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BUSINESS CASE: CYBERSECURITY EDUCATION

EH1: THE APP CHAPS

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TABLE OF CONTENTS

1. EXECUTIVE SUMMARY	4
2. BUSINESS CASE ANALYSIS TEAM AND STAKEHOLDERS	6
3. PROBLEM DEFINITION	7
4. PROJECT OVERVIEW	8
4.1. Project Description	8
4.2. Business Goals and Objectives	9
4.3. Project Performance	10
.....	11
4.4. Project Assumptions.....	11
4.5. Project Constraints	11
4.6. Major Project Milestones.....	12
5. STRATEGIC ALIGNMENT	13
6. COST BENEFIT ANALYSIS	13
7. ALTERNATIVES ANALYSIS.....	15
8. APPROVALS	16
9. INTRODUCTION	19
10. PROJECT MANAGEMENT APPROACH	19
11. PROJECT SCOPE AND MILESTONE LIST	20
12. WORK BREAKDOWN STRUCTURE (WBS)	22
13. CHANGE MANAGEMENT PLAN.....	23
14. COMMUNICATIONS MANAGEMENT PLAN.....	23
15. COST MANAGEMENT PLAN	25
16. PROCUREMENT MANAGEMENT PLAN.....	25
17. PROJECT SCOPE MANAGEMENT PLAN.....	27
18. SCHEDULE MANAGEMENT PLAN.....	28
19. QUALITY MANAGEMENT PLAN	29
20. RISK MANAGEMENT PLAN.....	30
21. STAFFING, RESOURCE AND COST	31
22. QUALITY BASELINE	34
SPONSOR ACCEPTANCE.....	35
APPENDIX A: WORK BREAKDOWN STRUCTURE.....	36
INTRODUCTION	36
OUTLINE VIEW.....	36
GLOSSARY OF TERMS.....	38
APPENDIX B: GANTT CHART AND PRECEDENCE NETWORK	40
APPENDIX C: RISK ASSESSMENT	41
APPENDIX D: QUALITY METRICS	43



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1. EXECUTIVE SUMMARY

The Business case presented in this paper was created in response to a project proposed by Dr Suzanne Prior. This project challenged our team to create a platform that will aid children, aged 5 to 9 years old, to advance their cybersecurity education and knowledge. The business case presented outlines the processes used by the App Chaps to develop a website which will address the issues raised by Dr Suzanne Prior. The issues raised include, but are not limited too, the lack of cybersecurity education present within schools. The lack of cybersecurity education, is in part, due to the lack of a centralized platform tailored to Scottish pupils. The business case presented will discuss the goals of this project, along with the constraints, assumptions and justification for the project.

1.1 Issue

Dr Suzanne Prior is a cybersecurity researcher at The University of Abertay. While at Abertay she is currently researching password education within schools and has an interest in supporting and improving the Curriculum for Excellence (CfE). Within the education of cybersecurity, and CfE, there is an absence of platforms with the content that is required to efficiently teach the core concepts of cybersecurity. As the education system and curriculum have moved forward with technological education, the supporting platforms which go alongside these are yet to be updated. Up to this current point, most platforms are tailored to a specific age group which has led to pupils using multiple different platforms throughout their school careers. However, rather than multiple different platforms, the use of one platform with progression throughout the years would suffice. In order to combat this issue, the App Chaps will create a web application which pupils can use throughout their entire school careers.

1.2 Anticipated Outcomes

With the creation of a web application, for cybersecurity education, this will enable Dr Suzanne Prior to have access to a centralized environment for accessing and completing research. It will allow Dr Suzanne Prior to commit to new research avenues with greater ease, as the web application will allow for the creation of anonymized data. Another requirement of the web application is the need for a visually appealing interface. As the web application is targeted towards young pupils, it is vital that the information presented is done so in an interesting and appealing way. This will be achieved through the implementation of a simple colorful UI, along with a pirate themed continued through the entire application. Alongside increasing the accessibility of data, the platform will allow for content to be easily updated. This aids with cybersecurity education, which is a very fast-moving sector, with the education required to be cyber aware constantly changing. All of these factors will increase both the efficiency



of cybersecurity research and cybersecurity education, both of which are becoming more important each day.

1.3 Recommendation

Various implementations of existing websites were analyzed, to determine the best application of both user interface and services provided. This was done to ensure that the implementation for Dr Suzanne Prior was the best it could be, for the issue presented. The approach described best allows for Dr Suzanne Prior to further the essential research currently being completed. The data that the website will create will be accessible once the final project has been delivered and is populated with users. The user's data will be anonymized so that it can be manipulated and reviewed.

The education of Scottish pupils is the primary goal of this project, with a secondary goal of providing a research platform. This education will allow for Scotland to have a more cyber aware populous, leading to more a cyber resilient Scotland.

The goals of this project are to implement the following:

- To provide a cybersecurity education platform to educate Scottish pupils.
- Tailor content to be delivered in line with the Scottish Curriculum for Excellence.
- Provide a platform for researchers to access anonymized data.
- To support teachers and parents and create a site that is entirely safe and suitable for children to use.

1.4 Justification

The development of a central web application for pupils' cybersecurity education, is a must to further cybersecurity education in Scotland. It will allow for a pupil to stay within one platform aiding their cybersecurity education. This benefits the pupils as it leads to a more streamlined education system, as the web application will accommodate for the progression of skills. Alongside this, it will give access to data for researchers, which will only further Scotland's understanding of cybersecurity education. In addition to the research benefits, it will also aid in understanding how young people learn. Other implementations of the same service, be it through a standalone application or educational course, both have greater overheads, as well as not being as easily accessible.



1.5 Team Experience

Collectively, the App Chaps team have over 6 years of website development and implementation experience. Our previous clients include The University of Abertay, Glasgow Clyde College and Dr Lynsay Shepherd. With the experience and knowledge presented by our team, it will ensure a high quality of work be conducted to deliver Dr Suzanne Prior's vision for a Scottish based cyber security web application. To contact us, please email, our Client Focal Point at 1800316@uad.ac.uk.

2. BUSINESS CASE ANALYSIS TEAM AND STAKEHOLDERS

2.1 Business Case Analysis Team

The following individuals comprise the business case analysis team:

Role	Description	Name/Title
Technology Support	Provides all technology support for the project.	Rory Leanord, Information Technology
Project Manager	Manages the business case and project team.	Moses Keir, Process Team Lead

2.2 Project Team

The following individuals comprise the project team:

Role	Description	Name/Title
Backend Development	Responsible for the development of the infrastructure required for the project.	Rory Leanord, Backend Developer Finlay Connell, Backend Developer
Frontend Development	Responsible for the development of the projects UI/UX.	Lindsay Wilson, Frontend Developer
Content Creation	Responsible for the creation of content for the project.	Moses Keir, Content Creation Toby Willson, Content Creation
Quality Assurance	Creates and executes testing plans to ensure the project is meeting requirements.	Ryan Todd, Quality Assurance Specialist

2.3 Client and External/Internal Stakeholders

In addition to the client listed below we have identified the following stakeholders:

Role	Description	Name/Title
Client (Dr Suzanne Prior)	Sponsor for project	Dr Suzanne Prior, The University of Abertay Researcher.



3. PROBLEM DEFINITION

3.1 Problem Statement

As the world is becoming more reliant on technology, the education provided on how to stay safe online has been stagnant. As younger generations are growing up with technology and the internet, it is essential that the education curriculum reflects the reliance on technology that now exists within children and young people. The curriculum for excellence expects that by the age of 4, a child should be able to create and memorize their own passwords. However, at 4 years old most children are unable to even read or write, let alone create and memorize their own passwords. Along side this; bad practice exists within children's password education, where it is common practice for an entire class to use the same password for the first years of their school careers. This behavior then must be untaught later and in addition to this, a lot of young people and children are under the false impression that a good password alone will keep them safe from manipulative parties.

3.2 Organizational Impact

This the project will create a cybersecurity education platform tailored specifically to Scottish students, which on a greater scale will aid in the creation of cyber aware and confident individuals. The project will impact the teaching and research of cybersecurity in Scotland and will allow researchers to have access to anonymized data.

The project is self-contained, as there are no legacy systems that are going be phased out or replaced. This in turn allows for a simple and smoother implementation of the deliverable project.

Upon completion of the project, the accessibility of data for cybersecurity researchers will begin to increase dramatically. Anonymized user metrics will be made available to researchers allowing them new insight into how students learn and their understanding of cybersecurity principles.

Alongside this, the project will change how cybersecurity is taught in schools, as having an easily accessible website within schools will benefit the pupils immensely. The content implemented will be tailored to the Curriculum for Excellence, further aiming the project at Scottish pupils.

3.3 Technology Integration and/or Migration

Due to the nature of this project, there are no legacy systems to be replaced. A phased approach will be used as it allows for testing of the site infrastructure, to ensure that when the project is finished the site will be ready to deploy. The phases of this



approach will line up with the delivery of prototypes. Testing will be conducted continually throughout the development cycle by the teams dedicated quality assurance tester.

Phase I – Foundational backend will be created, and the user interface will be developed. The content creation team will produce written materials appropriate to the various age groups, that make up the target audience.

Phase II – Frontend and Backend teams will converge to work on data handling, management and research focused features. The content creation team will pivot to create dynamic content, such as animations, videos and populate the website with art assets.

Phase III – During this phase, final polishing, reviewing and testing of the completed system will take place.

Phase IV – This final phase will include the delivery of the project and the training required to keep the website up to date.

4. PROJECT OVERVIEW

This section contains a high-level description of the project; including the web application; the project aims; user and client benefits as well as performance criteria, assumptions, constraints and major milestones. As the project develops these areas will be steadily expanded upon; providing an enhanced level of detail and more granular insight into how the application will be successfully executed.

4.1. Project Description

The Cybersecurity Education project will primarily focus on developing a web application (website) to teach Primary School children cybersecurity concepts in line with the objectives of the Scottish Curriculum for Excellence. Additionally, the web application will generate anonymized data for cybersecurity researchers, such as the client, based on user metrics. The application will be appropriate and safe for children to use and allow adult supervisors such parents and teachers to manage student accounts and monitor their learning and progress.

From a student user's perspective the application will be a website with age-appropriate activities for them to complete. These will include videos, quizzes and games. The activities they have access to will be dependent on what they've previously completed



and their school year. Their experience will be managed and monitored by a guardian or teacher, who will set up the student's account and can check on student progress from a management console.

Finally, data from the web application will be anonymized and made accessible to the client to enable further research into this area. The level of comprehension around cybersecurity that young children have or are capable of having is not fully understood and it is hoped that this project will help researchers enhance for current teaching methods.

To ensure that the client brief can be achieved in the timeframe available, the Apps Chaps will be split into four smaller teams working towards the website front end, back end, content and quality assurance respectively. All four sub-teams will conduct their own research and implement the solutions that they deem most appropriate. Progress will be made (and tracked) through the release of a weekly Web-Application prototype. This prototype will consist of a steadily increasing number of 'shippable' features which will be available to the client for feedback and adjustment requests.

4.2. Business Goals and Objectives

The Cybersecurity Education project is being developed on behalf of Dr Suzanne Prior, Lecturer and cybersecurity Researcher at Abertay University. Dr Prior's research is currently focused around developing cybersecurity systems and teaching methods for children and therefore this project has the following objectives:





Business Goal/Objectives	Description
A web application for teaching primary school children about cybersecurity.	The website must be attractive and interesting for children to use. It must have separate activities relevant to different age groups.
Suitability for tablet devices.	Research has indicated that most children use tablets when at home, so the application must work flawlessly on such devices.
Suitability for children.	Very young children cannot read and many are unfamiliar with using a computer. The website must have voice-overs and use simple language. All activities should last less than 10 minutes to hold user attention.
Stored Progression	The site must retain the user's progress and allow them to log-in and pick up from wherever they left off.
Adherence to the Scottish Curriculum for Excellence	All the teaching material provided to children must be inline with the SCFE, which will dictate how topics are presented to each year-group.
Child safety.	The site must be intrinsically safe for children to use; storing the minimum personal information required to function and not have any inter-user communication features.

Business Goal/Objectives	Description
Parent/Teacher Management	Parents/Teachers should have a means to manage student accounts and monitor their progress. They will register their children's accounts and update any personal information (e.g. school year) from a management console.
Secure information storage.	All information on the site must be held securely. GDPR requirements around children's data must be strictly adhered to.
Researcher access to anonymized data.	Approved researchers can securely access fully anonymized data from the site for use in research.

4.3. Project Performance

The table below lists the processes and resources that the project team will use to ensure the project is on schedule and delivers all of the Client's requirements. These measures are explored further in Section 11 of the Project Plan.



Key Resource/Process/Service	Performance Measure
Weekly Prototype	Each prototype will consist of several completed features that can be assessed by the client to ensure that the team is producing work that lives up to their requirements and standards.
Project Gantt Timeline	The timeline indicates what areas each project sub-team should be working on by a given week and what major features should be implemented into the prototype by then. See Appendix B.
Request for Change Form / Request for Change Log	Deviation from the core plan will need to be requested, approved and logged along with justifications for any change. Impacts on the project timeline should be assessed and recorded with the Gantt chart being adjusted accordingly.
Staff Resources	All development work will be carried out by the 6-person team. They will brief each other on a weekly basis as the project goes forward so that progress can be affirmed, tester findings discussed and any overruns identified and overruns actioned.
Client Feedback	One member of the team will act as a dedicated focal point for client contact and liaise with the client to ensure that they are satisfied with any implemented features and manage any change requests.

4.4. Project Assumptions

Below is a list of assumptions on which all planning for the Cybersecurity Education Project has been based. If any further assumptions are identified during the project they will be added accordingly.

- All team members possess or quickly learn the skills required to develop the web application.
- Sufficient free resources will be found to allow the project to develop without incurring any monetary costs.
- The client will be available to provide feedback on weekly prototypes.
- Existing Abertay infrastructure (such as the Mayar server) will be available for hosting the web application and will be sufficient to support the site and all of its functionality.
- The team will be able to hold onto all personnel.

4.5. Project Constraints



Below is a list of constraints that will likely apply to the Cybersecurity Education project. If any further constraints are identified as the project progresses they will be added accordingly.

- The team currently lacks experience in certain areas, such as animation and using SQL.
- There is no funding available to the team so only free software and assets may be used.
- As all development will take place in-house there is little to no technical support available to the team.
- Due to COVID restrictions the team will not be able to meet in person nor will they be able to meet with testers. Therefore prototypes must be hosted in such a way that they can be used remotely.
- Pool of school-aged testers limited to list of personal contacts.
- The team has no control over the infrastructure provided by Abertay.

4.6. Major Project Milestones

Below is a timetable of Prototype releases and the client requirements that should be fulfilled by each release. This timeline may be adjusted as the project moves forward; subject to client feedback, asset availability and possible overruns. Please note that the timeline below does not include an exhaustive list of all features but instead marks the major milestones that the Project Team will deliver by each date/prototype.

Milestones/Deliverables		Target Date
Project Plan Review and Completion		15/12/2020
Project Kickoff		25/01/2021
1st Prototype Delivered		01/02/2021
Requirements	<ul style="list-style-type: none">• Determine database model to utilize• Agree on web-application engine and other development tools• Collate SQA guidance on cybersecurity education for primary children	
3rd Prototype Delivered		15/02/2021
Requirements	<ul style="list-style-type: none">• Student UI front-end framework completed	
5th Prototype Delivered		01/03/2021
Requirements	<ul style="list-style-type: none">• Parent/Teacher console front-end completed	
6th Prototype Delivered		08/03/2021
Requirements	<ul style="list-style-type: none">• Secure back-end completed• Educational content completed.	



Milestones/Deliverables		Target Date
8 th Prototype Delivered		22/03/2021
Requirements	<ul style="list-style-type: none">• Researcher access to anonymized data• Animations• Progression storage	
Feature Complete Product		29/03/2021
Testing and Polishing Complete		19/04/2021
Closeout/Project Completion		04/05/2021

5. STRATEGIC ALIGNMENT

The Cybersecurity Education project will be developed to augment the teaching aspirations and research of Dr Prior, who has an interest in improving cybersecurity education for young people. Dr Prior's research has produced a wealth of knowledge and material that could be used by children to learn about cybersecurity but no platform through which it can be distributed. The web-application will not only fulfil this need but also allow Dr Prior and her associates a means of generating data on child cybersecurity comprehension and how effective current teaching methods are.

Goal	Relationship to Project
Educate primary-school children about cybersecurity.	This project will provide a platform from which cybersecurity education can be delivered along with substantive teaching material. The sites design will be informed by childrens' abilities.
Create a platform that can be used by teachers and parents for home-learning.	The site's design will be informed the hardware children are likely to have access to, such tablets. Registration must be straightforward so that users do not require training.
Support ongoing research into cybersecurity education.	The web-application will retain data and metrics from many users over a range of ages. This data (once sufficiently anonymized) should be of value to researchers and allow direct testing of teaching methods and materials.

6. COST BENEFIT ANALYSIS

Below is a list of the costs and benefits that the project is anticipated to incur/produce. Please note that there is no budget allocated for the Cybersecurity Education project and as such the table below focusses mainly on the development time and the benefits for users and the client.



The 'Manhours' value is derived from the expected delivery time multiplied by the number of people working towards that particular action. The number of working hours in a given week is estimated at 16 (equivalent to 2 working days), this is in recognition of the fact that team members will have 2 other university modules to work on in addition to any other extra-curricular commitments and part-time work.

Action	Action Type	Description	Delivery Time	Cost Manhours
Acquiring development software and hosting services.	Cost	Initial activity for all 6 members of the Apps Chaps team.	1 Week	80-96 hours
Content Creation	Cost	Two team members locating and editing royalty-free art assets, parsing material provided by client and refactoring it for the web application.	6 Weeks	Around 200 hours
Animation Production	Cost	Time needed to produce animated material.	2 Weeks	32-40 hours
Front End Development	Cost	One team member (with assistance as required) will develop the front-end framework for the application on which Content Creation team can add the material they produce.	5 Weeks	80-100 hours
Back end Development	Cost	Two team members to develop the back end of the web-application.	6 Weeks	Around 200 hours
Data Handling	Cost	Front end and back end teams converge to ensure management features and research features are implemented.	3 Weeks	Around 100 hours
Testing	Cost	1 Team member to spend around 1 day a week testing the features from the previous week's prototype.	10-12 Weeks	80-100 hours
Polish and user testing	Cost	Team converges to rigorously test and polish application before final product is delivered to the client.	2 Weeks	Around 200 hours
Increasing Cyber Resilience of Scottish Schoolchildren	Benefit	Ingraining cyber awareness at a young age could make Scottish schoolchildren amongst the most cyber aware in the world.	Years	Scottish Government estimates 20% of scots are victim to cybercrime annually



Action	Action Type	Description	Delivery Time	Cost Manhours
Promoting Cyber education in	Benefit	Teaching and promoting cyber at a young age should lead to more students pursuing careers in cybersecurity, an industry the UK Government warns is suffering from growing labour shortages.	Years	RedSeal estimates a 4 million shortfall in Cyber professionals globally.
Assisting Teachers	Benefit	Creating a platform that is in line with the Curriculum for Excellence that students can use at home could free up classroom time for other subjects or further cyber topics.	Weeks	Scottish primary teachers currently spend 2-3 weeks a semester on cybersecurity.
Generating Research Data	Benefit	Cybersecurity researchers do not currently have convenient access to data on children's cybersecurity awareness, stymieing research and slowing development of cyber education. The site would allow for the constant generation of instantly accessible data.	Weeks	Dr Prior currently requires 2-3 months to set up data gathering exercises.
Total Manhours				944 – 1064

*2 team members working 1-2 hours a week.

The above table demonstrates the low cost of developing the project despite the scope of the web application. It should be noted that significant, un-paid manhours will be invested into project delivery, from which the true cost of the project can be best understood. According to expertmarket.co.uk a UK Junior developer earns £10 to £35 an hour. Using a figure of £20 per hour we can infer that the cost of labour alone for this project would be somewhere in the region of £20,000 (Or somewhere between £9,440 and £37,240).

While the benefits of such a project are incredibly difficult to quantify in monetary terms, it is clear that the web application would be a massive boon for researchers and teachers and potentially for society as a whole.

7. ALTERNATIVES ANALYSIS

In order to ensure that the Cybersecurity Education project can be delivered within the required timeframe at a high quality a number of alternative options were considered by the team. These are listed below alongside a brief explanation for why they ultimately were not adopted.



No Project (Status Quo)	Reasons For Not Selecting Alternative
Rely on existing methods of cybersecurity education. (eg Existing websites).	<ul style="list-style-type: none">• A wealth of useful and relevant teaching materials will remain underused and inaccessible to children.• Existing solutions do not tie in directly with the Scottish Curriculum for Excellence.• No means for data gathering to bolster the client's research.
Alternative Option	Reasons For Not Selecting Alternative
Use an existing website creation and hosting framework. (Such as Squarespace or Wix etc)	<ul style="list-style-type: none">• Sensitive user data hosted and accessible to third party.• Will incur significantly higher costs for subscriptions and hosting.• Client requirements would have to be compromised in order to work with features offered by third-party tools.
Alternative Option	Reasons For Not Selecting Alternative
Develop a non-dynamic website which would serve as a resource-bank rather than a full-featured teaching application.	<ul style="list-style-type: none">• Would not be in the spirit of the client's business need.• Would likely be less appealing to children.• Would not deliver much in the way of useful data for client's research needs.
Alternative Option	Reasons For Not Selecting Alternative
Utilise third-party developer to build bespoke application	<ul style="list-style-type: none">• Cost would be unattainable.• Would not satisfy coursework requirements.

8. APPROVALS

Approver Name	Title	Signature	Date
Dr Suzanne Prior	Client (Abertay University), Division of Cybersecurity Lecturer	<i>Suzanne Prior</i>	10/12/2020
Moses Keir	Project Manager, EH1 Apps Chaps	<i>Moses Keir</i>	xx/12/2020
Rory Leonard	Resource Acquisition, EH1 Apps Chaps	<i>Rory Leonard</i>	xx/12/2020

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PROJECT MANAGEMENT PLAN: CYBERSECURITY EDUCATION

EH1: THE APP CHAPS

**FINLAY CONNELL, MOSES KEIR, RORY LEONARD,
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9. INTRODUCTION

Dr Suzanne Prior has approved the Cybersecurity Education project and has authorised The App Chaps to begin development of the project. The end stage of the project is to develop a fully functional educational website that meets Dr Prior's requirements and the teaching standards set by the Curriculum For Excellence for primary school children.

The website will allow parents and teachers to have access over child accounts, this means that both teacher and parent can manage the account and monitor the child's progress in each class. This will allow teachers to see what students are struggling and in which section of the class, and help each student based on what they were struggling in.

The classes will teach a range of different Cybersecurity concepts, from password strength to phishing. Classes will come in the form of games, quizzes, videos, or text. Depending on the school year of the child the class will go more in depth on the topic being taught. By the end of each class the child should have gained a little more knowledge on how to be cyber safe.

In addition to the project being for education the team will also make it so it can be used by Dr Prior and other researchers as a method of gaining research data in regard to children and how they work with cyber security. There exists other educational websites for children but do not coincide with the Curriculum For Excellence. Nor do they fully support child learners in terms of abilities or the hardware they typically have access to.

The App Chaps will develop a web application of the highest quality to greatly enhance the Cybersecurity awareness and resilience of Scottish children. Furthermore, the website will generate data useful for Dr Prior and her ongoing research.

10. PROJECT MANAGEMENT APPROACH

The Cybersecurity Education project will be managed by Moses Keir. Who will be responsible for ensuring the project is executed according to this project management plan, and to the standards required by the Client. Project decisions are made by the whole team with majority votes on key design decisions (in case of a tie Moses shall have say on final decision). The team will be split into four sub-teams; consisting of a front-end developer, Lindsay Wilson, a back-end team, Rory Leanord and Finlay Connell, a content creation team, Moses Keir and Toby Wilkinson, and a quality assurance specialist, Ryan Todd. Ryan will also assist front-end and content teams where required.

Due to the nature of such a small team each member is assigned a specific role to assist in the overall project.



Team Member	Role
Moses Keir	Project Manager
Toby Wilkinson	Client Focal Point
Finlay Connell	Secretary
Lindsay Wilson	Risk Management
Rory Leanord	Resources Acquisition
Ryan Todd	Quality Assurance

There is no funding available to the project team. So, all resources and assets must be free or open source. If team members wish to purchase any resources, they must do so on the understanding that they cannot be reimbursed. The client will provide the base teaching material for the site and the team will be responsible for refactoring this and creating the web application on which it will be hosted.

While each sub team works separately there will be weekly meetings for the group to meet and discuss what they have achieved for the week and what they plan to do for the next week. Due to COVID restrictions and the lack of personal contact between team members; the weekly meeting will be an opportunity to ensure that all team members are happy and coping with the work.

The team has chosen to use the Prototype development method whereby each week they will deliver a web application prototype consisting of an increasing number of completed features. Feature milestones will be set to ensure that client requirements are implemented into a prototype by a given date. This allows the project team to track their progress and allows for early testing and continuous quality assurance. Additionally, the client will have access to the weekly prototype and will be able to give feedback and request changes.

Due to the project being a web application the prototyping approach is a suitable choice, as this means client feedback on completed features can be given sooner; it will reduce the amount of project errors due to constant testing of the core features and should allow a robust product to be developed in the short timeframe available.

11. PROJECT SCOPE AND MILESTONE LIST

The scope consists of, designing, developing, testing, and delivering a web application to the client. This web application must meet GDPR requirements around the handling of children's data; securely store and handle user information and of course provide a solid tool for educating primary school children on Cybersecurity. This means the application must be entirely suitable and safe for children to use.



Everything within the scope shall be completed internally by the team rather than outsourced to cut down on costs and the team is confident enough in their ability to be able to complete all requirements within the scope.

Below is a list of the major milestones which must be completed for the successful delivery of the project. Please note this is not an exhaustive list of all the web application features but a subset of critical requirements from the client. If for any reason there is any change or unexpected delay in the schedule that will affect a milestone; members of the project should inform everyone on the team and the team will decide on whether a milestone date will need to be pushed back or not.

Milestone	Description	Date
Basic first database model	This will be the completion of the first database that will later be developed into a more extensive database. The database model will be decided by the back end team.	01/02/2021
Complete layout of Website	The completion of how the website shall look, including necessary pages, navigation bar, and other features like basic content template.	15/02/2021
Complete Parent and Teacher control	The completion of the teacher and parent control over child accounts is completed. This will allow teachers and parents to monitor the child and their progress in their classes.	1/03/2021
Complete back end	The completion of the back end of the web application is done, making sure it is secure by using modern security methods, such as salting and hashing passwords.	08/03/2021
Complete content within web application	All the needed written content is completed, the majority of this will be classes that the children partake in.	08/03/2021
Complete Student Classes	The classes that the students learn and go through are completed. This will mostly be the code that is required to make the classes function properly.	15/03/2021
All features complete	All the required features are implemented and completed in line with the team's scope and Dr Prior's requirements.	29/03/2021
Complete testing	All functions and features are tested fully and working. Anything that is found to not be	19/04/2021



	working as expected is fixed in time before the deadline.	
Deliver finished project to client	Everything is implemented and meets the standards of the team and is sent off to the client.	04/05/2021

12. WORK BREAKDOWN STRUCTURE (WBS)

The App Chapps have together developed a WBS that will coalesce fully with the weekly Prototype development methodology. Due to team members other academic, extra-curricular and work commitments it has been decided that a working week will consist two 8-hour days; therefore, each project team member will spend around 16 hours working on each prototype. A work package will consist of any task or group of tasks that take between 4-16 hours to complete.

At each weekly meeting tasks will be self-allocated to sub teams and defined in terms of one or more work packages. Tasks that will take less than 4 hours to complete will be grouped together, and any task taking more than 16 hours must be broken down into smaller tasks to ensure that they can be delivered by the next weekly prototype. It is imperative that prototypes consist of completed (ready to ship) features so time allocated to tasks should reflect this requirement.

Work packages should be developed through collaboration among team members with client input where suitable.

The Cybersecurity Education project schedule has been developed by the project team who have taken into consideration the major milestones and the WBS. The schedule has been agreed upon by the project members and will be maintained as a Gantt timeline by the project manager. If team members wish to make any changes to the schedule they must do so through a Request For Change Form, which will be reviewed during the next weekly meeting and can only be authorised through majority agreement. The full Request For Change process is outlined in section 13.

To be authorised the team will decide based on schedule, resources, risk, and the scope. If it is believed that the change's impact will surpass the boundary conditions of the project, it will ultimately be rejected. The boundaries for The App Chapps are:

- CPI less than 0.7 or greater than 1.3
- SPI less than 0.7 or greater than 1.3
- Where 1.0 is the work package or task is on target.



To see the full work breakdown structure, see appendix A.

13.CHANGE MANAGEMENT PLAN

These are the steps that will be carried out should a change in the project plan be required.

The Deming cycle management method will best suit the needs of the group, the framework focuses on process improvement and is divided into four phases: Plan, do, check, and act. The four phases will identify the issues that need addressing, tackle those problems through managed change and keep tabs on the implemented changes to see if further action or adjustment is needed. This framework works well with a single team as there is no need to test changes before implementation and is conducive to delivering a project in a short timeframe.

Step #1: Identify the need for a change

A team member will identify the need for an adjustment and send a Request for Change form to the project manager, which will be discussed at the next weekly meeting.

Step #2: Implement change

If a change is approved by the team, the team will execute the plan taking small steps in controlling circumstances and ensure any changes are communicated to the client.

Step #3: Conduct an evaluation of the change

The project manager will conduct an evaluation of the impact of the change to cost, risk, schedule, and scope.

Step #4: Act

Take action to standardize or improve the process.

14.COMMUNICATIONS MANAGEMENT PLAN

This Communications Management Plan sets the communications framework for this project. It will serve as a guide for communications throughout the life of the project and will be updated as requirements change. This plan identifies and defines the roles of the Cybersecurity Education project team members as they pertain to communications. It also includes a communications schedule, contact details for project stakeholders and a code of conduct for meetings and other forms of communication.

Communication Type	Description	Frequency	Format	Participants/ Distribution	Deliverable/Product	Owner
Weekly Status Report	Email summary of project status	Weekly	Email	Team and Stakeholders	Updated activity logs	Project Manager



Weekly Project Team Meeting	Stand up and task allocation	Weekly	Teams call	Project Team	Meeting minutes	secretary
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Project team directory:

Name	Title	Sub team	E mail
Dr Suzanne Prior	Client	N/A	s.prior@abertay.ac.uk
Moses Keir	Project Manager	Content Creation	1803770@abertay.ac.uk
Toby Wilkinson	Client Focal Point	Content Creation	1800316@abertay.ac.uk
Lindsay Wilson	Risk Management	Front end development	1903189@abertay.ac.uk
Rory Leanord	Resource Acquisition	Back end development	1902471@abertay.ac.uk
Finlay Connell	Secretary	Back end development	1803710@abertay.ac.uk
Ryan Todd	Quality Assurance	Quality assurance and testing	1800627@abertay.ac.uk

Meetings:

The Project team will attend the scheduled meeting on Monday each week and if unable to attend will contact other members with 2 days prior notice.

Teams:

Microsoft Teams is the main communication tool used by the group used and all files pertaining to the project will be shared through the SharePoint linked to the teams Channel. This allows access to information quickly and should avoid any unnecessary delays as well as allowing collaboration in real-time without the need to be in the same location due to Covid limitations.

Email:

All emails related to the Project should be professional and will be distributed to project participants in accordance with the contact details above. Email is the main way of delivering a weekly summary to the client.

Informal Communications:

While informal communication is a part of every project the group has agreed that all updates or issues should be posted through the team's channel so that communication about the Project will be collected in one location.



Communications conduct:

Honesty should be a feature of the team's communication, whether it is directed to other team members, to the client, or externally. Facts and figures should be correct to the best of a preparer's knowledge. Precautions should be taken to protect any sensitive information contained therein. Honesty should also prevail when communicating goals, expectations, decisions, feedback, or judgments to other team members.

During all project meetings, the secretary will take notes for distribution to the team upon completion of the meeting. It is imperative that all participants arrive to each meeting on time and all cell phones and other applications should be turned off or set to vibrate mode to minimize distractions.

15.COST MANAGEMENT PLAN

The project manager will be responsible for recording the project's costs throughout the duration of the project. the information will be reviewed at each weekly meeting. The project manager will use data collected of the man-hours will be used to present to the group if the project needs to get back on track with budgeted times.

Costs for the project will be managed at the fourth level of the work breakdown structures. and value calculations of time will allow us to measure and manage the performance of the project. costs will be rounded up to the neared whole hour.

Reporting for cost management will be included in the weekly project status report. The weekly Project Status Report will include a section labelled, "Cost Management". This section will contain the man-hours spent. All cost variances outside of the thresholds identified in this Cost Management Plan will be reported on including any corrective actions which are planned. Change Requests which are triggered based upon project cost overruns will be identified and tracked in this report.

The cost change process will follow the established project change request process. approvals for project budget/cost changes must be approved by the team

Project budget

The budget for this project is shown below:

16.PROCUREMENT MANAGEMENT PLAN

This project is targeted to need no to minimum procurement but needed the project manager will seek out options for the items or services required to be used in the project. These options



will then be presented to the group review, discussed, and determine which option would be advantageous to the overall project.

In the event a procurement becomes necessary, the Project Manager will be responsible for managing any selected vendor or external resource. The Project Manager will also measure performance as it relates to the vendor providing necessary goods and/or services and communicates this to the purchasing and contracts groups.

The procure management process has many steps as well as managing all procurement activities and contracts. To aid in simplifying these tasks the use of standard documenting for all tests in the procurement management will be used.

The following standard documentation will be used for project procurement activities:

- Standard requests for proposal template to include
- Background
- Proposal process and timelines
- Proposal guidelines
- Proposal formats and media
- Source selection criteria
- Pricing forms
- Statement of work
- Terms and conditions
- Internal source selection evaluation forms
- Non-disclosure agreement
- Letter of intent
- Firm fixed-price contract
- Procurement audit form
- Procurement performance evaluation form
- Lessons learned form

Decision criteria

This criteria for the selection of procurement contacts for this project will be based on the following decision criteria:

- The ability of the vendor to provide all items by the required date
- Quality
- Cost
- Expected delivery date
- Comparison of outsourced cost versus in sourcing



These will be measured by the project manager and the ultimate decision will be made based on these criteria as well as available recourses.

17. PROJECT SCOPE MANAGEMENT PLAN

The project scope for our website was provided to us by our client, Dr Suzanne Prior. It was outlined and defined in a written brief, giving an aim and description of the project. The responsibility of ensuring the project remains within the given scope lies with the Project Manager who will ensure that the project schedule is adhered to and will manage the Request for Change process.

In order to make changes to the scope, there are 2 paths that may be followed. The client may approach the development team, App Chaps – and more specifically the Client Focal Point, and request that changes are made to the scope of this project. As this project was at the client's request, any changes that they desire, the team will attempt to fulfill as far as possible. Another method for changing the scope of the project, would be internal requests from the Development Team. The request must be submitted to the Project Manager via the Request for Change process, as outlined in the App Chaps rules. The Request for Change Form is managed by the PM, providing oversight and final decision as to scope changes, making it effective for scope management.

As the project is being developed using the prototyping methodology, there is an expectation of minor changes to the scope as the prototypes begin to give a better picture of the final deliverable. Part of the development methodology is to have regular feedback sessions with the client to ensure they are happy with the project direction. If the client decides they wish to submit a change, in these feedback sessions we can discuss with them and guide them through the Request For Change process.

The brief provided by the client was fairly broad, allowing the team to define much of the scope. Therefore much of the website's design and features were decided upon by the Apps Chaps. This ensures that the scope is well within the teams capabilities to deliver. A major consideration for the team is the Scottish Curriculum for Excellence which effectively provides the scope for the educational content that must be included in the web application. As this is an educational tool used in schools in Scotland this means that the learning tool must go in line with the Curriculum for Excellence and follow the learning pathways set out by them. Teaching pathways can be used to get an understanding of the scope and can be followed for guidance, including having the ability to check the content being created is within the scope.

There are multiple checks in place to ensure that the web application will be developed to a high caliber and fulfill the required scope. Every prototype will be stringently checked upon completion



in line with the Quality Management Plan. There is also a designated Quality Assurance Manager who will double check alongside the development team that each requirement is met. Once the team is entirely satisfied with the web application, the project will be handed over to the client for final approval.

18. SCHEDULE MANAGEMENT PLAN

The first project schedule is formulated by the Project Manager. The schedule will follow particular dates referred to as “milestones” that are points within the development that would mean something substantial has been completed. These are then grouped and become one whole prototype. Doing this allows the group to have clear tasks set each week and consistent roll out of prototypes. The following step would be to vote on the schedule as a team. Once a majority is agreed, and with any amendments made, the schedule will be implemented. Any future changes to the schedule must be agreed and voted on as a team. The designated milestones decided by the PM are as follows:

1. Project Kickoff
2. **1st Prototype Delivered**
 - Agree on web-application engine and other development tools
3. **3rd Prototype Delivered**
 - Front end framework completed
4. **5th Prototype Delivered**
 - Teacher front end completed
5. **6th Prototype Delivered**
 - Secure backend completed
6. **8th Prototype Delivered**
 - Animations
7. Product Completed
8. Quality Assurance Completed
9. Project Completed

The milestones have dates decided by the Project Manager that they wish for these to be met by. This provides the group with a clear timeline and schedule to follow, allowing for good schedule management. If the team falls behind, they can compare current progress with the approaching milestones and take remedial action appropriately. The responsibility of ensuring these target dates are being met is with both the Project Manager and the individual teams. The individual teams must communicate any issues regarding milestones to the PM, where they can make a decision about the schedule going forward. Possible methods of remediation include



changing milestone date deadlines, changing requirements agreed upon for these milestones or communicating with the teams about dedicating more time to their workload.

Maintaining the schedule is largely the responsibility of the Project Manager. In their role, they must create the schedule and milestone dates, deciding what must be completed for these milestones and overseeing the schedule implementation. This means the PM has a greater amount of responsibility in ensuring that teams are reaching milestones at a sufficient pace, and then ensuring the project is completed and delivered on time. If they feel as though an individual team is not developing at an appropriate speed, they can pull the members of the team aside to work out the cause of this slowdown. From there, the PM can offer additional support, from increased staffing and resources, to adjusting milestones and changing the schedule to sufficiently fulfill development requirements but also a more appropriate workload for the team members.

As with all projects, the biggest impact on managing the schedule is the responsibility of individual teams completing work on time. This means that the teams have a duty to communicate any issues regarding scheduling to the Project Manager. This also means that the teams must work together to ensure that work is being completed at an appropriate pace and that deadlines are being met. There are appropriate safeguards in place regarding absence within App Chaps that members must stick to in order to make sure the teams are staying on track. The teams also have a responsibility to keep checking progress in line with the Gantt chart.

Another safeguard to maintain schedule management is using a Gantt chart in order to track the progress of the project. The chart creates a timeline for tasks required for the project, alongside notable milestones in a well displayed way. This is done in a chronological order, so therefore it is essential for schedule management as it allows the team to see what their progress is in comparison with the present day. The Gantt chart is also appropriately colored in order to allow the teams to see what appropriate work is required for them.

A Gantt chart is provided in Appendix B.

19. QUALITY MANAGEMENT PLAN

Every member of the development team holds a level of responsibility to ensure quality is maintained throughout the project. It is of the highest importance that a standard level of quality is found across the scope of the project. As the group is working in four separate sub teams, that makes it easier to maintain this as it is not individual collated.

The team has a dedicated Quality Assurance Manager, who's role includes maintaining the Quality Management Plan alongside the Project Manager. It is the QA Managers role to assure



compliance with the standards that the client expects. At the end of each week, when the prototype is delivered, it is the responsibility of the Quality Assurance Manager to review and test the prototype and identify issues with quality and report back to the team on any areas that need improvement.

The client too has involvement with quality management. The prototyping methodology allows for regular feedback from the client, where they can view the prototypes. The client will have the opportunity to regularly meet with the team to provide direct feedback, or request changes. The client also has to approve the final project deliverable, so therefore this must meet the standard they expect.

The Project Manager is also responsible for quality management. Being the lead of the team, if the Project Manager is not happy with the quality – or lack thereof – then they can approach the appropriate team and discuss ways of improving the quality. The Project Manager is also responsible for managing changes to the project so can review the quality of all additions.

The rest of the development team will hold responsibility for maintaining quality throughout the development in their respective areas. It is part of their role and responsibility to assist the PM and the QA Manager to communicate any issues or concerns about quality to either peer. From this, the group will meet in the “review” stage of the development to discuss quality and to assess whether a high standard has been met, and to bridge gaps between areas that may need more support. This is a responsibility of the whole group to attend these meetings and communicate any concerns regarding quality.

It is of vital importance that quality assurance is the responsibility of the whole team, and to make sure it is frequently checked, and rechecked, for quality issues. This is because the work is coming from three different teams, each with different development/coding styles and methods. The Quality Assurance Plan is designed and put in place to maintain a standard, high level of quality through every stage of the development, through spot checks of prototypes to quality assurance meetings in the “review” stage, the ownership and responsibility of keeping this consistent throughout remains with the whole development team.

20. RISK MANAGEMENT PLAN

The team will manage risks during the project and define the significance of them by using a risk matrix that will quantify the probability and impact that they pose to the project. Along with this, details of the largest risks to the project will need to be made and appropriate mitigation measures to be put in place before work on the project begins. The team’s dedicated risk analyst is responsible for identifying and categorising any possible threats to the project. In addition to



this any project member who perceives a risk to the project will inform the risk analyst who in turn will quantify the risk and where appropriate will develop mitigation measures. When the project is complete there will be an evaluation on how well any risks that came up were dealt with and how this could be improved on, which will help improve the risk reaction plans for any future projects.

The main three risks to the project are Loss of a team member, data loss and team conflict; further details on these risks, as well as additional threats can be found in Appendix C.

21. STAFFING, RESOURCE AND COST

Staff

The project will require a selection of staff to deliver the final web application. All the work will be completed internally with minimal external resources due to budgetary constraints. There is crossover between the management and development roles due to the small size of the team. The staff required are:

Quality assurance officer (1)

This member is responsible for testing and defining the quality of the web application. The Quality Assurance Officer will be managing the documentation relating to testing to make sure the functionality of the program is in place and of the required standard. Due to the limited size of the team, their duties will also include assisting the layout and content teams as required.

Client Focal Point (1)

To ensure that the team fully understands the client's vision, regular contact with the client will be required. The client focal point will be the team member that will communicate with the client and convey any feedback or requests to the rest of the team. Whenever information is passed from or to the client the client focal point will be the direct link to them and if necessary, will organise any meetings between the team and client.

Risk analyst (1)

Any project will have risks involved in the development process and the risk analyst is responsible for documenting these potential issues and the danger they pose to the project. They will also develop mitigation strategies where appropriate. They oversee documenting any potential risks to the project along with how likely these are to happen and what steps will be taken if any of these issues were to occur.

Secretary (1)

For the project to run smoothly, proper documentation of minutes, roles and other important aspects that have been discussed and decided upon are required, which is the role of the



secretary. The secretary is in charge of organising any internal meetings or events that may be required throughout the planning and development process.

Project manager (1)

The project manager is required to assign roles and make executive decisions on the direction of the project. During discussions, if there are any points that are disagreed upon and cannot be resolved through consensus, the manager is responsible for the final decision. Project manager will define the project schedule, including major milestones and ensure that this timeline is adhered to. The project manager will check that the work team members assign to themselves for each prototype is appropriate and oversee its delivery.

Resource acquisition officer (1)

The purpose of the resource acquisition officer is to ensure that any resource required for the different aspects of the project is sourced and made available for the team. For managing the team's resources, they will need to document how long these different resources will be required for and any costs relating to them.

Front-end Team (1)

The web application will need a developer to work on the overall layout of the pages and how they will link together, and this will be the role of the Front-end Team. This team is a single member who will be required to create the elements for the content and backend teams that will shape the user experience and interactivity.

Content Creation Team (2)

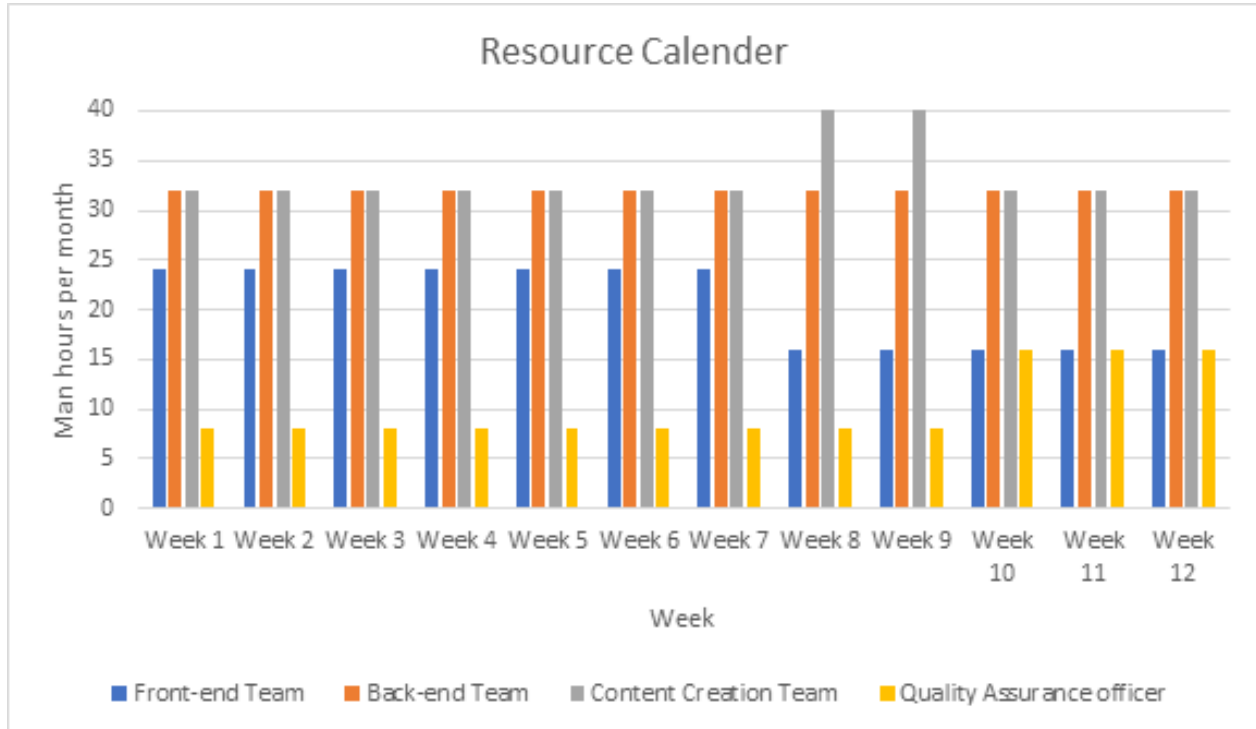
The Content Creation Team is responsible for any sort of content contained on the website, including written material, animations and art assets. Any content that they source will be copyright free material to avoid any legal infringement and avoid having to commission artists.

Back End Team (2)

Due to the functionality requirements for the website, it will require a data base for storing information persistently and functionality surrounding this and the different interactions between the user and the website. The members responsible for developing this are the Back-end Team.

Resource

For the project to be completed, it will require input from all team members for the entire duration of the project, and depending on the stage of the project, will require varying levels of workload from the different sub-teams. The schedule for how long the different resources that are required for is seen in the calendar below.



During the project, all members are required to have access to their respective machines and work from home due to the current COVID-19 restrictions in place.

Cost

During the project we will have a plan in place to ensure that all costs relating to the web application development and planning are accounted for relating to the man hours required for the project to be completed. The details of the total costs relating to the respective phases and their descriptions are shown in the table below.

Phase	Cost	Description
Resource Acquisition	£2,020 £600/Year	Covers, software licenses, art assets, web hosting costs, equipment costs.
Phase 1	£5,500	Covers the cost of wages for content, backend and frontend development
Phase 2	£1,540	Covers the cost of wages for development of data handling and animation production



Phase 3	£3,300	Covers the cost of wages during the polish and testing phase
Phase 4	£550	Covers the cost of wages in delivery and training users

Hardware for working on to complete work is not applicable because all staff will be using their own machines. Costs are derived from Expert market, Microsoft and Payscale.

<https://visualstudio.microsoft.com/vs/pricing/>

<https://www.expertmarket.co.uk/web-design/how-much-does-website-cost>

https://www.payscale.com/research/UK/Job=Web_Developer/Salary

22. QUALITY BASELINE

For the product to be complete there is a set level of quality and functionality that is required to meet the minimum expectation. For the project to be considered usable it will have to meet or surpass this standard. The standard for the features completion we have decided on are shown in the chart below.

Feature	Required completion	Details
Navigation	All links between user pages created and functional, navigation is intuitive and interesting for children.	User experience of the website.
Teacher/parent management features	Teacher and parents can track all user metrics and have areas of interest highlighted.	The management/progress of classroom page.
Database	Stores all the relevant information for students and teachers securely using modern best practices.	The database for the details of students and teachers.
Cross-platform compatibility	Functions on tablets and multiple browsers without errors and without formatting issues.	Assurance that the application functions on tablets and on most web browsers.
Documentation	All documentation completed and reviewed by the team.	All relevant documentation relating to the development of the application.



	leader to the client's satisfaction.	
Age appropriate design	User feedback to show that younger children can navigate the website easily and find the content engaging.	Web application must be intuitive, interesting and safe for children to use.

SPONSOR ACCEPTANCE

Approved by the Project Sponsor:

Suzanne Prior

Dr Suzanne Prior

14/12/2020

Date: _____





APPENDIX A: WORK BREAKDOWN STRUCTURE

INTRODUCTION

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

OUTLINE VIEW

Outline View

1. Educational Website
 - 1.1 Initialising Project
 - 1.1.1 Look over given projects to choose from
 - 1.1.2 Pick one that the team's set of skills can do well on
 - 1.1.3 Begin discussing ideas and concepts
 - 1.1.4 Have meeting with client to form a better understanding of their requirements
 - 1.1.5 Revise ideas and concepts
 - 1.1.6 Create pitch presentation
 - 1.1.7 Deliver presentation to client
 - 1.1.8 Pitch presentation is chosen
 - 1.2 Planning
 - 1.2.1 Begin furthering ideas and concepts
 - 1.2.2 Start project plan
 - 1.2.3 Meet with client again to discuss more on the project
 - 1.2.4 Revise features
 - 1.2.5 Revise project plan
 - 1.2.6 Create business case
 - 1.2.7 Create project management plan
 - 1.2.8 Submit business case and project management plan
 - 1.2.9 Business case and project management plan are approved
 - 1.3 Execution
 - 1.3.1 Team meeting to discuss execution plan
 - 1.3.2 Plan which features and functions to implement first
 - 1.3.3 Design the front end
 - 1.3.4 Create database needed to store users
 - 1.3.5 Create the user interface
 - 1.3.6 Research and start writing content for website
 - 1.3.7 Start implementing features from the scope
 - 1.3.8 Test implemented features and functions



- 1.3.9 Fix errors (if any)
- 1.3.10 Test revised features and functions
- 1.3.11 Team meeting to see if everyone is happy with the website
- 1.4 Aftermath
 - 1.4.1 Check to see if there is enough time left over in the schedule to go above and beyond the scope
 - 1.4.2 Team meeting to discuss what to do next
- 1.5 Finalising
 - 1.5.1 Update and create any final documents needed
 - 1.5.2 Team meeting to discuss everything
 - 1.5.3 Officially submit project

Tree Structure View





GLOSSARY OF TERMS

Work Package: A Work Package is a deliverable of related tasks grouped together to form a single package. Or if a singular task takes a considerable time it can be a



work package on its own. A work package is the lowest level of work in a WBS.

WBS Component: A WBS Component is what makes up the WBS. A WBS Component can be done at any level in the WBS and can be both a Work Package and a WBS Element.

WBS Element: A WBS Element is a single WBS component and its associated attributes located anywhere within a WBS. A WBS Element can contain work, or it can contain other WBS Elements or Work Packages.

SPI: SPI (schedule performance indicator) is a measure of the conformance of the actual progress being made compared to that of the planned progress. To indicate whether the project is on schedule or not.

CPI: CPI (cost performance indicator) is a measure of the amount of work done for each unit of cost. To indicate how effective the project is being at managing time and costs.

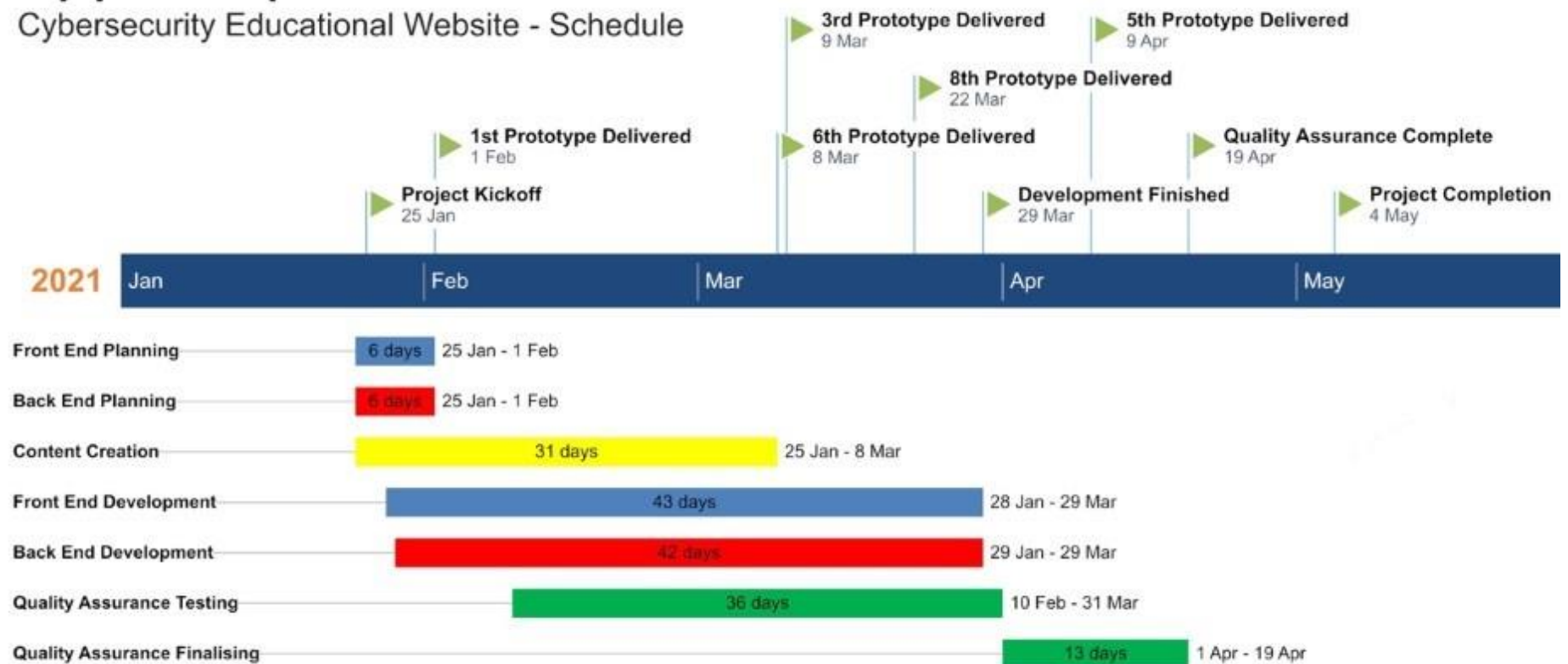




APPENDIX B: GANTT CHART AND PRECEDENCE NETWORK

App Chaps

Cybersecurity Educational Website - Schedule





APPENDIX C: RISK ASSESSMENT

Top risks to the project

R1: Loss of a team member – This risk applies to both temporary and permanent loss of a team member due to unavoidable circumstances. If we were to lose a team member, we would insure that their work is evenly delegated to other members of the team to cover the gap, and would be avoided by ensuring that all members of the team are happy and on board at all points in the project.

R2: Data loss – This includes being due to unforeseen technical faults such as failing hard drives or corrupt data. In order to avoid any sort of data loss we would need to ensure that all data is regularly backed up and that all members of the team have access to these backups.

R3: Team conflict – Conflict would cover disagreeing on points surrounding the project or any sort of social conflict that does not involve the project. If there are any points relating to the project that come up during meetings that members do not agree upon we will decide through consensus, and in the case of a tie the decision is down to the team leader. If the team comes across any sort of social conflict, we will speak to them individually and try to settle the dispute to the best of the team's ability.

Other risks

R4: Team members becoming unhappy/losing motivation – This applies to anyone who becomes unmotivated for work due to personal or circumstances relating to the COVID-19 virus. To help avoid this, we will ensure to keep in contact in a social setting and ensure everyone is happy with the direction the project is currently going. In the case of these issues having an adverse effect on members, we will make sure to have a one on one talk with the member to try help with their problems and if the problem becomes too severe then as a team we will agree to refer them to the appropriate help services.

R5: Over/underestimating the importance of feature(s) – Relating to any features that the team decide that the web application could benefit from and their importance to the overall requirements from the client. This will be avoided though ensuring that any contact through the point of contact is concise, clear and that any questions are resolved. If at any point during the development of features, we decide that the feature we are working on is not essential enough for the requirements we will need to ensure to refer to the function requirements for the project and decide if it is essential.



R6: Copyright infringement – Any content contained on the website will need to adhere to the relevant laws for copyright material to ensure to avoid any legal infringement. All content that will be contained on the website will be copyright free, and if required, will be commissioned to relevant artists.

R7: Feature creep – During the project there will be various features that will enhance the application that members of the team will discover, but to ensure that the project will be completed in the required time this will need to be kept well managed to ensure the project is not too ambitious. In order to manage the number of features to be added to the project we will need to plan out what is essential and non-essential to the web application through defining how much they are needed.

Risk probability matrix

Probability of Risk		High		R2	R1
		Moderate	R7	R4	R3
		Low	R6	R5	
			Low	Moderate	High
			Impact of Risk		



APPENDIX D: QUALITY METRICS

Customer Satisfaction:

Each prototype will be tested by the group and by people of the web apps demographic this will ensure that the website is Customer Satisfaction.

Criteria: Comfort, Ergonomic Functionality, Adjustability, Aesthetics, Size, Dexterity

Product bugs:

In order to minimize costs, reduce waste, and achieve consistent quality. The tests of the Project will be subject to internal guidelines regarding product defects. Bugs result in wasted costs for development personnel and re-work. In order to minimize the impact of these costs all prototypes will be measured against approved specifications and bug checks.

Once all measurements are completed for each prototype, the Project Manager, Quality Manager, and Project Team will meet to review and compile data and develop their recommendations based on the findings. If any of the metrics have not been satisfied, the Project Manager will include recommendations for correcting the metric in the Quality Management Review. This may be a small change to a process or consist of a larger scale development rework.

Cost of quality:

Cost of quality is one of the most important, yet often overlooked, metrics to monitor. The true cost of quality includes both the cost of poor quality and investments in good quality.

ASQ, or the American Society of Quality, developed the following formula for Cost of Quality:

Cost of quality (COQ) = Cost of Poor Quality (COPQ) + Cost of good Quality (COGQ)

COPQ includes internal and external failures, such as:

- Internal COPQ such as rework and re-inspection.
- External COPQ when bugs reach the customer, including adverse event reporting, corrections and removals, product liability and loss of brand reputation.
- COGQ is comprised of what you spend to create conforming products, including:
 - Appraisal costs such as inspection and testing, quality checks.



- Costs such as statistical process control (SPC), quality planning and training.

Portability:

Portability is given to an application if it can be used in an operating system other than the one in which it was created without requiring a huge rework. Porting is the task of doing any work necessary to make the computer program run in the new environment. This will be important as our application will be used on tablets as well as computers.

