# ASSESSMENT BRIEF - COVER SHEET

| **Course: BSc Computing (All pathways)** | | | | **Year: 1** | **CSY1019 - Software Engineering 1** | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **PJ1** | | **Title: System Specification, Analysis and Design** | | | | | |
| Date due out:  22/11/2021 | Date due in: | | Extension date: | | | | Extension agreed by: |
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**ASSESSMENT FEEDBACK:**

| **RATING SCALE** | **A+ - A-** | | **B+ - B-** | | **C+ - C-** | **D+ - D-** | | **F+ - F-** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Formulated Aims and Objectives  (10%) |  | |  | |  |  | |  |
| Problem Domain Elicitation Activities and Presented Findings (10%) |  | |  | |  |  | |  |
| Requirement Specification Document  (20%) |  | |  | |  |  | |  |
| System Interface Design  Documentation  (20%) |  | |  | |  |  | |  |
| Systems Architecture Analysis and Design  (20%) |  | |  | |  |  | |  |
| Client Presentation  (10%) |  | |  | |  |  | |  |
| Report Quality – Presentation, format and use of English  (10%) |  | |  | |  |  | |  |
| Specific aspects of your assignment that the marker likes: | | | | Specific aspects of your assignment that need more work: | | | | |
| Tutor’s Signature: | | Date: | | | | | Grade: | |

**System Specification, Analysis and Design**

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Description automatically generated

Table of Contents

[1. Introduction **6**](#_heading=h.30j0zll)

[1.1 Project Background (1 page) 6](#_heading=h.1fob9te)

[1.2 Project Aims and Objectives (1 page) 7](#_heading=h.3znysh7)

[1.3 Project Development Methodology (2 page) 8](#_heading=h.2et92p0)

[**2 Requirements Engineering 9**](#_heading=h.tyjcwt)

[2.1 Elicitation Activities 9](#_heading=h.3dy6vkm)

[2.1.1 Interview plans 9](#_heading=h.1t3h5sf)

[2.1.2 Interview findings 9](#_heading=h.4d34og8)

[2.1.3 Other problem domain research 10](#_heading=h.2s8eyo1)

[2.1.3.1 Comparable Software System Review 10](#_heading=h.17dp8vu)

[2.1.3.1.1 Records Management Systems 10](#_heading=h.3rdcrjn)

[2.1.3.1.2 Zoo Websites 11](#_heading=h.26in1rg)

[2.1.3.1.3 Visitor Kiosk/Information Systems 11](#_heading=h.lnxbz9)

[2.1.3.2 Development Relevant Legislation 11](#_heading=h.35nkun2)

[2.1.3.3 Visitor Questionnaire (Optional) 11](#_heading=h.1ksv4uv)

[2.2 Requirements Specification 16](#_heading=h.44sinio)

[2.2.1 Problem Domain Description 17](#_heading=h.2jxsxqh)

[2.2.1.1 Existing Business Operation 17](#_heading=h.z337ya)

[2.2.1.1.1 Animal Life-Cycle 17](#_heading=h.3j2qqm3)

[2.2.1.1.2 Sponsorship Life-Cycle 17](#_heading=h.1y810tw)

[2.2.1.2 Summary of existing business limitations 17](#_heading=h.4i7ojhp)

[2.2.2 Functional Requirements 17](#_heading=h.2xcytpi)

[2.2.2.1 Records Management System 17](#_heading=h.1ci93xb)

[2.2.2.2 Zoo Website 17](#_heading=h.3whwml4)

[2.2.3.3 Visitor Kiosk Information System 17](#_heading=h.2bn6wsx)

[2.2.3 Performance Requirements (Records Management System) 17](#_heading=h.qsh70q)

[2.2.3.1 Speed 17](#_heading=h.3as4poj)

[2.2.3.2 Capacity 17](#_heading=h.1pxezwc)

[2.2.3.3 Reliability 17](#_heading=h.49x2ik5)

[2.2.3.4 Usability 17](#_heading=h.2p2csry)

[2.2.4 Performance Requirements (Zoo Website) 17](#_heading=h.147n2zr)

[2.2.4.1 Speed 17](#_heading=h.3o7alnk)

[2.2.4.2 Capacity 17](#_heading=h.23ckvvd)

[2.2.4.3 Reliability 17](#_heading=h.ihv636)

[2.2.4.4 Usability 17](#_heading=h.32hioqz)

[2.2.5 Performance Requirements (Visitor Information System) 17](#_heading=h.1hmsyys)

[2.2.5.1 Speed 17](#_heading=h.41mghml)

[2.2.5.2 Capacity 17](#_heading=h.2grqrue)

[2.2.5.3 Reliability 17](#_heading=h.vx1227)

[2.2.5.4 Usability 17](#_heading=h.3fwokq0)

[2.2.6 Design Constraints (All software components) 17](#_heading=h.1v1yuxt)

[2.2.7 Commercial Constraints (Total Project) 17](#_heading=h.4f1mdlm)

[**3 System Interface Designs 18**](#_heading=h.2u6wntf)

[3.1 Draft Interface Designs for RMS 18](#_heading=h.19c6y18)

[3.1.1 Wireframes 18](#_heading=h.3tbugp1)

[3.1.2 System Navigation Diagram 18](#_heading=h.28h4qwu)

[3.1.3 System Screen mock-ups 18](#_heading=h.nmf14n)

[3.1.4 System Activity Event Diagrams 18](#_heading=h.37m2jsg)

[3.2 Design Revisions 18](#_heading=h.1mrcu09)

[3.3 Draft Interface Designs for Zoo Website 18](#_heading=h.46r0co2)

[3.1.1 Wireframes 18](#_heading=h.2lwamvv)

[3.1.2 System Navigation Diagram 18](#_heading=h.111kx3o)

[3.1.3 System Screen mock-ups 18](#_heading=h.3l18frh)

[3.1.4 System Activity Event Diagrams 18](#_heading=h.206ipza)

[3.2 Design Revisions 18](#_heading=h.4k668n3)

[3.1 Draft Interface Designs for Kiosk/Visitor Information 18](#_heading=h.2zbgiuw)

[3.1.1 Wireframes 18](#_heading=h.1egqt2p)

[3.1.2 System Navigation Diagram 18](#_heading=h.3ygebqi)

[3.1.3 System Screen mock-ups 18](#_heading=h.2dlolyb)

[3.1.4 System Activity Event Diagrams 18](#_heading=h.sqyw64)

[3.2 Design Revisions 18](#_heading=h.3cqmetx)

[**4 Analysis and Design Records Management System - 18**](#_heading=h.1rvwp1q)

[4.1 Preliminary Analysis Stages 18](#_heading=h.4bvk7pj)

[4.1.1. Textual Analysis 18](#_heading=h.2r0uhxc)

[4.1.2. Significant Event Analysis 18](#_heading=h.1664s55)

[4.1.3. Class- Responsibility-Collaborator (CRC) 18](#_heading=h.3q5sasy)

[4.2. Detailed Static System Designs 18](#_heading=h.25b2l0r)

[4.2.1. First Draft BON System Architecture Diagram 18](#_heading=h.kgcv8k)

[4.2.2. BON System Chart 18](#_heading=h.34g0dwd)

[4.2.3. BON Cluster Charts 18](#_heading=h.1jlao46)

[4.2.4. BON Class Charts 18](#_heading=h.43ky6rz)

[**5 Report Conclusion 18**](#_heading=h.2iq8gzs)

[**6 References 18**](#_heading=h.xvir7l)

[**7 Appendix 18**](#_heading=h.3hv69ve)

# Introduction

This section will provide a brief introduction for the project overall. It will provide the background information for the project. The aims and objectives will outline in detail, the end expectations of the projects and the software suite of products that are expected to be developed. Furthermore, it will also cover the project development methodology, which will provide an in-depth summary of the different elicitation techniques such as questionnaires, interviews etc… that will be used to extract key information, essential in the success of the project.

## Project Background (1 page)

The name of the project is Claybrook Zoo. The Synergy Solutions software development company was approached by Matthew Jones, the current zoo manager at Claybrook zoo, who wants us to develop a suite of software products that includes a website, visitor information technologies and records management system.

Four key stakeholders:

1. **Matthew Jones:** The current zoo manager, who is an expert on the existing organisational procedures and practice.
2. **Thomas Smith:** An existing, regular visitor to the zoo, who has a good insight into the current visiting experience available for general members of the public.
3. **Jonathan Rodgers:** A senior administrator within the zoo, who is responsible for running the animal sponsorship scheme.
4. **Phillip Brown:** A local small business owner who is interested in the animal sponsorship scheme if he can perceive potential benefits by way of advertising/positive publicity available through the scheme.

The current situation is that the zoo does not currently have any technology implemented in the business. All administrative tasks are paper based.

The problem with the current situation is that there are concerns about loss of staff, animals and visitors’ data stored in the zoo, due to it being paper based.

There is also a lack of technology implemented in the business, which is affecting the development and growth of the zoo, as there is less outreach to the members of the public.

The signage is only updated once a year, as it is not technical.

We will implement technology available to resolve all the concerns of the client.

For example, at the moment the animal’s record is stored on a paper-based record form. To resolve this issue, we will develop an RMS (Record Management System), a database, which will allow the members of staff to find the required animal record easily. We will achieve this by allowing complex search criteria combinations which the staff member can use to interrogate the database. This database, therefore, will allow the members of staff to search for animals using multiple search criteria easily. Furthermore, we will also include a graphical representation of the animals held within the database, so that the animals can be easily identified.

To help promote the zoo and the features/benefits that it offers, to the wider members of the public and therefore provide more outreach, again through the implementation of technology we will develop and produce a zoo website. The website will allow potential visitors to look at the critical zoo animals held within the zoo, prior to actually visiting the zoo. The website will also include key information about the zoo, which will also encourage more visitors.

To resolve other issues, such as queuing at the zoo tickets office, we will also investigate the relevant technologies that the zoo can implement to incorporate possible touch-screen features which will be a part of the visitor information technology, such as a kiosk system or a QR driven and Mobile Application that will run on a smartphone that will allow visitors to interact with the existing attractions at the zoo.

1.2 Project Aims and Objectives (1 page)

The key aim of this project is to develop very effective and efficient suite of products which includes:

1. A customer facing zoo website
2. An internally facing visitor information technologies
3. A zoo records administration/content management system that will allow key business records for the zoo to be effectively managed.

The end goal of the project is that the three software products developed will very effectively resolve all the concerns of the client. In order to successfully meet this aim, the following provides an overview of the objectives that have been developed for each of the three software products.

Do the objectives as bullet points – remove the subtitles

A zoo records administration/ content management system:

* Investigation into existing record management systems
* Organisation of current record management
* Technologically advance the current record management system in order to create an easy method of storing important information
* Create better security for the new system to decrease the chance of the zoo being liable for any damages or losses in important data and information
* A more effective way of providing sponsors and customers their personal information

To develop a customer facing zoo website, that is of high quality and very user friendly the following objectives have been developed:

* Investigation into existing zoo websites, as comparable system, to identify common features or characteristics of the website, that must be implemented in zoo websites.
* Evaluation of the positive and negative aspects of the existing zoo website. This will help to identify the strengths and also the weaknesses of each website.
* Investigation into existing design principles, that can be implemented to improve the usability of the website for the target audience.

A internally facing visitor information technologies

* Investigation into existing visitor information technologies
* Create better flow within the zoo by creating a kiosk system that allows people to purchase tickets quickly
* Create another source of income through the shopping kiosk and creating a new shop design
* Create a more effective way for members to find, correct and know their personal information through the mobile app
* Create a way for visitors to know about seasonal activities through the new kiosk system and the mobile app

1.3 Project Development Methodology (2 page)

In this section we will be discussing the different elicitation techniques such as questionnaires, interviews and reading the brief. We will briefly discuss the advantages and disadvantages for each of the elicitation technique and justification for why we have chosen the particular technique.

The table below provides a brief explanation of the advantages and disadvantages of the different elicitation techniques and a justification, for why we have chosen to implement the technique.

| **Technique** | **Advantages and Disadvantages** | **Justification** |
| --- | --- | --- |
| Background reading – Reading the client briefs | Advantages  - Provides background information to the project.  - Helps to gain an understanding of the key stakeholders involved in the project.    Disadvantages  - Doesn’t provide in depth information for the project. | The decision was made to implement this technique, so that we can gain some background information on the project and understand who the key stakeholders are, before, we begin working on the project.  Reading the briefs helped us to identify the problem domain characteristics for this project before we start planning our interviews to obtain key information from the clients. |
| Interviews | Advantages  - Opportunity to explain questions in detail and to also discuss the answers in detail with the clients, to gain any necessary clarifications.  -Potentially saves the client’s time, as the interviewer, doesn’t have to ask a particular question if the client has already answered it while answering another question, compared to a questionnaire/form for example, where the client has to answer all the questions, separately, with less detail or explanation. The interview format gives them the opportunity to expand on their answers if needed.  Disadvantages  - It can be very costly and also very time consuming.  - The client might not feel as comfortable answering the questions, especially in group interviews, as they are face to face, and it can be intimidating to them, compared to a questions form conducted online, where they can take their time to answer the questions.  - Furthermore, if the questions were asked in an online form/questionnaire format, they would feel more comfortable answering the questions, as they are not under time constraints and they do not feel the pressure from the interviewer. Also, since they are not under pressure, they will be able to think more clearly, resulting in better and more detailed responses to the questions. This will mean, that we the interviewers, will have more detailed and clear answers to the questions asked, which we can then analyse in detail to extract the key information. | The decision was made to implement this technique, so that we can obtain key project information from the clients. Interview plans were developed to obtain key information about the project from the clients. The interviews will help us to understand more clearly, about the requirements of the project and obtain key additional project information from the clients regarding the software products that they would like us to develop.  The information obtained from the interviews will be essential, in terms of the development of the software products. |
| Questionnaire | Advantages  - It is not expensive, as it is conducted online.  - The visitors will not be under pressure to answer the questions as there are no time constraints.  - It is easily scalable. This is because you can send the questionnaire to hundred visitors, for example, within seconds, which makes it a very practical option.  - You can get the results extremely fast. As, the questionnaire is carried out online, when the visitor/user completes the questionnaire, you can get a notification email, depending on the questionnaire software tool used.  - Carrying out the questionnaire online, allows you to analyse the results for each of the questions separately, easily and also very effectively. This is because there are several software tools available, which allow you to automatically analyse the results for each of questions, and also provide bar charts, pie charts, to illustrate the complex aggregated statistics collected from the questionnaire.  - Finally, the questionnaire can be anonymous, and the visitors, completing it should be informed this at the start of this questionnaire. This is a major advantage of questionnaire because it potentially means that the visitors, will be more honest with their responses as their identity is anonymous.  Disadvantages  - It lacks detailed information. It doesn’t allow them to expand or explain the answers that they have provided.  - The visitors might ignore or leave some questions unanswered.  - The information gathered may not always be reliable and accurate, as we do not know whether the respondent of the questionnaire, has understood the question fully before answering or responding to it. If the questions were answered, without fully understanding, this will lead to inaccurate data. | The decision was made to implement this technique, so that we can gain valuable information about the views of the existing Claybrook zoo visitors and what they feel about the current zoo visiting experience and also what they would like to see improved in the future.  The questions will be short and simple, which will make it very easy for the visitors of the zoo, to complete the questionnaire and therefore lead to more accurate results.  The information gained from this questionnaire, will be key in terms of the development of the software systems for the project. This is because, we will be able to take into account the views and the perspective of the visitors of the zoo and what they would like to see improved in the future as well as the requirements of the clients of the project to develop effective software products. Furthermore, this will make the current visitors of the zoo feel valued, as their views are taken into account, when developing the software systems which will be used by the visitors itself and also attract new visitors, therefore improving the overall visiting experience of the zoo. |

# 2 Requirements Engineering

This section will cover the elicitation activities that we will carry out, to ensure that we gather the requirements that are required to achieve success in this project. The main elicitation technique that we will use to gather the information will be interviews. It will outline the interview plans and then an in-depth documentation of the interview findings. Furthermore, we will also carry out other problem domain research as a review of the comparable systems for each of the software products, where we will carry out in-depth research into existing systems for each of the products. We will also provide a summary of the relevant legislation for the project. Finally, to gather further information we will also develop a questionnaire for the current visitors, to gain a better understanding of their perspective of the zoo.

## 2.1 Elicitation Activities

There are a few elicitation activities that we carried out, such as interviews with the key stakeholders, to extract the key information for the project. We recorded the findings from the interviews in a table. The information gathered from these interviews will be essential in the development of the software products. We will also develop a visitor questionnaire and distribute it to the current visitors of the zoo to ensure that we take into account the views of the current visitors of the zoo. Furthermore, we will also carry out comparable software system review for each of the three software products, where we will evaluate the current existing systems for the three software products.

2.1.1 Interview plans

In order to ensure that we gain all the required information from the key stakeholders, we decided to develop interview plans for each of the three interviews. This will structure the interview, so that we can gain all the essential information effectively.

2.1.1.1 Interview plan for Matthew Jones

2.1.1.2 Interview plan for Thomas Smith and Phil Brown

2.1.1.3 Interview plan for Jonathan Rodgers and outstanding questions for Matthew Jones

## 2.1.2 Interview findings

We recorded the findings from the interviews in a table. Below is the information gathered from the three interviews.

2.1.2.1 Interview findings for Matthew Jones

2.1.2.2 Interview findings for Thomas Smith and Phil Brown

2.1.2.3 Interview findings for Jonathan Rodgers and outstanding questions for Matthew Jones

## 2.1.3 Other problem domain research

We decided to carry out problem domain research for the project. First, we carried out comparable software review for the three software systems.

2.1.3.1 Comparable Software System Review

Below we have carried out software system review for each of the three software systems, the RMS, website and kiosk.

## 2.1.3.1.1 Records Management Systems

We decided to research into the existing record management systems.

|  | **AWS** | **Oracle Cloud** |
| --- | --- | --- |
| **Brief introduction of the system** |  |  |
| **Image of the system** |  |  |
| **Cloud Fundamentals** | A broad range of services and products that meet any requirement to enable a flexible and robust cloud environment. | Cloud products and services are supplied as a complete integrated stack. |
| **Technology** | Dependent on advanced technology.  Database compatibility concerns, limited database performance if compared with Oracle. | Dependent on advanced technology. Oracle representatives claim its database technology to be 20 years ahead of AWS. |
| **Scalability** | Near-unlimited scalability. | Near-unlimited scalability. |
| **Offering Adequacy** | Adequate services delivered within a wide diversity. | The bare-bone solution with minimal out-of-the-box functionality. |
| **Position in the Market** | Long standing leader and the biggest market share. | New to the market with a small market share. |
| **Cost** | High, depending on each specific configuration. | High, depending on each specific configuration.  However, it is to be lower than AWS. |
| **Customer Support** | Multilingual and limited support that depends on a wide network of partners and managed services providers. | Deficient support of enterprise-level customers lack of managed services providers. |
| **Advantages of the system** |  |  |
| **Disadvantages of the system** |  |  |

***Table: Comparison between AWS Platform and Oracle Cloud***

## 2.1.3.1.2 Zoo Websites

## 2.1.3.1.3 Visitor Kiosk/Information Systems

## 2.1.3.2 Development Relevant Legislation

The following section outlines the current laws which affect the current way data is handled at Claybrook Zoo. As a result Synergy Solutions have come up with software products that abide by these laws.

**Data protection act 2018**

According to the GOV.uk website, the data protection act 2018 is the UK's implementation of the General Data Protection Regulation (GDPR). This controls how personal information is used by organisations, businesses, or the government. The data protection principles to follow are to make sure that the information is used

* fairly, transparently, and lawfully
* for the exact specified purpose
* in a way that is limited to what is necessary and relevant data

The data collected must be accurate and kept up to date and guaranteed the most appropriate security for the data including protection against unauthorised or unlawful processing, access, loss destruction or damage. There should also be stronger protection for sensitive information such as:

* Race
* Genetics
* Biometrics(which is fingerprints and face id)
* Health
* Sex orientation
* Ethnic background

There are separate legal requirements regarding criminal convictions and offences.

The customers have the right to:

* be informed regarding how their data is used
* have access to their personal data
* have access to correct any incorrect data
* have any data erased
* terminate/ restrict the processing of their data
* get and reuse their data for different services
* in certain circumstances to object to how their data is processed

**GDPR**

According to the guide-to-the-general-data-protection-regulation by the ICO (Information Commissioner's Office) "the GDPR applies to processing carried out by organisations within the EU and goods/services outside the EU". Therefore, due to Brexit Claybrook Zoo does not apply to the GDPR currently but decisions are still being made in the government so they may decide that the GDPR still applies. If so Claybrook Zoo can use the Synergy Solutions services again by contacting Kenneth Da Cruz. However, the key thing to note is the GDPR definition of personal data. This definition is a baseline of what Synergy Solutions will be considered personal data as if the Government decides to continue to follow the GDPR it is in the company's interest to know the defining factors of the definition of personal data. According to the ICO's guide to data protection, the meaning of personal data is "any information relating to an identifiable person who can be directly or indirectly identified in particular by reference to an identifier". Personal identifiers can be:

* A name
* Identification number (such as passport number)
* location data
* online identifier
* the way Claybrook Zoo or any other organisation collects information about people

This also applies to automated and manual filing systems.

**Child protective law GDPR**

Children have the same protective rights as adults over their own personal data even if they are unaware of that fact. This includes the right to:

* be provided with information that explains the process in which their data is being used and this must be clear and explicit (meaning you cannot imply any information)
* have any incorrect data corrected and incomplete data completed
* have their personal data erased if they wish

Even if a child does not know their own rights it is still their rights, not their parents or guardians however the legal age of contractual consent in England is 13 meaning and child 12 and below must have parents/guardians’ consent.

According to the NSPCC, the definition of a child in England is anyone who has not yet reached the age of 18 including children who are 16 and are:

* living independently
* in further education
* a member of the armed forces
* in hospital
* in custody

Therefore, even though the age of consent is 13, the customer should be considered a child until 18 for any relevant situations.

**Equality Act 2010**

According to the GOV.uk website "the Equality Act 2010 legally protects people from discrimination in the workplace and in our society"

There are different types of discrimination which are also known as protected characteristics. These include:

* a person's age
* a person's gender reassignment
* if a person is pregnant or on maternity leave
* if a person has a disability
* a person's sex or sexual orientation
* a person's religion or beliefs
* if a person is married or in a civil partnership
* race including their skin colour, ethnicity, nationality or national origin

The products that Synergy Solutions have created comply with all of these laws that have been stated above and remove any prejudice or discrimination that a customer may face, while also securely protecting the customer's data/ personal information. However, if Claybrook Zoo was to expand into other countries or even back into the EU there will be new laws to follow therefore they should contact Synergy Solutions through Kenneth Da Cruz and consult with the company on how to expand.

## 2.1.3.3 Visitor Questionnaire (Optional)

**Visitor Questionnaire**

Thank you for taking your valuable time to complete this online questionnaire designed to find out what you(an existing Claybrook Zoo visitor) feel about the current zoo visiting experience and also what you would like to see improved in the future.

Please be absolutely honest about your opinion on the following questions.

**Note:** Please keep in mind that any information that you provide in this questionnaire will be restricted to members of my team only. Your answers will remain confidential & your identity anonymous.

| **Questions** | **Strongly agree** | **Agree** | **Disagree** | **Strongly disagree** |
| --- | --- | --- | --- | --- |
| **About You** |  |  |  |  |
| I heard about the Claybrook zoo from your leaflet/advertisement |  |  |  |  |
| I heard about the Claybrook zoo from my family/friend |  |  |  |  |
| I visit the Claybrook zoo often |  |  |  |  |
| **About your visiting experience** |  |  |  |  |
| The staff members were really  approachable, friendly and helpful |  |  |  |  |
| I know about your current sponsors |  |  |  |  |
| The staff are very knowledgeable |  |  |  |  |
| I enjoyed my time at Claybrook zoo |  |  |  |  |
| My overall experience in buying the tickets at the ticket office was positive |  |  |  |  |
| The Claybrook has met my expectations as a visitor |  |  |  |  |
| **Future** |  |  |  |  |
| I would prefer to purchase the tickets on a website in advance rather than at the ticket office |  |  |  |  |
| I would consider sponsoring an animal |  |  |  |  |
| The zoo is an fascinating place |  |  |  |  |
| I would be interested to purchase merchandise from the gift shop |  |  |  |  |
| The overall visiting experience at Claybrook zoo is very positive |  |  |  |  |
| I would recommend Claybrook zoo to my family and friends |  |  |  |  |
| Are there any other improvements or changes that you want to see in the future? |  | | | |
| Before you submit the questionnaire, please let us know how you would rate the questionnaire overall?  ☆☆☆☆☆  Please provide any additional feedback: | | | | |
|  | | | | |

Thank you for completing the questionnaire. We genuinely appreciate your views on the questions and will use your comments to improve the visiting experience of our zoo.

We hope you have enjoyed completing this questionnaire.

This questionnaire was distributed to 100 current visitors of the Claybrook zoo on the 7th of December 2021. The questionnaire was sent to the visitors via email, requesting them to complete the questionnaire.

Following is an example of the email sent to a visitor. The same email format was used when sending the questionnaire to all the visitors.

Graphical user interface, text, application, email

Description automatically generated

## 2.1.3.4 Visitor Questionnaire Results Analysis

In this section, we will discuss the results obtained from the questionnaire and analyse responses to each of the questions in detail, using pie charts.

The questionnaire was distributed to 100 current visitors of the Claybrook zoo on the 7th of December 2021.

The following results were obtained:

| **Questions** | **Strongly agree** | **Agree** | **Disagree** | **Strongly disagree** |
| --- | --- | --- | --- | --- |
| **About You** |  |  |  |  |
| I heard about the Claybrook zoo from your leaflet/advertisement | **25%** | **25%** | **50%** |  |
| I heard about the Claybrook zoo from my family/friend | **30%** | **20%** | **50%** |  |
| I visit the Claybrook zoo often | **30%** | **20%** | **20%** | **30%** |
| **About your visiting experience** |  |  |  |  |
| The staff members were really  approachable, friendly and helpful | **90%** | **10%** |  |  |
| I an aware about the current sponsorship scheme for animals at the zoo. | **25%** | **25%** |  | **50%** |
| The staff are very knowledgeable | **85%** | **10%** | **5%** |  |
| I enjoyed my time at Claybrook zoo | **95%** | **5%** |  |  |
| My overall experience in buying the tickets at the ticket office was positive | **10%** | **20%** | **70%** |  |
| The Claybrook has met my expectations as a visitor | **85%** | **10%** | **5%** |  |
| **Future** |  |  |  |  |
| I would prefer to purchase the tickets on a website in advance rather than at the ticket office | **100%** |  |  |  |
| I would consider sponsoring an animal | **30%** | **20%** | **20%** | **30%** |
| The zoo is an fascinating place | **85%** | **10%** | **5%** |  |
| I would be interested to purchase merchandise from the gift shop | **85%** | **15%** |  |  |
| The overall visiting experience at Claybrook zoo is very positive | **90%** | **10%** |  |  |
| I would recommend Claybrook zoo to my family and friends | **100%** |  |  |  |
| Are there any other improvements or changes that you want to see in the future? | **Updated signage and use of technology and interactive exhibits to make the visitor my exciting for my children (x10)** | | | |
| Before you submit the questionnaire, please let us know how you would rate the questionnaire overall?  ☆☆☆☆☆ – 4.5 average review  Please provide any additional feedback: | | | | |

Below we have illustrated the results obtained from the questionnaire using pie charts in a table format, and analysed results for each question in detail.

| **Questions** | **Graph** | **Analysis** |
| --- | --- | --- |
| I heard about the Claybrook zoo from your leaflet/advertisement |  |  |
| I heard about the Claybrook zoo from my family/friend |  |  |
| I visit the Claybrook zoo often |  |  |
| The staff members were really  approachable, friendly and helpful |  |  |
| I am aware about the current sponsorship scheme for animals at the zoo. | Chart, pie chart  Description automatically generated |  |
| The staff are very knowledgeable |  |  |
| I enjoyed my time at Claybrook zoo |  |  |
| My overall experience in buying the tickets at the ticket office was positive | Chart, pie chart  Description automatically generated |  |
| The Claybrook has met my expectations as a visitor | Chart, pie chart  Description automatically generated |  |
| I would prefer to purchase the tickets on a website in advance rather than at the ticket office |  |  |
| I would consider sponsoring an animal |  |  |
| The zoo is an fascinating place |  |  |
| I would be interested to purchase merchandise from the gift shop | Chart, pie chart  Description automatically generated |  |
| The overall visiting experience at Claybrook zoo is very positive | Chart, pie chart  Description automatically generated |  |
| I would recommend Claybrook zoo to my family and friends | Chart, pie chart  Description automatically generated |  |

comment on results overall.

## 2.2 Requirements Specification

Now that we have gained an in-depth understanding of the problem domain, in this section, we will develop the requirements specification documentation for this project. This will include an in-depth explanation of the existing business operations, using flowcharts, to effectively outline the flow of information in the company. Furthermore, we will also outline a brief summary of the existing business limitations.

## 2.2.1 Problem Domain Description

One of the main problems that Claybrook Zoo currently faces are the loss of staff, animal, and visitor- data stored in the zoo since the current system is paper-based. The paper-based system is a major limitation to the zoo’s business as it prevents the proper representation of the zoo’s data and prohibits the zoo from analysing the data to further improve the business. Another factor to the problems within Claybrook Zoo is the lack of technology. The earth is currently in a digital age and because of the lack of technology within the zoo, Claybrook Zoo is not fully taking advantage of the benefits technology provides which in turn creates a decrease in potential visitors. Furthermore, due to the lack of technology within Claybrook Zoo, the amount of funds expended for hard labour is substantially higher than what it should be if they had the technology. For example, Claybrook Zoo has to manually change the signage within the zoo instead of using technology that could change it in an instant. Another issue that Claybrook Zoo has is its lack of outreach due to its lack of technology, potential customers are unaware of Claybrook Zoo’s existence because Claybrook Zoo has not reached them technologically; however , Synergy Solutions has created solutions that will help combat this problem and help the company boost profits and sales.

## 2.2.1.1 Existing Business Operation

The current business operations are operating at an incredibly slow rate that is causing customers to turn away from the zoo. 70% of the current visitors do not like the current operations as seen in the questionnaire in (reference questionnaire). Fundamental operations within the business are the animal cycle, sponsorship cycle and membership cycle. The membership cycle below (reference member flowchart) shows the basic process of one of the key operations. The other key operations within the business- the animal cycle and the sponsorship cycle- show the process of the paper-based system in more detail. From this Synergy Solution noticed that the longest stage of the process is getting the file from the paper-based system and updating it. By cutting down the wait time between requesting a file and changing any details, Synergy Solutions’ proposed solution will increase the operations within Claybrook Zoo and will in turn create an increase in the effectiveness within the zoo.

## 2.2.1.1.1 Animal Life-Cycle

## 2.2.1.1.2 Sponsorship Life-Cycle

## 2.2.1.2 Summary of existing business limitations

## In this section we have carried out analysis on the information collected in the interviews with the clients, in order to briefly identify the problems or issues with the current system that require effective resolutions.

The table below outlines the problems that were identified within the current system.

| **Existing business limitations** | * Requires a large physical space in the zoo buildings to store the paper-based files/documentation. * Possible loss of the paper-based files. * Time consuming to input and extract data. * Lack of technology implemented. |
| --- | --- |

Table 2.2.2.1 Identified limitations in current business model

## 2.2.2 Functional Requirements

## In this section, we will detail the functional requirements for the software suite of products that will be developed. It will detail what the new software systems will do in order to effectively solve the problems that were highlighted by the key stakeholders.

## 2.2.2.1 Records Management System

## 2.2.2.2 Zoo Website

## 2.2.3.3 Visitor Kiosk Information System

## The purpose of the new kiosks system is to decrease the high level of queuing outside the zoo and to create better flow within the zoo. The new kiosk systems are created to be accessible to all customers including people who are not able-bodied. Key pages that Claybrook Zoo will be about to see on the new kiosk system are: the tickets page that will be a simple and easy way to purchase tickets (this will help decrease the ques to enter the zoo); the events page which will tell new customers what events are happening during the week (this list will be updated when a new event is happening in the week such as during holidays); the members page which will be a way for current members to get temporary passes if they lose their membership card( this is an alternative way to have the members prove that they are members if Claybrook Zoo are not able to invest in the mobile app) and the basket page. The basket page will be the page where visitors can see what they have purchased, and it is also the opportunity to ask customers if they want to become a sponsor. The kiosks will be colourful, bright, and family-friendly. This is to give a family orientated aesthetic for customers to see that the main focus of the zoo is a fun family day. The shopping kiosk also will have a page of all the items that customers can buy with a navigation diagram on the side for customers to easily navigate through the system. This will also be another way for the zoo to boost their sales and create another stable source of income in order to create more profit.

Mobile App

The purpose of the mobile app is to provide customers of the zoo access to zoo information easily and from anywhere. This app has many benefits for members but is aimed at all guests. One key page of the mobile app is the membership information page that allows the member to view the information that they have given to the zoo such as their phone number and email address as well as being able to change and correct information. The members page also allows members to see how long they have left in their membership and provides a quick and easy way to renew their membership including the feature of taking their own photos. Other key pages are the events page and the tickets page, like the kiosk those pages will allow people to book tickets (this is so that they can buy tickets for other family members that are visiting which will be helping the zoo’s family friendly appearance) and allow them to look at the key events that are happening in the Zoo. Furthermore, the customers will be able to pre-order merchandise like T-shirts, toys and much more, this will boost the Zoo’s sales and allow them to create another source of income. The app will also have a map of the zoo with GPS location so that new visitors could look at the app and find out how to go to the specific animal that they want to see this feature will also have a QRF card game to make it more appealing to teens as well. The QR card game idea that the Synergy solutions team has come up with is to make a collectable QR card that will have a 3D video of a zoo animal appear on the screen and the animal will pop up on the zoo. This collectable it will be a unique way of getting children involved in viewing and exploring the zoo. This is just one game idea that Synergy Solutions have but will hopefully be in talks with Mathew Jones about implementing other game ideas to have within the mobile app.

## 2.2.3 Performance Requirements (Records Management System)

## In this section, we will outline the performance requirements for each of the software systems that will be developed. We will address four performance requirements for the proposed system which includes speed, capacity, reliability, and usability.

## The following are the performance requirements for the Record Management System.

## 2.2.3.1 Speed

## 2.2.3.2 Capacity

## 2.2.3.3 Reliability

## 2.2.3.4 Usability

## 2.2.4 Performance Requirements (Zoo Website)

Below, we have discussed the 4 essential performance requirements for the proposed part of the software system: website.

## 2.2.4.1 Speed

The website response time will need to be quick, maximum of 3 seconds. The website must load quickly, within three seconds.

The user must be able to open/access and switch between the sub-web pages on the website very quickly.

The user must be able to book tickets and pay for them very quickly, securely, and effectively.

The user must also be able to easily sign up to the newsletter very quickly and get a response, such as signup email confirmation instantly, informing them that they have signed up to receive the newsletter.

## 2.2.4.2 Capacity

Maximum number capacity of site visitors - “send it to you by email”

## 2.2.4.3 Reliability

The website must be reliable. The users must by able to carry out certain tasks, such as complete a membership signup form, without the website crashing. As discussed with the clients, there will be times where the website will be unavailable for the members of the public. The downtime of the website will be on Sunday nights going into early Monday morning, maybe 11am to 3pm, would be best, unless its peak time, for general maintenance and to make any necessary updates to the contents of the website, such as updating information about the key events coming up at the zoo, so that it is up to date with the latest information.

## 2.2.4.4 Usability

The time taken for the user to learn the software website will be determined by the user group category that they fall into. However, overall, the website that will be developed, will be very easy to use/operate, as it will be very intuitive.

Below I have defined the different user group categories and also indicated how long it will approximately take for each user group to learn how to use the website.

* Beginner user

A beginner computer user should be able to navigate through the website and understand how to carry out essential tasks, such as finding contact details of the zoo and be able to book tickets on the website and sign up to the newsletter, in no more than 10 minutes.

* Intermediate user

An intermediate computer user should be able to navigate through the website and understand how to carry out essential tasks, such as finding contact details of the zoo and be able to book tickets on the website and sign up to the newsletter, in no more than 8 minutes.

* Expert user

An expert computer user should be able to easily navigate through the website and understand how to carry out essential tasks, such as finding contact details of the zoo and be able to book tickets on the website and sign up to the newsletter, in no more than 5 minutes.

Overall, the website, will be very easy to use. All users will be able to easily find key information such as contact details of the zoo, on the website.

## 2.2.5 Performance Requirements (Visitor Information System) (Mobile App)

On the below subcategories, we will focus on finding the best system to have a high performance. We will focus on creating the app to be compatible with the **IOS** and **Android** system to increase the compatibility across devices.

## 2.2.5.1 Speed

* The app needs to start in 1-2 seconds
* The logo icon needs to be responsive and activate the app
* Needs to be able to process a transaction in 3 seconds
* All the system databases needs to be up to date
* Ensure minimum memory consumption for the app to run fast and smooth
* The server down time, will be once a month for installing additional updates and run a main system check

## 2.2.5.2 Capacity

As the app will be connected to the same database the website will be using, the capacity will be limited by the same limitations as the website.

## 2.2.5.3 Reliability

* Needs testing for high battery time consumption
* Will be available 160 hours per week out of 168 hours
* Payments will be available 365 days out of 365

## 2.2.5.4 Usability

Determined time that will reflect on how long does any category able to learn how to use the app

The groups of users mentioned below reflect how much time has taken each group to use the app.

* Beginner user

In less than 10 minutes, a novice phone user should be able to navigate through the app and learn how to perform basic tasks, such as discovering the zoo's contact information and booking tickets using the app.

* Intermediate user

In less than 8 minutes, an intermediate phone user should be able to navigate through the app and learn how to perform basic tasks, such as discovering the zoo's contact information and booking tickets using the app.

* Expert user

In less than 5 minutes, a novice phone user should be able to navigate through the app and learn how to perform basic tasks, such as discovering the zoo's contact information and booking tickets using the app.

## 2.2.6 Design Constraints (All software components)

In this section we will discuss the design constraints for the project. These are non-functional requirements that will constrain how the three software systems are built. The design constraints were imposed by the clients.

The following issues were discussed and reviewed with the project’s clients during the interviews and the information obtained is recorded below.

* **The operating system**

The latest operating system of Microsoft Windows 10 will be implemented, as the clients had no preference or background technical knowledge, on what operating system they would like to implement.

* **The hardware requirements**

The clients said that we can assume the hardware requirements as again, they don’t have the technical knowledge.

* **The Front-end graphic styles (Claybrook zoo defined colors etc..)**

In terms of the front-end graphic, the clients would like to keep the corporate colors, such as the colors of the logo. As you can see, the logo of the zoo is on the left, which has been provided by the client. We will make certain to implement the key corporate colors in the three systems that we will develop. A picture containing text

Description automatically generated

* **Any specific programming languages to be used**

The clients did not have any specific requirements on the programming languages that they would like us to use. We will be using the java programming language to develop the system.

## 2.2.7 Commercial Constraints (Total Project)

We have taken into account the following estimations when calculating the commercial constraints for the project.

* Cost estimations
* Project time scale estimations

We have carried out some basic calculations, to calculate the potential cost of the project. The calculations were based on estimated factors such as:

* The estimated staff costs and the total hours of work that is required to complete the work.
* The project costs/resources
* The required profit margin

Below is a table that provides the complete breakdown of the costs involved in the project. We carried out an in-depth research, when calculating the project costs.

Table

Description automatically generated**The table above shows the calculated costs of the project.**

As you can see, we have calculated the total project costs. The total cost of the project will be £48,900.00. We have split the costs clearly, so that the clients can see the various costs involved in the project, and how these costs add up to the total cost of the project without any ambiguity.

# 3 System Interface Designs

Now that we have gained an in-depth understanding of the features that each of the software systems must have and the functionalities that it must include, we will start developing the interface designs for each of the three systems. We will start with draft interface designs for each of the systems, which are the wireframes. The wireframes will be a simple sketch of what the layout of each system screen will look like and behave.

## 3.1 Draft Interface Designs for RMS

The following section shows the wireframes designs for the Record Management System, the navigation diagram for the system, the screen mock-ups and the system activity event diagrams.

## 3.1.1 Wireframes

Following are the wireframes developed for the RMS system.

## 3.1.2 System Navigation Diagram

Below is the navigation diagram for the Record Management System.

## 3.1.3 System Screen mock-ups

Following are the screen mockups developed for the RMS system.

## 3.1.4 System Activity Event Diagrams

Below are system activity event diagrams for the Record Management System.

## 3.2 Design Revisions

## 3.3 Draft Interface Designs for Zoo Website

The following section shows the wireframes designs for the website, the navigation diagram for the system, the screen mock-ups and the system activity event diagrams.

## 3.1.1 Wireframes

Following are the wireframes developed for the website.

## 3.1.2 System Navigation Diagram

Below is the navigation diagram for the website.

## 3.1.3 System Screen mock-ups

Following are the screen mockups developed for the website.

## 3.1.4 System Activity Event Diagrams

Below are system activity event diagrams for the website.

## 3.2 Design Revisions

## 3.1 Draft Interface Designs for Kiosk/Visitor Information

The following section shows the wireframes designs for the Kiosk, the navigation diagram for the system, the screen mock-ups and the system activity event diagrams.

## 3.1.1 Wireframes

Following are the wireframes developed for the kiosk system.

## 3.1.2 System Navigation Diagram

Below is the navigation diagram for the kiosk system.

## 3.1.3 System Screen mock-ups

Following are the screen mockups developed for the kiosk system.

## 3.1.4 System Activity Event Diagrams

Below are system activity event diagrams for the kiosk system.

## 3.2 Design Revisions

# 4 Analysis and Design Records Management System –

In this section we

## 4.1 Preliminary Analysis Stages

## 4.1.1. Textual Analysis

## 4.1.2. Significant Event Analysis

## 4.1.3. Class- Responsibility-Collaborator (CRC)

## 4.2. Detailed Static System Designs

## 4.2.1. First Draft BON System Architecture Diagram

## 4.2.2. BON System Chart

## 4.2.3. BON Cluster Charts

## 4.2.4. BON Class Charts

# 5 Report Conclusion

In this section we will provide a brief summary of the outcomes and also the implications of the work that has been produced. We will discuss the strengths and the weaknesses of the work. A discussion of whether the original aims and objectives of the project have been met and if not, then why not. If the original problems have been solved. Finally, a summary of the changes that we would implement if we were to carry out this project again and the enhancements that we would make to the project.

The key strengths of the work are, that we were able to carry out all the required activities as outlined in the introduction. One key strength of the work is that we were able to work together as a group to carry out all the elicitation activities, such as effective interview plans for the client interviews and extract the key required information, including the functional and performance requirements for the three systems from the clients. Another key strength of the work is that we were then able to us the information obtained from the client interviews to develop effective solutions, screen mockups, for the three software systems which are: Record Management System, website, and the visitor information technology, such as a kiosk system and the Mobile Application. We spent significant amount of time on the screen mock-ups, making sure that we include all the functional requirements, outlined by the clients for the three systems. The group was very successful in achieving this as the final screen mock-ups produced for the three software systems were consistent in terms of implementation of the corporate colours across the three systems and they included all the functional requirements outlined by the clients. The reason we were able to achieve this is because, we asked each other for feedback on the screen mock-ups produced and the feedback received, was then used to enhance the mock-ups produced. As a group, we were able to implement our creative skills and imagination to come up with the best possible mock-ups for the three systems.

There are a few key weaknesses of the work which include time constraints such as testing the new systems, and this can be very time-consuming. Also, the implementation of advanced technologies such as the physical kiosk in the zoo could have an adverse effect on the visitors, because it could potentially mean that the zoo is now lacking human interaction, due to the advanced kiosk system implemented. However, the new kiosk system is crucial in creating a better flow within the zoo and the Claybrook zoo can maintain that sense of human connection through special key events taking place at the zoo, such as animal feeding, a possible photo booth and the potential shop. With regards to the time constraints issue, testing is necessary because this is the first suite of software products that will be implemented in the zoo. Therefore, the set of products will be the deciding factor in how the visitors react to any further technological advances that the zoo implements, so they must exceed the visitor’s expectations in order to create a positive outcome.

We believe that the original aims and objectives of the project have been met. This is because, as although we have not built the software systems, we have developed very effective screen mockups, which includes a customer facing zoo website, which will provide more outreach to the members of the public, attract new visitors to the zoo and feature interactive content that is aimed at the target audience.

In terms of internally facing visitor information technologies, the aim was to create a better flow of information within the zoo. To achieve this aim, an effective system has been developed to buy tickets. The visitors can purchase their tickets through the app and also at the zoo through the kiosk system that will be implemented. Another key aim was to create an additional income, so that the zoo doesn't only have to rely on ticket sales alone for income, so we implemented the shop. This will generate more revenue for the zoo, making the business very successful.

For the zoo records administration/content management system, the key aim was to develop a electronic records mamgament system that will allow key business records for the zoo to be effectively managed. The aim was to transfer from a paper based system to an electronic database so that all the staff, visitor and animal data can be stored securely electronically and remove any liability that the zoo may face. The record management system that has been designed, allows the staff members at Claybrook zoo, to easily add the records to the system and effectively manage them. It also allows the staff members to make changes to the signage, within a couple of seconds. Therefore, the original aims for the record management system have been met effectively.

The original problems have been solved, this is because we were able to implement technology to resolve the key concerns of the clients. The three main problems included: concerns about loss of staff, animals and visitors data stored in the zoo, due to it being paper based. The lack of technology implemented, which limited outreach and the problem regarding the signage, as it was updated once a year, as it is not technical.

We implemented technology available to solve the three key original problems. To solve the concern about loss of staff, animals and visitors data in the zoo, due it being paper based, we developed the mock-up for the record management system, which allows the staff members to store all the records electronically. Furthermore, even if the staff members, deleted a record by accident, this can be easily recovered, which effectively solves the problem about the loss of staff, animals and visitors’ data stored in the zoo. To solve the problem of a lack of technology implemented, we have developed a customer facing and very user-friendly mock-up of the website. The website will provide more outreach and allow the Claybrook Zoo, to advertise the key events taking place at the zoo and attract more visitors to the zoo, therefore increasing the revenue of the zoo. Finally, to solve the problem of the signage, only updated once a year, as it is not technical, we have implemented a function in the mock-up of the record management system, where the members of staff at the Claybrook zoo, can easily update the signage within minutes, by simply editing and updating the signage with the new information, to be displayed at the entrance of the Claybrook zoo.

In the future, if we were to undertake this project again, we would implement a few enhancements such as we would make the website more interactive, by including a section, where the kids can play zoo games, therefore making the website more engaging and interactive for the visitors of the zoo. In terms of the record management system, we would make amendments to the layout of the different screens of the record management system, so that it is more user friendly, therefore allowing the members of staff at Claybrook zoo, to carry out the different functions very easily, such as adding a new animal record. As for the kiosk department, they would implement a kiosk system that shows the layout of the zoo as a more accessible way of seeing the zoo instead of using the mobile app. It would be designed like the information kiosk(see kiosk comparable systems table).This would create a more immersive feel within the zoo however the mobile app would still be there to enhance the visitors’ experience through the use of the interactive QR cards.

# 6 References

* Legal references
* GDPR <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/711097/guide-to-the-general-data-protection-regulation-gdpr-1-0.pdf>
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* Data protection act 2018
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* Joel’s reference in performance requirement
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* Any specific programming languages to be used reference: <https://online.maryville.edu/blog/programming-languages-for-software-developers/#:~:text=Although%20Java%20and%20Python%20are,is%20the%20most%20popular%20choice>.

# 7 Appendix

**The link to the mockup website developed:**

**The pictures used on the mockup website developed:**

**Newsletter signup Confirmation email:**

**Newsletter example:**

**Ticket confirmation email:**

**Extra wireframe pictures that were not used in the final mockup:**

**RMS**

**Website**

**Kiosk**

**Add work split**