UNIVERSITY OF YORK

DEPARTMENT OF COMPUTER SCIENCE

# Method Selection and Planning Cohort 2 - Group 16 (Skloch)

## Group Members:

Charlotte MacDonald

Hollie Shackley

Luis Benito

Kaustav Das

Sam Hartley

Owen Gilmore

**Outline and Justification of our Software Engineering Methods**

Due to the short time frame to complete the project, it was clear that multiple stages of the software engineering process would have to be completed at the same time. This fitted an agile approach. It was also reasonable to suspect that plans would change significantly each week as it would be hard to plan how long each task would take when all team members had other commitments and relatively little experience of creating a game or using game engines. Agile fitted this and also the concept of having flexible interactions with the customer - for example, after the initial customer meeting, there were informal conversations that happened in each practical. Agile approaches prefer shorter timeframes, encourage face-to-face conversations and encourage regular reflection on efficacy [1]. These fitted well to our organisation of having a face-to-face meeting with all team members each week. As these meetings were 2 hours long, they provided ample time to reflect on the previous week, plan for the following week and have detailed discussions about the deliverables. The assessment format of releasing a partial solution first also fitted well to the agile manifesto [1].

The main inspiration for our methods and organisation came from scrum. As we were already committed to weekly meetings, it was natural to create weekly sprints. The start of each meeting was then dedicated to a review and retrospective of the sprint using ideas from scrum to reflect on what did and didn't happen and which tasks went well, were challenging or were problematic. This allowed us to reflect on anything that needed to change for the next sprint before planning the sprint and adapting overall project plans as needed. Work that was categorised as not done was able to be pushed back to a more suitable time. The retrospective also allowed for reflection on unforeseen dependencies that had limited progress which allowed for the re-ordering of tasks and prioritisation of what was left.

We also drew inspiration from the spiral lifecycle as this produces good documentation control [2] and a large part of the project is based around documentation. This documentation is also reviewed in every loop which was very similar to how we created new plans and reviewed the risk assessment each week. However, we only used certain parts of this lifecycle as adapting it well would not have fitted our size of project and scheduling was extremely important to the project [2].

**Identification and Justification of Development and Collaboration Tools Used** The customer briefing placed the constraint of using only Java for the implementation and using a gaming engine written in Java. The requirements for the game included that it would be 2D. Research of various 2D Java game engines was undertaken and LibGDX was chosen as this has specifically been built for 2D games and interlinks well with Github. Other alternatives, including J Monkey and LWJGL, were considered. Many team members liked the look of J Monkey however it seemed much more suited to 3D game development and the assessment brief specified that the game must be 2D. By looking at reviews of LWJGL, it seemed that it was difficult to learn at first so it was felt that this would be an unnecessary delay and inefficient to choose [3]. IntelliJ was selected as the IDE as LibGDX relies heavily on Gradle to assemble projects. Originally, the plan was to use VSCode as all team members had used it before including for Java and it was already on all department machines but this does not interact well with Gradle and would have created unnecessary difficulty during implementation. After finding that IntelliJ was also available on the department machines and would work much better, it was agreed upon.

Github was chosen for the code base and website as several team members had prior

experience and it is the standard tool. Other alternatives were briefly considered such as Apache

Subversion but no team members had prior experience with these so it was felt that they would add unnecessary delays and extra work of becoming experienced with using them first. In addition, Github encourages small commits as well as branching and merging which worked well with our agile approach. Github was also selected to host the website as all team members either had prior experience or would be gaining experience through its use in the implementation. Google Drive was used for collaboration for the other deliverables due to the live collaboration features and all team members having access and prior experience. Using Google Docs for the deliverables also had the advantage of version control so any changes could always be reverted if necessary. Being able to add comments easily to Google Docs also allowed collaboration on documents without having to switch between multiple platforms. Google Slides was also used for scrum reviews and retrospectives as it provided easily movable shapes and text boxes to categorise if targets for the week had been met or not. It also allowed all team members to add in their thoughts and for this to easily be presentable in meetings.

For collaboration such as suggesting ideas outside of meetings, Discord was agreed as the platform to use. Slack was considered but no team members had experience of using it whereas all had experience of Discord. Whatsapp was also considered but Discord was felt to be more suitable as it was better suited for sharing larger amounts of text and channels would allow different deliverables to be discussed in their own areas to help organisation. Using Discord fit well with our scrum-inspired methods as it allowed for very frequent communication between team members. For architectural diagrams, the decision was made to use PlantUML. This was because this works well with Google Docs and so it would be easy to add diagrams to documents but also to change them during the evolution of the document and the project. PlantUML was also used for other diagrams including those in the planning process. This reduced the bus factor as it meant that more people were aware of and experienced with the language being used for the architectural diagrams. Alternatives considered included Mermaid and Graphviz but these did not have the benefits of PlantUML.

As well as the constraint of only using Java for implementation, there was also the constraint of only using tools available on department machines so that if team members weren't able to use a personal device or access the tools personally, they would still be able to access the full project and contribute well. Available expertise was taken into account for each decision.

**Team Organisation**

Team members were assigned to 15 marks from the 6 deliverables. Most team members wanted to be on more than one deliverable to gain more experience. As the website had so few marks allocated, this was assigned to just one person. However, all other deliverables had a minimum of 2 team members working on them to lower the bus factor. Assignment started by assigning team members to areas that they had experience of in order to keep the project as efficient as possible. Team members were then assigned to anything they particularly wished to do and finally the gaps were filled.

As there were 6 deliverables and 6 team members, each team member took on leadership for one deliverable. The website was assigned to Luis so he took on the leadership role for this deliverable. Implementation was split between Sam (60%) and Owen (40%). As Sam had the biggest

proportion of marks, he took this one on. Method selection and planning was split evenly between Hollie (50%) and Luis (50%). As Luis already had a leadership role, Hollie took this on for this deliverable. Requirements were split between Hollie (50%), Luis (25%) and Kaustav (25%). As Luis and Hollie already had roles, Kaustav took on the leadership role. Risk assessment and mitigation was split evenly between Kaustav (50%) and Charlotte (50%). As Kaustav already had a leadership role, this was taken on by Charlotte. Architecture was split between Charlotte (45%), Luis (9%), Kaustav (23%) and Owen (23%). As Charlotte, Luis and Kaustav already had roles, Owen took the leadership role. This approach was suitable for the project as it was made clear that equitable work allocation was expected and so no team member should be given more responsibility than another. This approach also avoided joint leadership for any deliverable. Deliverable leaders were responsible for splitting the work in that deliverable between the team members assigned to work on it.
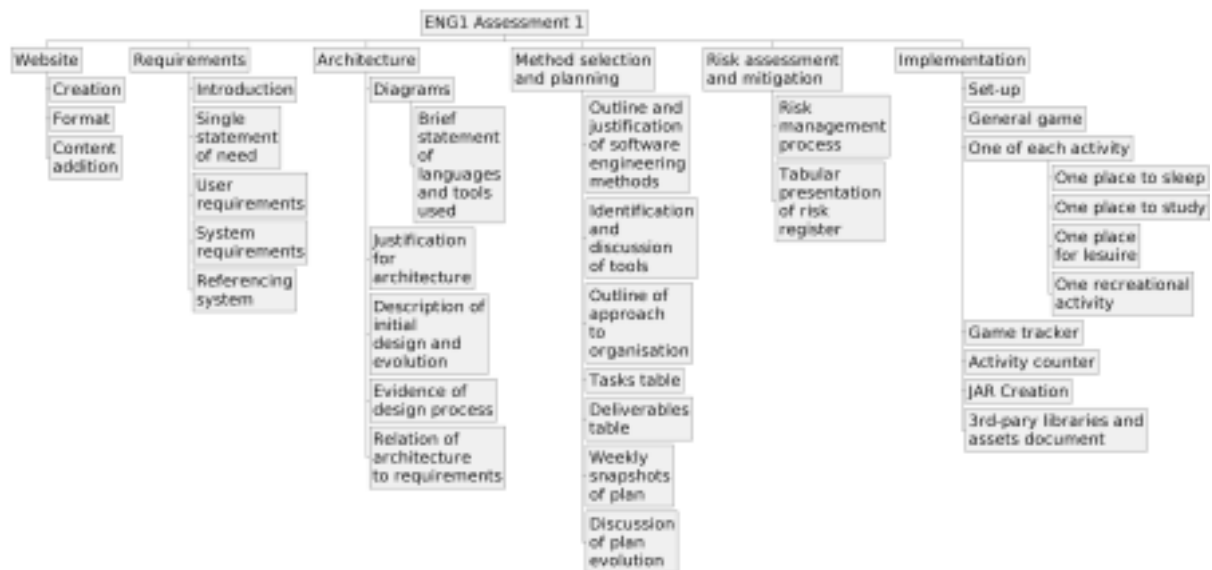
The risk management process required that 3 roles be designated. These were project manager, product owner and team leader. To again ensure equitable work allocation, each role was allocated to 2 team members. As the primary product is the game, Owen and Sam were selected as product owners as they were completing the implementation deliverable. Charlotte and Kaustav were selected as team leaders as they were responsible for the risks and mitigation deliverable and so were naturally leading that process. Hollie and Luis were selected as project managers as they were responsible for the planning deliverable which fits into the scope of project management.

There was also the role of upper management provided by the customer. This was available if it was needed to solve team disputes or any other issues but wasn't needed. The customer was also the main stakeholder and the only stakeholder who decided requirements. Communication with the stakeholder was first through a formal client meeting to gather more information about requirements. It was then continued through weekly discussions during practical sessions where smaller questions were clarified and updates on progress were given.

Decisions were mostly made through unanimous decision as there was very little disagreement. However, where there was any disagreement, the decision was first attempted to be made through the majority opinion. If opinion was equally split, the decision was made by the leader of the deliverable it related to.

**Work Breakdown**

The work breakdown structure was created using the assessment document to split into deliverables which were then further broken down. The product brief was used to break down the implementation deliverable.

ENG1 Assessment 1

Website
- Creation
- Format
- Content addition

Requirements
- Introduction
- Single statement of need
- User requirements
- System requirements
- Referencing system

Architecture
- Diagrams
- Brief statement of languages and tools used
- Justification for architecture
- Description of initial design and evolution
- Evidence of design process
- Relation of architecture to requirements

Method selection and planning
- Outline and justification of software engineering methods
- Identification and discussion of tools
- Outline of approach to organisation
- Tasks table
- Deliverables table
- Weekly snapshots of plan
- Discussion of plan evolution

Risk assessment and mitigation
- Risk management process
- Tabular presentation of risk register

Implementation
- Set-up
- General game
- One of each activity
  - One place to sleep
  - One place to study
  - One place for leisure
  - One recreational activity
- Game tracker
- Activity counter
- JAR Creation
- 3rd-pary libraries and assets document

**Deliverables Table**

| ID | Title | Due date | Description Visibility Relevant tasks |
|---|---|---|---|
| D1 | url1.txt | 21/3 | Website Shared T1 |
|  | Req1.pdf | 21/3 | Requirements Shared T2 |
|  | 2 Questions for client | 29/2 | Preparation of questions for client Internal T2.2 interview |
| D3 | Arch1.pdf | 21/3 | Architecture Shared T3 |
| D4 | Plan1.pdf | 21/3 | Methods and planning Shared T4 |
| D5 | Risk1.pdf | 21/3 | Risk assessment and mitigation Shared T5 |
|  | Impl1.pdf | 21/3 | Implementation Shared T6.6 |
|  |  | 21/3 | Implementation Shared T6.1-T6.5 |
|  | Executable JAR | 21/3 | Implementation Shared T6.1-T6.5 |

**Tasks Table**

| Task ID | Description | Start date End date Dependencies | Priority |
|---|---|---|---|
| T1.1 | Create and format website | 21/2 27/2 | High |
| T1.2 | Add all content and links needed to website | 12/2 12/3 T1.2 | High |

| T2.1 | Create requirements referencing system | 28/2 5/3 | High |
|---|---|---|---|
| T2.2 | Prepare for and have client meeting | 21/2 29/2 | High |
| T2.3 | Give statement of user requirements | 28/2 5/3 T2.1, T2.2 | High |
| T2.4 | Give statement of system requirements | 28/2 5/3 T2.1, T2.2 | High |
| T2.5 | Introduction to requirements | 6/3 12/3 T2.2 | High |
| T2.6 | Single statement of need | 6/3 12/3 T2.2 | Medium |
| T3.1 | Diagrammatic representations of product'sarchitecture | 21/2 12/3 | High |
| T3.2 | Statement of languages and tools | 21/2 12/3 | High |

T3.3 Justification for architecture 21/2 12/3 High T3.4 Initial design and evolution 21/2 12/3 High T3.5 Evidence of design process followed 21/2 12/3 T3.1 High

| T3.6 | Relation of architecture to requirements | 28/2 12/3 T2.2, T2.3 | High |
|---|---|---|---|
| T4.1 | Outline and justification of methods and tools including alternatives considered | 6/3/24 12/3 | High |
| T4.2 | Outline and explanation of team organisation | 6/3/24 12/3 | High |
| T4.4 | Work breakdown diagram with explanation | 21/2 27/2 | High |
| T4.5 | Deliverables table | 21/2 27/2 | High |
| T4.6 | Tasks table | 21/2 27/2 T4.5 | High |
| T4.7 | Discussion of plan evolution and Gantt charts | 21/2 12/3 Meetings, previous charts | Medium |
| T5.1 | Risk register | 21/2 27/2 | High |
| T5.2 | Create mitigation and contingency strategies | 21/2 27/2 T5.1 | High |
| T5.3 | Describe and justify risk management process and format of risk register | 21/2 27/2 T5.1, T5.2 | High |
| T5.4 | Continued risk reassessment | 21/2 12/3 T5.1 | Mediu |

| | | | m |
|---|---|---|---|
| T6.1 | Set-up implementation | 21/2 27/2 | High |
| T6.2 | Create one of each activity | 28/2 12/3 T6.1 | High |
| T6.3 | location Create game tracker | 28/2 12/3 T6.1 | High |
| T6.4 | Create counter | 28/2 12/3 T6.1 | High |
| T6.5 | Document code and create JAR | 28/2 12/3 T6.2, T6.3, T6.4 H | |

T6.6 List 3rd-party libraries and assets with licences and discussion of licence suitabilities

**Discussion of Plan Evolution**

28/2 12/3 T6.2, T6.3, T6.4 High

The Gantt charts [please see Gantt Charts website tab] were updated after each weekly meeting to reflect changes in the plan and variations between the work that was intended to be completed and what was actually completed. As we'd adapted a scrum methodology, each meeting started with a sprint review and retrospective to identify what work had been completed and any issues that team had faced. A new plan was agreed for the remainder of the project. Small changes were required each week. These mostly involved extending the number of days required for tasks or pushing back tasks due to unforeseen dependencies. We started by leaving a spare week for anything that ran over and for proofreading. After the week 2 meeting, the website hadn't been created and the progress with architecture was behind. Luis asked to be moved off implementation so Sam was moved to this and Luis took on methods selection. After the week 3 meeting, the website, user requirements and non-functional requirements needed to be pushed back. User requirements being pushed back restricted the ability to finish functional system requirements and also held back architecture and implementation. After the week 4 meeting, it was clear that some deliverables needed a bit of extra time so these were extended and the proof reading time shortened to accommodate this. It was also necessary to add a task of a week 5 re-plan as things hadn't been finished as hoped. It was also necessary to push back the methods selection write-up.

**References**

[1] K. Beck, et al. (2001). Principles behind the Agile Manifesto. Manifesto for Agile Software Development. [Online]. Available: https://agilemanifesto.org/principles.html [Accessed: 13 March 2024].

[2] A. Garg, R. K. Kaliyar, and A. Goswami (2022). PDRSD-A systematic review on plan-driven SDLC models for software development. 8th International Conference on Advanced Computing and Communication Systems, Coimbatore, India, Mar. 25-26, 2022, IEEE, 2022

[3] B. Refi (2023, Aug. 3) Java Game Engines: Top Choices For Game Development. Bluebird. [Online]. Available at: https://bluebirdinternational.com/java-game-engines/ [Accessed: 14 February 2024].

# Team 15

| MEETING RECORD | | | |
|---|---|---|---|
| **Date:** 17/4/24 | | **Place:** CSE/069 | |
| **Present:** Adam, Tseveta, April, Oliver, Chris | | | |
| **Agenda:** Finalize Project Decision, Start to Familiarize With Code | | | |
| **Summary of the Discussion:** Chose Group 16 | | | |
| **Reports on Progress to Date:** | | | |
| Action List | | | |
| **Action No** | **Owner** | **Short description of action** | **Status:** |
| 1 | All | Start to look at codebase to understand how the project works, and how to structure tests, edit the codebase etc | *Ongoing* |

| SUMMARY OF RESPONSIBILITIES | | |
|---|---|---|
| **Phase of work** | **Owner** | **Contributors** *Give a short account of who did what* |
| Intention | Adam, Oliver, Luke, Tsveta, April | Started to look at project codebase, discussed how to write unit tests for the project |
| Intention | Chris | Started to look at change report and what needed to be done for it |

Initial Gantt Chart

## MEETING RECORD

| | |
|---|---|
| **Date:21/4/24** | **Place: Slack** |

**Present: Adam, Oliver, Luke, Tvesta, April (Implementation)**

**Agenda:**
- **Decide how to divide work**
- **Choose which classes everyone should begin to work on**
- **Discuss what tests to implement**

**Summary of the Discussion:**
- **Decided to use github issues to divide work**
- **Decided that testing must be complete before continuing the project**

**Reports on Progress to Date:**
- **Assigned classes to everyone**
- **Began implementing unit tests**

| Action List | | | |
|---|---|---|---|
| **Action No** | **Owner** | **Short description of action** | **Status:** |
| | | | |

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| SUMMARY OF RESPONSIBILITIES | | |
|---|---|---|
| **Phase of work** | **Owner** | **Contributors** *Give a short account of who did what* |
| Intention | All | Continue to test the new code |
| | | |

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## MEETING RECORD

| | |
|---|---|
| **Date:24/04/24** | **Place: CSE/069** |

**Present: Adam, Oliver, Luke, Tvesta, Luca,Chris**

**Agenda:**
- **Discuss how to divide work for the following sections:**
  - **CI Report**
  - **Change Report**
- **Resolve issues found with unit tests**

**Summary of the Discussion:**
- **Divided work for the above sections, in proportion to the marks allocated to each member**
- **Suspended work on unit testing due to inexperience - Test Driven Design is considered impractical if we can't figure out how to write tests easily**
- **Decided to focus on implementing features in time for user evaluation**

**Reports on Progress to Date:**
- 

| Action List |
|---|

| Action No | Owner | Short description of action | Status: |
|---|---|---|---|
| 1 | Luca,Chris | Started to update the inherited deliverables | *Ongoing* |
| 2 | Implementation | Continued work on resolving test issues and updated list of what needs to be tested | *Ongoing* |
| 3 | Implementation | Decided on which requirements are most important to implement before user evaluation | *Completed* |

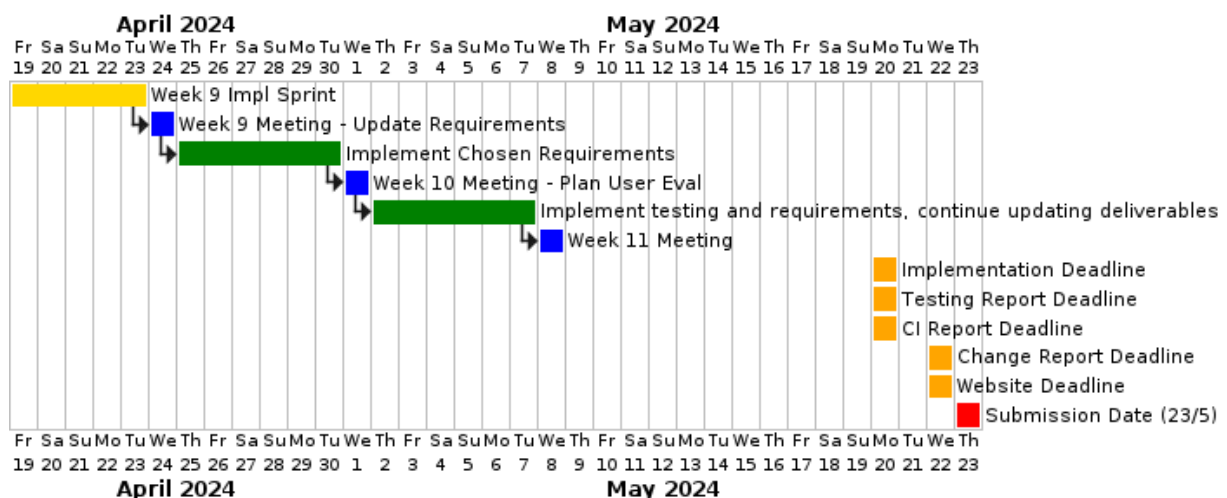| SUMMARY OF RESPONSIBILITIES | | |
|---|---|---|
| **Phase of work** | **Owner** | **Contributors** *Give a short account of who did what* |
| Intention | Implementation | Continue to test the new code |
| Intention | Luca,Chris | Continue to update the inherited deliverables |
| Intention | Implementation | Implement chosen requirements - namely the scoring feature and additional places for recreational activities |

Updated Gantt Chart
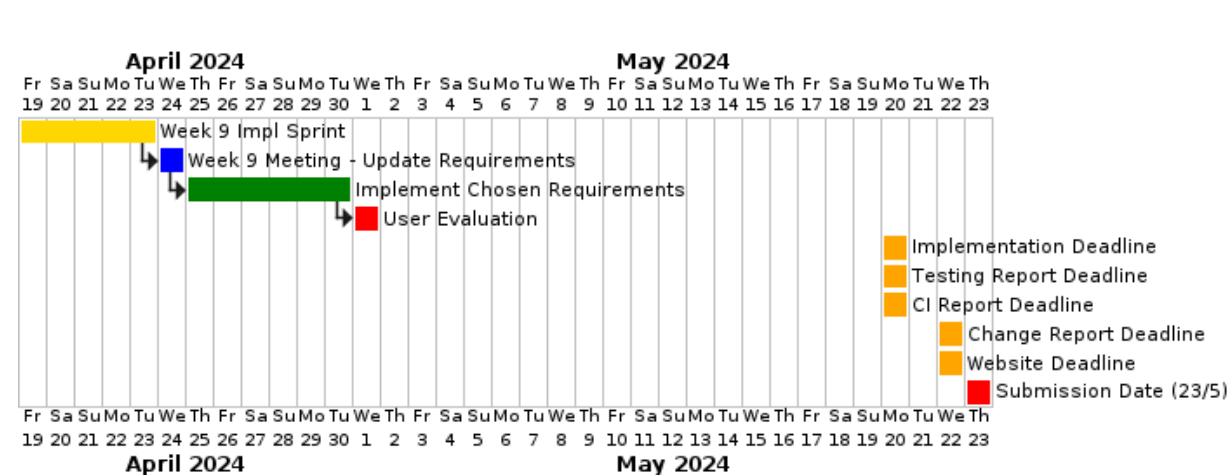


| MEETING RECORD |
|---|

| Date:01/05/24 | Place: CSE/069 |
|---|---|
| **Present: Adam, April, Luke, Tvesta, Luca,Oliver** | |
| **Agenda:** | |
| - **Plan the User Evaluation** | |
| **Summary of the Discussion:** | |
| - **Decided on a time to do the user evaluation** | |
| - **Used spare time to continue assigned work** | |
| **Reports on Progress to Date:** | |
| - **All forms for the User evaluation have been completed** | |

| Action List | | | |
|---|---|---|---|
| **Action No** | **Owner** | **Short description of action** | **Status:** |
| 1 | Oliver , Tvesta,April | Plan User Evaluation | *Completed* |
| 2 | All | Continue with assigned work | *Ongoing* |
| | | | |

| SUMMARY OF RESPONSIBILITIES | | |
|---|---|---|
| **Phase of work** | **Owner** | **Contributors** *Give a short account of who did what* |
| Intention | Luca, Chris | Continue to work on new deliverables |
| Intention | Adam | Aim to start testing by next week |
| Intention | Tvesta, Oliver, April, Luke | Continue implementation |

# MEETING RECORD

| Date: 6/5/24 | Place: Online (Google Meets) |
|---|---|

**Present:** Adam, Tsveta, Luke, April, Oliver

**Agenda:** Identify Testable Parts Of The Project

**Summary of the Discussion:**
- Have started to write unit tests for Leaderboard/LeaderboardScreen classes
- Have started to write manual tests to cover the rest of the project

**Reports on Progress to Date:**

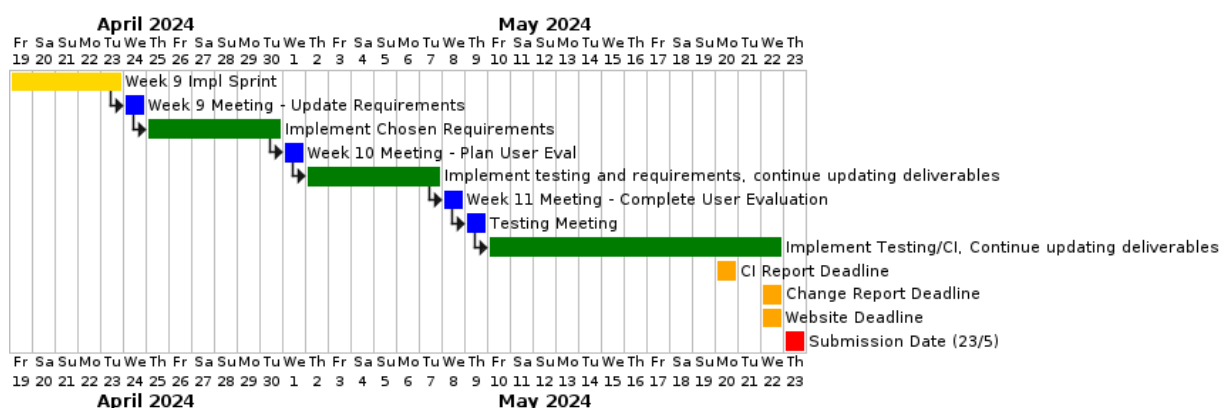| Action List | | | |
|---|---|---|---|
| **Action No** | **Owner** | **Short description of action** | **Status:** |
| 1. | Adam | Start to write basic manual tests to cover all user requirements | *Ongoing* |
| 2. | All | Look through project classes to determine testable classes | *Done* |
| 3. | All | Look through Leaderboard/LeaderboardScreen classes to identify testable areas | *Ongoing* |

| SUMMARY OF RESPONSIBILITIES | | |
|---|---|---|
| **Phase of work** | **Owner** | **Contributors** *Give a short account of who did what* |
| Intention | Adam | Start with manual testing for the scope of basic coverage, then move onto boundary testing, etc |
| Intention | All | Start to write unit tests for the Leaderboard/LeaderboardScreen classes |
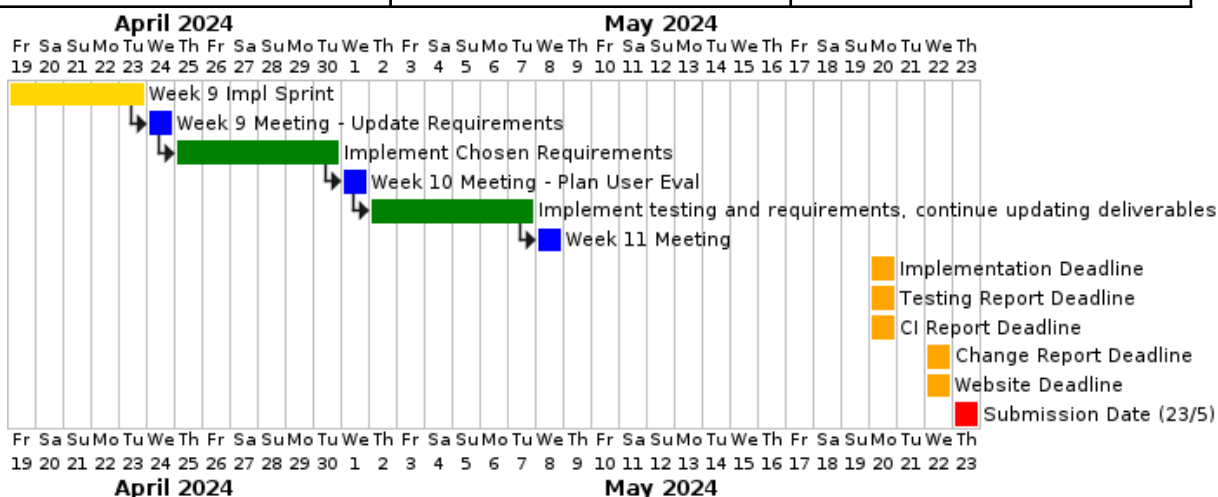


# MEETING RECORD

| Date:08/05/24 | Place: CSE/069 |
|---|---|

**Present: Adam, April, Chris, Luke, Tvesta, Luca,Oliver**

**Agenda:**

| | | | |
|---|---|---|---|
| - **Complete User Evaluation** | | | |
| - **Work on getting testing and CI to work** | | | |
| - **Continue assigned work** | | | |

**Summary of the Discussion:**
- **Got assistance from the practical leader on issues we had with testing and CI**
  - **Can now properly implement**

**Reports on Progress to Date:**
- **Completed User Evaluation**
- **Set a meeting date to discuss testing**

| Action List | | | |
|---|---|---|---|
| **Action No** | **Owner** | **Short description of action** | **Status:** |
| 1 | User Evaluation + Luke | Complete User Evaluation | *Completed* |
| 2 | Adam | Begin to fully implement testing/CI | *Ongoing* |
| 3 | Luca | Continue to update deliverables | *Ongoing* |
| 4 | Testing | Set a meeting date to divide work | *Completed* |

| SUMMARY OF RESPONSIBILITIES | | |
|---|---|---|
| **Phase of work** | **Owner** | **Contributors** *Give a short account of who did what* |
| Intention | Implementation | Adjust code based on user evaluation |
| Intention | Testing | Continue to implement testing |
| Intention | Luca,Chris | Continue to update deliverables |



| MEETING RECORD | |
|---|---|
| Date:17/05/24 | Place: Online (Google Meet) |

| Present: Adam, April, Tsveta, Oliver | | | |
|---|---|---|---|
| **Agenda:** | | | |
| - **Discuss current state of testing** | | | |
| - **Outline changes to be made for final implementation** | | | |
| - **Divide work for testing report** | | | |
| **Summary of the Discussion:** | | | |
| - **Decided on final things to implement** | | | |
| - **Started to work on test report** | | | |
| **Reports on Progress to Date:** | | | |
| - **Started on final implementation** | | | |
| - **Started on test report** | | | |
| - **Started on presentation** | | | |

| Action List | | | |
|---|---|---|---|
| **Action No** | **Owner** | **Short description of action** | **Status:** |
| 1 | Adam | Implemented NPCs (Tilemap + Event) | *Completed* |
| 2 | All | Fix JUnit tests for automated testing | *Ongoing* |

| SUMMARY OF RESPONSIBILITIES | | |
|---|---|---|
| **Phase of work** | **Owner** | **Contributors** *Give a short account of who did what* |
| Intention | Adam | Write presentation |
| Intention | Testing Team | Finish testing and write test report |