

UNIVERSITY OF SOUTHAMPTON

# COMP2211: Software Engineering Group Project

## DELIVERABLE 1: ENVISIONING

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# **1 Stakeholder Analysis**

## **1.1 Primary Stakeholders**

### **1.1.1 Runway Technician**

Responsible for the maintenance of the runway, including handling any foreign object debris (FOD) that is present on the runway. The technician will take the necessary measurements of the size of the obstacle and its position. He enters this data into the system and receives revised runway as well as some visualisation aid. Reports results to Airfield Operations Manager.

### **1.1.2 Airfield Operations Manager**

Manages the everyday operations of the airfield, including co-ordinating with runway technicians and making the decision in regards to runway re-declaration. Receives revised runway data from the system and decides whether operations are to continue. If they are to continue, he asks two qualified people to recalculate the published data about the affected runway. He then transmits the revised runway, calculated in accord with the official process, to the Air Traffic Controller.

## **1.2 Secondary Stakeholders**

### **1.2.1 Air Traffic Controller**

The Air Traffic Controller receives the official revised runway from the Airfield Operations Manager and republishes the data and makes sure that every affected Pilot/aircraft, Aircraft Marshall and others acknowledge the change in runway parameters.

### **1.2.2 Aircraft Marshall**

The Aircraft Marshall receives the official revised runway from the Air Traffic Controller in order to ensure that he taxis the plane to the correct part of the runway.

### **1.2.3 Pilot**

The Pilot receives the newly republished data and makes the decision of landing/taking-off on the modified runway. This decision is then relayed to the Air Traffic Controller.

## **1.3 Tertiary Stakeholders**

### **1.3.1 Passenger Airline**

It is its responsibility to make sure that its passengers travel safely, comfortably and efficiently.

### **1.3.2 Airline Passenger**

Contributes financially to the airlines and to the airports by buying airplane tickets and by visiting the duty-free shops. The passenger wants to travel safely, comfortable and doesn't want its plane to be delayed.

### **1.3.3 Cabin Crew**

Responsible for looking after passengers on the flight, and therefore are affected by any changes that may happen during take off or landing as a result of the runway re-declaration.

### **1.3.4 Airport Management**

Responsible for running the operations of the airport, which is financially impacted by the efficiency of the runway re-declaration process.

### **1.3.5 Support Personnel**

Provide additional support, such as emergency services and luggage transportation, which may be impacted by the runway re-declaration.

## 2 Personas

### 2.1 Lauren: Runway Technician



Lauren is a 22-year-old trainee runway technician who has only been in the job for 6 months. Having only recently graduated from college and began her career, Lauren is still under constant supervision by her more senior colleagues. Having grown up in the digital age, Lauren is very technologically literate, and often assists her older colleagues with any issues they may encounter with the computer-based systems that they use in their daily work.

Despite her juniority, Lauren is confident in her role and often impresses her superiors with her initiative. However, this also means she sometimes makes judgements without first consulting her supervisors, which can lead to poor decisions. She also is not completely familiar with all of the jargon that is used by her colleagues, and as a result may not understand certain acronyms or terms.

### 2.2 James: Airfield Operations Manager



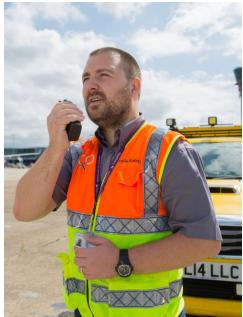
James is a 42-year-old Airfield Operations manager that has been working for the same Airport for 11 years. He has been working as a manager his whole career, thanks to his pro activeness throughout all his school years. James is committed to his role as a manager, and wants to always make sure everything and everyone is working as efficiently as possible and he hopes to inspire his colleagues with his determination.

James is a firm believer of the phrase “time is money” and therefore hates it when people idle-chatter, especially during work hours. Despite that, having worked for the same company for a long time, he understands the importance of creating good relationships and loyalty amongst colleagues, as well as not overworking staff. James isn’t very tech-savvy, but he understands how useful it can be to increasing productivity. He wants to learn how to use all these new forms of technology, however, when he isn’t working, he’d much rather

spend time with his family, so that he doesn’t overwork himself.

Over the years, James notices that there is a steady increase in the number of customers, therefore there are more aeroplanes are landing and taking off everyday. James finds it crucial that important information or tasks, such as regarding the airfield, are updated or completed quickly and reliably, without overworking the airport staff.

### 2.3 Charles: Airfield Operations Manager



Charles is a 47-year-old competent and seasoned airfield operations manager. He has been working in this field ever since he graduated college and first took on the role of a trainee. Over the course of 25 years Charles’s work ethic and intelligence didn’t go unnoticed, allowing him to climb up the ranks quickly to attain the position of manager. Charles also oversees the training of new trainees. Once having been in their shoes, Charles knows exactly how to coach them so that they can realise their fullest potential and more importantly not end up making any crucial errors that may lead to an accident. Charles recognizes the importance of his role as it affects the safety of thousands every day and hence takes his responsibilities very seriously.

Charles being a mentor to many notices occasionally that his subordinates don’t always relay information quickly enough with workers in different divisions to ensure all operations pertaining to the runway are running smoothly. As the number of incoming and departing flights continue to increase, Charles imagines this could lead to potential ramifications.

## 2.4 Aaron: Runway Technician



Aaron is a 27 year old qualified runway technician who has been working at the same airport he received training at for the past 6 years. After finishing college at 19 he spent a few years doing odd jobs whilst trying to figure out a career path for himself, until he landed a runway technician trainee role at an airport. Having worked hard whilst showing promise and competence Aaron became a fully qualified runway technician after 12 months as a trainee. Efficient in his role Aaron usually provides quick effective solutions to issues on the runway which he has become more familiar with as years pass.

A well equipped confident worker who helps out new trainees and works well in his team, Aaron believes in teamwork and division of labour as a best means to overcoming day to day obstacles. Aaron recognises that he is part of a bigger system at hand and that his actions have consequences, pushing him to ensure he doesn't mess around on job. Goal orientated and driven, Aaron is slowly becoming one of the more experienced technicians in the airport and is looking to further progress his career and move up the ladder in the airport, hoping to one day become head technician.

After being at the airport for 6 years, Aaron has witnessed more and more new runway personnel due to the increasing demand for air travel. With more new trainees and newly qualified technicians landing on the team, Aaron understands the need for team work and for him to pass on his knowledge on runway operations in order to help keep the airport running smoothly.

## 2.5 Felicia: Aircraft Marshall



Felicia, a 30 year old aircraft marshal with 8 years experience who takes pride and passion in her job. Her communication skills make her a key member of the runway team, allowing her to efficiently understand and comprehend instructions given to her on revised runways when taxiing aircrafts to their correct positions.

Having an open and friendly personality, Felicia is an engaging member of the airport team and is always sharing her knowledge and experience with others, whilst simultaneously learning from the other personnel members. She is committed to her job and happy in her position, knowing that her daily work is helping and affecting multitudes of people a day.

Whilst being at the same airport for many years, Felicia is still committed to her job. Seeing the trend of increased air travel year after year she is enjoying the new pressures and daily challenges involved with airports increasing in size and more planes departing and landing daily. Due to the increasing possibilities of issues on the runway from the growing number of departures and landings, she is always trying to learn from experiences in order to facilitate possible future issues of similar circumstances.

## 2.6 Hideo: Pilot



Hideo is a 56-year-old pilot who has been flying for just over 30 years. He is the most experienced pilot employed by his airline, and regularly flies long-haul flights to destinations across the world.

After having such a distinguished career, Hideo has been financially able to retire for quite some time, but desires to stay in the job for as long as possible. Despite his age, Hideo is a bit of a technophile, with his passion for technology only being surpassed for that of aviation, meaning he is especially enthusiastic about technology that relates to aviation.

He is very much a stickler for the rules, and intends to follow them to the letter, with the safety of his passengers and crew being his primary motivation. This however can put him at odds with his colleagues, since he expects the same professionalism and behaviour from them, and is more than willing to fiercely argue his points in these situations.

## 2.7 Hilary: Air Traffic Controller



Hilary is a 39-year-old Air Traffic Controller who has been monitoring airports' airspaces for 10 years now. She graduated with a bachelor's degree from the Air Traffic Collegiate Training Initiative program.

Her excellent communication skills make her very efficient at relaying information between the Airfield Operations Manager, the Pilot and other staff. Hilary's attention to detail and her lucidity as garnered attention from her superiors who have given her more and more responsibilities within the tower.

This added pressure to what is already a very stressful occupation has had some impact on her patience with her co-workers on the field. She will not hesitate to call out people

whose work isn't up to her expectations as she is worried about the safety of everybody in this airport. She hopes that her co-workers on the ground will start to understand the importance of producing accurate results within a short delay to ensure a safe operation of the airport runways.

## 2.8 Alicia: Airline Passenger



Alice is a 27 year old investment banker who has been working in this field since she graduated from college. She has excelled since her first day, her confidence and communication skills makes her an invaluable member of the firm. Despite her young age she is one her colleagues look for in times of help and assistance.

Alice travels frequently given the nature of her occupation. She has meetings with potential partners her firm are keen on working with and it is imperative for her to arrive early to make a good impression. Alice is a hard working, determined and extremely capable woman who is willing to go the extra mile to get the job done. She hates disappointing her superiors and colleagues who have high expectations of her.

Alice also has anxiety, the delay of her flight's arrival or departure time sometimes stresses her out which leads to a rather unpleasant journey. She just hopes that all communication between pilot and ground staff are quick, updated and accurate so that the pilot can make the fastest possible landing or take-off causing no delay which will surely increases the odds of Alice making it to her meetings.

## 3 Product Backlog

Name	Description	Priority
Declare New Airport	As a Runway Technician I want to be able to declare a new Airport so that I can store its runways within it.	MUST
Predefined Obstacle List	As a Runway Technician I want to have access to a list of predefined obstacles so that I don't spend as much time defining the size of the obstacle on the runway.	SHOULD
Obstacle Placement	As a Runway Technician I want to be able to declare the exact position of the obstacle on the runway so that the revised runway is as accurate as possible.	MUST
Obstacle Notification	As a Runway Technician I want to receive a notification from the system so that I know that I have added an obstacle.	COULD
Successful Runway Revision Notification	As a Runway Technician I want to receive a notification from the system so that I know that I have successfully a revised a runway.	SHOULD
Runway Update Notification	As a Runway Technician I want to receive a notification from the system so that I know that runway values have changed.	COULD
Obstacle Definition	As a Runway Technician I want to be able to define a new obstacle so that it can be placed on the runway for use in the calculations.	MUST
Runway Definition	As a Runway Technician I want to be able to define a new runway so that I can use it in calculations that may be required to determine if a runway should be re-declared or closed.	MUST
Revised Runway Calculations	As a Runway Technician I want to be able, given a runway and an obstacle, to calculate revised runway dimensions so that my manager can decide whether we should proceed with official calculations.	MUST
Obstacle Saving	As a Runway Technician I want to be able to save obstacles so that I can reuse it and save time in the future.	COULD
Input Error Checking	As a Runway Technician I want the system to check my input errors so that I don't end up producing incorrect results.	SHOULD
XML Airport Import	As a Runway Technician I want to be able to import details of the airport via an XML file so that I do not have to manually define it every time I use the system.	COULD
XML Obstacle Import	As a Runway Technician I want to be able to import obstacles via an XML file so that I do not have to manually define them every time I use the system.	COULD
XML Data Import	As a Runway Technician I want to be able to import other data via an XML file so that I do not have to manually define it every time I use the system.	COULD
XML Obstacle Export	As a Runway Technician I want to be able to export details of obstacles in an XML format so that I can use that data on other systems.	COULD
XML Airport Export	As a Runway Technician I want to be able to export details of airports in an XML format so that I can use that data on other systems.	COULD
XML Data Export	As a Runway Technician I want to be able to export other data in an XML format so that I can use that data on other systems.	COULD
System Accessibility - Screen Reader	As a Runway Technician I want to be able to use a screen reader so that I can use the system properly if I have impaired vision.	WON'T
System Accessibility - Colour Scheme	As a Runway Technician I want to be able to change the colour scheme of the visual representation of the runway so that if I were colour-blind, there is no mistake when viewing the visualisation.	WON'T
Data Comparison	As an Airfield Operations Manager I want to be able to view the re-calculated values and the originals so that I can more easily make a decision about runway re-declaration.	MUST

Calculation Breakdown	As an Airfield Operations Manager I want to be able to view a breakdown of the calculations so that I can compare them with the calculations made by my qualified personnel.	SHOULD
Runway Sideways	As an Airfield Operations Manager I want to be able to visualise the runway with the obstacle from a sideways perspective so that I can decide whether official calculations are necessary or the runway should be closed.	SHOULD
Runway Bird's-eye	As an Airfield Operations Manager I want to be able to visualise the runway with the obstacle from a bird's-eye perspective so that I can decide whether official calculations are necessary or the runway should be closed.	SHOULD
Simultaneous View Runway	As an Airfield Operations Manager I want to be able to visualise the runway from both a sideways and bird's-eye view simultaneously so that I can compare both perspectives to help determine whether to close the runway or re-declare it.	SHOULD
Change Thresholds	As an Airfield Operations Manager I want to be able to select different runways and thresholds so that I can see how the obstacle may obstruct taking-off and landing operations.	SHOULD
Runway Rotation	As an Airfield Operations Manager I want the system to automatically rotate the top-down view to the appropriate angle based on the compass heading so that I am able to easily visualise the runway re-declaration.	COULD
Clear and Graded Area	As an Airfield Operations Manager I want to be able to see the clear and graded area on the bird's-eye view of the runway so that I can determine if official calculations are required dependent on if the obstacle is located in that area.	COULD
3D Runway View	As an Airfield Operations Manager I want to be able to view the airfield in 3D so that I can more easily judge the severity of an obstruction caused by an obstacle.	WON'T
Print Visual Representation	As an Airfield Operations Manager I want to be able to print out visual representations of redeclared runways so that information that is more understandable to most can be transferred around more quickly.	WON'T
Real-World Overlay	As an Airfield Operations Manager I want to be able see a map view that overlays the runway diagram over a real-world image of it so that I am more easily able to visualise the obstacle(s) and proposed re-declaration.	WON'T
Extra Visual Control	As an Airfield Operations Manager I want to have the ability to zoom and pan in any of the views so that I can examine certain details of the scenario more closely.	WON'T
JPEG Runway	As an Airfield Operations Manager I want to be able to export the displays in a JPEG format so that I can use the generated visualisation outside of the system.	WON'T
PNG Runway	As an Airfield Operations Manager I want to be able to export the displays in a PNG format so that I can use the generated visualisation outside of the system.	WON'T
GIF Runway	As an Airfield Operations Manager I want to be able to export the displays in a GIF format so that I can use the generated visualisation outside of the system.	WON'T
Runway Colour Scheme	As an Airfield Operations Manager I want to be able to change the colour scheme of the visual representation of the runway so that if I were colour-blind, there is no mistake when viewing the visualisation.	WON'T
Screen Reader	As an Airfield Operations Manager I want to be able to use a screen reader so that I can use the system properly if I have impaired vision.	WON'T
Print Result	As an Airfield Operations Manager I want to be able to print out the results of the current simulation so that I can easily physically show or share this information with other people.	WON'T

## 4 Increment Plan & Sprint Plan

### 4.1 Sprint 1

#### 4.1.1 Sprint 1 - Summary

We decided to use the fibonacci series as our story point range as it provides more granularity compared to an estimation which uses doubles. This sprint delivers value to the customer because it provides a basic level of functionality that allows Airfield Operation Managers to make calculations with a breakdown based on the input from the runway technician(s), which can then be used to determine the best course of action. We estimated that our sprint will have a total of 68 story points to complete.

#### 4.1.2 Sprint 1 - Backlog

Story: Data Comparison	
<b>Tasks:</b> <ul style="list-style-type: none"> <li>• Code middle-tier</li> <li>• Implement UI</li> <li>• Test &amp; debugging</li> </ul>	<b>Total story points:</b> 5

### **Story: Obstacle Placement**

#### **Tasks:**

- Develop back-end
- Code middle-tier
- Implement UI
- Test & debugging

**Total story points:**

8

### **Story: Obstacle Definition**

#### **Tasks:**

- Develop back-end
- Code middle-tier
- Implement UI
- Test & debugging

**Total story points:**

8

### **Story: Runway Definition**

#### **Tasks:**

- Develop back-end
- Code middle-tier
- Implement UI
- Test & debugging

**Total story points:**

8

### **Story: Airport Definition**

#### **Tasks:**

- Develop back-end
- Code middle-tier
- Implement UI
- Test & debugging

**Total story points:**

8

### **Story: Revised Runway Calculations**

#### **Tasks:**

- Develop back-end
- Code middle-tier
- Implement UI
- Test & debugging

**Total story points:**

13

### **Story: Calculation Breakdown**

#### **Tasks:**

- Code middle-tier
- Implement UI
- Test & debugging

**Total story points:**

5

### Story: Input Error Checking

#### Tasks:

- Develop back-end
- Code middle-tier
- Implement UI
- Test & debugging

Total story points:

8

### Story: Predefined Obstacle List

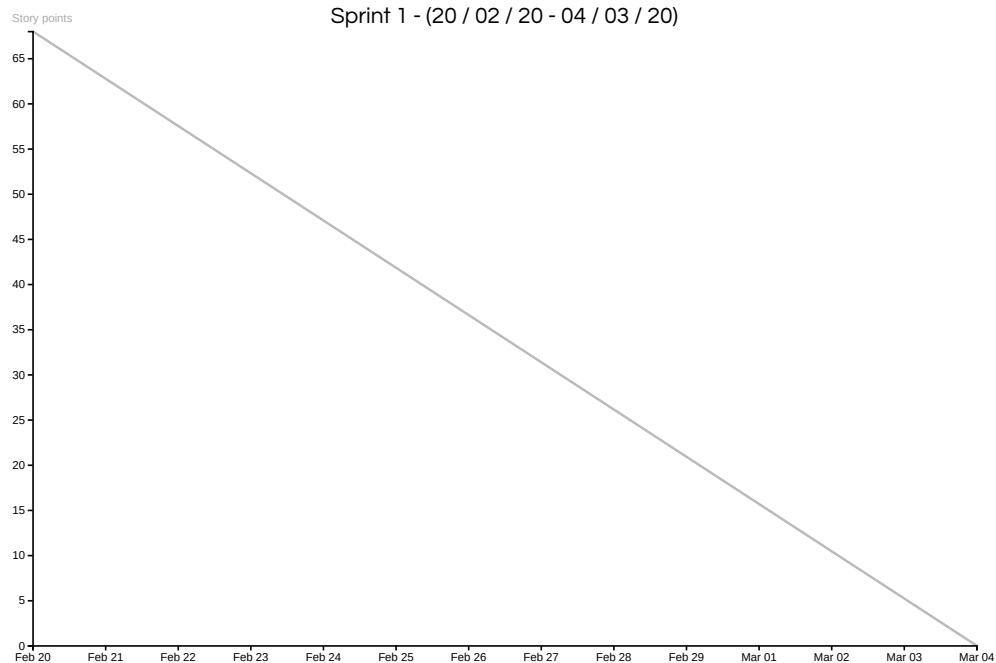
#### Tasks:

- Research about the most common runway obstacles
- Implement the list of obstacles
- Test & debugging

Total story points:

5

#### 4.1.3 Sprint 1 Day Zero Burndown



#### 4.2 Sprint 2

- Runway Sideways
- Runway Bird's-Eye
- Change Thresholds
- Successful Runway Revision Notification
- Simultaneous View Runway
- Runway Update Notification
- Obstacle Notification
- Runway Rotation
- XML Airport Import
- XML Obstacle Import

- Obstacle Saving
- Clear and Graded Area

### 4.3 Sprint 3

- XML Data Import
- XML Airport Export
- XML Obstacle Export
- XML Data Export

## 5 Risk Analysis

Risk	Probability (1, low - 5, high)	Severity (1, low - 5, high)	Risk Exposure (P x S)	Mitigation
Commitments to other modules/tasks	5	3	15	The team will ensure that specific time, both individual and as a group, is allocated to the project.
Unable to access Git repository	1	5	5	The team will try to keep their source code as up-to-date as possible on their own PCs to ensure that should this happen, work can still continue for the time being.
Assigned task taking longer than expected	4	2		The team will provide additional support to the person who is performing the task in question in order to achieve the deadline, or shift user stories to future 8 sprints to make the workload more manageable.
Individual with an appointed task becomes ill or otherwise unavailable	3	4	12	The team will cover for any such circumstance by splitting up any tasks that were assigned to the individual amongst all other team members.
University strike action	5	2	10	The team will use any support still available to them during the strike action should module staff be unavailable.
Damage to university facilities (e.g. fire)	1	3	3	The team will find another facility to use for meetings.
Difficulties learning JavaFX and other new libraries	4	2	8	Experienced members of the team will assist others with learning these libraries, and/or the team will make good use of online support.
Animosity between group members	2	3	6	Members of the team not involved in the dispute will attempt to de-escalate the situation, or will contact their supervisor or module staff to assist with resolving the issue(s).
Other technical problems	4	2	8	The team will make sure that they support each other in the event of any technical problems. As a team of 5 computer scientists, these issues should be resolved fairly swiftly.

## 6 Summary of Agile Methodologies and Software Adopted

### 6.1 Agile Methodologies

#### 6.1.1 Sprint plans

The team plans to make sprint plans based on the increment plan, adjusting the increment plan if it is found to be necessary due to changing circumstances during a sprint. We will be optimistic in the amount of work we are able to do in one sprint such that we do not finish all of the assigned work early, and instead shift work to future sprints that we find cannot be completed to a reasonable standard in the sprint initially planned. The priority of the tasks will purely be based off the MoSCoW prioritisation that we have already assigned to all user stories; any user stories thought off at a later stage will be added to the increment plan and given a MoSCoW prioritisation value such that can be placed in the appropriate sprint. Each plan will include not just the user stories, but a sprint backlog that includes the breakdown of the individual tasks required for that story, the estimated time taken, and the team member who is assigned that said task. During this period, a Scrum Master will be selected to coordinate the scrum by leading meetings, assigning tasks, and being the individual who is the first point of contact for removing any impediments that are affecting team members work.

#### 6.1.2 Scrum Meeting

The team will meet at least twice a week, with at least one of these times being with their supervisor. These meetings will usually take the form of ‘stand-up’ meetings where each team member takes turns to update the rest of the team on their progress, what they are planning to do in the time before the next meeting, and any current issues that are impeding their progress. These meetings will be coordinated by the Scrum Master, who will also be responsible for officially recording the minutes of the meeting in an official capacity.

#### 6.1.3 Sprint Review

At the end of the sprint, the Scrum Master will organise a meeting where the team reviews the sprint, discussing how much of the planned work was completed and identifying the reasons as to the performance of the team over the course of the sprint for future improvement.

#### 6.1.4 Sprint Retrospective

The team will close out the sprint by presenting their work to their supervisor, and another independent supervisor who will act as another stakeholder, who will then review the team’s performance and assist on planning for the next sprint. It is at this stage that the next sprint plan will be drafted and the product backlog/increment plan will be updated.

### 6.2 Software Adopted

#### 6.2.1 IntelliJ IDEA

The integrated development environment (IDE) of choice for this project. We selected this over other IDEs due to its suitability for developing Java applications, the experience that all team members already have with this IDE, and due to some of its specific features - notably its integration with Git.

#### 6.2.2 Maven

The tool that we are going to use to automatically build and deploy the application. Maven was selected due to the team’s prior experience with the tool, and how seamlessly it is integrated with IntelliJ IDEA.

#### 6.2.3 Jira

An issue tracking and project management solution that will be used to track the team’s progress, plan further sprints and allocate tasks to members. Jira was selected due to it being an industry standard tool that is often employed for agile-based projects. It was picked above other options because of prior experience that members have with the tool, and because a free cloud version is offered that requires minimal setup and is easily accessible.

#### 6.2.4 Slack

A more professional instant messaging (IM) platform that should allow the team to more easily communicate with one another in channels dedicated to certain roles. Slack was selected almost primarily because of its plug-in feature, particularly because of the Jira Cloud plug-in that can be set up to automatically provide messages in the event of significant events occurring on Jira (such as a task being created or completed).

### **6.2.5 UoS Outlook**

The Outlook email service provided by the university will be used by team members for communication with both our supervisor and potentially members of staff on the COMP2211 module team.

### **6.2.6 Facebook Messenger**

A widely used Instant Messaging platform that will be used for informal discussions between the team. Messenger was picked over alternatives simply because all members of the team were already using it, and used it for any initial conversations that took place.

### **6.2.7 GitLab**

A DevOps tool that provides a version control system in the form of the integrated Git repository it hosts, which will be used by the team to manage the code base, work in separate branches that can be merged when required, and revert any problematic code. It also includes additional features such as issue tracking and integration/deployment services. The team intends to use the UoS instance of GitLab that is provided to all students, and will use it almost exclusively for its repository rather than any of its additional features (such as issue tracking).

### **6.2.8 Google Docs**

An online word processor tool that allows the team to collaboratively work on documentation together. Google Docs was selected over other tools because of its emphasis on collaboration, with the comments feature being a key influencing factor in this decision.

### **6.2.9 Overleaf**

A cloud-based LaTex editor which was selected over other editors simply because the team can collaborate on documents together in real time.

### **6.2.10 Google Slides**

An online presentation application that allows the team to collaboratively work on slideshows together. Similar to Google Docs, Google Slides was selected because of its emphasis on collaboration.