Final Document
StudyBuddies

1. Final Phase Summary

In this final phase of the StudyBuddies online learning platform, the Graphic User Interface (GUI), quality assurance as well as change management will be discussed.

2. Graphic User Interface (GUI)

The link below provides the full GUI.
https://www.figma.com/file/ZjvMU2nIIIPqILVF0ctY2U/Tutor-website?node-id=2415%3A26437&t=FX9z7AXIb5Fkgok4-1

Feature: Login

Login page for all three types of users.

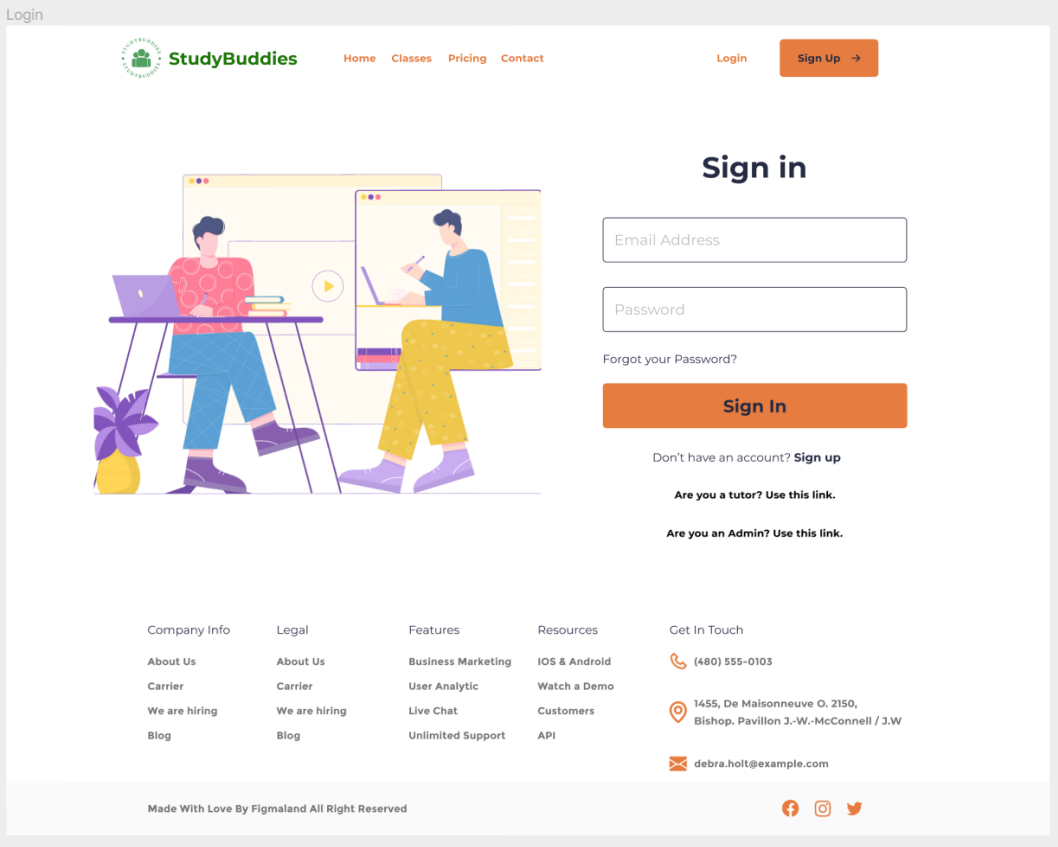

Figure 1: UI – Login Page

Feature: Registration Student/Parent, Tutor, Admin

Registration page for all three types of users.

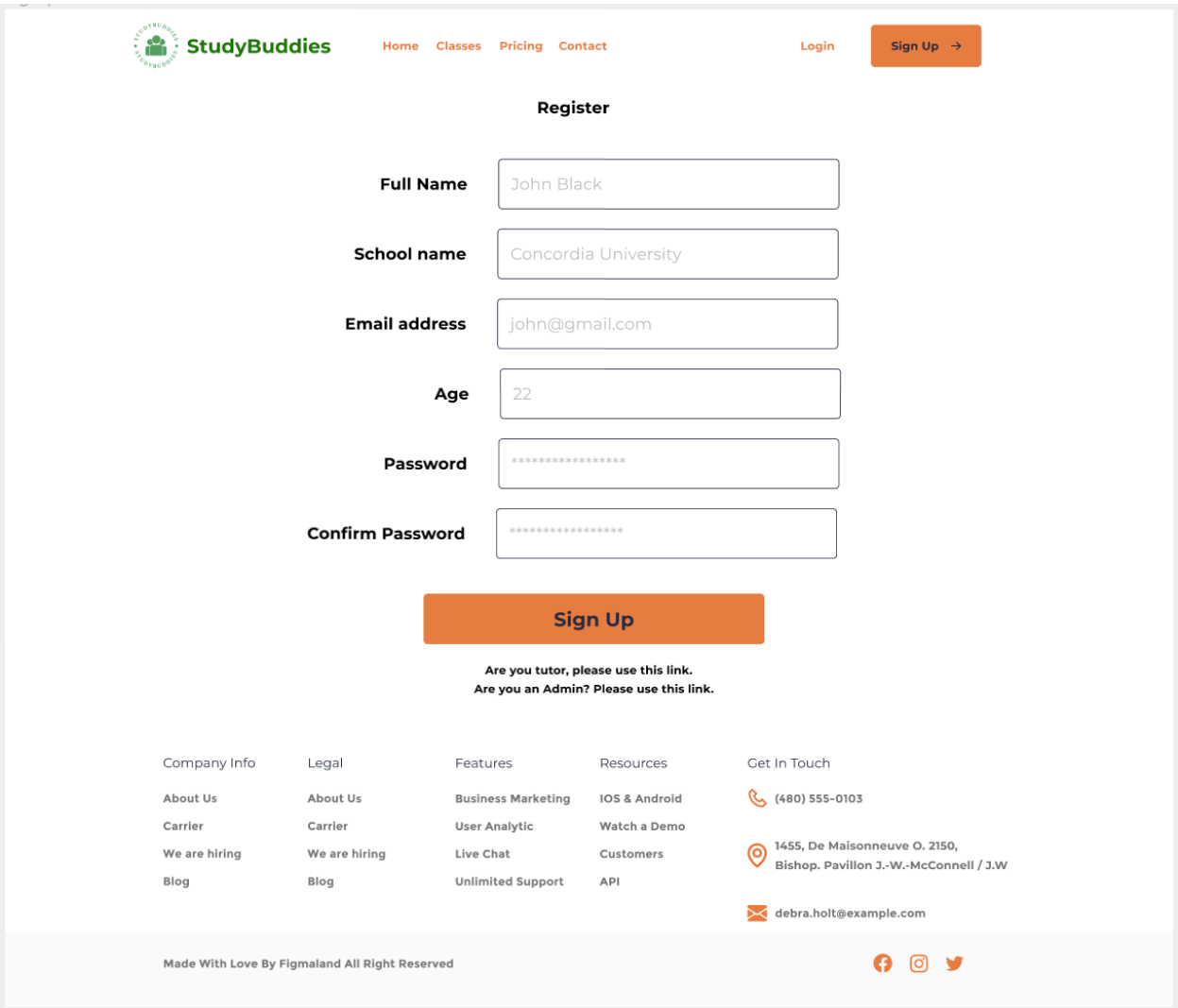

Figure 2: UI – Registration Page

Feature: Profile view Student/Parent, Tutor

In the profile view page, students can access their schedule making, view the classes they are enrolled in, and see their progress in their studies with badges. For admins, they can see messages sent from either students or fellow tutors and they can upload/remove files to their page.

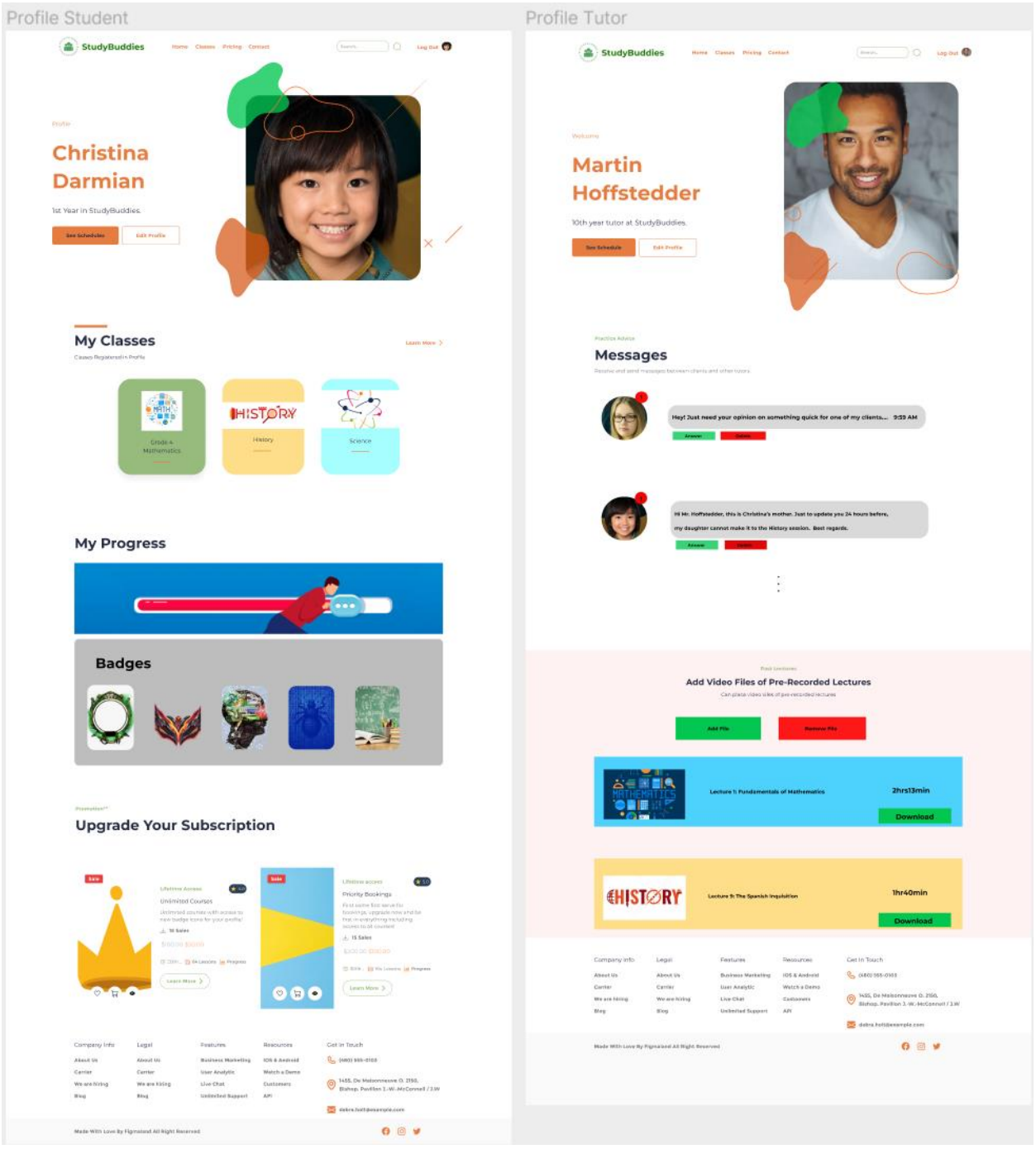

Figure 3: UI – Profile View

Feature: Flexible Schedule

In the schedule page linked from both the student and tutor profiles, they can manage their own schedules (time, session, etc). However, students will need the approval from their tutor for the need to cancel or confirm an appointment.

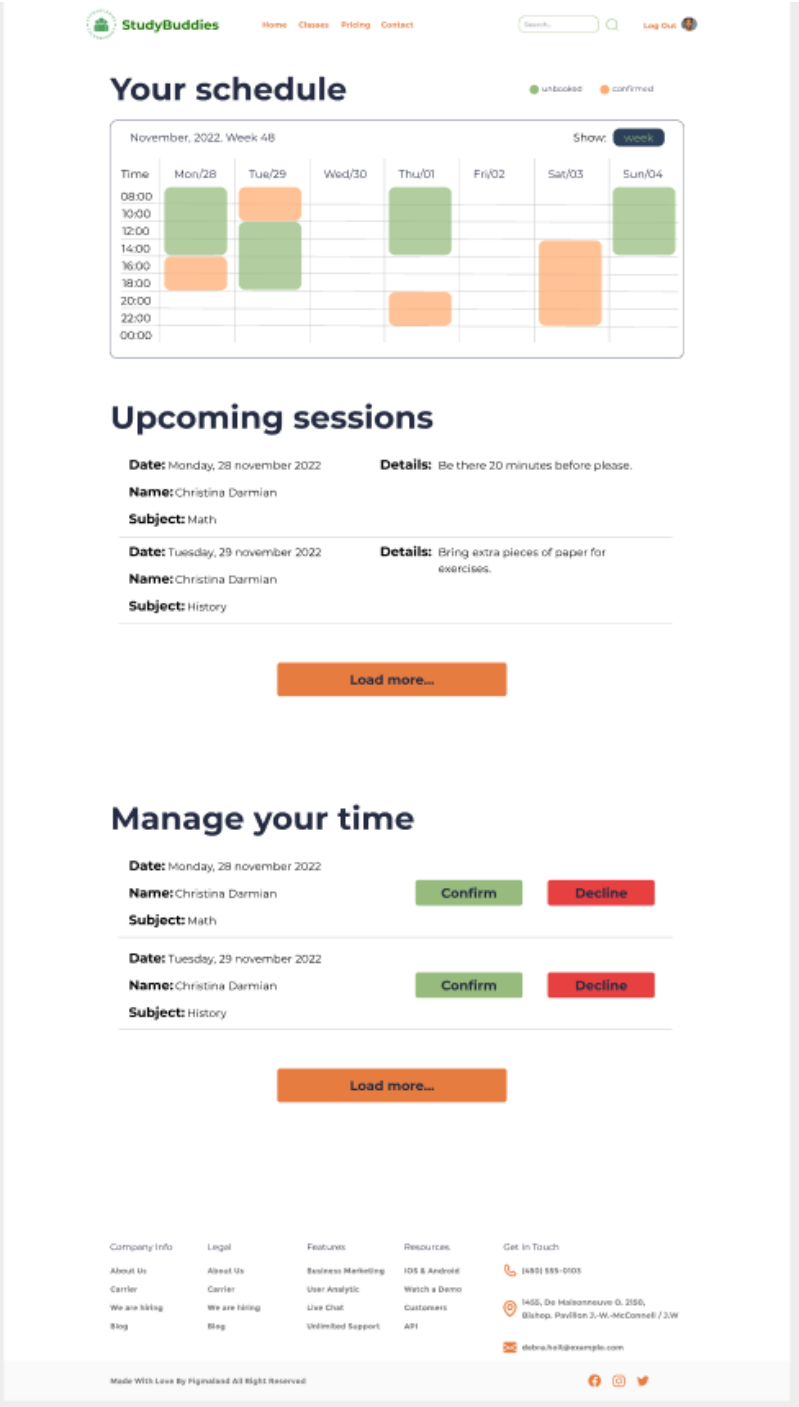

Figure 4: UI – Tutor's Page

Feature: Overview of Tutor - Student issues (tickets)

In this feature through the admin's page, they can oversee the reviews of the tutors given by the students or parents. The admin's can also be notified of newly created tickets where they can choose the options of it being resolved or to investigate it.

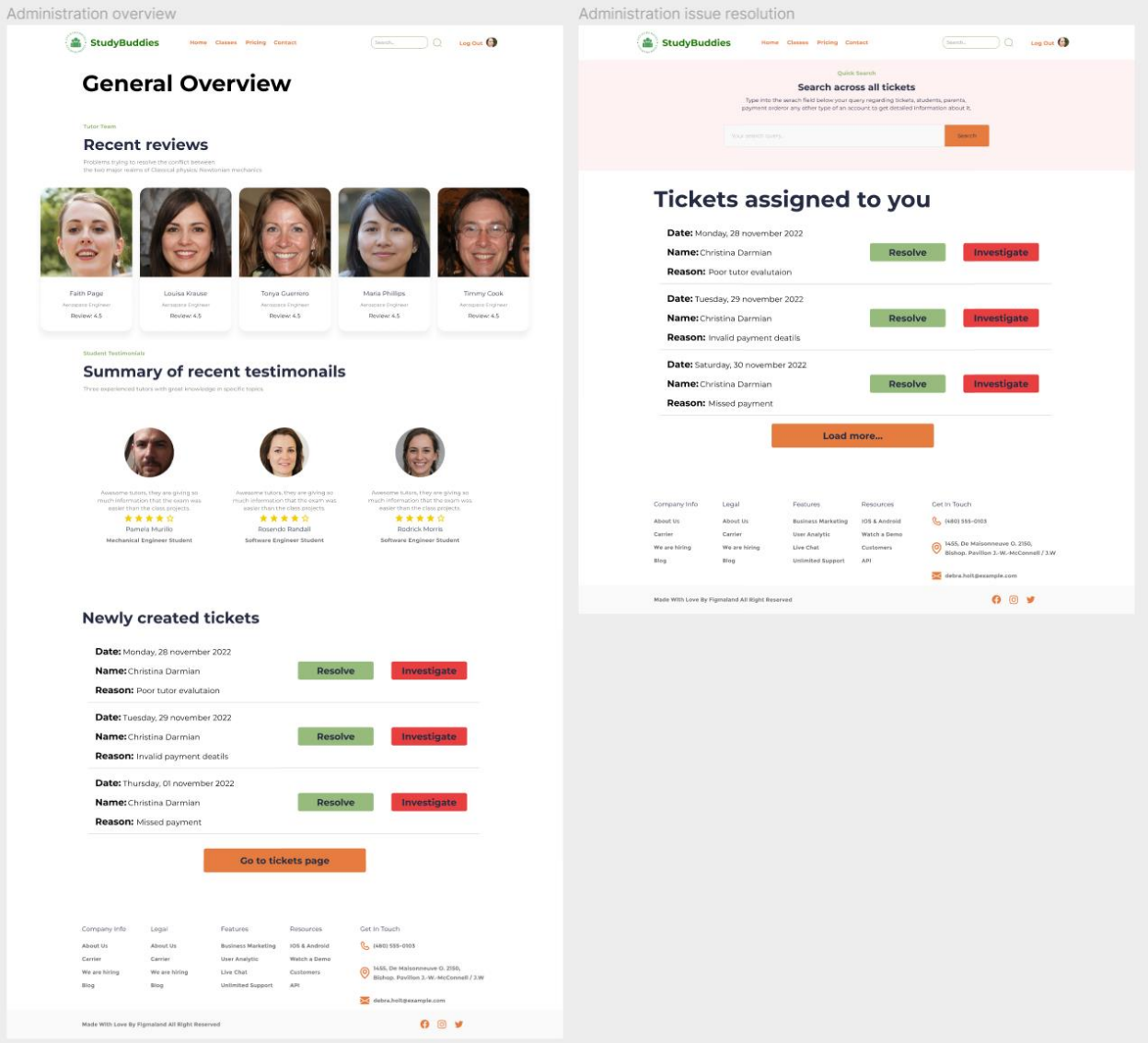

Figure 5: Tutor Overview

3. Quality Assurance

For the quality assurance part of our project, we revisited all of the requirements we already mentioned in the previous phases like the product features and the non-functional requirement statements. We used requirements reviews, test-case generation, use case diagram comparison, and prototyping (our GUI) to validate and improve our requirements.

Requirements reviews were done in combination with test-case generation. Our team went through the requirements one-by-one with a checklist that helped to evaluate their quality and detect their defects. The following checklist for functional requirement evaluation was used:

□ Atomic
□ Attainable
□ Cohesive
□ Complete
□ Independent
□ Modifiable
□ Traceable
□ Unambiguous
□ Verifiable

If any of the requirements had at least one characteristic unchecked, they were improved. After the checklist evaluation of each requirement, test cases were generated to make sure that no new problems emerge within the requirements. After working on this part of the project, we got the results shown in tables below.

3.1. Functional Requirements

Table 1: FR1 - Account Creation by Guest

ID	FR1
Name	Account Creation by Guest
Issues Identified	Completeness, Traceability
Improved Requirement	A guest shall be able to create a student or tutor account.
Test Cases	· Register as a student. · Log in with the newly created account. · Verify that the account can access only its respective features.

	· Register as a tutor. · Log in with the newly created account. · Verify that the account can access only its respective features.

Table 2: FR2 - Search Bar

ID	FR2
Name	All Types of Users Can Search Material (Search bar)
Issues Identified	Ambiguity, Traceability
Improved Requirement	A user shall be able to search for material on the platform by entering keywords into the search bar.
Test Cases	· Enter keywords into the search bar without logging in. · Click on the Search button. · Evaluate the relevance of the list of content that appears. · Repeat the previous steps after logging in as a student and as a tutor.

Table 3: FR3 - Attending a Lecture

ID	FR3
Name	A Student Can Attend Lecture
Issues Identified	Cohesion, Completeness, Traceability
Improved Requirement	A student enrolled into a classroom can attend a live lecture at the time specified by the tutor.
Test Cases	· Log in as a student that is enrolled into a classroom. · At the time indicated by the tutor, navigate to the classroom page. · Click on the Join Lecture button. · Verify that the audio and video of the lecture works.

Table 4: FR4 - Creating a Classroom

ID	FR4
Name	A Tutor Can Create Classroom
Issues Identified	Ambiguity, Atomicity, Coherence, Traceability
Improved Requirement	A tutor shall be able to create a classroom with a description that students could join.
Test Cases	· Log in with a tutor account. · Click on the Create Classroom button. · Add classroom description. · Finalize classroom creation. · Verify that classroom was created successfully and is visible to the public.

Due to the fact that we had created a use case diagram in our vision document, we decided to use this measure to add another step to our QA. As such, we have compared our features with the use case diagram. For the purpose of brevity, we give an example in this report of one of the functional requirements we verified with our use case diagram.

As our use case diagram shows below, a tutor (type of user) must be able to create a new classroom. The actor in this case is defined to be the tutor and the use case creates the functional requirement of creating a new classroom. As such, as part of our QA, we cross referenced the type of user being able to accomplish the specific use case scenario, making sure we took into account any dependent use cases. Note that test cases for each functional requirement were generated in part thanks to the use case diagram.

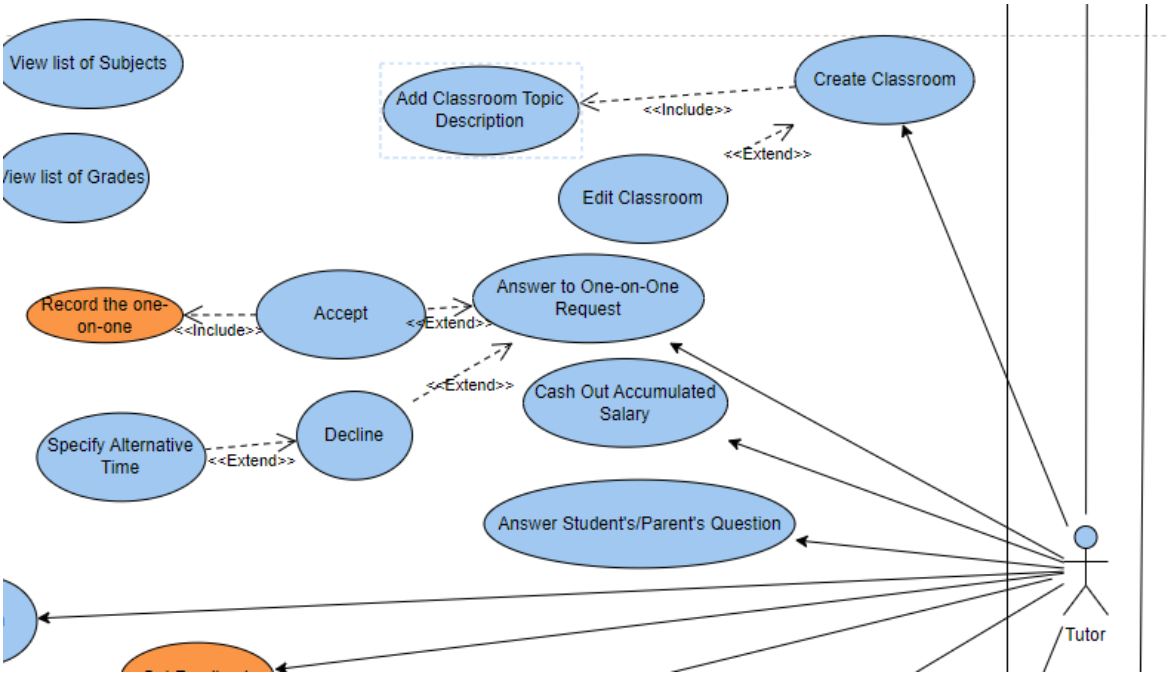

Figure 6: Tutor Use-Case Diagram

3.2. Non-Functional Requirements

Table 5: NFR1 - System Available Storage

ID	NFR1
Name	System Available Storage
Issues Identified	Atomicity, Traceability
Improved Requirement	The system shall have 10 TB of free storage space available initially with the possibility of increase if need be.
Test Cases	· Verify how much free storage space is available initially.
	· Increase the total storage space.

Table 6: NFR2 - System Response Time

ID	NFR2
Name	System Response Time
Issues Identified	Atomicity, Traceability, Unambiguity, Performance
Improved Requirement	The system shall have at maximum a 5-second response time to user interaction.
Test Cases	· Analyze response times of the system to different user interactions.
	· Verify that the user is disconnected from the system if the response time is more than 5 seconds.

Table 7: NFR3 - System Backup

ID	NFR3
Name	System Backup
Issues Identified	Traceability, Robustness
Improved Requirement	The system shall have a backup data storage that gets updated daily.
Test Cases	· Manually initiate a backup update. · Make unwanted changes in the system. · Restore the system using the backup data storage.

Table 8: NFR1 - User Training Time

ID	NFR4
Name	User Training Time
Issues Identified	Completeness, Traceability, Verifiability, Usability

Improved Requirement	The system shall be learnable by a new user in under 30 minutes on average.
Test Cases	· Introduce a group of users of different ages, cultures, genders, etc. to the system. · Record the times of each user to learn all the functionalities the platform has to offer. · Calculate the average learnability time.

As you can notice, the biggest problem with our requirements that was identified in QA was their traceability. In the previous sprints, functional and non-functional requirements were not given any IDs that could have helped to follow their evolution. This problem is now resolved. Apart from traceability, some requirements were improved to get rid of ambiguity and some to guarantee atomicity and completeness, but there was no other general problem.

As the last step of our quality assurance process, we used a Figma prototype to verify our requirements. The GUI we built helped us make sure that the functionality we wanted to include in StudyBuddies is the one we described in our requirements. We did not identify any new problems using this prototype, but it highly decreased the risk of developing wrong features for our platform.

4. Change Management

The Change Management Plan documents and tracks the necessary information required to effectively manage project change from project inception to delivery.
The Change Management Plan is created during the Analysis Phase of the project. It is intended audience is the project manager, project team, project sponsor and any senior leaders whose support is needed to carry out the plan. In this section, we will address the change management of StudyBuddies platform.
In this section, the change requests as well as change readiness of StudyBuddies platform will be discussed.

4.1. Change Requests

The following are examples of change requests for StudyBuddies platform.

Table 9: Change Request - Tutor Hiring Process

Element	Description
CR#	[CR001]
Title	Tutor Hiring Process
Description	Better review process for hiring new tutors, including formal interview process by qualified admins. The desired outcome is to improve the overall quality of the tutors.
Type of CR	Enhancement
Artifacts Impacted	Resources including Human Resource department and administrators
Importance of the CR	Low
Status	Open

Table 10: Change Request - Website Responsiveness

Element	Description
CR#	[CR002]
Title	Website Responsiveness
Description	The website responsiveness when accessing video lectures and browsing the main website hub. This change will increase website responsiveness thus improving overall customer satisfaction.
Type of CR	Enhancement
Artifacts Impacted	Software Engineers and Developers resources. Change affects quality.
Importance of the CR	High
Status	Work in Progress

Table 11: Change Request - Additional File Submission Formats

Element	Description
CR#	[CR003]
Title	Additional File Submission Formats
Description	File submissions by users were limited to PDF only. This change will allow the submission of files ending with DOC, DOCX, HTML, ODT, ODS, PPT and TXT. This change is lesigned to increase the ease of access for all users uploading or downloading files.
Type of CR	Enhancement
Artifacts Impacted	Software Engineers and Developers resources. Change affecting quality and scope.
Importance of the CR	Medium
Status	Open

Table 12: Change Request - 3rd Party Authentication Improvement

Element	Description
CR#	[CR004]
Title	3rd Party Authentication Improvement
Description	The 3rd party authentication was not secure, allowing users to bypass the authentication using burner phone numbers. The mprovement will disallow the use of fake phone numbers or burner phones, increasing security and reducing the number of fake users.
Type of CR	Defect/Security Improvement
Artifacts Impacted	Software Engineers and Developers resources. Change affecting security.
Importance of the CR	High
Status	In Review

Table 13: Change Request - Built-in File Conversion

Element	Description
CR#	[CR005]
Title	Built-in File Conversion
Description	In addition to CR[CR003], a built-in file converter will be needed to convert files from one extension to another. This change is to allow users who do not have a particular extension software to still be able to access the material.
Type of CR	New Feature
Artifacts Impacted	Software Engineers and Developers resources. Change affecting scope.
Importance of the CR	Medium
Status	Open

Table 14: Change Request - UI Personal Hub

Element	Description
CR#	[CR006]
Title	User Interface Personal Hub
Description	Personal Hub UI for students to be improved. The UI should now provide clear indication of all tutorial sessions, tutorial notes, progression status, easy access to extra material provided by tutor, activities tab. The goal is to make the overall navigation and visibility of the hub more clear and friendly for students. A clean interface is shown to improve student success and retainability.
Type of CR	Enhancement
Artifacts Impacted	Software Engineers and Developers resources. Change affecting user interface.
Importance of the CR	Low
Status	Open

Table 15: Change Request - Tutors' Personal UI Homepage

Element	Description
CR#	[CR007]
Title	Tutors' Personal UI Homepage
Description	Tutors will now be able to create a heavily customizable homepage to which Students and Parents can access. The feature will allow Tutors to modify UI elements, add pictures, videos and interactive UI elements. This change is designed to improve tutor marketability as professionally designed UI will clearly indicate tutor dedication and effort.
Type of CR	New Feature
Artifacts Impacted	Software Engineers and Developers resources. Change affecting user interface.
Importance of the CR	Low
Status	Open

Table 16: Change Request - WhiteBoard Feature

Element	Description
CR#	[CR008]
Title	Whiteboard Feature
Description	A built-in whiteboard for students and teachers to communicate during live tutorials. The whiteboard will allow users to draw, calculate, and communicate efficiently. This change is designed to improve the quality of tutorial sessions allowing better communication between users.
Type of CR	New Feature
Artifacts Impacted	Software Engineers and Developers resources. Change affecting Scope.
Importance of the CR	Medium
Status	Open

Table 17: Change Request - Parents/Admin Oversight on Live Tutorial Sessions

Element	Description
CR#	[CR009]
Title	Parents/Admin Oversight on Live Tutorial Sessions
Description	Parents and Admins will now have the capabilities of accessing live-going tutorial sessions without the knowledge of the tutor or students. This change is designed for parents to supervise the quality and material that is being provided to their child. This is to improve the overall teaching quality of the website as well as self-administer their child's education.
Type of CR	New Feature
Artifacts Impacted	Software Engineers and Developers resources. Change affecting Scope.
Importance of the CR	Low
Status	Work in Progress

Table 18: Change Request - E-Textbook Side Tab View

Element	Description
CR#	[CR010]
Title	E-Textbook Side Tab View
Description	This change is an improvement to the E-Textbook software. Instead of opening to the E-Textbook partnership website, E-Textbooks will now have the option to be opened as a side panel which will be easily accessible when browsing through the UI elements. This change is designed to improve the student's overall education quality.
Type of CR	Enhancement
Artifacts Impacted	Software Engineers and Developers resources. Change affecting User Interface.
Importance of the CR	Low
Status	Open

Table 19: Change Request - Achievement Stats for Students

Element	Description
CR#	[CR011]
Title	Achievement Stats for Students
Description	A new Achievement page UI for students that will display the stats in terms of overall participation, results, improvements and other general stats such as active daily study hours, etc. This page will allow students and parents to monitor the students' performance over time and easily view educational progression.
Type of CR	New Feature
Artifacts Impacted	Software Engineers and Developers resources. Change affecting User Interface and scope.
Importance of the CR	Low
Status	Testing

Table 20: Change Request - Tutor Rating System

Element	Description
CR#	[CR012]
Title	Tutor Rating System
Description	A tutor rating system that will allow students and parents to rate the tutor based on a star system in different categories. This system will allow all users to easily see the overall capabilities and effectiveness of a tutor. This change is designed to increase transparency and improve the overall quality of tutors.
Type of CR	New Feature
Artifacts Impacted	Software Engineers and Developers resources. Change affecting User Interface and scope.
Importance of the CR	Low
Status	Open

Table 21: Change Request - Video Player Quality

Element	Description
CR#	[CR013]
Title	Video Player Quality
Description	The video player was not properly sending packet information resulting in frame losses and low-quality video. This change is to fix minor issues resulting in a more efficient video player.
Type of CR	Defect
Artifacts Impacted	Software Engineers and Developers resources.
Importance of the CR	High
Status	Testing

4.2. Change Readiness

To make the changes easy to implement, we used traceability management techniques to assess the impact of the proposed changes and to apply them by maintaining consistency between the requirements document items. By making a traceability graph, it is easier to identify the items affected by a change request to evaluate the impacts and the feasibility. For example, for the change regarding tutors making a customizable homepage for the parents and students, we verified that this feature does not affect its linked items such as the functionalities of all the course features (access to lectures, notes, live sessions, payment, etc.). Thus, by making feature diagrams, it was possible to make a graphical representation of commonalities and variations in the system family to assess changes.

Furthermore, in order to evaluate the changes, we used some requirement evaluation techniques. We used inconsistency management to identify conflicts between items before and after a change is made to avoid terminology clashes and future conflicts in the system. Also, we used risk analysis to identify and evaluate product-related and process-related risks. For example, we identified the risk of 3rd party authentication not being secure by the use of burner phones and evaluated the countermeasures to increase security and reduce the number of fake users. All in all, requirements evaluation was an essential step in implementing new changes to the system.