COMP2211 Runway Redeclaration
Group 2

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1 Stakeholder Analysis

We identified a total of four stakeholders across the primary and secondary stakeholder groups. One of the primary **primary** stakeholders for the project is the groundcrew. Groundcrew will be responsible for identifying obstacles on and around the airfield and updating the system. We see groundcrew to be perfectly placed for this responsibility as they are able to investigate any obstacles up close, enabling them to identify the true scale and accurate location of the obstacle.

The other **primary** stakeholders are air traffic controllers (ATC). ATC is responsible for directing all aircraft on the ground and in-flight around the airfield. As such, quick access to accurate information is essential to safe and efficient operations. Being able to visualise the airstrip and any obstacles around ensures ATC can maintain proper situational awareness and enables them to provide pilots with vital information.

Pilots are **secondary** stakeholders. Pilots use the information provided by ATC as well as their own personal judgement to make decisions on how to operate their aircraft. Therefore, pilots will rely on the newly declared distances provided by ATC as well as any information regarding obstacles around the airstrip. This information will enable pilots to make the final decision on whether to take-off or land at a given runway.

Finally, regulators from the Civil Aviation Authority (CAA) are **secondary** stakeholders. CAA regulators will want to be able to oversee calculations and changes made by the system to declared distances to ensure they meet regulatory standards. Conformity to CAA regulations is imperative for safe aircraft operations, while a robust logging mechanism is essential for analysis in the case of accidents or near misses.

2 Personas

2.1 Belinda - Air Traffic Controller

Figure 1: Source: https://www.pexels.com/photo/eldelry-woman-in-black-blazer-5804208/

Belinda is a 55-year-old air traffic controller with 25 years of experience and an education in aviation management. She oversees the safe and efficient operation of both ground and air traffic at her airport. With so many years on the job, Belinda has also adopted a semi-managerial role, supporting her younger team members when needed.

Over the years, Belinda has come to appreciate the tried-and-tested processes that have kept operations running smoothly. In her high-stakes role, she firmly believes that "if it ain't broke, don't fix it" and is nervous of implementing new systems which can introduce new and possibly deadly errors. Still, she finds the current practice of pair validation for re-declaring runway distances increasingly inefficient, as it takes two skilled people away from other, potentially urgent tasks.

Moreover, Belinda is well aware that introducing new systems means retraining staff, a process that can lead to operational downtime and mistakes, which in her field have severe consequences. Consequently, she wants any new system to include comprehensive guidance or help documentation so it is as easy to learn as possible.

2.2 Alex - Air Traffic Controller

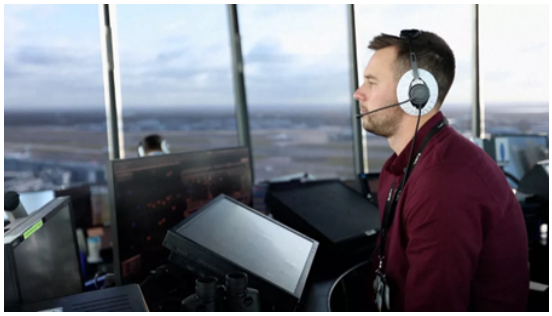

Figure 2: Source: https://tinyurl.com/2pb3s7ju

Alex is a 34-year-old tower air traffic controller at an international airport in UK. He has extensive experience managing both large and small aircraft in high-traffic airspace in the past decade. He has a background in aviation, and his job function is to ensure safety and efficiency in flight operations.

He uses the landing distance calculator to make orders about runway usage and sequences. Alex prefers tools that have a user-friendly, easy-to-use interface and deliver real-time accurate information. His goal is to monitor the status and movement of all aircraft to manage landings and takeoffs. He believes that adherence to procedures and protocols, making use of accurate data is vital to ensure safety. That's why Alex is concerned about the possibility of human error due to negligence and technical failures in the runway re-declaration system.

2.3 James - Ground crew

Figure 3: Source: https://www.careersinaerospace.com/ground-services-crew-2/

James is a 28 year old ground personnel, and he has been part of the ground operations team for 8 years and has many responsibilities including inspecting and regularly checking up on runways, clearing debris and coordinating with ATC to ensure safe operations. James usually is involved in emergency situations where quick assessment and immediate action is needed.

While doing his job in keeping the runway safe and restoring operations to normal in emergency situations James sometimes faces some challenges such as slow reporting of obstacles causing delays in decision making, unclear and only estimated calculations for runway distances and sometimes it is unclear how obstacles impact take-off and landing. There is also the issue of sometimes not being notified of obstacles whenever another member of the team finds them.

2.4 Abdullah - Aviation Safety Regulator

Figure 4: Source: https://www.careersinaerospace.com/ground-services-crew-2/

Abdullah Bennett is a 36-year-old Aviation Safety Regulator but has been working in the aviation industry for over 11 years, starting as an air traffic controller before moving into regulatory roles. He now oversees runway operations, ensuring compliance with national and international aviation standards. His primary responsibilities include setting safety guidelines, auditing runway operations, and collaborating with airlines and airport management to maintain compliance.

In addition to his regular duties, Abdullah is often responsible for, or involved in aviation incident investigations. These investigations benefit from knowledge of events leading up to the incident. Having this knowledge allows Abdullah to identify any anomalies or mistakes in operations which may have led to the incident. As a result, Abdullah wants a system which will log redeclarations made to runways around the country, as well as any mistakes made by the software or operators.

2.5 Whitney - Pilot

Figure 5: Source: https://unsplash.com/photos/person-in-black-jacket-driving-car-during-daytime-_TUvJQS9Aoo

Whitney is a 56-year-old pilot. Having worked as a First Officer for 5 years, she has now been working as a Captain for over 25 years. Despite dealing with a busy schedule at the commercial airline she is working for, she is considering transitioning into becoming a flight instructor, as she feels like it is her duty to pass down the invaluable skills that she picked up along her career onto the younger generations.

She is deeply passionate about flying and believes she will never retire from it as long as her health allows. She has great chemistry with her current co-pilot. At the airline she works for, most of the pilots are younger than her. Given her strong desire to help others, she never hesitates to offer feedback or suggestions to younger pilots while flying with them. However, this sometimes makes them feel uneasy, as they fear making mistakes under her watch.

With over 30 years of experience, Whitney takes great pride in her decision-making skills, believing they have sharpened significantly over the years. Her ability to handle complex situations has consistently ensured a smooth experience for both passengers and herself. However, she has recently realised that while her thinking is still sharp, she doesn't always put it into practice as easily as before. She fears that she will not be able to offer the same pleasant experience to her passengers as before.

3 Product backlog

Feature	**User Story**	**Priority**	**Task Size**
XML Import	As ATC I want to be able to add a new airport to store and use runway information	Must	L
Auto Calc	As ATC I want calculations to be automatic and near instant to ensure safety	Must	S
Validation	As ATC I want to be able to check the validity of calculations to maintain safety	Must	S
Obstacles	As ATC I want to see obstacles around the runway when they trigger redeclaration	Must	M
Help Documents	As a user I want detailed documentation so I can learn the system	Should	Continuous
Multi-View	As ATC I want to visualise the airfield from multiple angles	Must	L
Clear Display	As ATC I want information clearly presented so I can relay information to pilots	Must	S

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Table 1 – continued from previous page

Feature	**User Story**	**Priority**	**Task Size**
Notifications	As a user I want notifications of new obstacles and redeclarations so I can stay informed	Should	M
Notifications	As a user I want notifications to have different priorities so I can quickly understand the situation	Could	S
Distance View	As ATC I want to see available distances on screen so I can gain a full picture of the airfield	Must	M
Runway Info	As ATC I want to see distances for each runway separately to ensure I only see relevant information	Must	S
Obstruction Log	As ground crew I want to report runway obstructions so I can ensure safety for aircraft operations	Must	M
Obstacles	As ground crew I want predefined obstacles list so I can quickly add an obstacle to the system.	Must	S
Export Reports	As ground crew I want to export reports so I can save them for future reference	Should	XL
Error Handling	As a user I want error notifications to prevent me from inputting incorrect data and inform me of calculation errors	Must	M
CAA Standards	As a regulator I want calculations to meet CAA standards to ensure operations meet regulatory standards	Must	S
Access Control	As a regulator I want only authorised people to be able to make changes to the system to ensure system integrity	Must	L
PDF Export	As a regulator I want a PDF export feature so I can view and share logs from the system in case of investigation or safety audit	Could	L
Logging	As a regulator I want an error log so I can check system integrity	Could	M
Logging	As a regulator I want calculation logs so I can check system validity	Should	L
3D View	As a user I want 3D airstrip visualisation	Won't	XL

4 Increment plan

Increment 1	**Increment 2**	**Increment 3**
UML design	As ground crew I want predefined obstacles list so I can quickly add an obstacle to the system.	As a regulator I want only authorised people to be able to make changes to the system to ensure system integrity
As ATC I want to be able to add a new airport to store and use runway information	As ground crew I want predefined obstacles list so I can quickly add an obstacle to the system.	As ATC I want to visualise the airfield from multiple angles
As ATC I want calculations to be automatic and near instant to ensure safety	Improving runway visualisation	Improve GUI
Basic GUI - Basic runway visualisation and distance rendering without obstacles	As ATC I want to see available distances on screen so I can gain a full picture of the airfield	As a user I want notifications of new obstacles and redeclarations so I can stay informed
As ATC I want to be able to check the validity of calculations to maintain safety	Rendering objects on the runway	As a regulator I want a PDF export feature so I can view and share logs from the system in case of investigation or safety audit
As a regulator I want calculation logs so I can check system validity	As a user I want error notifications to prevent me from inputting incorrect data and inform me of calculation errors j	As a user I want detailed documentation so I can learn the system

Table 2: Feature Increments

5 Sprint 1 Plan

5.1 Goal

The goal of this sprint is to have the basic functionality of the application in place. Ideally, we will be able to store and save airport details, place basic obstacles and calculate runway distance available. The GUI will be basic and purely functional. The rendering of the runway will be minimal.

5.2 Sprint backlog

Task	**Estimation**	**Owner**
1: UML Design - MVC Structure	4h	All
2: Import airport runway from XML	**8h**	Louis **(Scrum master)**
2.1: Create airport objects in XML	4h	
2.2: Parse XML	2h	
2.3: Initialise airports	2h	
3: Perform calculations on distances	**6h**	Hossam
3.1: Automatically trigger calculations	1h	
3.2: Give option to expose calculations to user	3h	
3.3: Log calculations to txt file	2h	
4: Basic GUI	**7h**	Abdullah
4.1: Drop down to choose airports	1h	
4.2: Form to create airport	1h	
4.3: Runway and empty distances rendering	5h	
5: Basic obstacle placement	**4h**	Andy
5.1: Link obstacle placement to calculations	4h	
6: Creating test cases	**5h**	Eren
6.1: Testing calculation validity	2h	
6.2: Testing initialization	3h	

Table 3: Task Ownership Table

5.3 Burndown Chart

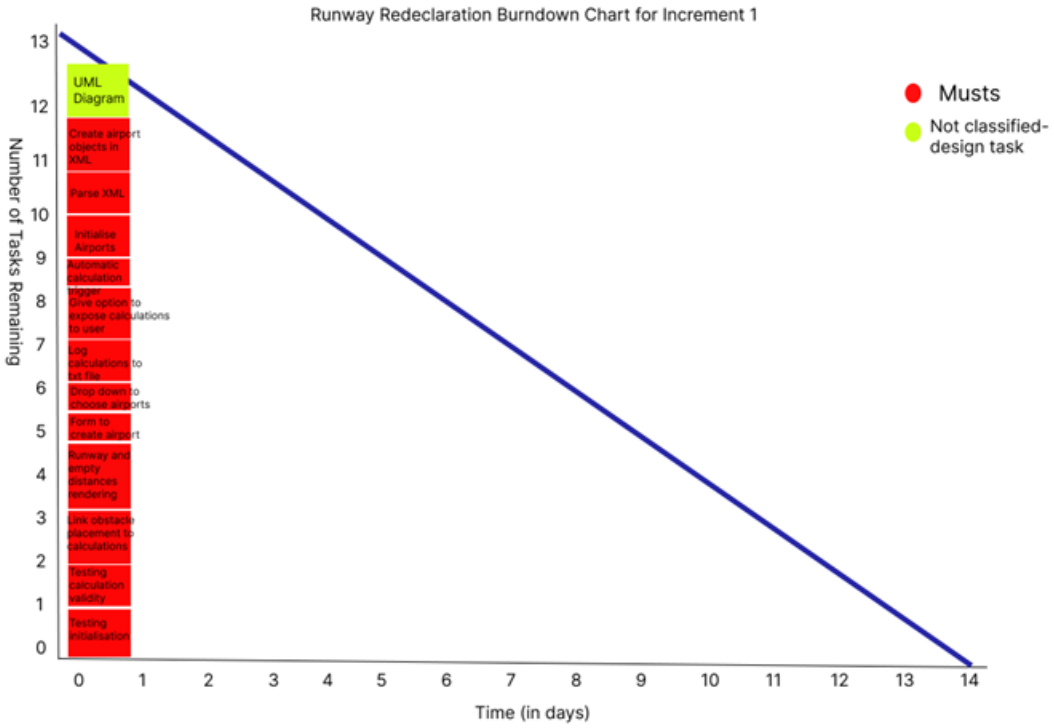

Figure 6: Chart for tracking task completion

6 Project setup

6.1 Development environment

We will be using Git version control through the GitLab portal provided by the University of Southampton. The program will be developed as a Maven Java project, making use of JavaFX for graphics and JUnit for testing. Development will be done using the IntelliJ IDE.

Communications are being handled mainly through WhatsApp as well as Microsoft Teams for file sharing and meetings. Teams and GitLab will also be used for task tracking during the SCRUM process. A Teams channel has been set up to enable team members to share what tasks they have been working on, where progress has been made and if there are any sticking points.

6.2 Risk Analysis

Risk	Likelihood	Impact	Severity	Mitigation	Risk Owner
Team member not being available	Medium	High	Medium	Allow time in sprints to make up for work not done in time, distribute workload evenly.	Team Manager
Integration challenges (such as integrating calculations into visualizations)	High	High	High	Define data formats early, test integration as the program is built.	Development Team

Risk	Likelihood	Impact	Severity	Mitigation	Risk Owner
Git Migration Conflicts	High	Medium	Medium	Get familiar with Git functions and always make sure work is up to date according to Git.	Development Team
Unclear Project Definition/Requirements	Medium	Medium	Medium	Regularly consult stakeholders/customers to clarify requirements.	Product Owner
Insufficient error handling for incorrect data input	Medium	High	Medium	Implement various checks and provide clear detailed error messages.	Development Team
Resistance from users who prefer manual processes	Medium	Medium	Medium	Provide training and detailed help documentation, and demonstrate system benefits.	Training Coordinator
Manipulation of calculations by unauthorized users	Medium	High	High	Restrict access to authorized users.	IT Admin
Misunderstanding of runway visualization by operators	Medium	High	High	Provide clear visualization and document how to understand it in the help documentation.	Training Coordinator