SOFTWARE ENGINEERING GROUP PROJECT: RUNAWAY RE-DECLARATION

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1 Introduction

This increment report details our start to our runway re-declaration project which primarily focuses on our planning phase. Additionally, it will include our usual burndown charts, work summaries and our response to the feedback from the last increment. It encapsulates our overarching structure and methodology, providing a comprehensive overview of our project's trajectory. Alongside our report, the project itself is enclosed within a separate zip file, accessible for review. It utilises a Maven JavaFX installation which can then be ran through a normal JavaFX execution.

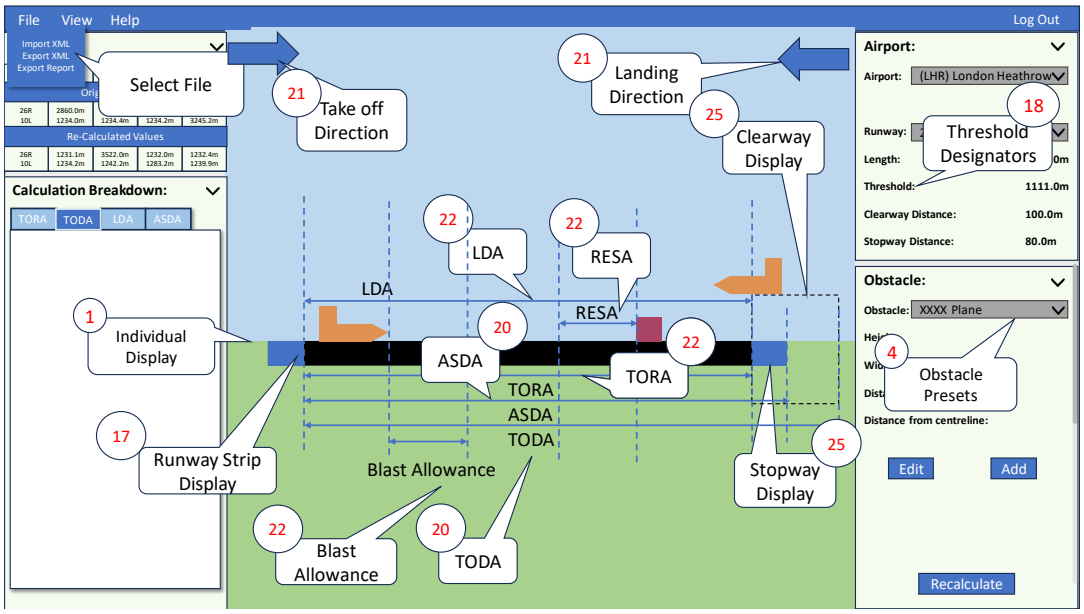
2 Key design artifacts

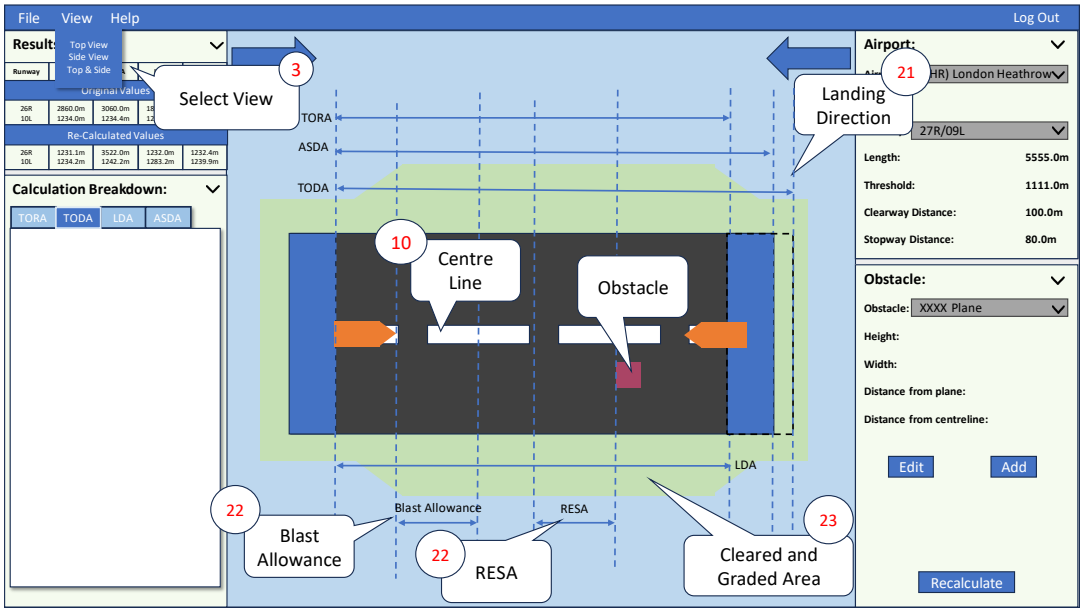
We decided to employ scenarios, storyboards and UML diagrams as our design artifacts. We used scenarios to detail specific examples of how users might interact with the system in various situations, providing insight into the practical applications of this tool. We utilised storyboards to visualise the requirements of the product and describe the operations of the software from the users point of view. Scenarios were instrumental for user interactions within diverse contexts, offering invaluable insights into practical system utilisation. For UML diagrams, we used them to help offer a standardised representation of the systems architecture and interactions. Collectively these design artifacts helped us identify and address design problems early on during the development. Furthermore, UML diagrams provided a standardised framework for depicting system architecture and interactions, enhancing our comprehension of the project's structural nuances.

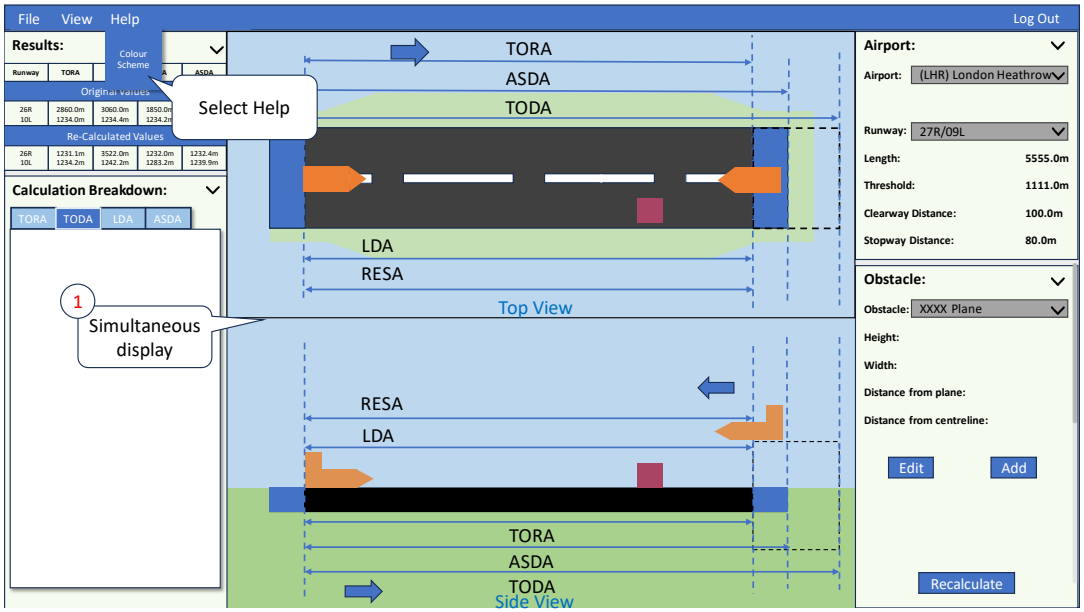
2.1 Storyboard

This section details the design of the storyboard, along with the rationale behind it. It encompasses user stories scheduled for this sprint, all of which have been meticulously designed and integrated within the storyboard. The table provided below outlines each story by its ID, offers a description of the associated task, and explains the reasoning behind its implementation. Additionally, visual representations of the storyboards will also be presented for clearer understanding.

ID	Tasks	Reason
1	Simultaneous Display & Individual Display	In the middle section, the display of the runway is shown. The individual and simultaneous display can be viewed. This is shown in the middle of the screen to ensure it's the main focal point for the users.
3	Select View	Pressing on view, a selection of the different views can be seen and selected. This is especially easy for the user to navigate so that different visualisations of the runway can be accessed with ease.
4	Obstacle Presets	Present at the top of the obstacle section so that they can be selected easily
10	CentreLine	Displayed clearly for the user on the top down view
17	Runaway Strip Display	Displayed clearly for the user so they can easily identify it
19	Threshold Indicator	Present for the user to read for the selected runway
20	ASDA & TODA	Displayed for the user to visually understand aspects of the runway. These can be shown individually so that the display isn't too cramped
21	Landing Direction	Shown so that the user doesn't misunderstand aspects of the runway.
22	RESA, LDA & TORA	Displayed for the user to visually understand aspects of the runway. TORA can be shown individually so that the display isn't too cramped
23	Cleared & Graded Area Display	Shows which area obstacles would interfere with the take-off/landing.




File
View
Help
Log Out
Top View
Side View
Top & Side
Select View
3
Landing Direction
21
TORA
ASDA
TODA
10
Centre Line
Obstacle
LDA
Blast Allowance
RESA
22
Blast Allowance
22
RESA
23
Cleared and Graded Area
Airport:
(LHR) London Heathrow
27R/09L
Length: 5555.0m
Threshold: 1111.0m
Clearway Distance: 100.0m
Stopway Distance: 80.0m
Obstacle:
Obstacle: XXXX Plane
Height:
Width:
Distance from plane:
Distance from centreline:
Edit
Add
Recalculate
Calculation Breakdown:
TORA
TODA
LDA
ASDA
Re-Calculated Values


File
View
Help
Log Out
Colour Scheme
Select Help
Results:
Re-Calculated Values
Calculation Breakdown:
TORA
TODA
LDA
ASDA
1
Simultaneous display
TORA
ASDA
TODA
LDA
RESA
Top View
RESA
LDA
TORA
ASDA
TODA
Side View
Airport:
(LHR) London Heathrow
Runway: 27R/09L
Length: 5555.0m
Threshold: 1111.0m
Clearway Distance: 100.0m
Stopway Distance: 80.0m
Obstacle:
Obstacle: XXXX Plane
Height:
Width:
Distance from plane:
Distance from centreline:
Edit
Add
Recalculate

2.2 Scenarios

2.2.1 Qualified Calculator of Air Traffic Control, Ava

Ava is an experienced qualified calculator for the air traffic control. She wants to input the parameters of the runway for the tool to complete the calculations and obstacles

- Ava opens the runway re-declaration tool.
- The home page of the tool is shown.
- Ava logs into the tool with her credentials.
- The tool shows the side viewing page first, with her airport being remembered by the system.
  - If this is the first time logging in, she will have to manually select the airport that she wishes to view.
- Ava then has to select the specific runway she is calculating parameters for, this is done from a drop down selection.
- She wants to add an obstacle, so she selects the obsticle, inputs the height, width, distance from plane and centre-line.
  - These values inputted should be in metres.
  - If an invalid input (such as a negative number, letter or symbol) is inputted, an error message will come up telling the user to put in a numerical value instead.
- Ava then selects the "Recalculate" button and an overview of the calculations will be shown in the left side of the screen.
- Ava checks the recalculated values.
- Once he completes his work, Ava presses "File" on the tool bar, then "Exit".
- The application now closes.

2.2.2 Qualified Calculator of Air Traffic Control, Ava

Ava is a qualifier calculator and would like to import an XML file containing airports and obstacles.

- Ava opens the runway re-declaration tool, then logs in after the home page is shown.
- The tool shows the side on viewing page first.
- Ava navigates to the tool bar and presses "File".
- She then presses "Import XML file".
- This then shows a pop up prompting her to enter an XML file.
- She selects he XML file that she has saved and presses enter.
  - If the file she enters isn't a valid XML file, she will be told that it isn't the right format and be prompted to re-enter a file.
- She will be returned to the original file with her changes now being added.
  - If the XML file contains airports, the additional airports will now be shown in the selection box.
  - If the XML file contains obstacles, these will also now be shown.
- Ava then continues with her work with these new additions.

2.2.3 Junior Qualified Calculator Air Traffic Controller (Trainee), Alex

Alex is a junior calculator (ATC), and needs to reread the help document as she has encountered a new problem she has not encountered yet.

- Alex opens the runway re-declaration tool.
- The home page of the tool is shown.
- Alex logs into the tool with her credentials.

- The tool shows the side on viewing page first.
- Lisa navigates to the tool bar and pressed on "Help".
- This then opens a page containing a help document.
- Alex then scans through the help document, finding the solution to the specific problem he encountered.
- Alex exits from the help document and he continues his work now with the some of the gaps in his knowledge now filled.
- Once he completes his work, Alex presses "File" on the tool bar, then "Exit".
- The application now closes.

2.2.4 Regulatory Authorities(CAA), Lisa

Lisa is part of the Regulartory Authorities and would like to edit the input parameters.

- Lisa opens up the runway re-declaration tool.
- Lisa logs into the tool with her credentials, these credentials have certain permissions that other users do not have.
- Lisa is shown the side on viewing page.
- Lisa presses on "File", then a drop down menu appears.
- This menu will include "Revise runway parameters" (this is a unique options to only people that have permissions on their account), Lisa pressed this.
- A screen with all of the aspects of the parameters that are provided by the CAA, with this user now being able to edit these.
- Lisa edits the parameters that are required and presses "Finish and Save".
- A pop up comes up with all of the changes she's made, asking her "Are these the correct changes?".
- Lisa presses "Yes", and is returned to the first page, the simultaneous viewing page.
- Lisa then presses "File", then presses "Exit".
- The application now closes.

2.2.5 Qualified Calculator of Air Traffic Controller With A Disability, Maria

Maria is a Qualified Calculator (ATC) and is changing the colours the the tools to suit her disability.

- Maria opens the runway re-declaration tool
- The home page of the tool is shown
- Maria logs into the tool
- The tool shows the side on viewing page first.
- Maria navigates to the upper toolbar and presses the help button
- Maria clicks on accessibility
- A colour blind drop down menu appears with options for different types of colour blindness (Protanopia, Deuteranopia, Tritanopia, Monochrome)
- Maria clicks on Tritanopia
- Maria is asked if she would like to set this as her default setting
- Maria selects "Yes, set as default"
- The colour palette of the tool changes to better suit her needs
- This becomes her default setting for next time she logs onto the application

2.2.6 Pilot, James

James is a pilot, circling around the airport in the sky and is wanting to know whether he can land.

- James contacts ground control to ask whether he can land the plane
- Ground control informs ATC of James' intention to land the plan

- Ground control uses James's flight parameters, such as current weather conditions, runway length, wind speed, and aircraft weight.
- ATC checks with the tool:
  - ATC gathers the input parameters from their interfaces
  - ATC inputs necessary parameters for this specific pilots landing
  - The outputted calculations are returned to the ATC
  - ATC reviews the outputted calculations and uses it as an aid to decide whether performing the calculations with the official landing process is worthwhile
  - If the calculated parameters indicate safe landing conditions, ATC informs James that he is clear to land.
  - If the conditions are deemed unsafe, ATC may advise James to continue circling or divert to an alternate airport.
- James receives the ATCs information and takes it onboard while preparing to land
- James begins descending and lands the plane safely and smoothly

2.2.7 Qualified Calculator of Air Traffic Control, Ava

Ava would like to change her dashboard to view both the top down and side on view simultaneously

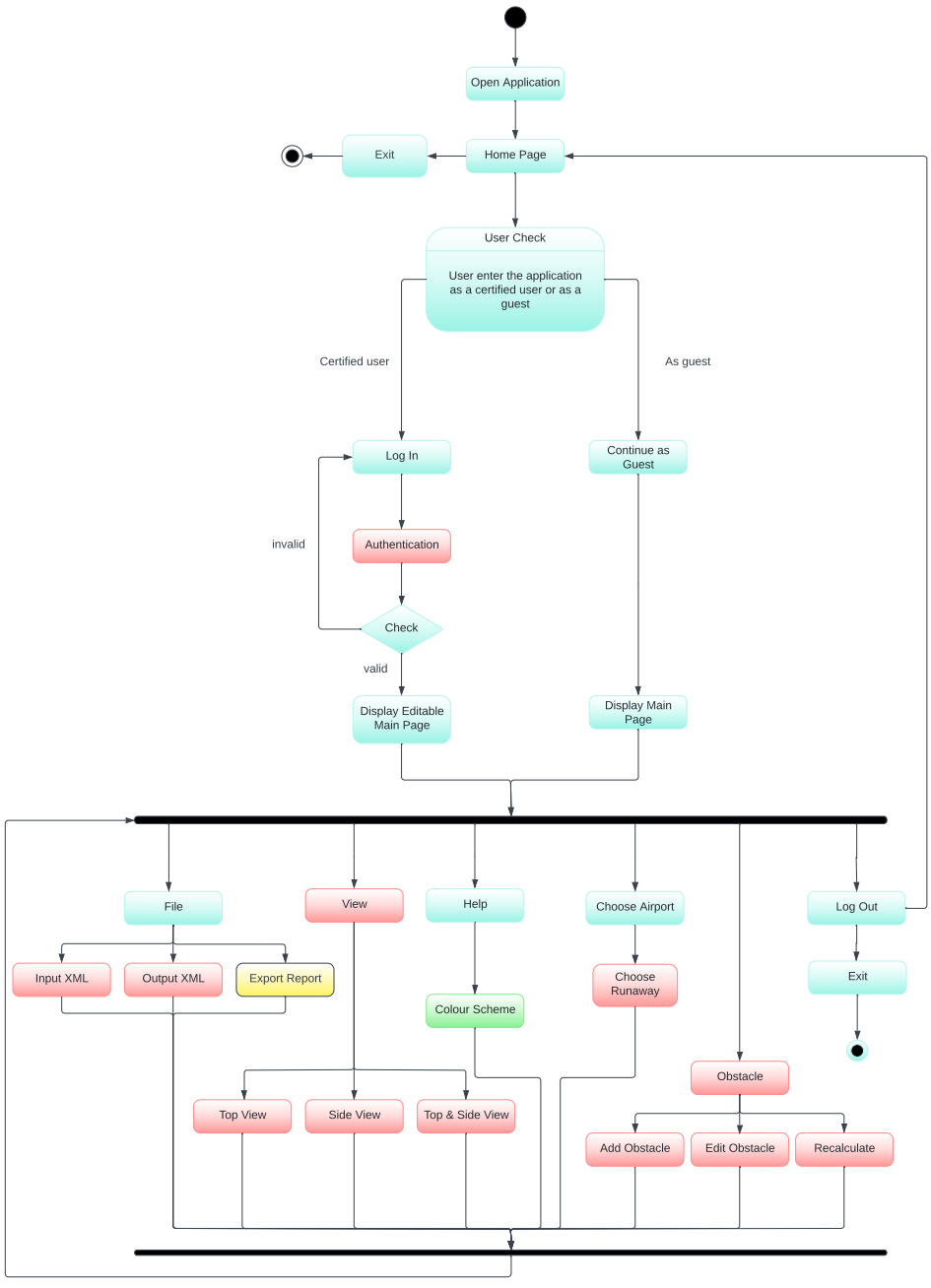
- Ava opens the runway re-declaration tool.
- The home page of the tool is shown.
- Ava logs into the tool with her credentials.
- The tool shows the side on viewing page first.
- Ava navigates to the top toolbar and clicks on the "view" button
- This opens a dropdown menu with three options "top", "side", "top & side"
- Ava presses "top & side"
- This changes the view of her software to display both the top down view and the side on the view simultaneously

2.3 UML Diagrams

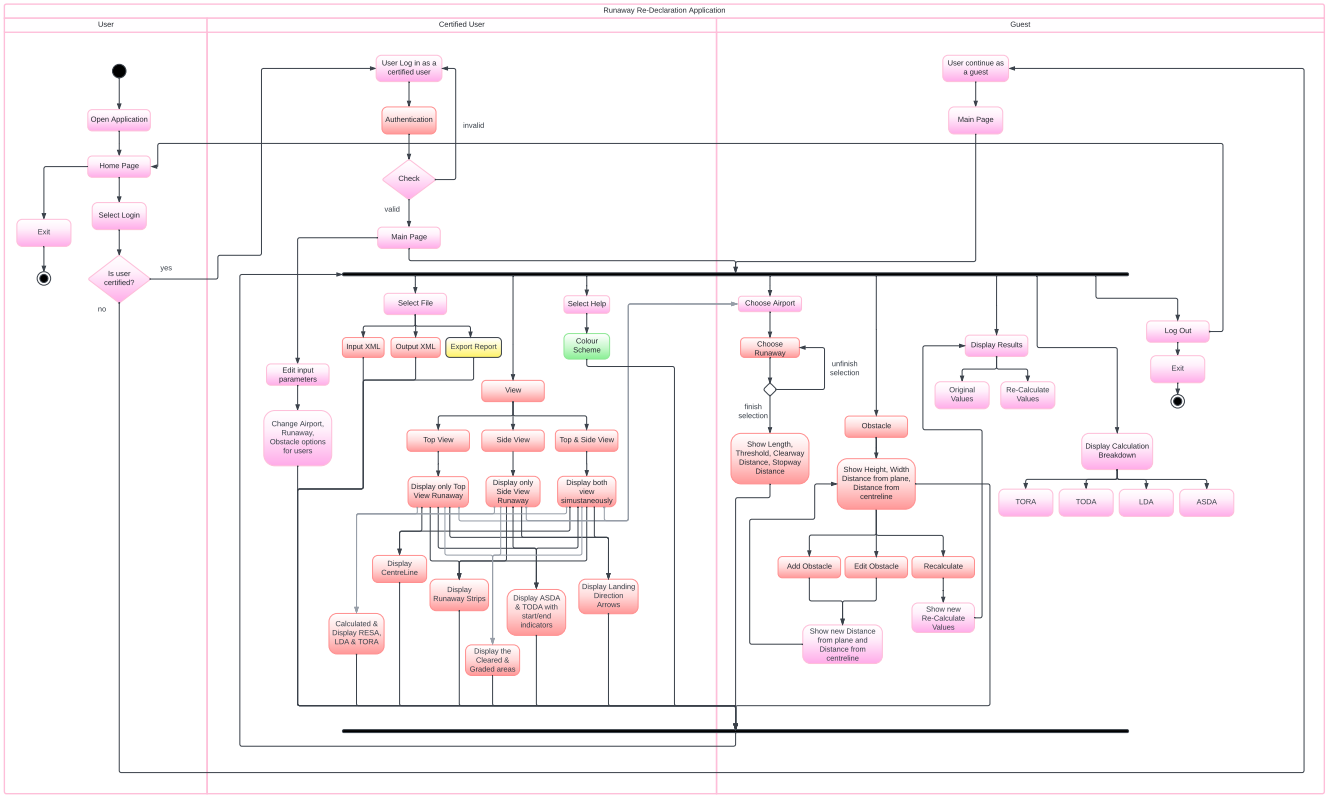
Unified Modeling Language (UML) is a visual language for specifying, constructing, and documenting the artifacts of systems. In this section we decided to show how our apps work and represent them using 3 different types of UML design:

1. **State Diagram**: Graphical representation of how the apps work illustrating the transitions between states to states.
2. **Activity Diagram**: Graphical representation that depicts the flow of activities within the apps.
3. **Class Diagram**: Structure diagram to show the structure of the apps by modeling the classes, relationships, attributes, and operations.

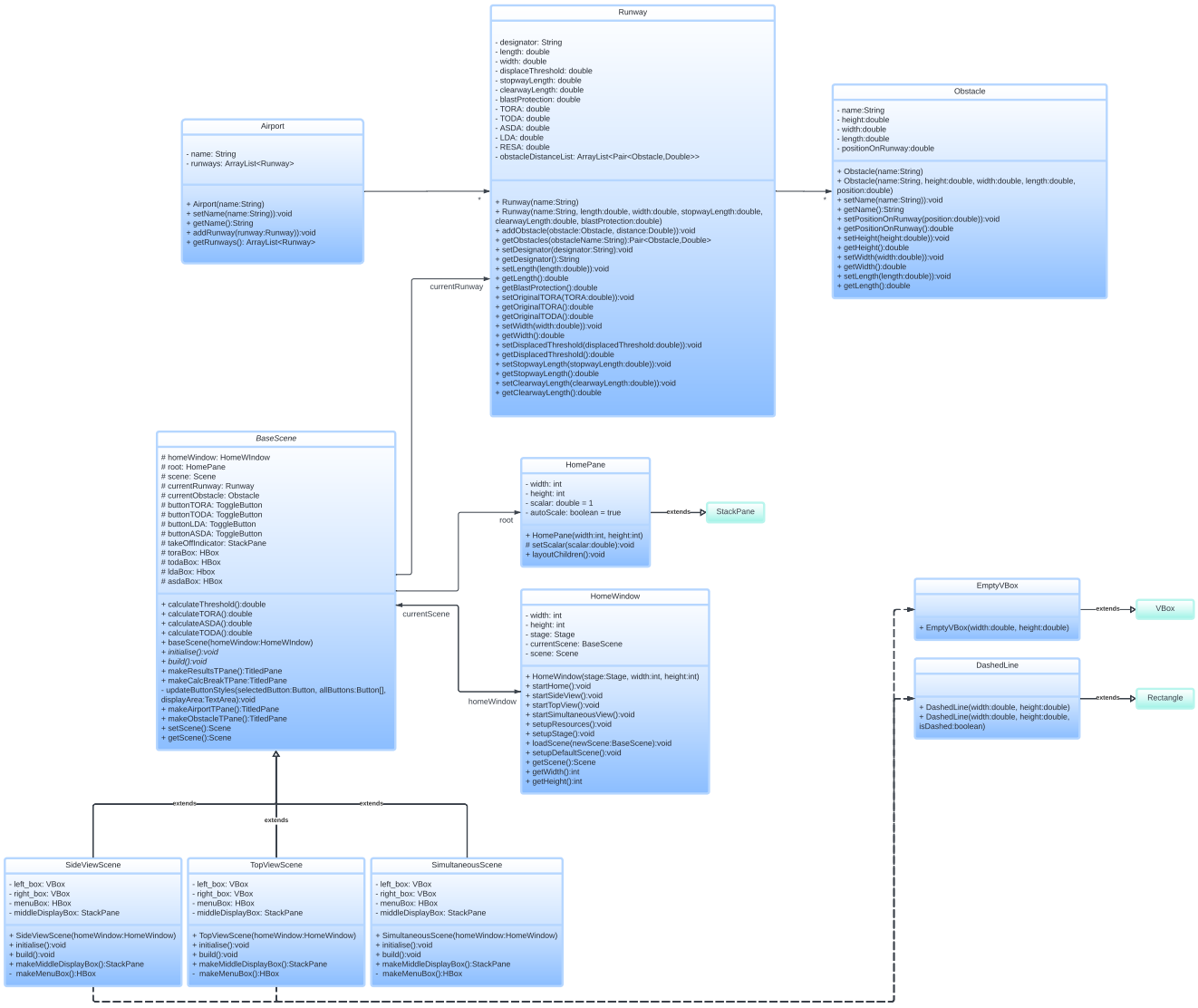
2.3.1 State Diagram



2.3.2 Activity Diagram



2.3.3 Class Diagram



3 Testing

3.1 Manual Testing

All planned tasks and user stories for this sprint exclusively involve user interface elements. Therefore, the testing processes will all be conducted manually by a team member as a tester. All tests are critical in this sprint adn they were all passed.

Story ID	Test Tasks	Expected Outcome	Pass
1	Side View Display	Side view is displayed successfully	yes
1	Top View Display	Top view is displayed successfully	yes
1	Simultaneously Display	Both views are displayed together successfully	yes
3	Switch views	Select different views successfully	yes
4	Predefined Obstacle	List of predefined obstacles stored and displayed	yes
10	Centreline	Display centreline on Top-Down view correctly	yes
17	Runway Strip Display	Display runway strip for both views successfully	yes
19	Threshold Designators	Show threshold and display on both views correctly and successfully	yes
20	TODA Display	Display TODA line at the bottom of runway strip on both views when selected correctly and successfully	yes
20	ASDA Display	Display ASDA line at the bottom of runway strip on both views when selected correctly and successfully	yes
21	Landing Direction	Display landing direction on both view successfully	yes
22	RESA Display	Display RESA line at the bottom of runway strip on both views when selected correctly and successfully	yes
22	LDA Display	Display LDA line at the top of runway strip on both views when selected correctly and successfully	yes
22	TORA Display	Display TORA line at the bottom of runway strip on both views when selected correctly and successfully	yes
23	Cleared & Graded Areas Display	Display Cleared and Graded Areas around the runway strip for Top-down view correctly and successfully	yes

4 Responses to feedback

Feedback from the envisioning was largely positive we have no areas to specifically work on and are continuing with the same format and processes as the envisioning section of out project.

5 Sprint one backlog

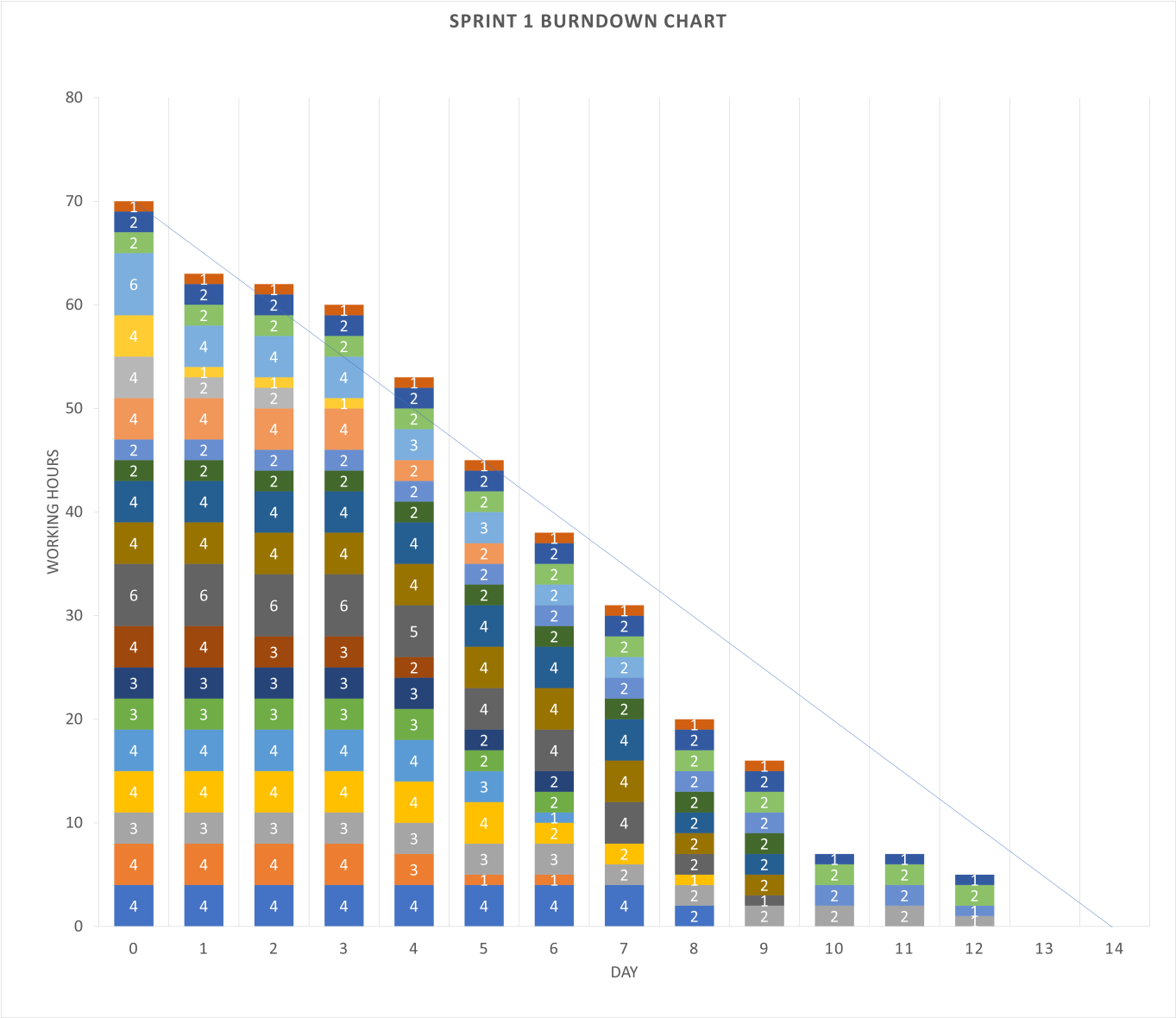
The sprint backlog is shown in the following table. The stories that are implemented follow the MoSCoW prioritisation:

- **Must**
- **Should**
- **Could**

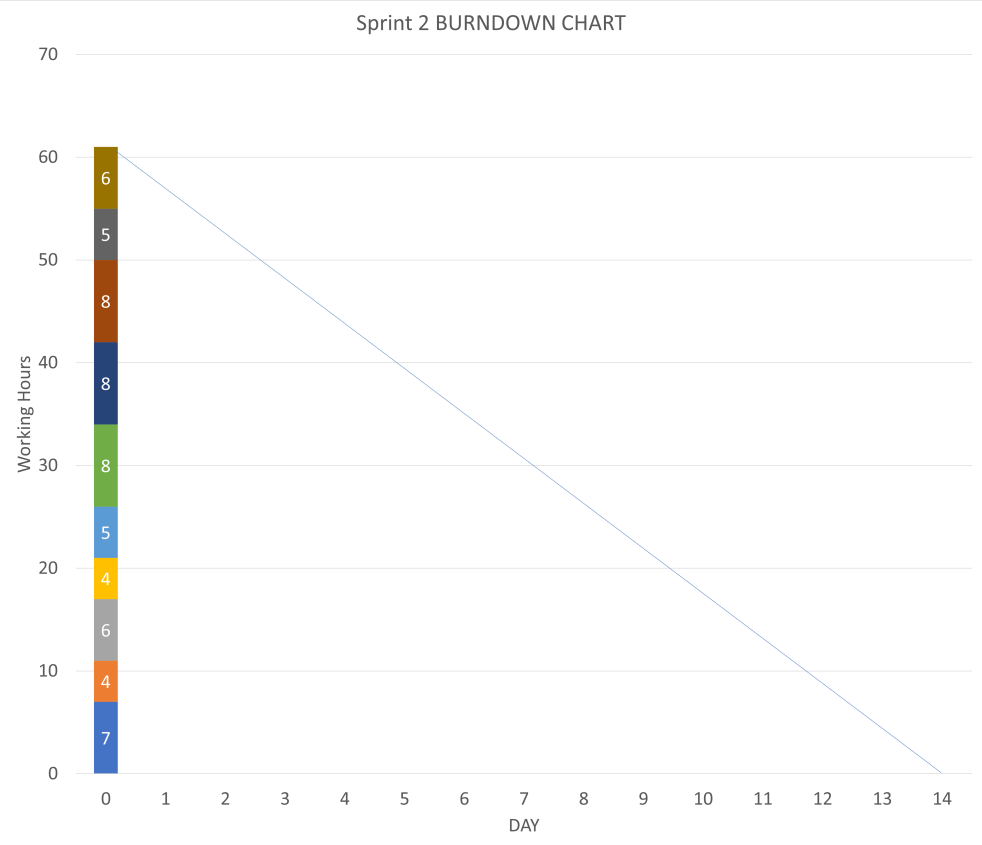
Story ID	Task	Workforce	Estimated	Actual
1	Individual Display	Eric, Sam H	4	4
1	Simultaneously Display	Eric, Sam H	4	3
3	Switch Views	Eric, AJ	5	2
3	Switch Runways	Eric, AJ	4	1
4	Predefined Obstacles	Eric, Sam H	3	1
10	Centreline	Eric, Muhammad	4	1
17	Runway Strip Display	Muhammad, Sam H	4	2
19	Threshold Designators	Muhammad, Sam H	4	2
20	ASDA Display	Muhammad, Eric	4	3
20	TODA Display	Eric ,Sam H	4	3
21	Landing Direction	AJ	2	2
22	LDA Display	Eric, Sam H	1	2
22	TORA Display	Eric, Sam H	1	2
22	RESA Display	Eric, Sam H	1	1
22	Blast Allowance Display	Eric, Sam H	1	1
23	Clear & Graded Area	Eric	4	4
Design	Storyboard	Eric, Muhammad, Sam H	4	5
Design	Scenarios	AJ, Sam H	4	2
Design	UML	Muhammad	6	4
Design	Tests	Muhammad, Sam H	2	2
Design	Report	All	4	3
Design	Burndown Chart	All	1	0.5
Design	Increment 2 Sprint	All	1	1
		Total	**72**	**51.5**

All user stories are classified to be **Must** tasks and all design artifact tasks are classified to be **Should** tasks.

6 Sprint 1 Burndown Chart



7 Sprint 2 Backlog

Story ID	Task	Workforce	Estimated	Actual
5	Original & New Values Display	Eric & Sam H	7	
6	Obstacle	Eric	4	
9	Recalculation	AJ	6	
16	Calculation Breakdown	Muhammad	5	
18	Threshold Indicators	Eric & Sam H	8	
24	Displaced Thresholds	Eric & Sam H	8	
25	Offset	Muhammad & AJ	8	
26	TOCS & ALS	Eric & Sam H & AJ	5	
13	Alternative Color Scheme	AJ	4	
28	Printing	AJ	6	
Design	Report	All	4	
Design	Burndown Chart	All	1	
Design	Increment 3 Sprint	All	1	
		Total	67	

8 Sprint 2 burndown Chart