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**Business Case: Abertay Challenge**

**Team Name: Byte Club**

|  |  |
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**Abertay University**

**Dundee, DD1 1HG**

**Date:**

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# Executive Summary

This report aims to justify why Byte Club are the best candidates to help increase student engagement and retention within Abertay University.

Xander Purvis, a Foundation Lecturer in Computing at Abertay University, has identified an issue with student engagement and retention in learning. The issue consists of students starting their educational journey motivated and eager to learn, however, as time passes, they can become disengaged as the material becomes more complex which can hurt academic performance. To address this, Byte Club have proposed the development of a web-based application that will host educational mini-games designed to increase student engagement and retention by allowing students to learn and study in a gamified environment.

This report outlines the key aspects of the project, which include the following:

* A section that outlines Byte Clubs recommendations for the project, describing the most effective approach to address the issue with the rationale to justify the solution.
* A detailed Work Breakdown Structure and development timeline has been created and reviewed to ensure that the project can be realistically developed within time constraints and milestones are being met at appropriate times.
* Risks associated with the project have been identified and approaches to manage them have been planned out as well.
* Considerations on how the most effective way to develop and implement the project
* A full cost breakdown taking into account costs and savings, software and hardware used and any additional factors.
* A justification into why alternative project solutions were not selected and why the selected proposal is the most suitable choice.

## Issue

Xander Purvis, a Foundation Lecturer in Computing at Abertay would like a way to increase student confidence and engagement with learning. While students can start their education journey highly motivated and engaged, this initial level of motivation can quickly disperse as material difficulty progresses. This can lead to students becoming despondent and disengaged with the content which in turn can severely affect academic performance. The primary issue with the current learning materials available for students is that it does not have a focus on engagement and retention, but purely on content, which leads to the learning experience becoming a chore instead of an opportunity to learn, this can lead students to associate education as a whole to be monotonous and uninteresting.

## Anticipated Outcomes

By creating a website with built in educational mini-games, students will be more inclined to engage in course material. The interactive and gamified nature of the website will create a fun and competitive way for students to interact with the material, this will eliminate the feelings of boredom and stress associated with learning material and instead encourage enjoyment and fun. By encouraging a more enjoyable learning experience for students, they will be more likely to revisit topics and aim to improve their knowledge which will enhance their proficiency which in turn, leads to improved academic performance. This is proven in a study which found that an educational game, “PaGamO”, enhanced students’ knowledge and boosted academic performance (Cheung and NG, 2021). This platform will provide valuable insights for lecturers into student progress; by tracking their engagement with the website and identifying weaker areas of their skillset, this can assist lecturers in offering more personalised support for the students.

## Recommendation

To address the project brief, Byte Club explored many ideas and found the most suitable to be that outlined within this report. This solution will involve hosting educational mini games on a website that will help students to become more engaged in their learning journey & increase student retention levels. The website will track student progression and allow students to identify weaker areas of their skillsets. The website will achieve these feats by:

* **Interactive Education Mini Games:** Students will have access to different mini games relevant to their course material, a daily challenge will be available for students each day encouraging daily visits to the website.
* **Varying Levels of Difficulty:** Each game will be tailored to different skill levels of students, ranging from first year students to postgraduates. Students will be scored initially and given a difficulty to work through which they will steadily advance to more challenging difficulties.
* **Scoring and Incentives**: To encourage a sense of achievement and self-progression, each game will be scored. Students will be rewarded based on their performance with incentives such as badges and score totals at the end of each game.

## Justification

The use of a web-based platform to host educational mini-games is ideal due to the ease of access and modularity. Unlike standalone applications which require installations and frequent updates, websites will only require students to have access to a device with an internet connection. An administrator can swap out games & challenges a lot quicker and easier on a website than a standalone application, meaning less time spent coding when implementing new challenges. The website can be accessible from My Learning Space – a webpage all students regularly access throughout the academic year - this will increase traffic to the webpage and encourage students to keep engaging with the content. The use of a website will be a safer option than a standalone application as we are supplied with Lochnagar and Mayar from Abertay University, which eliminates risks associated with using open-source software such as compatibility issues and security dangers.

## Team Experience

Byte Club collectively has years of experience developing web applications gained throughout educational journeys and personal pursuits. Each team member possesses a unique and invaluable blend of technical and soft skills, all with a strong desire to deliver an exceptional solution to the task at hand. Team leader, Snow White can be contacted at 2302444@abertay.ac.uk

# Business Case Analysis Team and Stakeholders

## Business Case Analysis Team

The following individuals comprise the business case analysis team:

| **Role** | **Description** | **Name/Title** |
| --- | --- | --- |
| Project Manager | Manages the business case and project team | Snow White, Process Team Lead |

## Project Team

The following individuals comprise the project team:

| **Role** | **Description** | **Name/Title** |
| --- | --- | --- |
| **Project Manager** | **Manages the business case and project team** | **Snow White, Process Team Lead** |
| **Researcher** | **Mainly responsible for gathering information relating to project solution** | **David Wadsworth, Julie Whyte** |
| **Designer** | **Mainly responsible for the design of the website** | **Michael Wilde, Harvey Williams** |
| **Programmers** | **Mainly responsible for coding the website** | **Josh Wilkins, Jack Tully** |

## Client and External/Internal Stakeholders

The stakeholder for the project has been listed below:

| **Role** | **Description** | **Name/Title** |
| --- | --- | --- |
| Client (Abertay University) | Sponsor for project | Xander Purvis, Foundation Lecturer in Computing |

# Problem Definition

## Problem Statement

Xander Purvis, a Foundation Lecturer in Computing at Abertay University has identified an issue regarding students and their learning. Xander has noticed a lack of engagement and retention from students in relation to their studies which has had a knock-on effect on their academic performance, these issues can be attributed to numerous reasons such as:

* **Traditional learning material not having a focus on engagement, only content:** The current approach to educational content focuses purely on delivering information over creating an engaging experience for students. This focus purely on content can be monotonous and boring for the students which in turn can negatively affect their learning experience.
* **Students are not being incentivised to continually improve their skillset:** Currently, students tend to focus primarily on completing their coursework to meet submission deadlines. This can mean students are not prioritising progressing their skillset, but only getting the work done. This approach limits their ability to develop a true understanding of the subject matter at hand and can be harmful to not only their academic performance but also working life after education.
* **Lecturers not being able to effectively track student progress throughout the year:** When students focus solely on completing coursework, lecturers are not being provided with adequate evidence to monitor student progress. Due to only having a snapshot of student work once assessments are submitted, it becomes difficult for lecturers to give adequate support to students throughout the academic year.

## Organizational Impact

The Abertay Challenges project will bring numerous benefits to Abertay University, benefiting both lecturers and students. The following highlights some of the impacts the project will deliver:

**Tools**: Both students and lecturers will be able to sign in to the web application using their Abertay log-ins. Since the project is web-based, it will be fully accessible from any platform or device with internet access.

**Process**: This web application will supplement student learning. Students can complete new challenges each day with varying difficulty to build a knowledge base and maintain strong fundamental skills. After a small period of time, lecturers can access the site to monitor student progression.

**Roles and Responsibilities:** The introduction of this web application may increase the time commitment for both students and lecturers. However, this extra time invested aims to benefit both parties and efforts will be made to minimize this impact. Lecturers will have access to a dashboard that allows them to quickly identify students' weak points, allowing for more efficient feedback. Additionally, students will only need to complete one short game or challenge to be considered engaged with the content.

**Hardware/Software**: To create this project, Abertay’s webserver and SQL server (Mayar & Lochnagar) – provided free by Abertay University – will be utilised. This eliminates any costs for the project and any risks associated with open-source software. The end goal is to have the website easily accessible from MyLearningSpace.

**Training:** This project will have a focus on simplicity and accessibility, it will not require training time for students or lecturers to effectively use this platform. The website will be intuitive and user-friendly to ensure any student, no matter their technical ability, can have a positive experience on the website.

## Technology Integration and/or Migration

As this project will not be a replacement for anything but rather a supplement to learning, implementation will not be a complex task and will not disrupt any day-to-day operations. The website will be put online with the database running behind it simultaneously, ready for use from that point onwards.

# Project Overview

The Abertay Web App overview is a website designed in a way that encourages student learning, is interesting enough to encourage student retention in that student can do the challenges with their peers and they may also compete against each other. The content is games and cyber security quizzes. The web site tracks analytical data in the form of a database that the admins have full control over this will show which students are engaging in the app, how long they stay on the page and how often they take part.

The goal is to make the web app accessible for all other degree modules in Abertay, so that it is interchangeable.

## Project Description

The client's requirements are to design and build a web app that can produce daily hacking scenarios and cyber security questions/ quizzes. New questions and quizzes will be saved on the website for admin access. Admin will also be able to track user data so that there is a score board. Within this data the client can see which students come to the page often and those who do not. This is to help with student retention and learning their module subject in a fun manner.

Software provided by the Uni is SQL database with Mayar server. This gives the client full control over the web app once it has been completed. The client will then update the relevant challenges daily. The client will also be able to see who has strong skills in this challenge and those who are not engaging enough. The goal is to make the web app also work for other degrees at Abertay such as law and engineering. With it being standalone, student ID and student e-mail is required to play. This will be integrated onto the MLS site.

## Business Goals and Objectives

The web app is designed to achieve the client's goal of creating an educational, engaging, website, with updated content each week in the form of a hacking task and/or a cyber security question. This web app is to promote student engagement within the relevant degree. Programs. The client will have access to data to see how the students are interacting with the web app and how long they use the app for, along with being able to see their scores. This can highlight any student that is not engaging enough in the web app.

|  |  |
| --- | --- |
| **Business Goal/Objectives** | **Description** |
| Student web app | Create a Web site with daily ethical hacking games/ cyber security questions. Security conscious website and secure data transfer of user details |
| Promote cybersecurity skills and awareness | Weekly skills using real life scenarios, to make the students practical skills in cybersecurity easier to learn. |
| Support for additional university degrees. | If required the basic concept can be changed to work with other university degrees, with minimal adjustments to change the weekly content to align with a different subject. |
| Improve student engagement | Content that is relevant in the degree. Leaderboards and user analytics will foster a sense of competition for the students. This is optional, but peer to peer learning and competition is good for learning. |
| Utilize university own technology/software to support client. /Reduce overhead costs | Using university software and technology will reduce the cost. Less prone to server errors or downtime, as any problems can be addressed in-house promptly by qualified staff. |

## Project Performance

The following table lists the key resources, processes, or services and their expected business outcomes in measuring the project's performance.

These performance measures ensure the project is aligned with the goal of improving student engagement, cybersecurity awareness, while being cost-effective and secure.

|  |  |
| --- | --- |
| **Key Resource/Process/Service** | **Performance Measure** |
| User Engagement Analytics. | Time spent on the web app by students, tracked via log-in and session duration. |
| New Content. | Uploading daily challenges, time limit of 30 mins. |
| Leaderboard. | Tracking user scores correctly. |
| Data security. | Compliance with University and legal data protection, with no data breaches. |
| User Feedback. | Positive feedback from students and staff, measured by surveys. |

## Project Assumptions

This preliminary list of assumptions will grow as the project starts; these are basic assumptions of the project going forward. More will be added as they happen.

* The team are committed to finishing the project on time, within the scope and with continued effective communication and regular meetings.
* Have a proficient level of trust with each other, in the team If the client cannot answer a question. Trust that the team can carry on with their knowledge and expertise.
* The client communicates what they are expecting out with the plan we already have. The client gives feedback on any progress, approves changes quickly.
* Daily challenges, as an initial start to the project there will be 8wks worth stored on the website.
* Software such as the web server and database are provided by the client, with all the relevant log in details needed, if there are any problems the client will rectify quickly to prevent delays to the web app.

## Project Constraints

The main project constraints are scope, time, and budget. Also known as the iron triangle, these 3 things are the most important ones when it comes to building a web app.

**SCOPE**

The client has made sure that we fully understand the scope of this web app, and what he expects it to do. We hope not to underestimate the work needed in delivering this web app. With the development phase soon to be underway we will be keeping a close eye on any changes that need to be made and avoid scope creep. Make sure we have flexibility and can adapt to what the client wants. If changes are to be made via user feedback and testing this will be good for the client to make sure they receive the project they asked for.

**TIME**

Our time limit from receiving the proposal through to completion is approx. 12wks, with 7 team members we are confident the project will be finished within the time and completion date we have given the client. If there are any unexpected delays or adjustments do happen that may impact on the schedule, we have included a 10% risk buffer for unseen challenges. Clear communication in case anything does happen will be addressed quickly with the client to keep the budget on track and time.

**BUDGET**

Project managers must try their utmost to work within the time limit and the budget. It is wise to give the client at least two quotes for the proposal, so that if the web app goes over the time limit or the budget, the client is not got too much of a surprise.

All team members will play a vital role in the project's success and lack of communication can lead to misunderstandings or scope that is out of reach.

Team members if they are ill or unavailable for work, their impact will be felt on the group. Leading to unexpected occurrences which might affect the project.

**RISK BUFFER**

There is a risk buffer included which will allow for any unforeseen situations. This will be 10% of the total project time.

This covers any implementation and testing issue, extra meetings, and conflicts within the team.

## Major Project Milestones

The major project milestones identified so far may need to be updated as our work schedule progresses.

|  |  |
| --- | --- |
| **Milestones/Deliverables** | **Target Date** |
| Project Plan Review and Research | 02/10/2024 |
| Project Kickoff | 25/09/2024 |
| Phase I Complete Planning | 02/10/2024 |
| Phase II Complete Design | 11/12/2024 |
| Phase III Complete Implementation | 22/04/2025 |
| Phase IV Complete Testing | 01/05/2025 |
| Phase V Complete Evaluation | 05/05/2025 |
| Product Presentation | 05/05/2025 |
| Closeout/Project Completion | 05/05/2025 |

# Strategic Alignment

The project aligns with the vision and strategic plan for 2020-2025 for Abertay University.

<https://www.abertay.ac.uk/about/the-university/strategic-plan/>

To remain focused on students, teaching, and research. This web app enhances digital skills with a platform that provides inclusive learning for all students, while aligning with Abertay’s commitment to innovation and excellence in the education and computer-based fields.

The client's vision for this project is for it to be fun and educational, designed with the inspiration from these websites: New York Times Crossword and Leetcode. The client has internal resources that we are utilizing in the project and when the project is complete and handed over, they have the skills and resources to manage it independently.

| **Plan** | **Goal** | **Relationship to Project** |
| --- | --- | --- |
| Promote digital innovation | Integrate technology for a creative learning platform | The web app is fun, educational with real life hacking scenarios and aligns with the degree. Cybersecurity/Ethical Hacking |
| Building Abertays reputation | Abertays commitment to providing students with practical design skills and competition for business. | The web/app demonstrates skills and innovative approach Abertay takes in its degree programs to prospective students and stakeholders. |
| Improving student success. | Use data to help and support struggling students | A database will allow the client to track important learning data. Who can then provide support to the students |

# Cost Benefit Analysis

Benefits start with Abertays reputation as a top-class university to learn a computer related degree, due to the hands-on experience and practical assessments involved. Highlighting a great interactive learning tool for various educational purposes.

The costs associated with this project have been decided through multiple factors. Utilities readily available via the client

Using indeed.com to research current salaries for the various positions within the team. Salaries found were per annum and 40hrs weekly. This was then calculated for our team at 20hrs per week over 12wks, giving an hourly wage, all the roles are interchangeable.

Getting quotes via websites for designing and hosting. The data tracker that we will use is Grafana.com. which analyzes, monitors and logs data, making it visually appealing and easy to use.

https://grafana.com/

Other costs associated with web design/hosting include implementation of

Web Application Firewall £ 100- £500p.a.

Malware scanning£200- £1000per annum.

DDoS protection £100 – £1000per annum.

SSL Certificate £100 -£500per annum

These are all computer-related security that the client will already have in place.

[https://wpengine.com/gb/plans/#pnp3-enterprise£1560](https://wpengine.com/gb/plans/#pnp3-enterprise%C2%A31560)

| **Action** | **Action Type** | **Description** | **First year costs (- indicates anticipated savings)** |
| --- | --- | --- | --- |
| Web Server | Savings | Provided by the client | £100,000.00 |
| Database | savings | Provided by the client | £50,000.00 |
| Data Tracker | cost | £300 per month | -£3600 |
| Project Manager | cost | Lead salary £ 45,000/52wks /40hrs=£21.63ph x 80hrs x 12wks | -£5191.20 |
| Web Design/Developers | cost | Annual salary £41,000  Hourly rate £19.71  X 3 team members | -£4730.77  X 3 team members = -£14,191.2 |
| Database Admin | Cost | Annual salary £41,500/52wks/40hrs=  Hourly rate £19.95 x 3 team members | -£4788 x 3 team members = -£14,364 |
| System maintenance & technical updates | Savings | The client will carry this out. £500p.m | -£5000 |
| Product testers | Cost | Testing of the web app | -£2974 |
| **Net First Year Savings** | £156,000 | Costs | **-£40,320.40** |

Based on the cost-benefit analysis above, by authorizing the web app project Abertay University will save £156,000 in the first year. This is a benefit to the company.

# Alternatives Analysis

The following were considered as an alternative option to address the current problem, not selected, and the reason for it was explained.

## 7.1 MAINTAIN STATUS QUO.

Maintain the learning as it is and do nothing. There is nothing similar on the MLS site that is interchangeable between degrees or has the user interaction with your peers. Do not update the learning experience for students and do not make the analytical data all the same regardless of the degree

## 7.1a Rejection.

This has been rejected by the client as it does not have the same engagement methods or the interactive learning that the new web app will provide It fails to track user data, and the educational outcomes provided via this web app. It misses a terrific opportunity to highlight what the students can design in the way of a modern website that includes a gaming/ cyber security aspect.

## 7.2 OUTSOURCE THE PROJECT.

Contract a web design business to design and build the platform.

### 7.2a Rejection

Having to depend on an external source that would need access to Abertay resources such as Mayar/Lochnagar and MYSQL. Which might prove a security risk to data.

It might be harder in the future if the project were to go open source.

Dependance on an external business for updates and content. Possibility of security breaches.

The cost of the chosen company’s software and staff.

## 7.3 Provide an add on to MLS.

Make a smaller module that will be a part of MLS. Add it separately to the degree module.

### 7.3a Rejection

Does not have the same usability as the main site; while being aligned to the degree module it is a stand-alone web app, a gaming site which encourages other students to try it.

# Approvals

The signatures of the people below indicate an understanding in the purpose and content of this document by those signing it. By signing this document you indicate that you approve of the proposed project outlined in this business case and that the next steps may be taken to create a formal project in accordance with the details outlined herein.

|  |  |  |  |
| --- | --- | --- | --- |
| **Approver Name** | **Title** | **Signature** | **Date** |
| Purvis, X | Client (Abertay University), CEO, Sponsor |  | 10/12/2024 |
| White, S | Project Lead Innovation  (Byte Club) | Snow White | 05/12/2024 |
|  |  |  |  |

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**Project Management Plan: Abertay App challenge**

**Team Byte Club**

**Snow White, Julie Whyte, Michael Wilde, Joshua Wilkins, Jack Tully, Harvey Williams and David Wadsworth**

**Abertay University**

**Dundee, DD1 1HG**

**Date: 04/12/2024**

# Introduction

Across all levels of education, a challenge that educators often face is the ability to deliver content to students that is enjoyable to interact with whilst also promoting meaningful retention of their learning. As seen in the *Uk Engagement Survey 2022* where it was reported that only 49% of students would engage with independent study beyond their taught material (Holden, 2023) there is a clear need for resources that assist students with retaining their teachings out of the classroom.

In response to this, at the request of Xander Purvis, a Foundation Lecturer in Computing at Abertay University, the Byte Club team aims to develop a website and database to be used for students to access a series of educational, enjoyable games. The website and its ability to host games will be designed to help with addressing the need for learning material that encourages student engagement and retention as well as gathering data on how students interacting with the website are doing.   
   
The following plan will provide a thorough outline of the Byte Club’s approach to the project, including the scope, milestones, scheduling, work breakdown structure, communication strategies, risks, costs and resources needed to successfully complete all the project’s deliverables.

# Project Management Approach

The project manager for the Abertay Challenges Website, Snow White, will throughout the project be responsible for the primary responsibilities of administration, communication and ensuring the team, Byte Club, is adhering to the scope and timeline found within this project plan. General responsibilities include scheduling team meetings, confirming the team is allocated sufficient time and resources for each milestone of development, securing the resources needed for each stage of the project, maintaining quality of deliverables and keeping an open, clear communication line between Byte Club and the sponsor, Xander Purvis.  
   
During development of the project, team members have each been assigned roles that is best suited for their individual talents and strengths. With each role being carefully distributed to ensure a balanced workload among each group. Team members will be assigned roles as following: David Wadsworth and Julie Whyte as lead researchers of information needed to support the project, Michael Wilde and Harvey Williams as the designers of the layout and appearance for the front end of the website and then finally, Joshua Wilkins and Jack tully will be responsible for programming the bulk of the website and databases back end.

While these roles provide a clear structure for the project, the team will also take a more flexible approach to the workload. If at any point during the project, a milestone requires more effort than initially expected the project manager may allocate a member from another role to assist in a task. This approach will help ensure that all milestones are completed in a timely fashion whilst also helping each team member gain familiarity with all stages of development.

To produce this work, Byte Club will employ a variety of tools and technologies to develop the Abertay Challenges Website. For the front end of the website, the coding languages used will be HTML, CSS and JavaScript, enhanced with the Bootstrap Framework library for a responsive layout. For the back end, PHP and MySQL will be used to handle the integration of the database and website, ensuring that all the data can be passed between the two without issue.

During the planning phase of the project, each member of the team will be responsible for attending meetings where development ideas will be discussed, suggested and evaluated. These meetings will be taken to a vote and if successfully passed, suggestions for the website will then be handled by the project manager who will then seek approval from the sponsor, Xander Purvis. Once approval has been granted, it is then the responsibility of Snow White to then delegate the task to the team members of the appropriate role. In addition, during development, team members will individually be responsible for writing the paperwork for their respective tasks which will all be collated by the project manager.

For development of the project, Byte Club will be utilising the waterfall methodology. After thorough discussion and research this method was chosen for a variety of reasons, the primary of which is that the team is experienced in website programming which should minimize the chance of large changes to the project plan and the need to reiterate work that another approach would include. As the scope and requirements of the Abertay Challenges website are well defined from the offset, the waterfall approach should allow the team to focus full resources on completing and familiarising themselves with each stage of development before moving on to the next. Additionally, due to the waterfall method being sequential, it is simpler for the team to document and track their progress to compare against the effort estimations set during the planned timeline.

# Project Scope and Milestone List

The scope of Byte Club’s Abertay Challenges project includes the complete planning, design, development and testing of the website alongside its accompanying database. It is critical to note, however, that although Byte Club shall implement example games for testing purposes during development, the responsibility of providing the website with future games will be that of the sponsor upon the team's completion and handoff of the project.

Due to the planned feature of the collection of student data throughout the website, the scope of the project will also include the team developing the site to meet the legal requirements of the Equality Act 2010, GDPR and the Data Protection Act 2018. In addition, throughout the project, the team will be required to produce and provide documentation for development detailing the steps that were taken during production alongside a manual supplying instructions on how to use the website for future teams and the client.  
   
For all stages of delivery during this project, all work will be handled and produced by the Byte Club team. At no point will work be outsourced and all deliverables made will be handled in-house by the team.   
  
Below, a table highlights the major milestones for the Abertay Challenges project. Here, these milestones represent major steps of development that each cover many multiple smaller milestones to provide a clear timeline of when deliverables shall be completed. Smaller milestones, those that would fall under the category of each major milestone have been omitted from the table and may be found within the Work Breakdown Structure (WBS) found within Appendix A.

|  |  |  |
| --- | --- | --- |
| **Milestones** | **Description** | **Date/Week** |
| Complete Requirements Gathering | All the requirements for the Abertay Challenges site have been determined and researched | 02/10/24 |
| Complete Design for the front end of the Website | The layout and appearance for the front end of the website has been designed | 11/12/24 |
| Complete the Coding for the Website | The Abertay Challenges website has been fully implemented and is functional | 20/01/25 |
| The Database has been created and the coding for the Website and Database to work together has been completed | The database storing the data from the Abertay Challenges site has been created. Furthermore, compatibility to store data from the website is fully functional and has been coded. | 22/04/25 |
| Complete the testing and debugging of the Website and Database | All functionality of the website and database has been tested, and all errors have been corrected and identified. | 01/05/25 |
| Complete Documentation for the project | All paperwork and documentation for the Client has been written and completed. | 05/05/25 |
| Complete the Transition and Hand Over of the project to the Client | The team Byte Club will hand over all deliverables to the client. | 05/05/25 |

The following deliverables will be handed to the client upon completion of the project:

|  |  |  |
| --- | --- | --- |
| Product | Description | Date/Week |
| Documentation | The Documentation will cover the development, produced features and functionality of the Website | 05/05/25 |
| User Manual | A guide detailing how a user would use the website alongside instructions on the upkeep of the website for an administrator | 05/05/25 |
| Source Code | The source code for the Website and Database including the PHP, CSS, JavaScript | 05/05/25 |

# Work Breakdown Structure (WBS)

The WBS of Byte Club’s Abertay Challenges Project will be composed of work packages that will be composed of timeframes between 3 and 30 hours. The time allocated for each package and the choice of the Work Packages themselves were decided upon by the team after a close reflection of previous work done which produced an estimate for what was needed to deliver the project to a reasonable schedule.

The schedule, reviewed by and approved by the Client, will be produced and followed from as a Microsoft Projects Gantt chart as seen in Appendix B. In the event of a change needing to be made to the project schedule, the Byte Club team will follow the change control process. Snow white, the project manager will assess the change and if needed, will take it further to the Client before being acted upon. This control process can be seen in section 13 for further detail.

By following the schedule set out for this project, the team will be working between set boundary conditions. In the case where the Schedule Performance Index (SPI) or Cost Performance Index (CPI) falls below 1.0, action will be taken by the project manager to address the team the issues that have arisen. In the case of the SPI or CPI falling to 0.8 or lower, the project manager will have a one-to-one meeting with the client to discuss the progress of the team as well as discuss possible solutions.

# Change Management Plan

The following steps outline the process for change on the Abertay Challange project and highlights the level of control and peer review necessary for implementation.

Step #1: Identify the need for a change.

Any change must first be documented using the CRF (change reference form) and will first be assessed by the project manager Snow.

Step #2: Internal assessment of change.

Snow, alongside the appropriate members of the team, will hold a meeting discussing and evaluating the necessity of proposed change as well as estimated costs across the board.

Step #3: Evaluation of the change

If the request passes step 2 a formal meeting will be held involving the primary client (alexander) and all founding team members to act as a control board to identify any conflict within the project's development that may arise as well as a general vote on feasibility of change.

Step #4: Secondary client feedback

The proposed modification will be presented to secondary clients. In This project being the other department professors using the Abertay Challanges service. For general feedback/concerns.

Step #5: Final confirmation

The project manager will have a 1-1 meeting with the primary client to consider both internal and external feedback on the modification; as well as a detailed cost breakdown. Upon agreement the change can be greenlighted and moved on with.

Step #6: Implement change

Once the change has been approved the appropriate members of the development team will start the process of implementation with thorough documentation and testing ona mirrored version of the Abertay Challenge service so as not to disrupt the current users. After the change is functional on the mirror it will be once more reviewed by thew primary client and the Project manager before being officially added to the active version of Abertay Challanges.

Any internal member or secondary client can submit request via the CRF linked here. This link will also be present within the profile page of any administrative account. Responses may take between 5-10 working days.

Any bugs will be reportable via a self-report form located for all users in the help section of the website, this form is for functionality changes only.

# Communications Management Plan

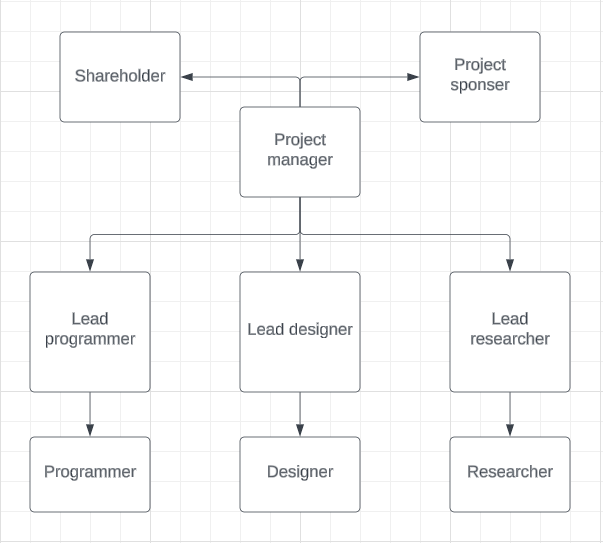
This plan details the hierarchy of communication, the forums it will be held in and the expected procedures. Detailed below is how the team will ensure all personnel are on the same page with a clear direction for work.

The communications matrix below details the scheduled events of correspondence between members. The project manager is directly responsible for the forwarding of invites and the distribution of the minutes of a given meeting.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Communication Type** | **Description** | **Frequency** | **Format** | **Participants/ Distribution** | **Deliverable/Product** | **Owner** |
| Activity log | Submitted log details actions carried out. | Weekly | Individual submission | Project Sponsor, Team and Stakeholders | Status Report | Stakeholder |
| In person meeting | Weekly meeting to discuss aims for the following week. | Weekly | In Person | Project Team | Short summery distributed amongst the team | Project Manager |
| Open online chat | Group digital space hosted on Discord | Within working hours | Digital | Project Team | Chat log showing project relevant communication | Project Manager |
| Project sponsor meeting | Weekly check in to discuss progress and to run ideas/thoughts by the sponsor | Weekly | In Person | Project Sponsor, Team | Short summary distributed amongst the team | Project sponsor |
| Design Recap | At end of each phase the team and sponsor review to confirm the Deliverable meets expectations. | End of-phase | In Person/Digital | Project Team/Project sponsor | Completed phase of project | Project sponsor |

Project team directory:

Below details the chain of order in the passing of information; this hierarchy ensures departments only receive relevant information. Communication upwards the chain will follow the same flow, even if the intended recipient is higher up, the reason for this is so the department lead is fully aware. This has the exception of any HR issues as this project does not have a dedicated HR team the project manager is acting in for that role.



|  |  |  |
| --- | --- | --- |
| **Name** | **Title** | **E mail** |
| Snow White | Project Manager | 2302444@abertay.ac.uk |
| Jack Tully | Lead coder | 2204397@abertay.ac.uk |
| Michael Wilde | Lead Designer | 2400897@abertay.ac.uk |
| Julie Whyte | Lead researcher | 2004003@abertay.ac.uk |
| Joshua Wilkins | Programmer | 2202374@abertay.ac.uk |
| Harvey Williams | Designer | 2201694@abertay.ac.uk |
| David Wadsworth | Researcher | 220869@abertay.ac.uk |

Communications Conduct:

Meetings:

The project manager will communicate with the team to agree on a time within the week all members can participate, in the event not full attendance can be achieved the project manager will review the agenda and work around the more relevant members for the week. In addition, in the event a member is missing they are expected to schedule a catchup with the project manager either in person or over a team call to discuss the minutes to verify an understanding of the week's goals. An official notice along with an agenda will be set out by the project manager at minimum 48 hours prior, any unexpected absences are required to give 24 hours' notice with the exception of extenuating circumstance. All members will be forwarded the minutes within 24 hours post meeting.

Email:

Emails will be professional and strictly relevant in nature with only the appropriate members copied in. Emails are only to be sent within working hours, and a response will be delivered within the next 2 working days. If a member has multiple points/concerns they are to be sent in different emails so they can be categorized and assigned a priority. This also allows the replies to be issue specific. If any member is unable to respond notice is preferred but not required; however, an explanation is required eventually and if none is given or there is no correspondence for an extended period disciplinary action will be taken.

Informal Communications:

Informal communication and discussions are encouraged within both the shared discord space as well as in person it is crucial to note that before any action is to be taken it must be first approved and voiced through the appropriate forums. Any reference to informal communication as justification for an action will not be accepted.

Despite that Informal conversation is good for the workplace environment by building team connections allowing better understanding and relations between colleagues and should not be discouraged.

# Cost Management Plan

This cost management plan dictates how costs for the Abertay Challenge App are estimated, managed and controlled. Costs will be analyzed using a schedule and cost performance index, (SPI and CPI) to ensure an acceptable financial performance is maintained in accordance with the budget. This plan will also detail the corrective process if the variance falls into an unacceptable range.

Within the Abertay Challange app we aim to maintain financial transparency with our stakeholders through an agreed upon budget paired with monthly reports to showcase our alignment with said budget.

Before a budget is agreed on a cost estimation approach will be represented containing a breakdown of the work breakdown structure, (WBS). This WBS will include the expenses for the deliverable containing; an employee-to-employee hire cost based upon the projected hours required and the industry standard rate for the relevant role, any additional costs such as travel required or upkeep of services such as external servers and a buffer accounting for unexpected costs and delays. This budget plan will be developed alongside any stakeholders.

Within the context of the Abertay Challange App earned value (EV) will be calculated by taking the percentage of deliverable completion to gain a figure from the estimated cost of the deliverable. The AC figure is represented of the money spent on the deliverable at the time of calculation. The Figure PV refers to the projected value, being the agreed upon budget.

Using the industry standard calculations for SPI and CPI (SPI =EV/PV, CPI = EV/AC) figures will be calculated and represented in the monthly report.

In the stakeholders' report will be the calculated figures alongside proposed corrective action if either SPI or CPI fall below 1.0.; As well as the flat figures the report will also contain a percentage variance from previous figures and a projection of SPI/CPI based on current trajectory. If a dip is projected the project manager will initiate meetings with the intention of preventing a fall below 1.0 to keep the project in the green.

# Procurement Management Plan

As the whole of the project is conducted internally no external procurement is required.

Direct procurement, as the deliverable is an entirely digital service, there is no applicable wholesale goods that can directly impact the deliverable.

Indirect procurement, the goods needed by the team such as stationery, computers and a workspace are all provided by the client, being Abertay university.

Service procurement, the client has asked to strictly use the services already provided for the project. In addition, if any extra staff are needed, they will also be sourced from within the university.

Although these choices were made in the interest of protecting the data of students and teachers and for ease of communication by keeping it within house. These choices effectively eliminate the need for a procurement methos and a cycle of negotiating and bidding between us and suppliers.

Howe despite all this any additional recourses will be obtained by first contacting the project manager and through them, the individual requesting, and the university the best option will be agreed on and documented. It is crucial that all documentation happens in a traceable format such as email with clear cut costs so it can be factored into the project's cost performance index.

# Project Scope Management Plan

In the Abertay App Challenge Project, the Project Manager will be responsible for scope management. The project scope is to be determined through the Scope Statement and the WBS.

The Project Manager will collaborate with the Client and any relevant Stakeholders in developing and approving any documentation to review the scope of the project, including quality checklists of deliverables and metrics for performance measurements.

The proposed scope changes shall be initiated by the Project Manager, Stakeholders, or any member of the project team.

Any changes must be sent to the Project Manager, who will go through the changes that are requested. If the change is approved, the Project Manager will forward it to the Client for final approval.

If the Client approves the changes, the Project Manager will update all the relevant project documents and then notify all the stakeholders. The Client, with input from the Project Manager and Stakeholders, shall be responsible for accepting the final project deliverables and overall project scope.

The Client is responsible for accepting the final deliverable of the project. Such Project Deliverable Acceptance shall be done after full review of all project documentation, testing results, and completion of all tasks, work packages, and product functionalities.

# Schedule Management Plan

Project schedules for the Abertay Challenges (TBC) will be created using Microsoft Project 2019, which will commence with the deliverables outlined in the project's Work Breakdown Structure (WBS). Activity definition will involve identifying the precise tasks that are required to complete each of the deliverables. The Activity sequencing will determine the optimal order of work packages and establish any dependencies between project activities. The Activity duration will be estimated, in days and hours, and will be used to calculate the estimated work periods necessary to complete each work package. The Resource estimation will assign appropriate resources to work packages, which will further the development of a comprehensive project schedule.

Once a preliminary schedule has been created, it will then be reviewed by the project team, and any resources identified will be tentatively assigned to project tasks. The project team and any resources must agree to the proposed work package assignments, durations, and schedule. Once these are achieved, the client will review and approve the schedule, and it will then be baselined.

**Schedule Risk Management**

To address any potential risks to the schedule, the project manager will work with the project team to identify any risks that may impact activity sequencing, resource availability, or task durations. Contingency buffers will be incorporated for high-risk tasks. Risks will be documented and reviewed regularly by the project manager. Mitigation strategies may include resource reallocation, task re-prioritization, or schedule adjustments based on impact assessments.

**Schedule Monitoring and Updates**

The project manager will review schedule progress weekly. Progress will be tracked using percentage completion of tasks, and deviations from the baseline schedule will be flagged. Updates will be made in Microsoft Project 2019, and the updated schedule will be shared with the project team and stakeholders.

**Variance Management**: For any variances in the tasks that exceed 10% of the baseline duration or effort, the project manager will initiate a review with the team and escalate any serious delays to stakeholders. Any actions that need to be corrected will be documented and implemented as needed.

**Schedule Change Control**

Once the schedule is baselined, any changes will be managed through the following steps:

1. **Change Request**: All requests for schedule changes must be submitted using a change request form.
2. **Impact Analysis**: The project manager will assess the impact of the change on the timeline, budget, and resources.
3. **Approval**: Changes will be reviewed and approved by the project sponsor and stakeholders.
4. **Implementation**: Approved changes will be incorporated into the schedule and documented.

A log of all schedule changes will be maintained for transparency.

**Roles and Responsibilities**

The project manager will be responsible for further work package definitions, sequencing, and estimating duration and resources within the project team. The project manager will also create the project schedule and validate the schedule with the project team, stakeholders, and the client. The project manager will secure the clients approval for the schedule and establish that as the baseline.

The project team is responsible for participating in the work package definition, the sequencing, the duration, and the resource estimates. The project team will also discuss and agree on the proposed schedule and perform the assigned activities once the schedule has been approved.

A tentative Gantt chart and precedence network with critical path is provided in Appendix B.

**Team Communication and Conflict Resolution**: Weekly check-ins will be conducted by the project manager to address any challenges with task durations or sequencing. Any disagreements will be resolved through discussions or being escalated to the project sponsor. For team discussions and meetings, brainstorming will be used to get the best out of the team.

The client will participate in reviews of the proposed schedule and approve the final schedule before it is baselined.

If there are any project stakeholders, they will participate in reviews of the proposed schedule and assist in its validation.

**Milestones**

In accordance with TSI’s organizational standard, the following will be designated as milestones for all project schedules:

* Completion of scope statement and/or WBS
* Baselined project schedule
* Project kick-off
* Approval of roles and responsibilities
* Requirements definition approval
* Completion of data mapping/inventory
* Project implementation
* Acceptance of final deliverables

**Milestone Validation:**  
Each milestone will be reviewed against predefined criteria to confirm completion:

* **Deliverables**: Check for submission of all required outputs.  
  Milestone signoffs will be documented and stored in the project repository.

# Quality Management Plan

All the members of the Abertay Challenges (TBC) project will contribute to the Quality Management Plan. It is essential that the team ensures that any work that is completed is of an adequate level of quality, from individual work packages to the final project deliverable. The following are the quality roles and responsibilities Project:

The Client is responsible for approving all quality standards for the Abertay Challenges (TBC) Project. This will include reviewing tasks and deliverables to ensure they comply with the established standards and providing final approval for the completed project deliverable.

The Project Manager will be responsible for quality management throughout the duration of the project. They are responsible for implementing the Quality Management Plan and ensuring all tasks, processes, and making sure documentation is compliant with the plan and its requirements. The Project Manager will collaborate with the project’s quality specialists to define acceptable quality standards and will communicate these standards to the project team and stakeholders. The Project Manager is also tasked with tracking compliance with quality standards and will coordinate any necessary quality control activities.

The Quality Specialists are responsible for working with the Project Manager to develop and implement the Quality Management Plan. Quality Specialists will recommend tools and methodologies for tracking quality and standards to establish acceptable quality levels. The Quality Specialists will create and maintain Quality Control and Assurance Logs throughout the project.

The members of the project team, and the stakeholders, will be responsible for assisting the Project Manager and the Quality Specialists in establishing acceptable quality standards. They will also work to make sure that all quality standards are met and communicate any concerns they have regarding quality to the Project Manager.

Quality control for the Abertay Challenges (TBC) Project will apply tools and methodologies that ensure that all project deliverables comply with approved quality standards. To meet deliverable requirements and expectations, we must implement a formal process in which quality standards are measured and accepted. The Project Manager will ensure all quality standards and quality control activities are met throughout this project. The Quality Specialists will assist the Project Manager in verifying that all quality standards are met for each delivery. If there are any proposed changes and approved, they are approved by the Client, the Project Manager is then responsible for communicating these changes to the project team and updating all and any project documentation and plans.

Quality assurance for the Abertay Challenges (TBC) Project ensures that all processes used in completing the project are of acceptable quality standards. The process standards are in place to expand project efficiency and minimize any waste. For each process used throughout the project, the Project Manager will track and measure quality against the approved standards with the assistance of the Quality Specialists and ensure all quality standards are met. If any changes are proposed and approved by the Client, the Project Manager is responsible for communicating the changes to the project team and updating all project plans and documentation.

**Applicable Standards**

The Abertay Challenges(TBC) Project must adhere to the following set of standards , with responsibilities for compliance which is outlined below:

* Legal Standards : Compliance with all relevant laws and regulations , the responsibility of this lies with the Project Manager and any Quality Specialists.
* ISO Standards: Adhering to specific requirements such as ISO 9001 for quality management , the responsibility for this lies with the project manager and any quality specialist.
* Accessibility standards: Making sure that compliance with any accessibility guidelines such as WCAG 2.1, the responsibility of this lies with team members and any Quality specialists.
* Usability Standards : Incorporate user-centered design principles, the responsibility lies with Quality specialist and Stakeholders.
* GDPR/UKDPA: Ensure compliance with data protection and privacy measures which align with GDPR and UK DPA, the responsibility lies with the Project Manager and Stakeholders.

# Risk Management Plan

The approach that the Byte club team is taking to manage the risks identified for the ‘Abertay challenge app’ project involves identifying potential problems early, ranking them by how manageable and high risk they are, and then swiftly acting on those that are deemed to be of high risk. With the various risks being identified early there will be ample time to create, plan, and implement any mitigation strategies that the team determines are necessary to address high-priority risks, ensuring the project remains on track and is completed to a high standard while also keeping cost suffered from issues to a minimum. These high-risk issues will be conveyed to the whole team as well as saved to the schedule to ensure that all members are aware of the potential risks and what the plan is in the event one does occur. This will also ensure that the risk manager is constantly aware of what they should be looking for as well as how to effectively roll out the mitigation plan in a way that doesn’t disrupt the whole flow of the project’s pipeline. The risk manager will also give updates to the team during the meeting to ensure they are aware of anything that may have happened during the last meeting.

When the project is in the final stages of development and as well as just before release the project manager will go over and double-check the project against all the risks identified to make sure that nothing is wrong, and the product can safely be released to the public without issue. This will also provide the risk manager with feedback to see if any improvements have been made which will help with future projects that they might undertake.

The three main risks identified have been listed below, along with a short description of how the team will address them. Further risks and a more detailed description can be found in Appendix C.

* **R1** **Having a data breach** – Will manage this by making sure all login systems are salted and encrypted, the team will also make sure to hide the URL directories to stop directory traversal.

* **R2 Copyright** – All assets will be created by the team, or they will get written permission from the original creator.

* **R3 Budget issues** – Strictly follow the project plan to ensure the team remains on schedule and within scope.

# Staffing, Resource and Cost

The Byte club team will be using a team-based structure while working on the Abertay challenge app. This work will be performed internally, and the staffing requirements include the following:

Project Manager (1 position) – responsible for all management for the Abertay challenge app. The Project Manager handles planning, creating, and/or managing all work activities, variances, tracking, reporting, communication, performance evaluations, staffing, and internal coordination with the team leaders.

Lead Coder (1 position) – responsible for oversight of all coding and programming tasks for the Abertay Challenge App, and ensuring it aligns with the quality baseline. Responsible for working with the Project Manager to create work packages, manage risk, manage schedule, identify requirements, and create reports.

Programmer (1 position) – responsible for coding and programming for the Abertay challenge app. All coding and programming tasks will be reviewed by the Senior Programmer before implementation. Responsibilities also include assisting with risk identification and status reporting.

Lead designer (1 position) – Responsible for coming up with the design of different pages. They are also responsible for pitching the design ideas to the group who then after the agreement will then pitch the design to the client and get them to sign off on it. They will also handle programming the front end of the website and reviewing the design work done by others.

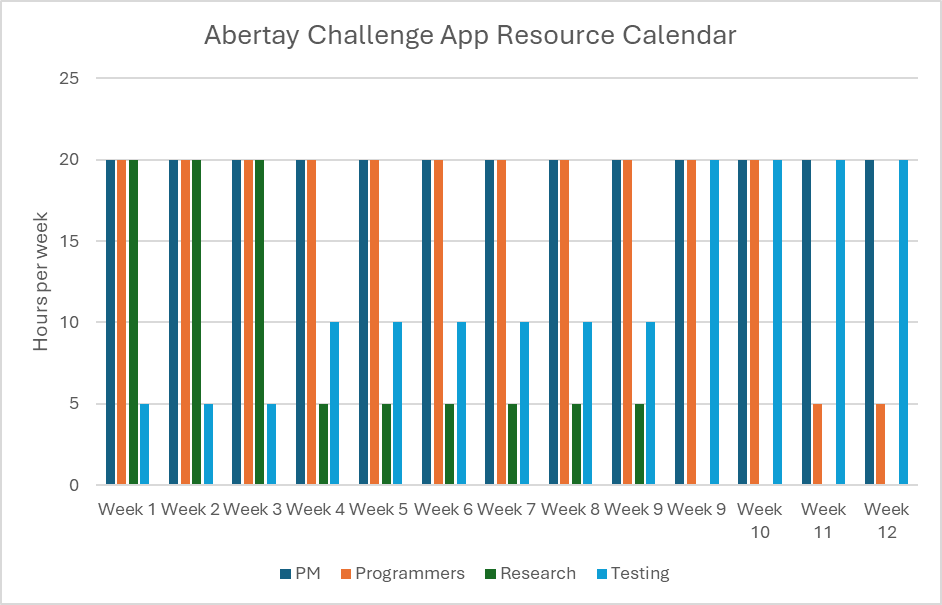
Designer (1 position) - responsible for helping the designer with brainstorming ideas and creating designs themselves. They will also handle programming the front end of the website and aiding with risk identification and status reporting.

Lead researcher (1 position) - responsible for providing the team costs for certain processes and is also responsible for contacting the client with predicted costs and getting confirmation that it is acceptable. They will also handle risk management for costs and reviewing the work that comes in from other researchers.

Researcher (1 position) - responsible for aiding the lead researcher with the research as well as aiding the programmers when there are no research tasks lined up. They will also handle assisting with risk identification and status reporting.

Resources:

The Abertay challenge app will require all project team members to work for 20 hours a week for 12 weeks. If a team member does not have any required work for the week, then it is up to the project manager to decide how their efforts outside the allotted project time are rewarded.



Cost:

The cost baseline for the Abertay challenge app includes all budgeted costs for the project's successful completion.

|  |  |  |
| --- | --- | --- |
| **Project Phase** | **Budgeted Total** | **Comments** |
| Planning | £2,886 | Includes work hours for all project team members for gathering requirements and planning project |
| Design | £1,673 | Includes work hours for all design team members for work on the Abertay challenge app conceptual design |
| Coding | £12,385 | Includes all work hours for coding of Abertay challenge app |
| Testing | £2974 | Includes all work hours for testing of Abertay challenge app software |
| Transition and Closeout | £2,886 | Includes all work hours for transition to operations and project closeout |

# Quality Baseline

To meet the quality standards established below in the quality baseline, which is the baseline that shows the acceptable quality level that the project must be completed too, the Byte Club team must make sure that all technologies and software lists below meet or exceed the baseline values to consider this project a success.

|  |  |  |
| --- | --- | --- |
| **Item** | **Acceptable Level** | **Comments** |
| Compatibility | No errors are associated with running software with compatible applications. |  |
| User analytics | A system that logs how many questions the user has completed and gotten right that week. | The user should be able to see these stats. |
| Web server | The web server must allow 5000 users to use the site at one time. | 5000 because Abertay University currently has approximately 4000 students |
| Admin Portal | The admin portal must allow for questions to be added, see user stats, and change other aspects of the site. |  |
| Game selection page | The game selection page must have an easy-to-understand design with an easy-to-understand tutorial where needed. |  |
| Feedback/suggestion page | This page must allow a user to give anonymous feedback. |  |

# Sponsor Acceptance

Approved by the Project Sponsor:



Date:\_\_10/12/2024

Xander Purvis

Abertay Challenges

# APPENDIX A: Work Breakdown structure

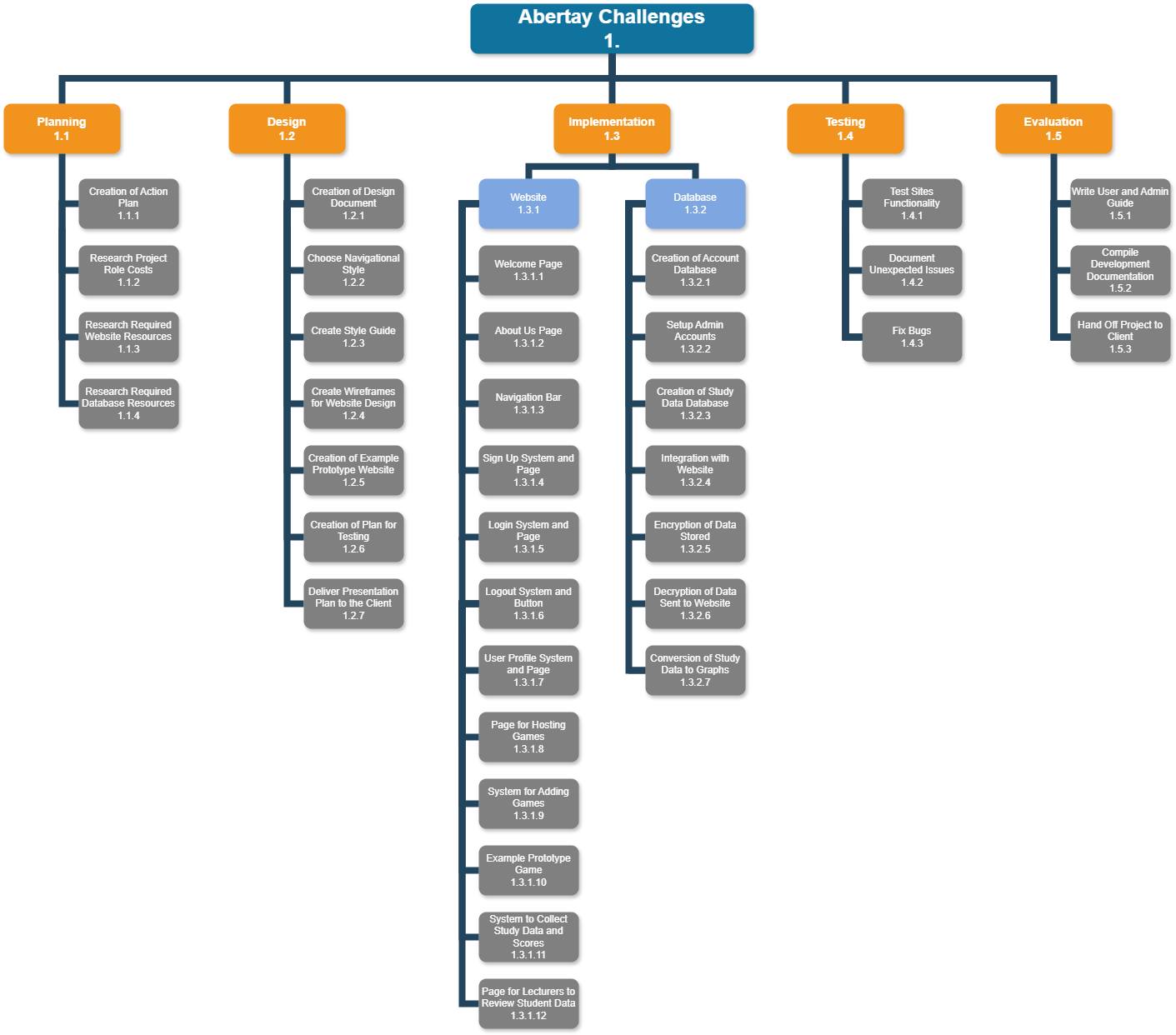
# Introduction

The Work Breakdown Structure presented here represents all the work required to complete this project.

# Outline View

1. Abertay Challenges
   1. Planning
      1. Creation of Action Plan
      2. Research Project Role Costs
      3. Research Required Website Resources
      4. Research Required Database Resources
   2. Design
      1. Creation of Design Document
      2. Choose Navigational Style
      3. Create Style Guide
      4. Create Wireframes for Website Design
      5. Creation of Example Prototype Website
      6. Creation of Plan for Testing
      7. Deliver Presentation to Client
   3. Implementation
      1. Website
         1. Welcome Page
         2. About Us Page
         3. Navigation Bar
         4. Sign Up System and Page
         5. Login System and Page
         6. Logout System and Button
         7. User Profile System and Page
         8. Page for Hosting Games
         9. System for Adding Games
         10. Example Prototype Game
         11. System to Collect Study Data and Scores
         12. Page for Lecturers to Review Student Data
      2. Database
         1. Creation of Account Database
         2. Setup Admin Accounts
         3. Creation of Study Data Database
         4. Integration with Website
         5. Encryption of Data stored
         6. Decryption of Data Sent to Website
         7. Conversion of Study Data to Graphs
   4. Testing
      1. Test Sites Functionality
      2. Document Unexpected Issues
      3. Fix Bugs
   5. Evaluation
      1. User and Admin Guide
      2. Compile Development Documentation
      3. Hand Off Project to Client

Tree Structure View



# Glossary of Terms

|  |  |
| --- | --- |
| **Term** | **Description** |
| WBS | The Work Breakdown Structure (WBS) is a diagram used to break down projects into smaller components and work packages. |
| Work Package | Work Packages are tasks that have been broken up and listed within the WBS. |
| WBS Code | A WBS Code is a unique identifier given to each element of the WBS that is used to set a hierarchical location within the diagram. |
| LOE | Level of Effort (LOE) is the amount of work requred to complete a task. |
| SPI | The Schedule Performance Index (SPI) is a value used compare the current progress of a project to the estimated effort that it required. SPI is calculated as SPI = EV / PV |
| EV | Earned Value (EV) is a value used to represent the amount of work that has been completed in a project. |
| PV | Planned Value (PV) is a value used to represent the amount of work that should be complete in a project by a certain date. |
| CPI | The Cost Performance Index (CPI) is a value used to compare the work done on a project to the estimated cost of the deliverables. CPI is calculated using  CPI = EV / AC |
| AC | Actual Cost (AC) is the cost of a project. A metric used to measure the amount of expenditure for a project. |
| Front End | The Front End of a website is a term used to describe the parts of the project that a user would interact with. This includes things such as the content, design and layout of the website. |
| Back End | The Back End of a website is a blanket term used to describe all of the coding and server side requirements of the site. The Back End of the website is what users don’t see, the functionality that allows the site to run and process data. |

# APPENDIX B: Gantt Chart and Precedence Network

**Gantt Chart** A screenshot of a computer

Description automatically generated

A computer screen shot of text

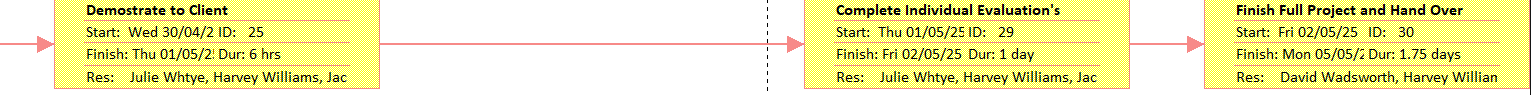
Description automatically generated

**Precedence Network with Identification of Critical Path**

**Critical Path**

A yellow box with black text

Description automatically generated



# APPENDIX C: Risk Assessment

Top Three Risks In the initial stages of this project there were a few issues that we identified could be an issue during the development of the project, they will be listed below, however the risks that we have deemed to be of the highest priority in terms of danger to the project are:

* **R1** **Having a data breach** – This will occur if our website has poor security, and this is an issue because it can lead to legal, financial, and reputational problems. However, this can be mitigated by filtering inputs and restricting access to the database code which will stop attacks from being able to access the databases.
* **R2 Copyright** - This can lead to legal trouble which would cost the project both financially and in more extreme cases could lead to it being shut down. This can be avoided by making sure all assets are created by us, are free to use, or we have written permission to use said content on our website.
* **R3 Budget issues** - This can disrupt the whole project flow as there would need to be a cut down on costs which could cause some areas to feel rushed and have a poor user experience as well as in more extreme cases the project will have to be scrapped because it cannot be fully funded. This will be avoided by researching ways to keep costs down, as well as strictly flowing the tasks we have planned so that there are no unnecessary additions that would cost the cost to go over budget

Aside from the three main risks identified there are others that have been identified by the team and below is a list and a description of why they are there:

* **R4 Brand damage** – While this risk was not placed in the 3 main risks this is still what the team considered a high-risk issue compared to the others in this list. This is an issue because having a bad image as a brand can cause users to lose trust in the product, as well as there will be a much lower user sign up rate when the project is launched. We will maintain the brand image by delivering a high-quality product as well as making sure that there are no issues at launch.
* **R5 Scope creep / Exceeding timelines** – If this were to happen then it would increase costs, it would also cause more work meaning the time needed to complete the project would take a lot longer. To mitigate this the byte club team has a list of exactly what needs to be done in each stage so if this is followed, we will be well between deadlines.
* **R6 Performance issues** – This will be an issue caused by inefficient or incorrect coding which would affect the user experience. It can be avoided by getting multiple people to test and giving feedback on how the user experience feels and if needed changes can be made.
* **R7 Making ambitious promises** - While similar to scope creep this only becomes an issue if the team is too overambitious with what we say we can deliver in the time frame. The way to avoid this is by adhering close to the task list and only once all the things are checked off will the team think about adding more.

**Risk Probability-Impact Matrix**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Probability of Risk** | High |  |  | R1 |
| Moderate |  | R6 | R2, R3 |
| Low |  | R4 | R5, R7 |
|  |  | Low | Moderate | High |
|  |  | **Impact of Risk** | | |

# APPENDIX D: Quality Metrics

Based on customer needs set in the brief, industry standards and our own personal standards, this set of quality metrics has been produced to ensure a high standard is met in the deliverable. These metrics have been peer reviewed by the project manager aswell as the project sponsor of the Abertay Challange App.

1. Before each iteration of the deliverable goes live for public testing our in-house penetration tester will ensure that the Abertay Challange app is compliant with the industry standard iso (insert reference) ensuring both the security of the testers information and preventing malicious parties from tampering with the deliverable.
2. Given Abertay's student population of ~4000 as of 2024

(*About Us* (2024) *Abertay*. Available at: <https://www.abertay.ac.uk/about/#:~:text=Home%20to%20approximately%204%2C000%20students,in%20a%20variety%20of%20industries>. (Accessed: 04 December 2024).

A maximum capacity of 5000 concurrent users will be maintained across every iteration ensuring the service will always be completely accessible.

1. Before live public testing there will be in-house testing using an offline version. After testing the participants will fill out a questionnaire ranking various factors such as readability and ease of navigation. Before wider live testing occurs, these scores will have to achieve 8/10 across the board for the standard of deliverable to be met. These scores will also identify areas of weakness within the deliverable aiding the team's direct efforts appropriately.
2. For every subsequent live test, the individual volunteers will be recorded and noted on if they return. Those who don’t will be reached out and present a form to explain if it was due to external factors or to detail what it was about the deliverable that made it unappealing to return too. The aim before the final product is an 80% retention rate.
3. For every subsequent live test, the returning volunteers average score across each challenge will be recorded and plotted indicating the average improvement of students. If the number of students showing progress is below 80% then a combination of both student feedback and peer feedback from other teachers within the university will be considered to assist in the development of the challenges.
4. Alongside the students using the deliverable there will be a separate division of the test for ethical hacking/game development students to treat the deliverable as a bug bounty. Thier aim is to stress test both the website and the challenges to hunt for exploits/breaks missed during development. After each test all identified bugs will be patched before the next iteration with the aim of providing a flawless service upon release.

|  |  |  |  |
| --- | --- | --- | --- |
| **Metric** | **Standard** | **Frequency** | **Report** |
| Website security | iso 27001 | Per prototype | Before each live version |
| Website capacity | 5000 | Per prototype | Before each live version |
| Usability score | 8/10 based on feedback | Per prototype | After each deliverable test |
| Student retention | 80% of testers returning | Per live test | After each deliverable test |
| Student improvement | 80% of testers improving | Per live test | After each deliverable test |
| Bug count | 0 | Per Stress test | After each stress test |

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