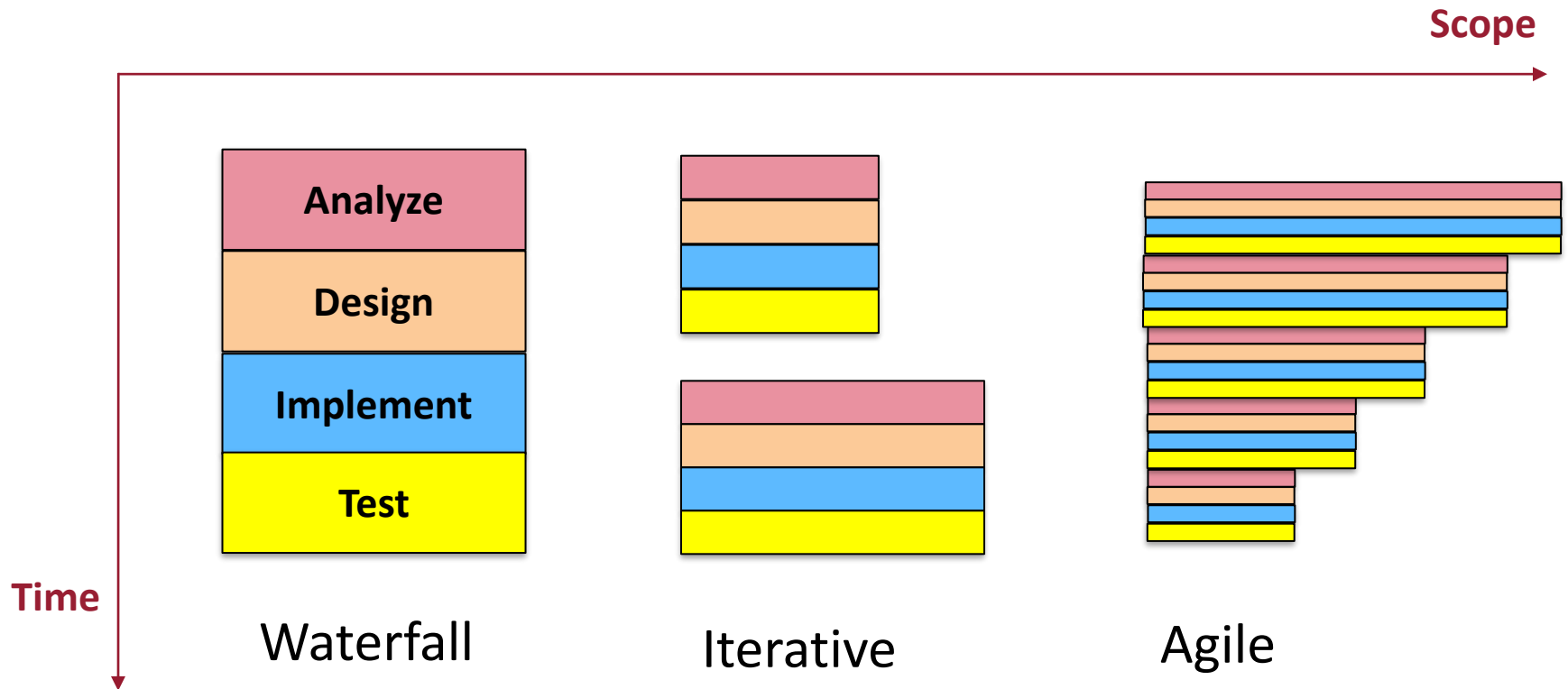
Agile and Scrum

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World Class. Face to Face.

Agile Processes



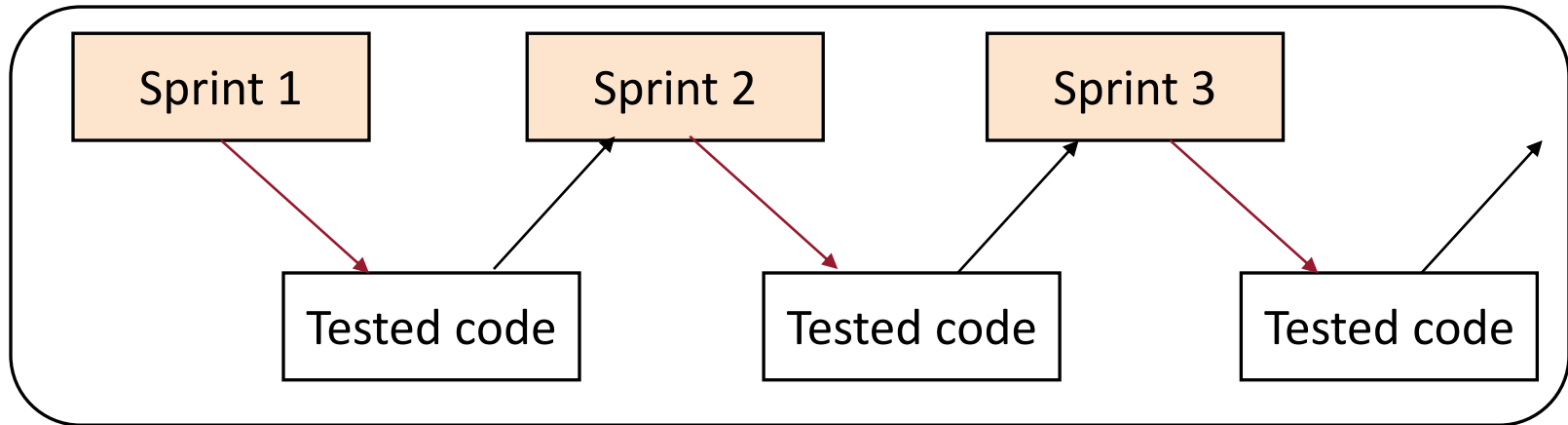
- Agile process is an iterative process with short iterations

Definition: Sprint

- **Sprint**

- A sprint is a pre-set period of time during which a team completes part of a software project.
- Each sprint will go through most or all of the process steps.
- A typical sprint might have a team of 4 to 10 people working for 1 to 4 weeks.

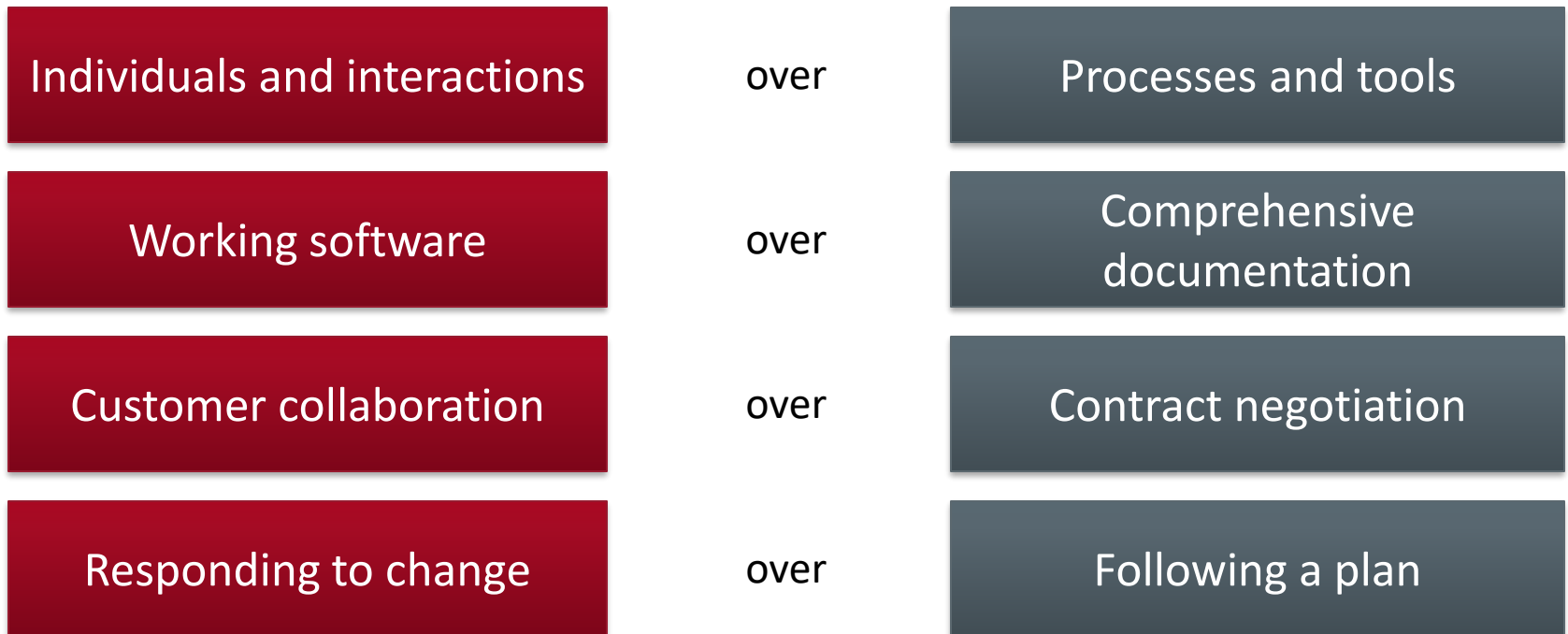
Agile Process



- Development of a project is divided into a large number of sprints.
- For each sprint, a team works through a full software development cycle including planning, requirements analysis, design, coding, testing, and acceptance testing.
- This is a lightweight process with minimal documentation created during the process.
- Each sprint is completed in a fixed time period, e.g., four weeks. The size of an sprint is based on team size, e.g., 4-10 people.
- After each sprint the code may be:
 - released (original agile method)
 - combined with code from other sprints for subsequent release
 - incorporated into a larger code base (spiral development)

Agile Manifesto

We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:



That is, while there is value in the items on the right, we value the items on the left more.

Agile Process

1. Gather requirements and specifications:
 - Recognize it will evolve
 - Without something to show probably can't get full requirements
 - Important: try to think about what areas are more likely to change?
 2. Design:
 - Design for expected change
 3. Implementation:
 - Critical pieces first
 - Write code with testing in mind
 - No premature optimization/generalization
 - Implementation will likely change
 - Can leave some parts unimplemented
- Iterate:
 - Show to user/customer the prototype
 - Update the requirements, update design, ...

Agile – Advantages:

- Customer satisfaction by rapid, continuous delivery of useful software
- Continuous attention to technical excellence and good design; no premature optimization
 - Refactoring
 - Test driven development : Automated testing is a mandatory part of agile
- Regular adaptation to changing circumstances and requirements
- People and interactions are emphasized rather than process and tools

Agile – Disadvantages:

- Difficult to assess the effort required at the beginning of the software development life cycle
- Project scope can go off-track
- Costs can increase
- Harder for new developers to integrate in the team
- Can be very demanding on the customers time

What's the best model for ...

- A system to control anti-lock braking in a car
- A learning management system similar to Blackboard Learn or Canvas.
- An interactive system that allows airline passengers to quickly find replacement flight times (for missed or bumped reservations) from terminals installed at airports
- A mobile app for finding romantic partners

Choosing a Software Process

- Changes during the software development process are expensive.
 - If a big software system has many inter-related components without major changes to the design of a system during development. *Sequential process, such as the waterfall model.*
 - If the requirements are poorly understood, or expected to change, select a process that keeps flexibility. *Iterative and agile.*
 - If the market for the software is poorly understood, use a process that gets operational software in front of customers as quickly as possible. *Agile or evolutionary prototyping.*

Corporate Processes

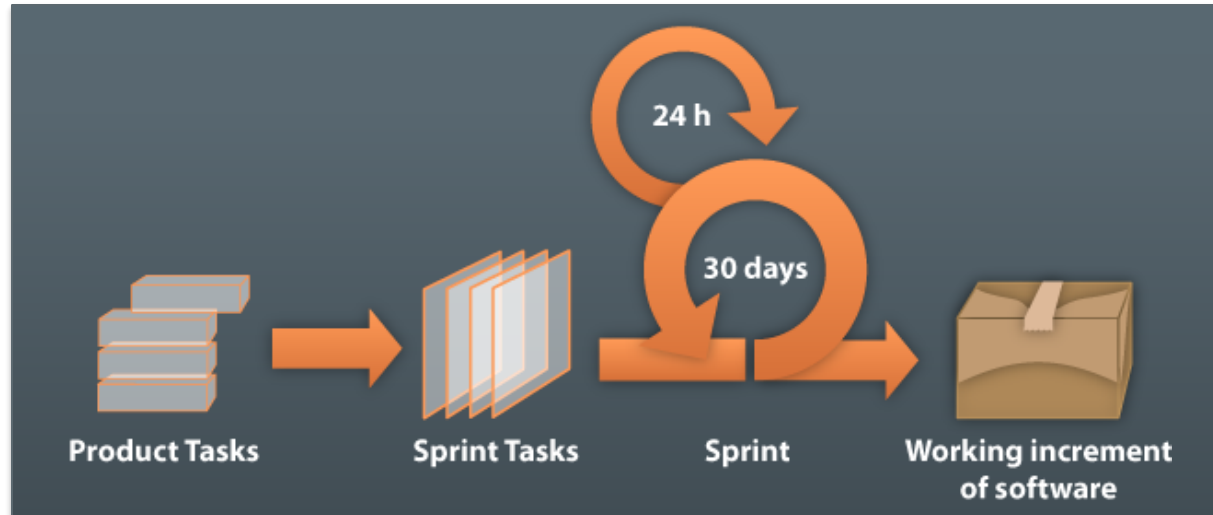
Large software development organizations have their own internal processes that are designed for their needs. For example:

- **Amazon.com** (Internet commerce) makes extensive use of sprints. Most software development is divided into increments of about four weeks elapsed time.
- **SAP** (business software) emphasizes the functionality that is seen by their business customers. Much of the development is suitable for a sequential process.
- **Microsoft** (PC software) places great emphasis on testing with a very wide variety of equipment and backward compatibility. Much of the development uses spiral and agile processes.
- **Lockheed Martin** (government contractor) follows a sequential process that fits with the way that the US government manages software contracts.

Variations on Agile Software Development

- There is a number of specific agile development methods widely used today.
 - Scrum, Extreme Programming, Crystal, Adaptive Software Development, Kanban, Lean Software Development, etc.
- The Agile Methodologies differ in the approaches to software development and management they propose.
 - Some focus on project management and collaboration practices:
 - Scrum, Adaptive Software Development (ASD), Kanban, and Lean Development.
 - Some concentrate on software implementation practices:
 - Extreme Programming (XP), Agile Modeling (AM), and Feature-driven Development (FDD).

Scrum Framework



Roles

- Product Owner
- Scrum Master
- Development Team

Events

- Sprint
- Sprint Planning
- Daily Scrum
- Sprint Review
- Sprint Retrospective

Artifacts

- Project Charter
- Product Backlog
- Sprint Backlog
- Burn down chart



Product Backlog

Scrum Framework



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Scrum Artifacts-Sprint Backlog (SBL)-Example:



Project: Shopping Website

First 2 tasks planned for
the next Sprint

Prior ity	Product Backlog Items	User Story #	User Story	Story Point	Estimate (Hours)
1	Database Creation	9	As an operations engineer, I want to be able store all customer information, so that I can serve to customers.	40	240
2	Login Page	15	As a site member, I want to login the site, so that I can do online shopping.	20	160
3	Category Page	23	As a site member, I want to be able to look for different categories of brands, so that I can choose what I want.	100	400
4	Payment Process	18	As a site member, I will be able to make payment, so that my deliveries can be shipped.	40	240
5	Contact Page	3	As a site member, I want to be able to find contact information of the site, so that in case I need, I can contact.	13	80
6	Banner Area	1	As a marketing personnel, I want to be able to make advertisement, so that I can attract visitors	8	40

Roles

1. Product Owner

- Defines the features of the product
- Decides on release date and content
- Prioritizes features according to market value. Adjusts features and priority every iteration, as needed
- Accepts or rejects work results

2. Scrum Master

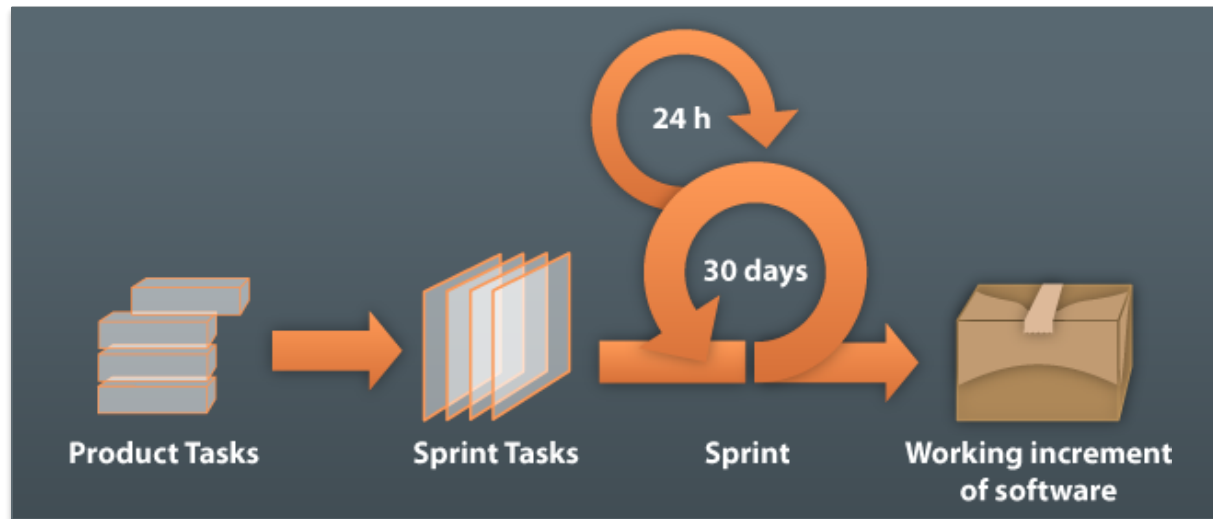
- Represents management to the project
- Responsible for endorsing Scrum values and practices
- Removes obstacles
- Ensures that the team is fully functional
- Enables close cooperation across all roles and functions
- Shields the team from external interferences

Roles (cont.)

3. Development Team

- Members are cross-functional, with all of the skills as a team necessary to create a product
 - Programmers, user interface designers, testers, business analysts, etc.
- Members have no titles other than “Developer”, regardless of the work being performed by the person
- Members may have specialized skills and areas of focus, but accountability belongs to the team as a whole
- Teams do not contain sub-teams dedicated to particular domains like testing or business analysis.
- Optimal team size: 4-6 members

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Events - Sprint

- Considered the “heart” of Scrum
- A sprint is a time-box of one month or less (usually between 2-4 weeks) during which a “Done,” useable, and potentially-releasable product increment is created.
- Sprints have consistent durations throughout a development effort.
- A new Sprint starts immediately after the conclusion of the previous Sprint.
- During the Sprint:
 - No changes are made that will affect the Sprint Goal
 - Development Team structure remains constant
 - Software Quality attributes do not change
 - Scope may be clarified and re-negotiated between the Product Owner and Development Team as more is learned

Events - Sprint Planning Meeting

- A Sprint Planning Meeting is a meeting where the work to be performed in the sprint is planned.
- Usually time-boxed to eight hours for a one-month sprint. For shorter sprints, the event is proportionately shorter.
- There are two parts to the meeting:
 - What will be delivered in this Sprint?
 - How will the work get done?

What will be delivered in this sprint?

- The Product Owner presents to the Development Team an ordered list of all items needed to be completed.
- The entire Scrum Team collaborates on understanding the work to be done in the Sprint.
- Other items evaluated before making a decision:
 - Product Backlog
 - The latest product Increment (or Iteration)
 - Projected capacity of the Development Team for the upcoming Sprint
 - Past performance of the Development Team
- A **Sprint Goal**, or an objective that will be met within the Sprint, is defined during this meeting.

Product Backlog to Sprint Backlog

Scrum Framework

Scrum Artifacts-Sprint Backlog (SBL)-Example:



Project: Shopping Website

Prior ity	Product Backlog Items	User Story #	Estimate (Hours)
1	Database Creation	9	240
2	Login Page	15	160

Prior ity	Product Backlog Items	User Story #	Estimate (Hours)
1	Database Creation	9	240
	Design of <i>CustomerDetails</i> Table		6
	Design of <i>PaymentDetails</i> Table		4
	Creation of <i>CustomerDetails</i> Table		8
	Creation of <i>PaymentDetails</i> Table		8
	Defining <i>Primary & Foreign Key</i> relationships of <i>CustomerDetails</i> & <i>PaymentDetails</i> Tables		5
(Break down continues)...		

How will the work get done?

- The Development Team decides how it will build this functionality into a “Done” product Increment during the Sprint
- The **Product Backlog** items selected for this Sprint plus the plan for delivering them is called the **Sprint Backlog**.
- The Development Team self-organizes the Sprint Backlog by estimating the time it will take to complete each item and assigning tasks to individual team members

Sprint Backlog

Scrum Framework



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Scrum Artifacts-Sprint Backlog (SBL)-Example:



Project: Shopping Website

Prior ity	Product Backlog Items	Estimate (Hours)
1	Database Creation	240
	Design of <i>CustomerDetails</i> Table	6
	Design of <i>PaymentDetails</i> Table	4
	Creation of <i>CustomerDetails</i> Table	8
	Creation of <i>PaymentDetails</i> Table	8
	Defining <i>Primary & Foreign Key</i> relationships of <i>CustomerDetails</i> & <i>PaymentDetails</i> Tables	5
(<i>Break down continues</i>)...	



Daily Scrums

.....> Developer #1

.....> Developer #2

.....> Developer #3

.....> Developer #4

.....> Developer #5

Events - Daily Scrum Meeting

- The Daily Scrum (or “Stand-up Meeting”) is a 15-minute time-boxed event for the Development Team to synchronize activities and create a plan for the next 24 hours.
- The Daily Scrum is held at the same time and place each day to reduce complexity.
- Each team member answers three questions:
 - What has been accomplished since the last meeting?
 - What will be done before the next meeting?
 - What obstacles are in the way?

Sprint Backlog

Scrum Framework



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Scrum Artifacts-Sprint Backlog (SBL)-Example:



Project: Shopping Website

Priority	Product Backlog Items	Estimate (Hours)
1	Database Creation	240
	Design of CustomerDetails Table	6
	Design of PaymentDetails Table	4
	Creation of CustomerDetails Table	8
	Creation of PaymentDetails Table	8
	Defining Primary & Foreign Key relationships of CustomerDetails & PaymentDetails Tables	5
(Break down continues)...	



Daily Scrums

Developer #1 ✓ Done Takes Next Task

Developer #2 ✓ Done Takes Next Task

Developer #3 ✓ Done Takes Next Task

Developer #4 ✓ Done Takes Next Task

Developer #5 ✓ Done Takes Next Task

<https://masterofproject.com/blog/3813/scrum-sprint-backlog>

Events - Sprint Review Meeting

- The Sprint Review Meeting is the time when the Development Team presents what it accomplished during the sprint
- Takes the form of a demo of new features or concrete progress
- Informal and requires little prep time
- The entire team participates

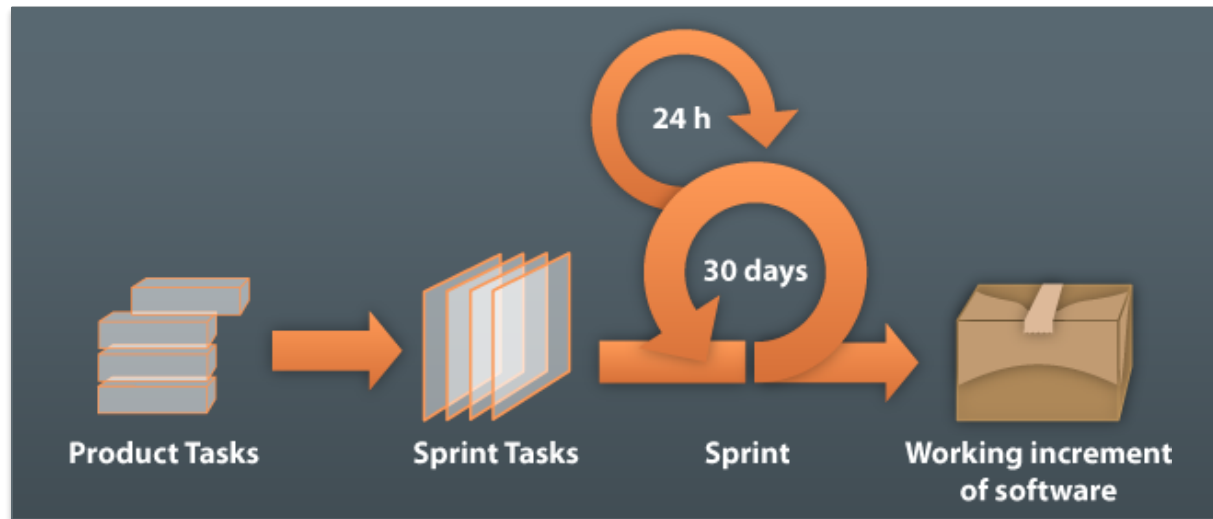


Events - Sprint Retrospective Meeting

- The Sprint Retrospective is an opportunity for the Scrum Team to reflect and create a plan for improvements to be enacted during the next Sprint.
- The purpose:
 - Think about how the last Sprint went with regards to people, relationships, process, and tools
 - Identify the major items that went well and potential improvements
 - Create a plan for implementing improvements to the way the Scrum Team does its work
- All team members have the opportunity to answer:
 - What went well during the last sprint?
 - What didn't go well during the last sprint?
 - How should the team improve for the next sprint?



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- Burn down chart

Artifacts - Project Charter

- **Problem Statement:**
 - Short and succinct (one or two sentences)
- **Project Objectives:**
 - What the project will achieve
- **Stakeholders:**
 - Persons who will be actively involved with the project (e.g. project sponsor, types of users, etc.)
- **Project Deliverables:**
 - The major results or services that will be produced, what are the specific things the software will do

Artifacts - Product Backlog

- The **Product Backlog** is an ordered list of everything that might be needed in the product and is the single source of **Requirements** for any changes to be made to the product.
- The Product Owner is responsible for the Product Backlog, including its content, availability, and ordering.
- A Product Backlog is never complete.
- Lists all features, functions, requirements, enhancements, and fixes that constitute the changes to be made to the product in future releases.

Product Backlog Sample

Backlog Item	Priority
As a guest, I want to make a reservation.	3
As a guest, I want to cancel a reservation.	5
As a guest, I want to change the dates of a reservation.	3
As an admin, I want to change the availability of dates at my hotel.	8
As a developer, I want to improve exception handling.	8

- Backlog items are usually in the form of:
 - As a _____, I want to _____ (so that I can _____).
- Product Backlog items are sometimes called “**user stories**”



Artifacts - Sprint Backlog

- In a Sprint Backlog, the Development Team selects items from the product backlog they can commit to completing in a given sprint.
- The team then identifies tasks to complete these and each is estimated (how many hours to complete).

As a travel planner, I would like to see the reviews of each hotel.

User Story (from Product Backlog)



Program the Back-End (8 hours)

Program the Front-End (4 hours)

Write Test Cases (4 hours)

Make Database Changes (2 hours)

Update Dependent Pages (3 hours)

Sprint Backlog Items

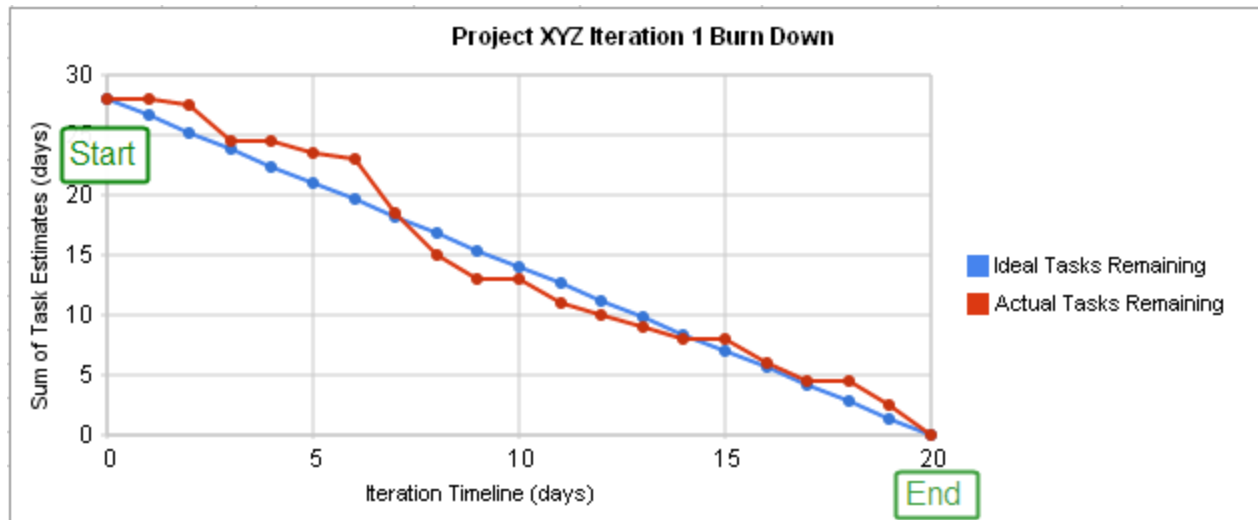
Managing the Sprint Backlog

- Individuals sign up for work of their own choosing
- Work is never assigned
- Estimated work remaining is updated daily
- Any team member can add to, delete from, or modify the sprint backlog
- Work for the sprint emerges
- If work is unclear, define a sprint backlog item with a larger amount of time and break it down later
- Update work remaining as more becomes known

Sprint Backlog Sample

Backlog Tasks	Mon	Tue	Wed	Thur	Fri
Program the Back-End	3	4	1		
Program the Front-End			2	2	
Write Test Cases	3		1		
Make Database Changes		2			
Update Dependent Pages					3

Burn down chart



- Graphical representation of work left to do vs time left in which to do it
- Time is x axis
- Outstanding work (backlog) is y axis



Case Study – Smile App

- Product Backlog:

	Backlog Item	Priority
1	As a user,	
2	As a user,	
3	As a user,	
4	As a user,	
5		
6		
7		

Case Study – Smile App

- Product Backlog:

	Backlog Item	Priority
1	As a user, I can create an account at the Smile Portal.	2
2	As a user, I can login to the Smile Portal.	2
3	As a user, I can view the posts others posted. I can view the title, body, happiness level, like count, timestamp of each story. I can also see who posted the story and the tags associated with it.	1
4	As a user, I can post a new story.	1
5	As a user, I can like the stories posted.	3
6	As a user, I can sort the stories according to different criteria : title (alphabetical), timestamp (most recent first), like count (descending).	3
7	As a user, I can filter the view and display only my posts.	3
8	As a user, I can delete my own stories (can't delete others).	3

Case Study – Smile App

- Sprint Backlog:

	Backlog Item	Hours	Assignee:
1	Define a form (WTForm class) for posting a story.	1	Zayn
2	Revise the DB schema and add a new model to the DB for storing “story” data and a model to store “story tags”. Create a many-to-many relationship associating these two models.	1	Sakire
3	Create a html template to render the “post” form.	1	Guangbei
4	Define a route function (createpost) that will handle the GET request to render the “post” form and POST request to save the story data received in the post form.	1	Sakire
5	Create unit tests for testing the model functions and the route view function.	3	Zayn
6	Create a script to insert the initial tag data to the tags table in the DB. This script should be automatically run each time the DB is initialized.	1	Guangbei
7	Update the “post” form and include a list in the form for	2	Zayn

Case Study – Smile App

- Sprint Backlog:

	Backlog Item	Hours	Assignee:
7	Update the “post” form and include a list in the form for the selection of story tags.	2	Zayn
8	Update the createpost route view function to save the selected tags (in the “post” form) to the DB. Those tags should be associated with the created story.	2	Sakire