Blood Match

Major Project Report

Bsc Interactive Multimedia Design

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Acknowledgements

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I also want to thank the lecturers of all the modules in the Interactive Multimedia Design course whose lectures and expertise have helped contribute towards the knowledge needed in order to complete my final year project.

I would also like to acknowledge my friends and family who has been very helpful and supportive throughout the whole year and without their advice and assistance throughout every stage of the project, Blood Match wouldn't be the project it is today.

Contents

1.1 Background

Blood Match will be a fully responsive web application that will allow people to be able to volunteer to donate blood by them uploading their blood details and for doctors and nurse to be able to find the correct donor for their patients based on location and patients' blood requirements such as blood type. It will allow doctors/nurses to connect their patients to the correct their donor so that they can the blood they need.

Any person that wants and is eligible to donate can sign up by creating a detailed profile on themselves which can be verified by a health professional. This will be done to ensure that the volunteer donor is healthy enough to donate and that the information they provide is correct. The information provided by the volunteer donor will be used to create a search that will allow doctors/nurses to filter through all the volunteer donors so that the doctors/nurses can find the matching donors for their patients.

When the doctor/nurses sign up to the service they will need to provide their details such as their name, surname and their GMC and NMC reference numbers. GMC which stands for NMC which stands for Nursing and Midwifery council are the two professional bodies that maintains the registers for doctors and nurses, by using their reference numbers this will be able to make sure that only doctors/nurses can use the web application and have access to all the information of the volunteer donors. **(General Medical Council) (Nursing and Midwifery Council)**

Once the volunteer donor has signed up, they can show if they are an active donor or an inactive donor. The active donor means that they are available to donate blood now. While the inactive donor means that they can't donate blood right now, this can be due to them donating previously as there is a limited amount of blood one person can donate at one time. This gives the doctors/nurses an indication on which volunteer donor they can contact for a blood donation.

The idea of the Blood Match application came from seeing how blood donors have helped members of my family. Also hearing the lack of people donating blood was disappointing has donating blood can save many more lives.

The web application can be used in a medical setting and be a more efficient way of finding blood donors and could be another way of encouraging people to donate blood. For this web application I can see it branching out to not only blood donation but also of other parts of the body such as heart.

1.2 Aims and Objectives

1.2.1 Aims

The intended outcome of the Blood Match web application is to deliver a web application that provides a platform for anyone that would like to volunteer to donate blood and for doctors and nurses to find the perfect blood match for their patients through the list of volunteers that are available to donate.

1.2.2 Objectives

To achieve this aim, there are the following objectives that must be met:

- Research effective and appropriate technologies to build the web application on.
- Ensure that the information that goes on the web application is correct and relevant for the user for example all the blood types are listed correctly
- Have the application available and fully functional across all browsers such as Chrome and Firefox and devices such as computer and mobile
- To make the design of the web application clear and easy to use so that the user can easily navigate their way around the web application.
- Have the design of the database correct from the beginning
- The application is tested fully by variety of different users with different abilities
- Before coding ensure that each stage of the application is designed fully

1.2.3 Scope

Blood Match does have some limiting factors that will influence the overall scope and quality of the web application. Here are some of the factors that will affect this:

Time

With the final deadline for the major project to be completed on is 5th May 2019 with every element of Blood Match deliverable to be completed before or on this date. With such a limited time to learn, design, develop, test and launch the web application, the time needs to be used wisely to ensure that the appropriate attention is given to each stage of the project.

Not only the final deadline for the major project, there are other time constraints placed on this project, including making sure that the concept is validated for BCS, ethics and Health and Safety compliance by the 26th October 2018 and a functioning prototype on the 7th January 2019. This is to include a video walkthrough with the functional prototype code and a draft report or work to-date. To cope with these time constraints a plan with all the different deadlines was created which will help me keep on track and manage the workload.

Research

Research is very important in this project has this will ensure that the best application is created. To conduct the research there will be different ways to do this for every stage of the product. The research for the design of the project will be looking at current design trends and how important user experience is. In the development stage of the project research will also be carried out to ensure that the best technologies are used to implement the project. A very important part of the research for this project is on blood donation itself and what the process for blood donation, has this will help determine what direction to take the project.

Design and Development

Once research for the design and development is carried out this will make it easier to complete. When design of the project is chosen it will be consistent throughout the web application and the design will be considered to the user so that they can have an excellent user experience on the web application.

The development stage will be the most time-consuming stage of the project. This will include the front end and back end of all the features to include Blood Match. Also, the database will need to be created for the project and make sure that it is a very secure system has it will have donor's personal information on the system.

Testing

When testing the Blood match web application, it is important to consider that the web application will be used by different users with different levels of expertise which is why the system needs to be testing to ensure that all the different users are accommodated for. With different browsers such as Chrome and Firefox it is important to see how the web application works properly on these browsers and functions how it should. Every feature on the web application needs to be thoroughly tested by looking at the interface and use experience. By testing the web application, it will allow time to make sure that if there are any problems or bugs within the project they can be fixed.

Cost

When creating the Blood Match web application, it is important to look at the cost of creating the Blood Match web application. Although most of the software, hardware and services are available for free to build the web application. However, additional costs may arise such as purchase of domain name, host or possibly and API. To control the cost of the web application, use all the free technologies available or use cheaper alternatives.

Quality

While studying Interactive Multimedia Design and while on placement, the quality of work must be at a professional level. For the project the quality is of the upmost importance as this will affect the overall outcome of the project and will result in you not meeting you aim for the project. To prevent this from happening tasks will be scheduled according to the importance of the task.

Based on the factors discussed the scope for developing the Blood Match web application will be:
- To develop a fully responsive web Application that runs and performs correctly on all devices and browsers

- The Blood Match web application will allow users to sign up as a doctor/nurse or someone that wants to volunteer to donate blood

- A Doctor/nurse will have the ability to search for a volunteer donor based on their blood type and contact that donor for them to donate

- The volunteer donor will have the ability to update and edit their details so that they can say if they are an active donor or an inactive donor

- The design of the Blood Match web application will be important and making sure that the usability and user experience are considered

My Blood Match web application will not include:

- Guarantee any risks that go along with donating blood.

- A guide on how to use the application but there may be prompts that will be able to help you use the application.

- Information on blood donation

1.3 Overview of Work Undertaken

To develop the Blood Match application, research, development and testing had to be carried out. The project brings together all the different skills and techniques that have been taught throughout the Interactive Multimedia Design course as well has on placement, both front end and backend web development. The project allowed me to learn and gain experience in new technologies such as the PHP framework Laravel.

1.4 Overview of Report

The following report will follow the structure of an agile methodology which will start with the concept definition and testing. This section explains how the idea was generated, the research behind it and the requirements to develop and implement the Blood Match Application. This is followed by the design of the Blood Match Application which consists of UX design, system design and data design. Finally, a review of the different technologies used with the testing process which leads to the evaluation of the project.

2.1 Idea Generation

The idea of Blood Match as previously stated previously came through seeing family members benefit from blood donation. Also hearing that "the NHS has turned away thousands of potential blood donors because staff are too busy, despite complaining of a 40% slump in people coming forward and a potential shortage of future stocks." This was a shocking statistic has there needed to be more blood donations so that people getting treated for conditions such as anaemia, cancer and blood disorders.

2.2 Contextual Research

Currently there is nothing out there that can help a doctor or nurse find the perfect blood match for their patients which allows them to contact volunteer donors directly or for a donor to choose when they are available to donated. In **appendix C** there is a website called give blood which allows to register to become a donor and tells you where to donate.

Recently the family 6-year-old Marley Nicholls who was been diagnosis with a rare blood condition and make desperate pleas for more donors to come forward as no one in his family is a match and are now working with the Anthony Nolan Trust to help find a suitable donor in their area of Newport. **(ITV)**

The Anthony Nolan Trust see in **Appendix C** also encourages users to donate stem cells that can help with blood disorders. The Anthony Nolan Trust was started by Shirley Nolan who set up the world's first register after her three-year-old son Anthony needed a Bone Marrow transplant. **(Anthony Nolan)**

What is the purpose of blood?
Blood is very important to life has blood circulates through the body to help deliver different nutrients oxygen and needed to the body's cells. The waste products in your body are moved

away by the same body cells that deliver the oxygen and nutrients. Blood can't be substitute or manufactured. In figure 1 this shows the blood structure and what is in your blood.
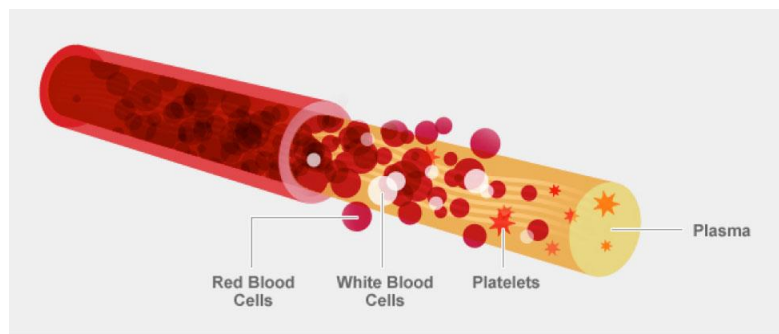
Figure 1: Blood Components

Red Blood Cells

The red blood cells in your body are around 40-45% in the volume of your blood . This is generated from the bone marrow and have a lifecycle of 120 days in the body.

Platelets

Platelets are the smallest of our blood cells and control bleeding, for example if you have a wound, the blood vessel sends out a signal which the platelets receive and travel to the area where the wound is which forms into cluster until the wound is healed.

Plasma

 Plasma is yellowish liquid part of the blood in colour. It is mainly made up from water but also contains proteins, sugars, hormones and salts which are sent to your body tissue.

White Blood Cells

White blood cells are only 1% of the blood, they are essential for good health and protect against any illnesses and disease. Like red cells they are generated from bone marrow, which flow through the blood stream and attack foreign bodies such as viruses and bacteria and can sometimes leave the bloodstream to fight into tissue.

Blood types

There are eight blood groups: A+, B+, AB+, B-, AB-, A-, O+ and O . The most common blood type is O positive and the least common is AB negative. In **appendix B** here is what the population blood group type if. Different blood types react differently to each other, so some are incompatible with

others. The number of antibodies present in the blood cell is based on what blood type you are and decide which blood cells in the body are going to be rejected. Blood group A rejects Blood group B; Blood Group B rejects Blood Group A; and Blood group O rejects both types A and B. Blood group AB contains no antibodies, so will accept any type of blood. Blood compatibility is very important especially for blood transfusions, in **appendix B** here is the list of all the blood types that are compatible with each other. Some blood groups are more common among some ethnic communities, so donations from people of all backgrounds are needed.   **(What's My Blood Type)**

Blood Donation

A blood donation occurs when a person choses to have blood drawn which benefits those that need transfusions.**(Wikipedia)** Donation may be of whole blood, or of specific components of blood such as red blood cells. Depending on how your blood is stored, blood can be stored for 42 days or 6 weeks for stored packed red blood cells. A female can donate blood every 16 weeks or 3 times in the space of 12 months and a man every 12 week or 4 times in the space of 12 months with the total amount being 470 ml, which is just under a pint. Before donating blood, you can't drink alcohol the night before or smoke on the day of donation or for a few hours after donation. **(Anthony Nolan**) To donate a donor must have adequate blood count to donate. Here are the basic requirements for donating blood:

Age

You can start donating blood from 17 years old and be a fist time donor until you are 66 years old. If you are a regular donor you can donate for as long as you like providing that the donor is well enough to donate.

Weight

The weight of the donor should be at least 50kg but if you are a female less than 20 years old your height and weight will be considered. There is no upper weight limit to donate blood.

There are other factors that need to be considered when donating blood such as the general, lifestyle and sexual health of the donor, certain medical conditions and infectious diseases such as

heart disease and HIV. If you have had surgery depending on what type of surgery, you have had you can donate but wait for a period after the surgery. If you have had a tattoos or piercings you must wait 4 months after having the tattoo or piercing. Also, if a donor has been to a country that is a malarial area they have to wait for a year before they can donate. If you have had a live or non-live immunisation there is a time frame from when the donor can donate. If waiting on test result wait until you test results come back and are clear from ill health. Previous blood transfusions aren't allowed as this was put in place in 2004 to reduce the risk of variant Creutzfeldt-Jacob disease. **(Northern Ireland Blood Transfusion Service.)**

2.3 Requirements Specification

The large scale of the project made defining the requirements an overwhelming task. But to help come up with the appropriate requirements the use of user stories helped defined what different scenarios that the user will go through using the application. Designing an application with a user centred approach is necessary is important has this will help created a highly usable and accessible application for the user. With the use of user stories this will help develop Blood Match into a user-friendly application. The user stories helped simulate several scenarios that each of the users for the blood match application will go through , which can be seen in **appendix D**. The requirements were also aided using the Volere Requirements Specification Template which helped along with the user stories put the list of requirements for the Blood Match application. The headings in the snow cards are:

Requirement Number (#): The ID number of the requirement

Requirement Type: Whether the requirement is functional or non-functional

Description: Brief description of the requirement

Rationale: The reason as to why it is required

Dependencies: Whether the requirement is depended on another requirement being completed

Fit Criterion: How the requirement is tested

Has there is lot of the requirements they can be seen in **Appendix F.** Also, in **Appendix F** after all the user requirements where created a table to help sort out the priority each requirement by rating the user value. Also, in **Appendix F**, the user survey provided a great insight into what the users want in a blood management application.

2.4 Paper Prototyping

2.4.1 Sitemap

Before starting the sketching ideas on how each page will look. I needed to have an idea of what pages are going to be in the website and for what user. To establish this, I did a quick sketch of a sitemap that can be seen in figure 2.
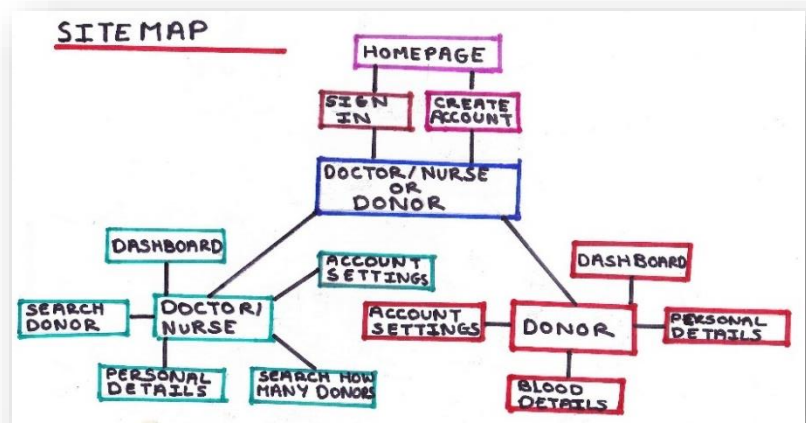
Fig 2: Original Sitemap

2.4.2 6-up /1-up

The 6-up/ 1-up is a technique that is used to produce 6 sketches of the same page. This method is a fantastic way of brainstorming different layouts for the same information. Having to come up with six different ideas allows you consider other ways of laying out information and can often lead to better ideas that wouldn't have been considered if you just focused on one sketch.

Homepage
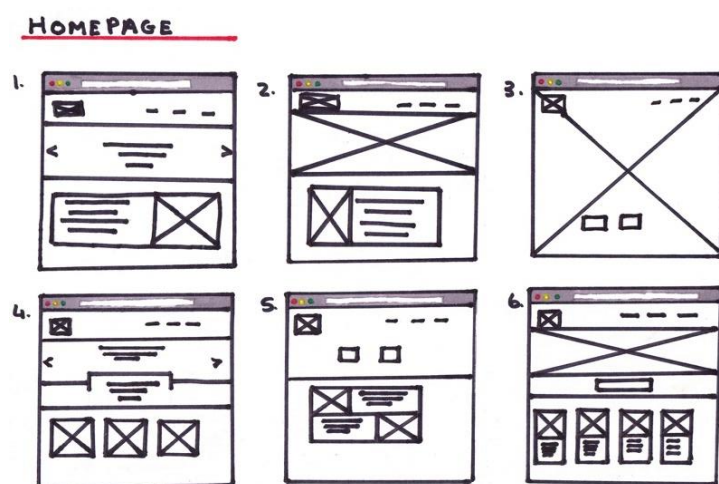
Figure 3: 6 ups of Homepage
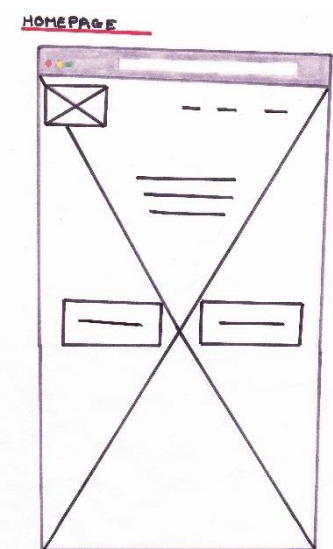
Figure 4: 1 ups of Homepage

The image above in **figure 3** shows the 6 – ups that were created in the process of designing the homepage. When designing onto the 1-up of the homepage it was mainly sketch 3 that was the mainly influence for the design which can be seen in **figure 4**.

Homepage 1: The webpage begins with the logo at the top left corner and the navigation at the top right corner. Below that there is a full-width slideshow with images of blood donation and explaining the positives of blood donation that will encourage more blood donors. Underneath the slideshow there will be images and text that explain what service the application provides and how it works for doctors/nurse and volunteer donors.

Homepage 2: The webpage is very similar to homepage 1 one except that there is no slideshow and is just one background image. The header with the logo and navigation is smaller compared to homepage 1. The information below the slideshow will explain what service the application provides and how it will work for doctors/nurse and volunteer donors.

Homepage 3: The webpage is very different to Homepage 1 and 2 as all the information such as about us and contact details will be on separate pages. The homepage will just have two buttons one for the volunteer donor and the other for doctors/nurse which will bring them to the sign in page. Out of all the homepages this one is very plain and straight to the point.

Homepage 4: This webpage is like homepage 1 with the logo at the top left corner and the navigation at the top right corner. Below that there is a full-width slideshow with images of blood donation and explaining the positives of blood donation that will encourage more blood donors. But underneath the slideshow there will be images and text that explain what service the application provides and how it works for doctors/nurse and volunteer donors. Also, before the information of the service the application provides the user information on how to sign in and make and account.

Homepage 5: This webpage has a hero image with the navigation inside it. Within the hero image there are two buttons one for the volunteer donor and the other for doctors/nurse which will bring them to the sign in page. The information below the hero image will explain what service the application provides and how it will work for doctors/nurse and volunteer donors.

Homepage 6: The final webpage has a separate navigation bar with the hero image sitting underneath. Underneath the hero image there are two sections. The first one which has just a button for the user to go to the sign in page and the second one information telling the user about the application and what it does.

Homepage 1-Up: For the 1-upshow above in **figure 4** the homepage it was decided that sketch 3 would be taken forward with text add above the buttons to produce an enhanced layout. At the top of the left-hand corner the logo sits, and the right-hand side is where the navigation appears. Below that there is text that will give brief information on the application and below that the two buttons one for the volunteer donor and the other for doctors/nurse which will bring them to the sign in page relevant to them.

With other pages such as about us and contact us will be on separate pages which are linked in the navigation. The footer will consist of the Blood Match logo, copyright information, social media links and terms and conditions of the application.

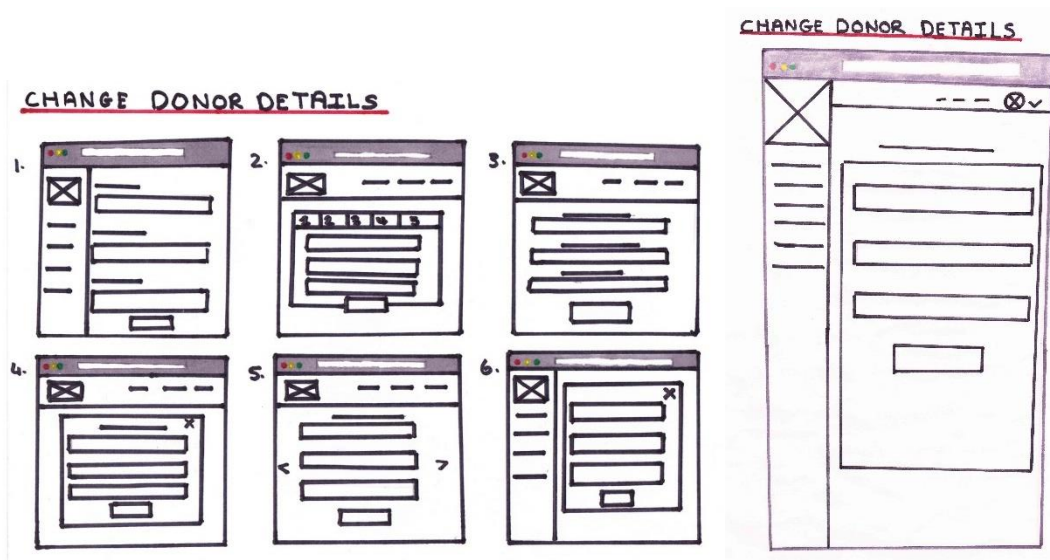**Change Donor Details**

Figure 5: 6 ups of Change Donor Details   Figure 6: 1 ups of Change Donor Details

The image above in figure 5 shows the 6 – ups that were created in the process of designing the change of donor details. When designing onto the 1-up of the change of donor details it was a

combination of sketch 1 ,4 and 6 that was the mainly influence for the design which can be seen in **figure 6**.

Change Donor Details 1: The first 6 up for the change donor details will have the navigation at the left-hand side. Has there will be different donor details to change the forms will be on separate pages which the donor can access by clicking the links in the navigation. The form is simply laid out by having the input boxes going down the page and at the bottom a button that simply changes the details once clicked. This will keep with the layout for the donor dashboard.

Change Donor Details 2: The second 6 up for the change donor details will have the navigation at the top right-hand corner. Has there will be different donor details to change the forms will be split into 6 different sections which the donor can access by clicking the tabs labelled 1 to 6 above the form. The form is simply laid out by having the input boxes going down the page and at the bottom a button that simply changes the details once clicked. This will be on every tab and the user must do this for every section they change.

Change Donor Details 3: The third 6 up for the change donor details will have the navigation at the top right-hand side like the second 6 up. Has there will be different donor details to change the forms will be on separate pages which the donor can access by clicking the links in the navigation. The form is simply laid out by having the input boxes going down the page and at the bottom a button that simply changes the details once clicked.

Change Donor Details 4: The fourth 6 up for the change donor details will have the navigation at the right-hand side. Has there will be different donor details to change the forms will be on separate pages which the donor can access by clicking the links in the navigation. The form is simply laid out by having the input boxes going down the page and at the bottom a button that simply changes the details once clicked. Also, the form is contained in a card which an x symbol which the user can click to remove that card and change to a new on.

Change Donor Details 5: The fifth 6 up for the change donor details will have the navigation at the right-hand side. Has there will be different donor details to change the forms will be on separate

pages which the donor can access by clicking the links in the navigation. The form is simply laid out by having the input boxes going down the page and at the bottom a button that simply changes the details once clicked. Also, the arrows at each side can navigate the user to the form that they want to change their details to.

Change Donor Details 6:

The final 6 up for the change donor details will have the navigation at the left-hand side. Has there will be different donor details to change the forms will be on separate pages which the donor can access by clicking the links in the navigation. The form is simply laid out by having the input boxes going down the page and at the bottom a button that simply changes the details once clicked. The form is contained in card style with an x at the top for the user to leave that form and move onto the next. This will keep with the layout for the donor dashboard.

Change Donor Details 1-Up: For the 1-up above shown in **figure 6** for the change donor details it was decided that sketch 1 would be taken forward and will have the navigation at the left-hand side. Above the menu is the Blood Match Logo. Has there will be different donor details to change the forms will be on separate pages which the donor can access by clicking the links in the navigation. The form is simply laid out by having the input boxes going down the page and at the bottom a button that simply changes the details once clicked. There is another navigation which as the user's avatar and the button to logout of the application. This will keep with the layout for the donor dashboard.
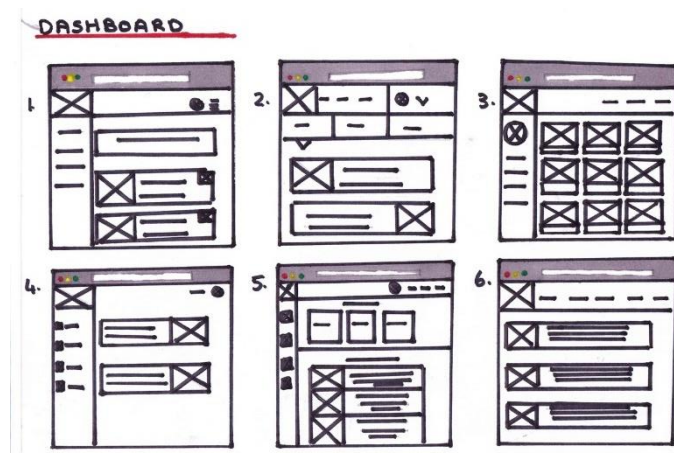
Dashboard
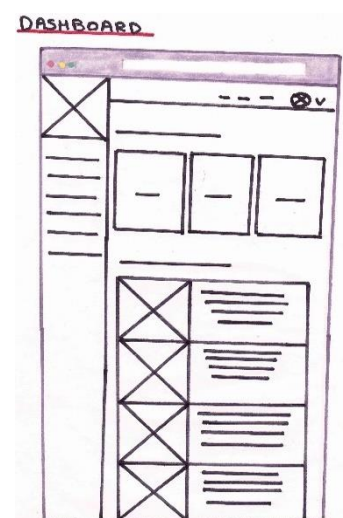

Figure 7: 6 ups of Dashboard

Figure 8: 1 ups of Dashboard

The image above shown in **figure 7** shows the 6 – up sketches that were created in the process of designing the dashboard. When designing onto the 1-up of the dashboard it was sketches 1 and 5 that was the mainly influence for the design which can be seen in **figure 8**.

Dashboard 1: The first 6 -up sketch for the dashboard was to help the user know that they have logged into the application and are looking at the information that is relevant to them. The layout of the dashboard consists of the header that has the Blood Match logo in the top left and in the top-right hand corner the user avatar and dropdown which links to the user being able to logout. The main dashboard content is split into two sections, one is the information relevant to the user receives and the second section is the sidebar where the links to the other sections of the dashboard are contained. In the top section of the dashboard it will welcome the user to the application and show if they have any notifications which the user can dismiss if they want to. An example of what will be in the dashboard for the doctor/nurse is what patients they have contacted, and have they accepted to donate and for the donor it will show what doctors/nurse have contacted them and if they wish to accept to donate their blood.

Dashboard 2: The second 6-up sketch has all the same information as what sketch 1 will have except that the navigation is below the welcome avatar and in a tab style so when the user is active on a certain section it would be clear for them to see has a tab will appear to show them.

Dashboard 3: The third 6-up sketch has a left sidebar to the left to link it to the other sections of the dashboard. All the notifications are displayed in a card style with an image that visually show them what the notification is about and text underneath. The user's avatar will be placed in the sidebar with the other links.

Dashboard 4: The fourth 6 -up sketch has the left sidebar but beside the links are images that are relevant to that link. In the dashboard itself it will only display the notifications for the user by displaying an image and text explaining what that notification is about. In the top right-hand corner is the user avatar with the logout button

Dashboard 5: The fifth 6-up sketch is a combination of all the sketches by having the sidebar to the left. The three grids display important information that is relevant to that user and the list of donor or doctors/nurses that get into contact with the user, depending which type of user. The sidebar has just icons that are relevant for that section and no text beside them.

Dashboard 6: The final 6-up sketch completely removes the sidebar and just has the navigation at the top of the page at the right-hand side. It simple just has the notifications on one page

Dashboard 1-Up: It was decided that a combination of sketches 1 and 5 would be the best option to develop more as shown above in **figure 8**. The layout of the dashboard consists of the header that has the Blood Match logo in the top left and in the top-right hand corner the user avatar and dropdown which links to the user being able to logout. The main dashboard content is split into two sections, one is the information relevant to the user receives and the second section is the sidebar where the links to the other sections of the dashboard are contained. In the top section of the dashboard it will welcome the user to the application and show if they have any notifications which the user can dismiss if they want to. The three grids display important information that is relevant to that user and the list of donor or doctors/nurses that get into contact with the user, depending which type of user
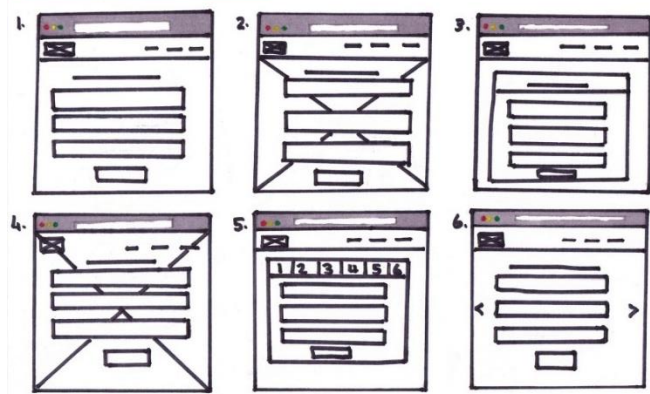
Create an Account

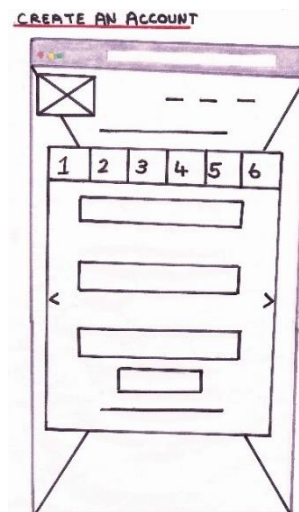Figure 9: 6 ups of Create an Account

Figure 10: 1 ups of Create an Account

The image above shown in **figure 9** shows the 6 – up sketches that were created in the process of designing the create an account page. When designing onto the 1-up of the create an account page it was mainly sketch 5 and 4 that was the mainly influence for the design which can be seen in **figure 10**.

Create an Account 1: The first 6-up sketch contains the header at the top with the Blood Match Logo and navigation at the right-hand side. This consists of a form to create an account that is centred horizontally. The form has the basic fields such as first and email to create your account and a button after the form.

Create an Account 2: The second 6-up sketch contains the header at the top with the Blood Match Logo and navigation at the right-hand side. This consists of a form to create an account that is centred horizontally. The form has the basic fields such as first and email to create your account and a button after the form. This is very similar to sketch 1 but has an image for a background.

Create an Account 3: The third 6-up sketch contains the header at the top with the Blood Match Logo and navigation at the right-hand side. This consists of a form to create an account that is centred horizontally. The form has the basic fields such as first and email to create your account and a button after the form. It is contained in a card style layout.

Create an Account 4: The fourth 6-up sketch contains the header at the top with the Blood Match Logo and navigation at the right-hand side. This consists of a form to create an account that is centred horizontally. The form has the basic fields such as first and email to create your account and a button after the form. It has an image for a background which will either be darken or have a light gradient over the image. This is very similar to sketch 2 but the header blends into the background.

Create an Account 5: The fifth 6-up sketch contains the header at the top with the Blood Match Logo and navigation at the right-hand side. This is multiple form splits up the information into relevant sections. The form has the basic fields such as first and email to create your account and a button after the form.

Create an Account 6: The final 6-up sketch contains the header at the top with the Blood Match Logo and navigation at the right-hand side. This consists of a form to create an account that is centred horizontally. The form has the basic fields such as first and email to create your account and a button after the form. It has arrows at each side of the form to take the user to the relevant part of the form.

Create an Account 1-Up: The main sketch that will be taken further to develop is sketch 5 has shown above in **figure 10** has this is the most suitable type form as there will be loads of information required and splitting it up into relevant section would make it easier for the user and not feel has overwhelmed when signing up. It will also have validation to make sure that the user is filling out the form correctly. Also, the user of the background and header from sketch 4 will be added has this keeps the theme consistent with the homepage and login.
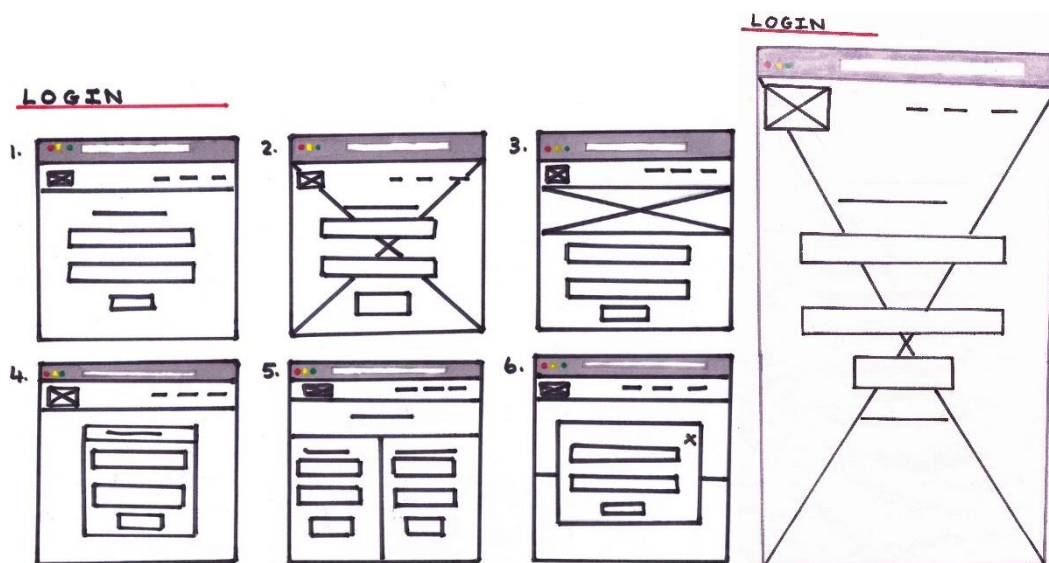
Login

Figure 11: 6 ups of Login   Figure 12: 1 ups of Login

The image above shown in **figure 11** shows the 6 – up sketches that were created in the process of designing the login page. When designing onto the 1-up of the login page it was mainly sketch 2 that was the mainly influence for the design which can be seen in **figure 12**

Login 1: The first 6-up for the login page contains the header at the top with the Blood Match Logo and navigation at the right-hand side. This consists of a form to create an account that is centred horizontally. The form has the basic fields such as password and email to create your account and a button after the form.

Login 2: The second 6-up sketch contains the header at the top with the Blood Match Logo and navigation at the right-hand side. This consists of a form to create an account that is centred horizontally. The form has the basic fields such as password and email to create your account and a button after the form. It has an image for a background which will either be darken or have a light gradient over the image.

Login 3: The third 6-up for the login page contains the header at the top with the Blood Match Logo and navigation at the right-hand side. Below that there is a hero image which indicates this is the login page. This consists of a form to create an account that is centred horizontally. The form has the basic fields such as password and email to create your account and a button after the form.

Login 4: The fourth 6-up for the login page contains the header at the top with the Blood Match Logo and navigation at the right-hand side. This consists of a form to create an account that is centred horizontally. The form has the basic fields such as password and email to create your account and a button after the form. This is very similar to sketch 1 but the form is contained in a card style layout.

Login 5: The fifth 6-up for the login page contains the header at the top with the Blood Match Logo and navigation at the right-hand side. Below that there is text which indicates this is the login page. But unlike the other sketches there are two forms which are side by side in different sections. One form is for the donor and the other is for the doctor/nurse.
The forms have the basic fields such as password and email to create your account and a button after the form.

Login 6: The final 6-up for the login page contains the header at the top with the Blood Match Logo and navigation at the right-hand side. Below that there is a hero image which indicates this is the login page and in the hero image there is a button that pops up with the form to sign in. The form has the basic fields such as password and email to create your account and a button after the form.

Login 1-Up: The sketch that will be developed further for the 1-up is sketch 2 shown above in **figure 12**. This contains the header at the top with the Blood Match Logo and navigation at the right-hand side. This consists of a form to create an account that is centred horizontally. The form has the basic fields such as password and email to create your account and a button after the form. It has an image for a background which will either be darken or have a light gradient over the image. Below the form will be a link to go to the create an account page if you need to create an account. It is important to keep the login form simple and feel that it is better for the user not to have unnecessary information on this age and just have the form.
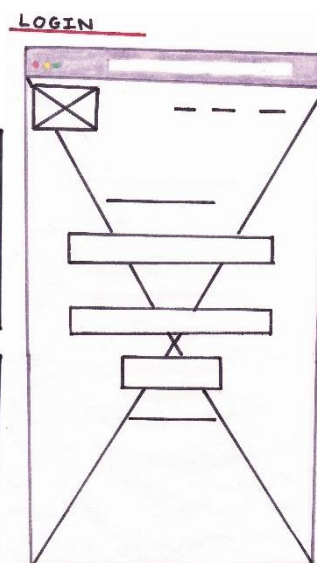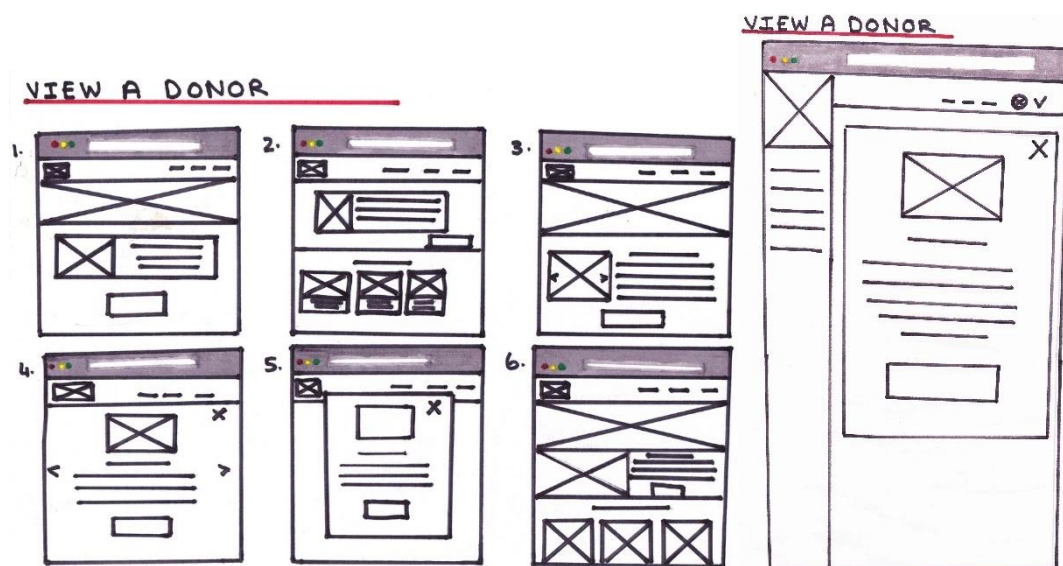
View a Donor

Figure 13: 6 ups of View a Donor

Figure 14: 1 ups of View a Donor

The image above shown in **figure 13** shows the 6 – up sketches that were created in the process of designing the view a donor page. When designing onto the 1-up of the view a donor page it was mainly sketch 5 that was the mainly influence for the design which can be seen in **figure 14**.

View a Donor 1: The first 6-up sketch will have the logo at the top left-hand corner with the navigation that links to other sections of the application. Below that there is a background image that will show how many donors there are to view and below that an image of the donor with information about themselves and a button that will allow the doctor to contact that donor.

View a Donor 2: The second 6-up sketch will have the logo at the top left-hand corner with the navigation that links to other sections of the application. Below that there is an image of the donor with information about themselves and a button that will allow the doctor to contact that donor. Also, another section shows other donors that the doctor/nurse might be interested in.

View a Donor 3: The third 6-up sketch will have the logo at the top left-hand corner with the navigation that links to other sections of the application. Below that there is a background image that will show how many donors there are to view and below that an image of the donor with information about themselves and a button that will allow the doctor to contact that donor. But the images will be on a carrousel that the doctor/nurse can scroll through and the information changes to the relevant picture.

View a Donor 4: This is a similar concept to sketch 3 and the user information being on a carrousel where the doctor/nurse can scroll through and then select the button to contact them. But the doctor/nurse can also exit the carrousel so that they can get an overview of the donors that are available to them

View a Donor 5: The fifth 6-up sketch will allow the doctor/nurse to click on the donor to view their information more. This will pop up and allow the doctor/nurse to view the information to contact them but once they are done the user can exit that donor to view more donors.

View a Donor 6: The final 6-up sketch is a combination of sketches 1 and 2 were below that there is a background image that will show how many donors there are to view and below that an image of the donor with information about themselves and a button that will allow the doctor to contact that donor. After show that donor it shows other donors that the doctor/nurse might be interested in.

View a Donor 1-Up: The sketch that will be developed further is sketch 5 shown above in **figure 14**. It will allow the doctor/nurse to click on the donor to view their information more. This will pop up and allow the doctor/nurse to view the information to contact them but once they are done the user can exit that donor to view more donors. The sidebar where the links to the other sections of the application which is like the dashboard design.

Search a Donor
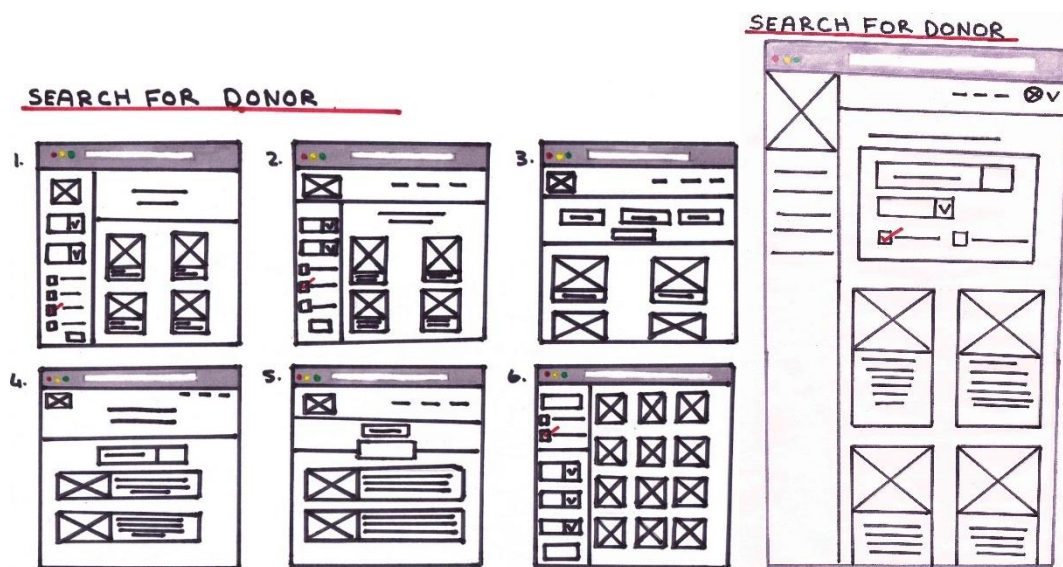
Figure 15: 6 ups of Search for a Donor   Figure 16: 1 ups of Search for a donor
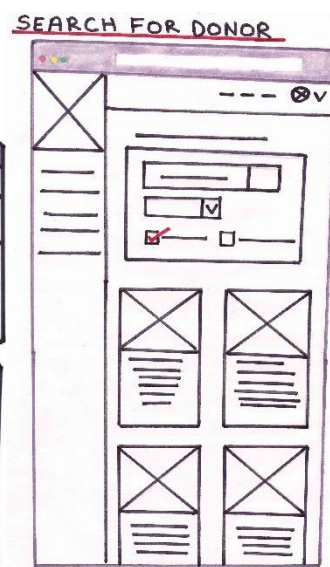
The image above shown in **figure 15** shows the 6 – up sketches that were created in the process of designing the search a donor page. When designing onto the 1-up of the search a donor page it was combination of sketch 3 ,1 and 2 that was the mainly influence for the design which can be seen in **figure 16**.

Search a Donor 1: The first 6-up contains a side bar with the Blood Match logo which contains all the search criteria for the doctor/nurse to complete to find the donor they are looking for based on the requirements they give. There is a background image which will show how many results have come back and will be displayed in a two-grid column with brief information about them and the contact button.

Search a Donor 2: The second 6-up is like the first 6 up sketch with the sidebar that contains the search criteria for the doctor/nurse to complete to find the donor they are looking for based on the requirements they give. But the Blood Match logo is in the header along with the navigation.

Search a Donor 3: The third 6-up sketch has the header at the top along with the Blood Match logo at the left-hand corner and the navigation is on the right-hand side. Below that the search criteria for the doctor/nurse to complete to find the donor they are looking for based on the requirements they give were below the results of the search will appear in a card style with an image of the donor and information.

Search a Donor 4: The fourth sketch has the header at the top along with the Blood Match logo at the left-hand corner and the navigation is on the right-hand side. Below that it will be indicted to the user that this is the search page. This will be contained into a hero section. Below the hero section the is one search input for the user to type in what type of donor they want.

Search a Donor 5: The fifth 6 up sketch has the header at the top along with the Blood Match logo at the left-hand corner and the navigation is on the right-hand side. Below that is just a search bar and a button for the user to search for their donor. Below that the results of the search will appear with an image of the donor and text about the donor.

Search a Donor 6: The final sketch contains a side bar with the Blood Match logo which contains all the search criteria for the doctor/nurse to complete to find the donor they are looking for based on the requirements they give. The results of the search appear with just the image of the donor.

Search a Donor 1-Up: Going forward with the development of the search for a donor page is a combination of sketch 3 ,1 and 2 shown above in **figure 16**. The sidebar has the Blood Match logo at the top left-hand corner with links to the other sections of the application. At the top right-hand corner is the user avatar and a dropdown for the user to logout. Below that is the search criteria for the doctor/nurse to complete. Below that shows how many results have come back

and will be displayed in a two-grid column with brief information about them and the contact button.

Show How Many Donors are on the System
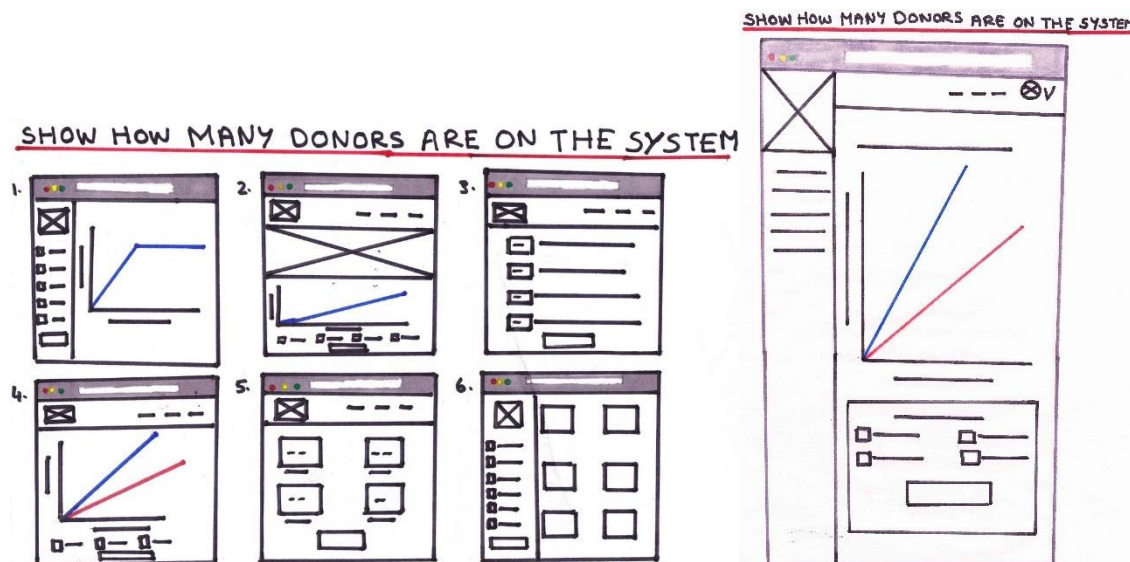
Figure 17: 6 ups of Show how many donors are on the system

Figure 18: 1 ups of Show how many donors are on the system

The image above shown above in **figure 17** shows the 6 – up sketches that were created in the process of designing the show how many donors are on the system page. When designing onto the 1-up of the how many donors are on the system page it was combination of sketch 1 and 2 that was the mainly influence for the design which can be seen in **figure 18**.

Show How Many Donors are on the System 1: The first 6 up sketch contains a sidebar with the Blood Match logo that has checkboxes for the doctor or nurse to check so that it can show the results they want on the graph which is displayed onto a section of the webpage.

Show How Many Donors are on the System 2: The second 6 up sketch has a header with the Blood Match logo and navigation at the top right-hand corner. The checkboxes for the doctor or nurse to check so that it can show the results they want on the graph which is displayed onto a section of the webpage is at the bottom of the webpage with the graph to display the results

above it. Also, there is a hero image which indicates to the user this is a search to find information on the system.

Show How Many Donors are on the System 3: The third 6 up sketch has a header with the Blood Match logo and navigation at the top right-hand corner. Compared to sketches 1 and 2 were there was a graph to display the results. This has information already listed and beside a number will appear beside each text once the user has hit the button below, for example 3000 blood donors are on the system.

Show How Many Donors are on the System 4: The fourth 6 up sketch has a header with the Blood Match logo and navigation at the top right-hand corner. The checkboxes for the doctor or nurse to check so that it can show the results they want on the graph which is displayed onto a section of the webpage is at the bottom of the webpage with the graph to display the results above it.

Show How Many Donors are on the System 5: The fifth 6-up sketch is like sketch 3 which has information already listed and beside a number will appear beside each text once the user has hit the button below, for example 3000 blood donors are on the system. But is displayed in a two-grid column.

Show How Many Donors are on the System 6: The final 6 up sketch is similar in layout to sketch 1 which contains a sidebar with the Blood Match logo that has checkboxes for the doctor or nurse to check so that it can show the results they want but instead of a graph it shows numbers.

Show How Many Donors are on the System 1-Up: The combination of sketches 1 and 2 will be taken further to development as shown above in **figure 18**. It contains a sidebar with the Blood Match logo that is linked to other sections of the application. The checkboxes for the doctor or nurse to check so that it can show the results they want on the graph which is displayed onto a section of the webpage is at the bottom of the webpage with the graph to display the results above it.

2.5 Feasibility Testing

2.5.1 Risks

When creating any project there are always risks and challenges that may get in the way of achieving the overall aim of the project. Here are some of the risks and challenges listed below:

Morality

There are some moral questions that need to be considered for the project, one being if the blood donation goes wrong because of using this service who will be responsible. Has blood donation is carried out by medical professionals it is important to check that only the right users can access the information. All these points will be taken into consideration when designing and development the web application.

Learning New Technologies

Learning new technologies and techniques has well as improving the skills that I already have will be very high risk. To develop the project using the PHP framework Laravel is a risk with not using this framework before and will be a massive learning curve to make the web application functional and have all the features it needs. It will also require time to learn how to use Laravel which may affect the time spent on other areas of the project when you could create it from scratch.

Software and Equipment

With technology there is always a risk of something not going to plan. With software there is constant updates and new and better software being released so it is important to have a backup plan and have other alternatives at hand so that it doesn't waste time. Often equipment can be temperamental and can breakdown when you least expect it so it is important to have backups of you work in different places so if anything happens you always have another copy.

Data Protection

With the Blood Match web application being a medical application and having volunteer donor's medical information on the application. It is vital that the application is secure and protected so that it can't be hacked into and the information doesn't go to the wrong users.

Experience

Looking at the time to complete the project there is plenty to be completed to achieve the aim of the project. The experience of front-end development is greater compared to back-end development which is a great concern has the back-end development is very important for this project to make it functional and secure.

Life outside the project

There are other factors outside the project which will affect the completion of the project. Illness being one of them which is something that can't be avoided and if it does happen it is important that the time is made up to complete the project. With other modules to complete time needs to be allocated for them so it is important to plan around them has well to ensure that everything is being completed.

A table of challenges and a plan on how I plan to overcome these challenges can be found in **Appendix J.**

2.5.2 Resources

There are a wide range of resources that will help achieve the aim of this project. The use of a computer to complete all the work required to complete the project. Other hardware's such as tablet and phone are already available which will be used has a part of the testing process. Adobe Creative Cloud will be required to help design the web application. To create the database, the use of phpMyAdmin, MySQL and a server. Also, a FTP client such as FileZilla is required so that more work can be completed from home. With there being a risk of your work deleting there are other resources available other than the university's server such as GitHub to back up your work.

Luckily all these resources are available already. But during the project other hardware and software maybe required and will be resourced efficiently.

2.6 Methodology Selection

When it comes to planning there are a variety of different methodologies that can be used to help manage the project. These include:

Agile

The agile methodology works when splitting tasks into small sections and is mainly used when working in a team that has different skills. Agile works in sprints which are created by a list of backlogs. Sprints can last 2-4 weeks and then continues this way until the project is completed. This methodology is very flexible to change rather than a fixed schedule. Although I have used this type of methodology before I feel that it works best for working in teams. **(Lotz,M)**

Prototyping

The prototyping methodology allows developers to create a sample implementation of the system or product to show what it does. This allows the developer to go back and make any changes. The Executor Director of the Learning Technologies at McMaster University, David Walker, Ph.D. claims that "subsequent models are created by refining earlier versions, with the aim of convergence on the desired end product." So basically, this means that by potential models of the project are changed based on changing earlier versions with the aim of moving closer to the desired product. Although flexible to change it is a very time-consuming methodology and risky if the prototype doesn't go to plan. **(Sacolick,I.)**

Waterfall

The waterfall methodology is a typical methodology that has a manufacturing background. The design process of the waterfall methodology is a sequential. Which follows eight stages which are conception, initiation, analysis, design, construction, testing, implementation, and maintenance and when are completed, the developers move on to the next step. **(Volchko,J.)**

Due to being a sequential process once a step has been completed then the developers can't go back to the previous step without having to start the whole project all over again. As there is no room for error there must be a plan put in place and followed carefully from the beginning. **(Base 36.)**

After looking at the different methodologies available for this project the agile methodology is the best for this product has this gives flexibility to make changes and revisit parts of the projects. Although the waterfall methodology would be an ideally methodology and ideally have each stage completed before proceeding on to the next stage, but this is too restricting for this project. The agile methodology is perfect for this project has I am familiar with this methodology and has there are two different users that will be using this project their requirements may change throughout creating the project, so this methodology allows the flexibility to revisit the different stages of your is project to review and change. Allowing the opportunity to revisit parts of the project again will be vital in helping to develop a well-rounded web application. Also, the use of the user stories in agile will help convey the ideas and is a good way of coming up with the requirements of the project. To help visually see the duration of each task it will be displayed on a gantt chart. In this gantt chart the development stage will be the most time-consuming as there is so many elements to create for the project. The hard and soft deadlines played apart when considering how long each stage should be spend on. **See Appendix A**

3.0 Design

3.1 User Experience Evolution

3.1.1 Wireframes

Once completing the 6-up and 1-up sketches for the Blood Match application were complete the next step was to create more detailed wireframes that would help created the user experience. Having completed original sketches on pen and paper it was time to go into more detail on each wireframe on how each part of the application was going to be used. See **appendix H**

3.1.2 Branding

The branding of the Blood Match application is very important has it will tell the user what type of business you are. The name 'Blood Match 'was decided as it explained what the application does which basically matches blood types. The branding for the blood match application went through many changes until a design was selected. Here are some of the previous logos variations before the final logo was chosen as shown in **figure 19**.
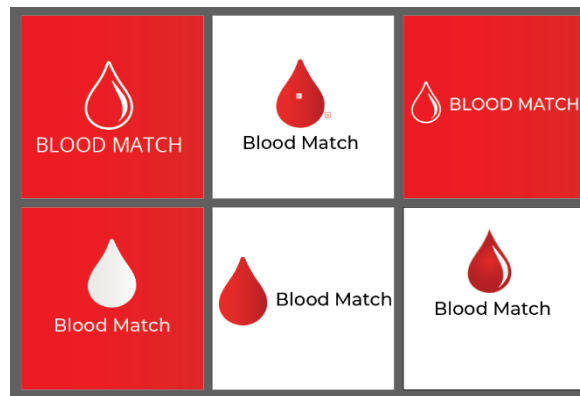
Figure 19: Different styles of branding
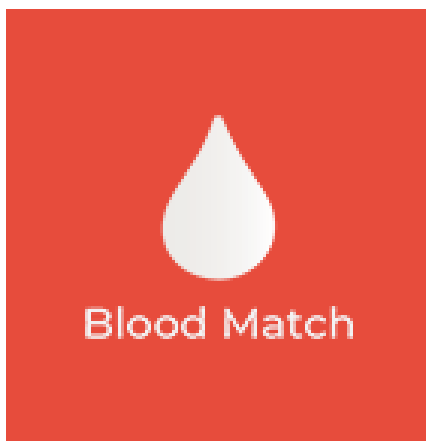
This is the final design of the logo as shown in **figure 20** which is the fourth logo pictured in the above image. The blood drop is associated with blood donation with a white and silver gradient and open sans text in white so that it stands out on the read background. Also the white blood drop and text will be used on other coloured backgrounds so therefore the red background won't be required.

Figure 20: Final Logo

To continue developing the application it was important to establish a style and colour scheme so that the design of the application remain consistent throughout. It is also good to have a style guide has it is a good reference point to have when designing the applications style sheet. Here is the style guide below in **figure 21**.
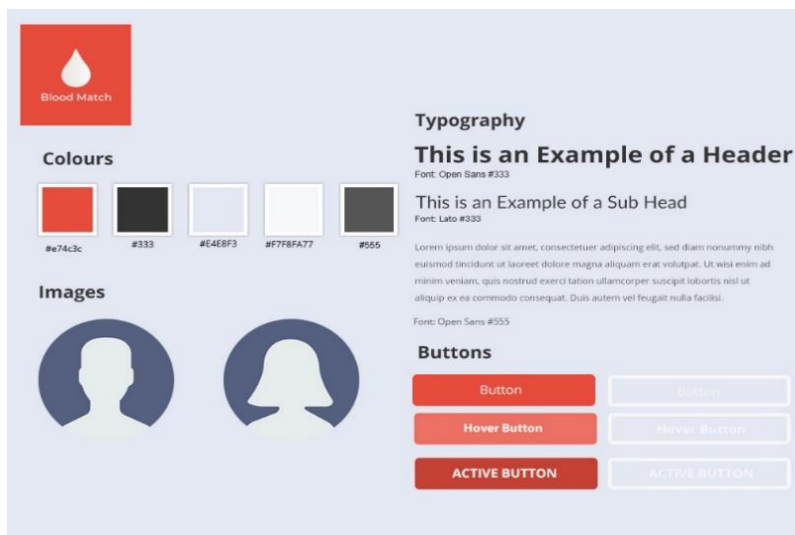
Figure 21:Style Guide of Blood Match

3.1.3 User Personas

Has there are two types of users that will be using Blood Match, the use of user personas might give a representation on what the typical user of Blood Match might be like and what that user might accept from the application. To see the user personas, go to **Appendix I**

3.1.4 User Flow

Has there are two different users for the Blood Match application which are the doctor/nurse and the donor they will experience difference journeys on the application which can be seen below.

Doctors/Nurse User Flow

This is what the doctor or the nurse's user flow of the Blood Match Application as shown in **figure 22**. They are first greeted with the home page where they can view the looking for blood page, All the blood request list and all the donors list. They can also sign in or create an account if they don't have one. Once signed in the doctor or nurse can view their dashboard, view all donors, view all blood requests and the charts which gives them an overview of the application.
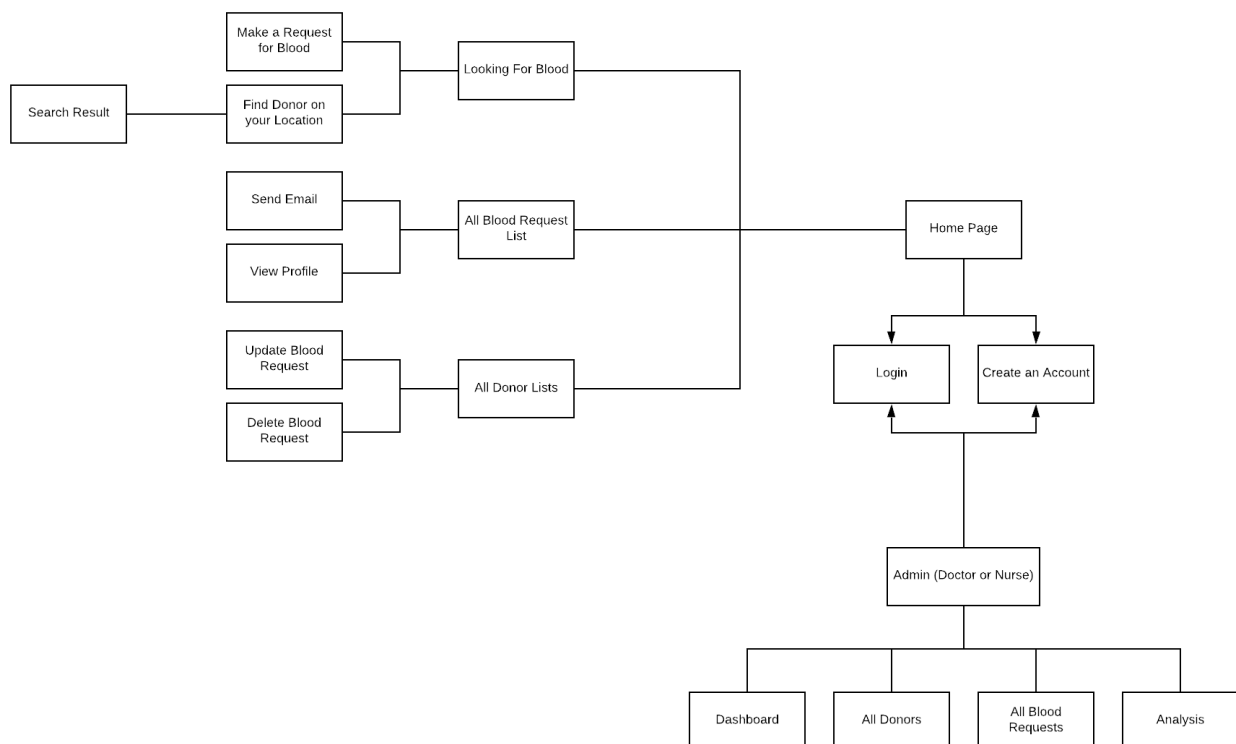
Figure 22:User Flow for a doctor or nurse

Donor User Flow

This is what the donor's user flow of the Blood Match Application which is shown in **figure 23**. They are first greeted with the home page where they can view the looking for blood page, All the blood request list and all the donors list. They can also sign in or create an account if they don't have one. Once signed in the donor can view their profile, Change their personal details and their blood details. In the Blood Match application, the donor can change their privacy settings.
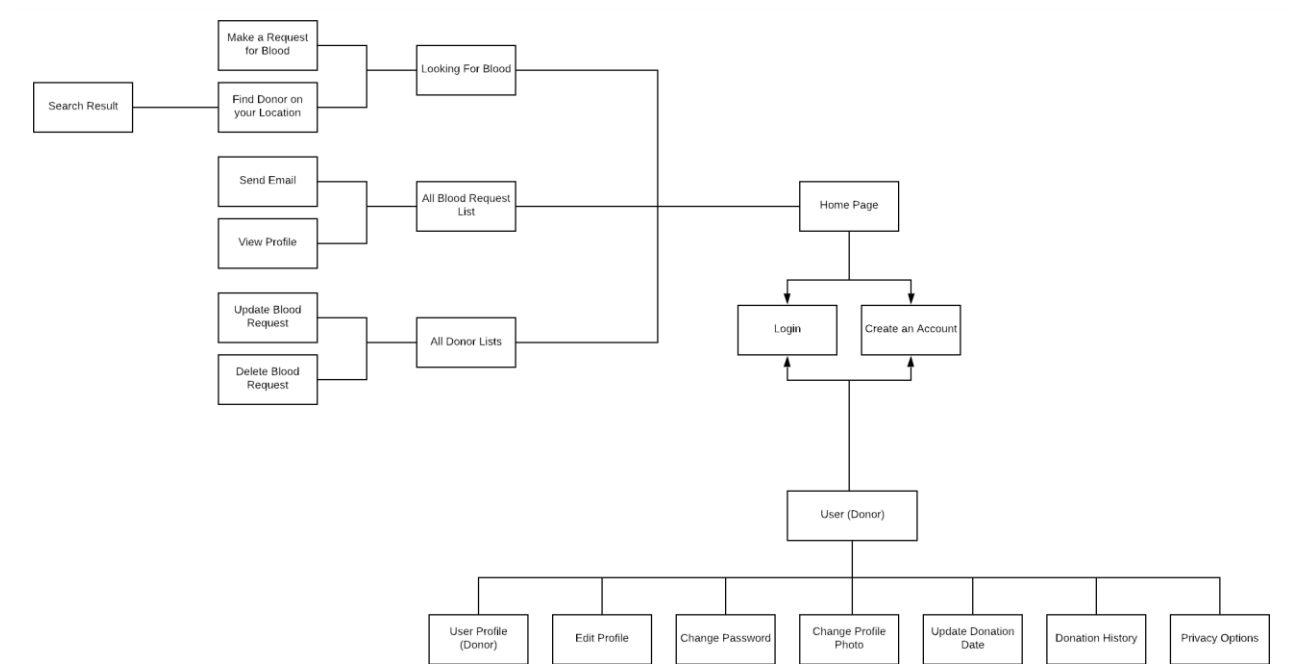
Figure 23:User Flow for a donor

3.1.5 Mock Ups

Once the wireframing process was complete it was time to make the wireframes into a real example on how the Blood Match Application would aim to look. To create the mock ups Adobe XD was used and built from the wireframes that were previously made as shown in. In **figure 24** you can see a sample of the mock-ups but due to the amount of mock ups made the rest can be seen in **appendix G.**
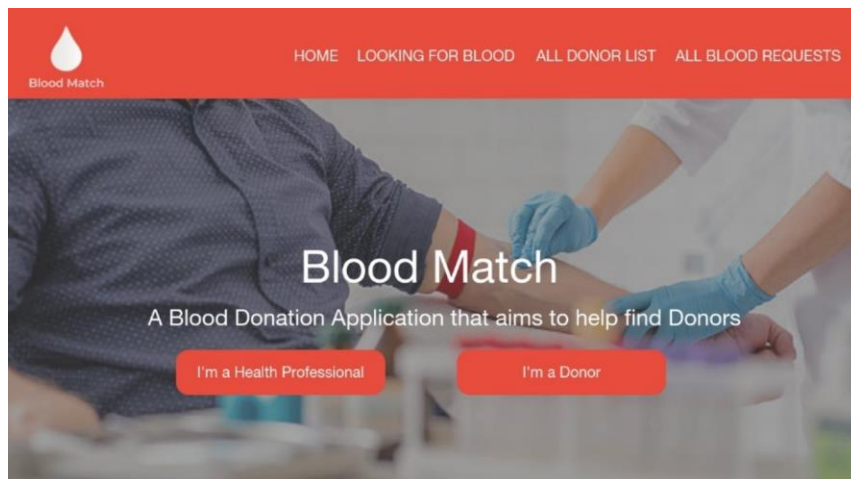
Figure 24:Mock up of the homepage

3.2 System Design

Once the user experience was complete it was time to move on to the development stage of the Blood match Application. This looks at how the Blood Match Application system will function.

3.2.1 Refined Site Map

Having created a sitemap for my design. The design of the system needed to be revisited to make sure that no changes needed to happen. The refined sitemap can be seen in **figure 25.**
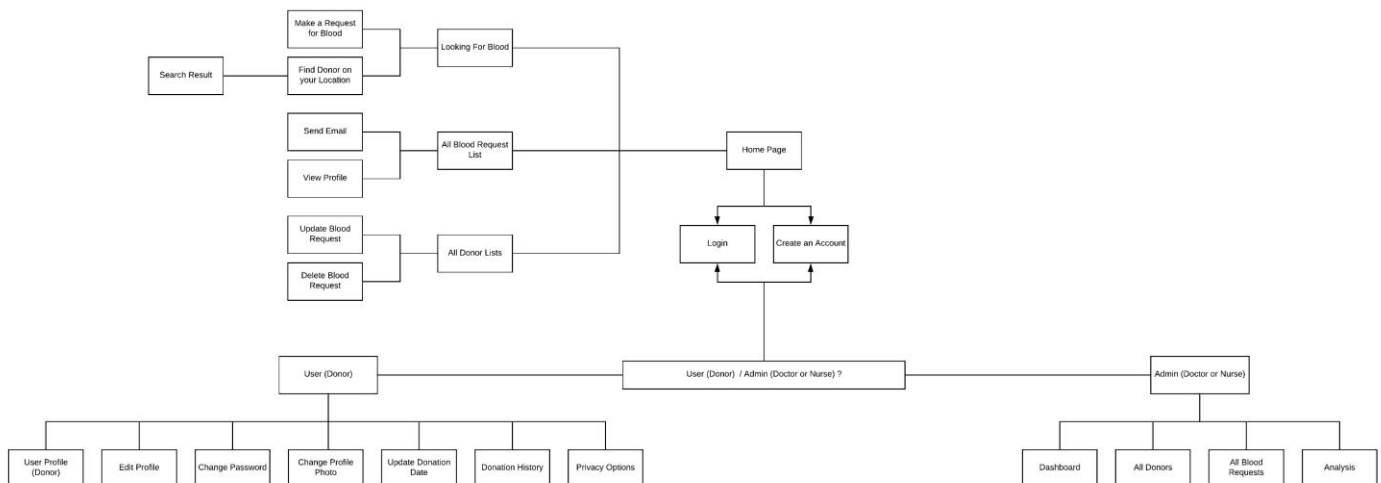
Figure 25:Refined site map

3.2.2 Client Server Model

The Client Server Model as shown in **figure 26** is a renowned and popular model that is easy to understand of which is only one in an array of perspectives that can be used to show and layout the starting point for identifying technologies that will be used in a project. This model is structured in way that shows you all the technologies that will be processed on the user's client-side and what technologies will require the internet in order to process information stored on the server-side
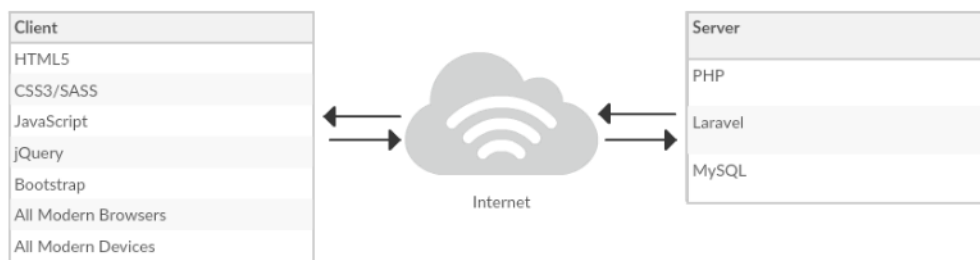
Figure 26:Client Server Model Diagram

3.2.3 Logic Design

As the Blood Match Application will be built and developed in the Laravel framework. It will use the model view control. Which can be seen in the diagram below in **figure 27**.
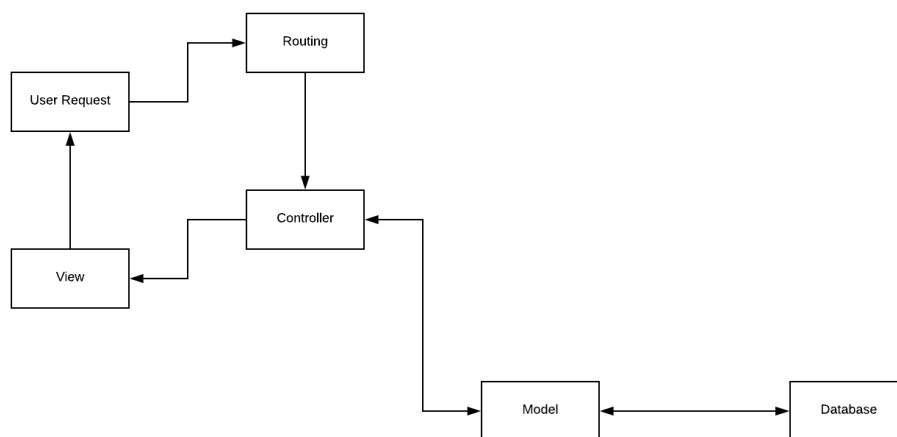
Figure 27:Laravel Model View Control Diagram

3.2.4 Data Design

Use Case Diagram

A use case diagram allows to see a what way each user will be interacting with the application. The diagram below shows how certain users will interact with the application as shown in **figure 28**. For example, if you're an unregistered doctor or donor then you will create an account.
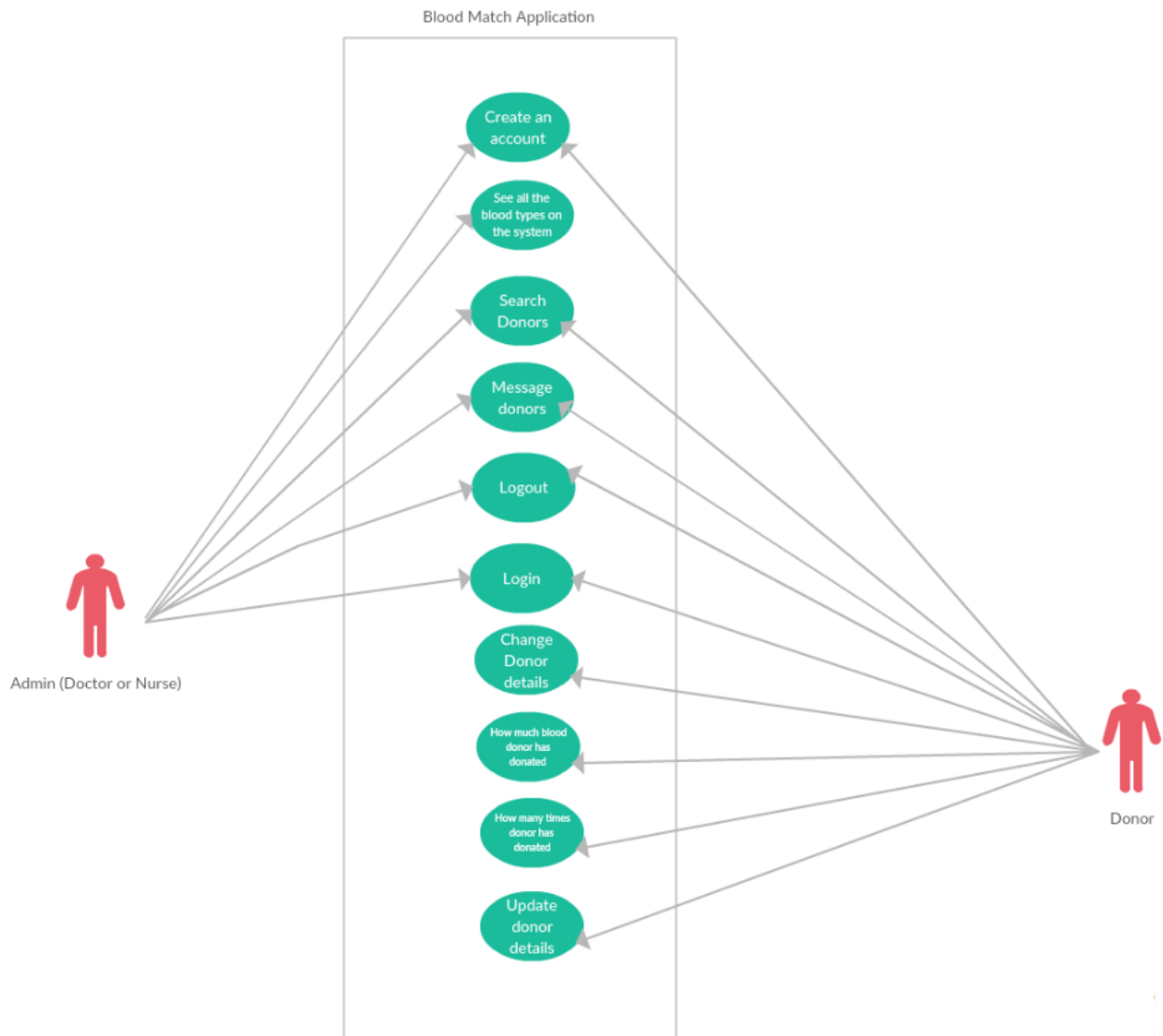
Figure 28:Blood Match Use Case Diagram

Sequence Diagram

The sequence diagram allows to see the interactions between all the elements of the system. Here is a sequence diagram of the Blood Match Application as shown in **figure 29.**
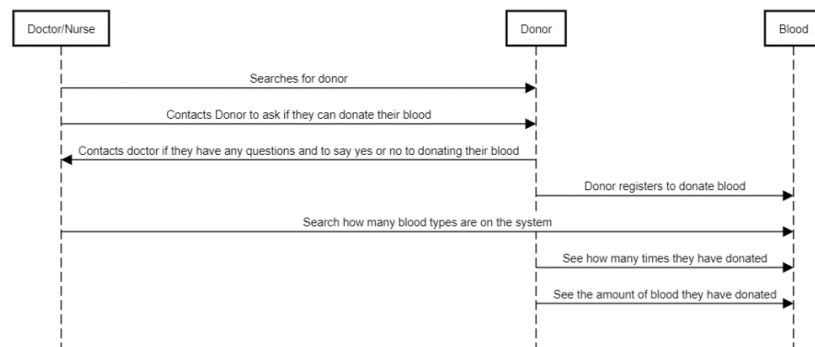
Figure 29:Sequence diagram of the Blood Match Application

3.4.1 Database Design

ER Diagram

An ER diagram shows the relationships between all the entities in the database. The admin which is the doctor or nurse looks at the different blood requests, donors and donations. While the donors give the donation and makes a blood request as shown in **figure 30.**
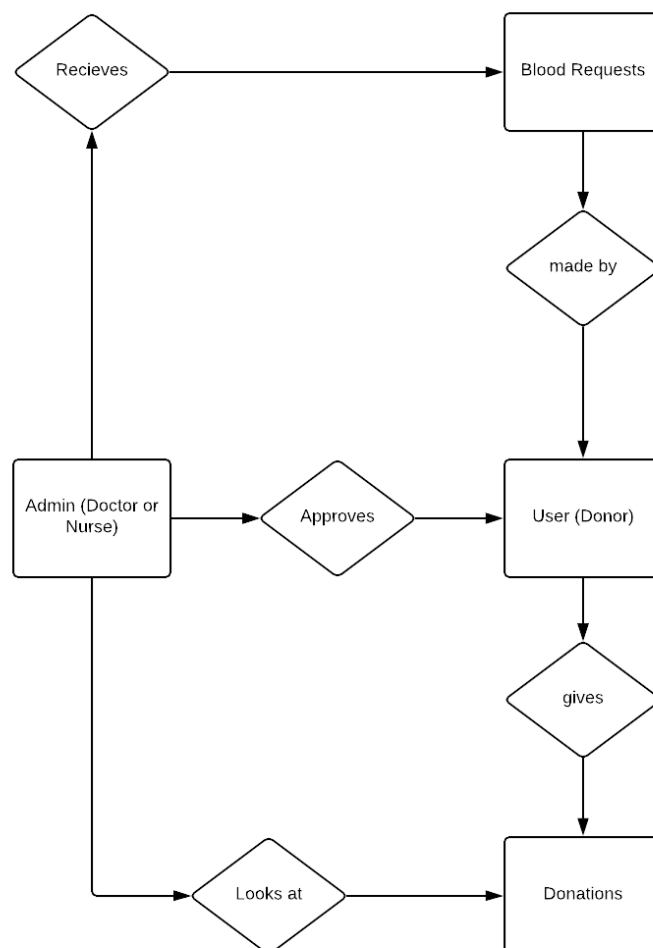
Figure 30:ER digram for the Blood Match application

Database

This is the database for the Blood Match Application as shown in **figure 31**.
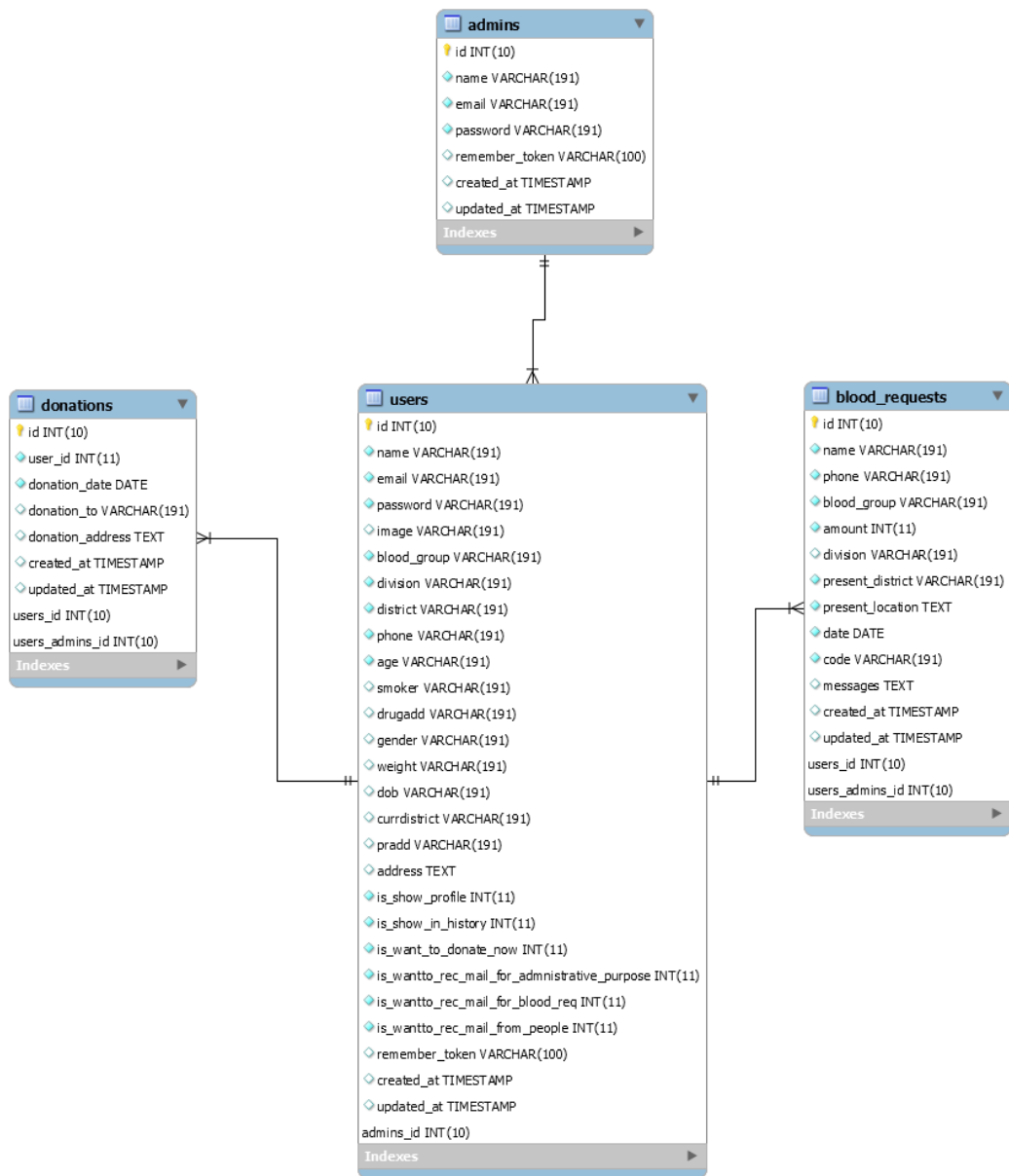
Figure 31:Database for the Blood Match Application

4.1 Technology and Tool Review

4.1.1 Server-Side Technologies

PHP

According to the PHP Website "PHP (recursive acronym for PHP: Hypertext Preprocessor) is a widely-used open source general-purpose scripting language that is especially suited for web development and can be embedded into HTML." [PHP Website, 2016].

Essentially PHP is a Server Scripting Language that can be embedded in your HTML on the client but allows for communication to a server where database information may be stored. PHP has its advantages which are that it is open sourced and is constantly developed and maintained by the PHP community. There are plenty of PHP resources that offer support and assistance, this helps makes learning PHP easier. However, there are some disadvantages such as it is not suitable for larger applications has it is hard to maintain.

Node.js

Node.js is a platform built on Chrome's JavaScript runtime for easily building fast, scalable network applications. Node.js uses an event-driven, nonblocking I/O model that makes it lightweight and efficient, perfect for data intensive real-time applications that run across distributed devices.

One of the advantages of using node.js is how fast and efficient node.js is in handling request and is used by many companies that have heavy traffic on their website. Node.js has a big community where developers come together to learn and contribute into improving Node.js. However, there are some disadvantages, these are that it isn't efficient on larger scale projects and are preferred on projects of a lighter scale. The inconsistence of the Node.js API which make changes which developers are required to make changes to the code to make it compatible.

4.1.2 Client -Side Technologies

HTML5

HTML5 which stands for Hyper Mark-up language was released by W3C and defines the different properties and controls the behaviour of all webpages. This is supported by all web browsers such as Chrome and Firefox.HTML5 helped the development of the web and how the web would be

developed from then with regards as to what will be supported in the future. Without it the capabilities we have today would just not be, so any web project will be developed upon the HTML5 guidelines for standard use and accessibility.

CSS3

CSS3 which stands for Cascading Style Sheet is the latest edition to the functionality and usage of CSS3 has been heavily implemented into today's industry with it taking a firm seat in all our most loved browsers like Firefox and Chrome

JavaScript/jQuery

According to Wikipedia "Alongside HTML and CSS, JavaScript is one of the three cores technologies of World Wide Web content production; most websites employ it, and all modern Web browsers support it without the need for plug-ins." **[Wikipedia, 2018].**
It first appeared in 1995 and has been used consistently since then in order to help make websites more interactive and a better overall user experience, nowadays with the use of JavaScript Library such as jQuery, it helps to streamline the development process down much like how SASS does the same with CSS.

4.1.3 Frameworks

Foundation
Foundation is a front-end responsive framework targeted toward mobile first development that iterates and improves upon its' previous versions such as a reduction in the amount of code by 50%, customisable SASS grid, faster prototyping, more semantic and accessible. Its competitor could be said to be Bootstrap which is also a front-end responsive framework and from the research carried out, not all that much different from Foundation, fundamentally coming down to user preference.

Bootstrap
According to the Bootstrap website**,** Bootstrap is the most popular HTML, CSS, and JS framework for developing responsive, mobile first projects on the web. Developed by twitter employees who wanted to bring consistent look to their internal tools. The Bootstrap Framework allows for quick

development of an application and creates a consistent look and feel throughout the application on all devices. Compared to the Foundation framework, Bootstrap has great documentation and community support.

Although great for designing a responsive application, Bootstrap has its negatives. Bootstrap is often accused of not following the best practices in web development with too many classes if Another negative of a Bootstrap website is that they start to look the same in design if the styles and colours aren't customised.

Laravel
Laravel is a free open PHP framework created by Taylor Otwell and aims to make the likes of routing and authentication easier in development. Becoming one of the top PHP frameworks that developers use when creating a PHP application. Laravel uses the model view controller Architecture. The framework is easy to customise by using composer to install to add various of features and dependencies.

With having its own templating engine called Blade this makes it easier to use PHP and Laravel features on webpages. The command PHP artisan is useful has it helps speed up the develop process and helps build and create the application. Laravel has a great documentation to help assist you inbuilding the application with the use of Laracasts which are video tutorials that show you how to build the application on Laravel. Although Laravel has proven to be very popular there are however some drawbacks such as Laravel is relatively new compared to other frameworks there are some bugging issues as it is still being developed.

4.1.4 Database

MySQL
MySQL (Structured Query Language) is the industry standard for accessing databases as it is open-source and allows for multiple users and great scalability. It was initially released back on May 23rd, 1995 so it has had great longevity and implementation. MySQL offers paid editions of its service that have more functionally and features that are not really needed for small scale project like the one being created here.

Although regularly used and very popular MySQL have some drawbacks according to Digital Ocean it tends to be less reliable compared to other databases which relate to how it handles certain functions such as transactions and auditing. MySQL is community driven so therefore it is behind on certain functionalities and features that they offer. This has led to developers exploring other alternatives.

SQLite

Like MySQL, SQLite is a relational database management system but instead is embedded onto a user's programme rather than on a server. The SQLite database is very portable as it is on a single file that is stored on a disk. However, as the database is embedded into the application, it doesn't allow for multiple users.

PostgreSQL

PostgreSQL, also known has Postgres, is an object-relational database management system with an emphasis on extensibility and standards compliance. PostgreSQL is known for its architecture, reliability and extensibility. With a strong community and plenty of documentation PostgreSQL is a good choice for creating a project on a larger scale. But drawbacks for PostgreSQL are that a lot of hosting companies tend not to support PostgreSQL which will affect the stability of the overall application.

4.1.5 Other

SASS

SASS (Syntactically Awesome Style Sheets) is a CSS pre-processor which adds features such as variables, nested rules and mix-ins into your regular CSS. The main competitor for SASS would be LESS which is very similar to SASS except the way it is written. But SASS is better documented compared LESS.

LESS

LESS is a dynamic pre-processor style sheet language that can be compiled into Cascading Style Sheets and run on the client side or server side. Although like SASS, LESS has less of a community and documentation on how to use LESS.

Gulp

According to Brandon Clapp Gulp is a JavaScript task runner that completes tasks such as:

- Bundling and minifying libraries and stylesheets.
- Refreshing your browser when you save a file.
- Quickly running unit tests
- Running code analysis
- Less/Sass to CSS compilation
- Copying modified files to an output directory

(Brandon Clapp 2015)

This saves developers from minifying their libraries and stylesheets by hand which great has this is allows developers to focus on other tasks. The disadvantage of Gulp that it takes time to set-up initially and is a learning curve but once learnt it helps saves time in the development process.

Grunt

Grunt is a JavaScript task runner, like Gulp it performs tasks such as minification and compilation. But compared to Gulp, Grunt is considered the more difficult compared to Gulp as is slower to run compared to Gulp

4.2 Technology and Tool Selection

4.2.1 Server-Side Technologies

PHP and Laravel
My reasons for choosing PHP with the framework Laravel over another server scripting language is down to my personal experience with PHP, the fact that PHP is at the top of its field regarding its goals and the limited timeframe available for the project itself where taking up and learning a whole new language would take up more time than what is available. Not only using PHP, the framework Laravel will be used for development. Having never used Laravel Framework before, this will require research to understand the framework. Also, there are great components of Laravel, for example Laracharts which will be used to help create the different charts needed in the Blood Match application.

4.2.2 Client -Side Technologies

HTML5

Although there are other versions of HTML, HTML5 is the latest version HTML language and is compatible with all the browsers. HTML5 allows canvas and animation which will help aid in the design of the Blood Match application. There were no other alternatives has this is the latest HTML language.

JavaScript and jQuery

The to use JavaScript and jQuery was an easy one has I am familiar with both JavaScript and jQuery and feel that this will help make the application more user friendly and make the quality of the user experience better. Also, JavaScript and jQuery are required to make parts of the Blood Match Application Interactive.

CSS3

Although there are other versions of CSS, CSS3 is the latest version CSS and is compatible with most browsers. CSS3 will be included as this will aid in how the Blood Match Application is presented on the webpage for example the font, colour and layout.

4.2.3 Frameworks

Bootstrap

Bootstrap was chosen has the front-end framework. After looking into both foundation and Bootstrap there was no difference between the two except for preference. Therefore, this was the main reason Bootstrap was chosen as I am very familiar with Bootstrap and have used it for many projects both at university and personal. Bootstrap will also help save time for designing the project which allow me to focus on more important parts of my project such as the back-end development. With more documentation on Bootstrap compared to the Foundation framework, this will be helpful to refer to during the development of the application. One negative of Bootstrap is that the websites created on Bootstrap look similar, but I feel with some of my own styling added this will make it look different to other Bootstrap websites and the positives out way the negatives.

4.2.4 Database

MySQL

MySQL will be the chosen Database Management System for this project because of its reputation and has I am very familiar with MySQL has I have used it for university projects. Although PostgreSQL was considered learning a new tool and implementing may be difficult to do at the short time given to complete the project but also PostgreSQL lacks hosting opportunities.

4.2.5 Other

SASS

The decision to use SASS instead of LESS for the Blood Match application was a very easy decision. Having used SASS for a previous assignment, I have a good knowledge of SASS and the benefits it has for your project. Although LESS was considered and would have provided the same result it was down to which one, I had the most experience with and learning another tool that does something similar is a waste of time.

Mailtrap

When in the development stage sending emails to real email address shouldn't happen. To stop spamming actual customers, Mailtrap provides a fake SMTP server which allows to see how the emails look and what data is being sent . It is a great way to test out any emailing functions before they are sent out to real life clients. (Mailtrap.io 2018)

4.3 Technology and Tool Use

4.3.1 Client-Side Technologies

The client technologies used for the Blood Match application where already familiar due to studying the Interactive Multimedia Design Course . Therefore, these technologies where easy to implement but has also developed a better understanding of each of these technologies and my skills in these technologies have improved.

4.3.2 Server-Side Technologies

One of the biggest challenges for creating the Blood Match Application was learning the PHP framework Laravel and being ale to implement it to create a fully functional application. Before completing this project, the knowledge on PHP was minimal, so creating the website was a

difficult challenge which required plenty of research and watching of online tutorials. The use of Laravel's own tutorials called Laracasts were great support has they explained everything step by step on specific tasks **(Laracasts 2019)**.The two YouTube series by Travesty Media and DevMarker were used to help create the multiple authentication system and helped explained how Laravel works.

The different tutorials helped the Blood Match Application follow good coding practice by keep the code well-structured and tidy. The most useful part of using Laravel was the way blade templating which helped make all the pages look the same without having to individually go to every single page. Also, the way Laravel is able to create the different relationships between files. The model in Laravel makes the connection to the database by being able to identify the relationships between the tables . The controller in Laravel would specify were the information from the model goes which also allows the different functions such as show add and delete to be linked to specify templated views. **Figure 32** shows the Model and the Controller functions.


```php
<?php

namespace App\Http\Controllers;

use Illuminate\Http\Request;

class AdminController extends Controller
{
    public function __construct(){
        $this->middleware('auth:admin',['except' => []]);
    }
    public function getIndex(){
        return view('myadmin.index');
    }
}
```

```php
<?php

namespace App\Models;

use Illuminate\Notifications\Notifiable;
use Illuminate\Foundation\Auth\User as Authenticatable;
use App\Notifications\AdminResetPasswordNotification;

class Admin extends Authenticatable
{
    use Notifiable;
    protected $guard = 'admin';
    protected $table = 'admins';

    /**
     * The attributes that are mass assignable.
     *
     * @var array
     */
    protected $fillable = [
        'name', 'email', 'password',
    ];

    /**
     * The attributes that should be hidden for arrays.
     *
     * @var array
     */
    protected $hidden = [
        'password', 'remember_token',
    ];

    public function sendPasswordResetNotification($token)
    {
        $this->notify(new AdminResetPasswordNotification($token));
    }
}
```

Figure 32: Model on the right and Controller on the left for Admin

4.3.3 Other Back up option and project management tools

To prevent any unforeseen circumstances such as file and data corruption or laptops breaking, backups were made. For the code of Blood Match, the main backup used was Bitbucket as shown in **figure 33** because it is very handy to use during coding processes and allowed you to see go back to when the code was work if any errors happened. For the report and the code for Blood

Match One Drive was used as it is always synced to my own computer. Another backup used was a hard drive which was kept at home.
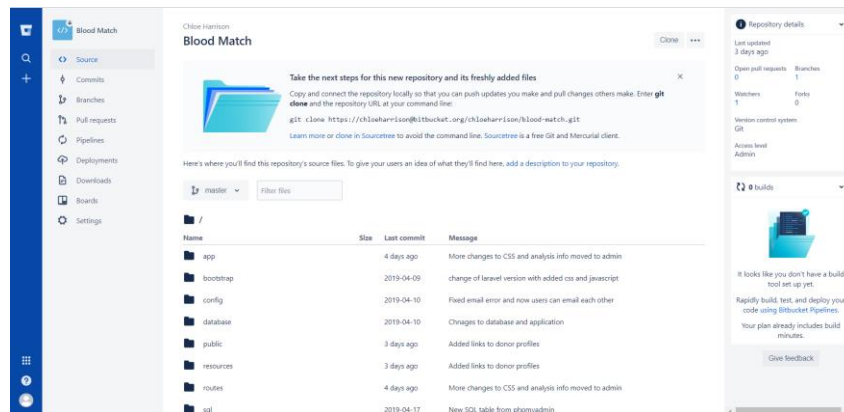
Figure 33:Using Bitbucket

To help keep track on what needed to be done for the Blood Match Application the use of Trello helped give a visual overview on what needed to be worked on . Trello was already a familiar concept has this was part of a module on the Interactive Multimedia Design Course as shown in **figure 34** which followed the agile scrum approach which was the selected methodology .
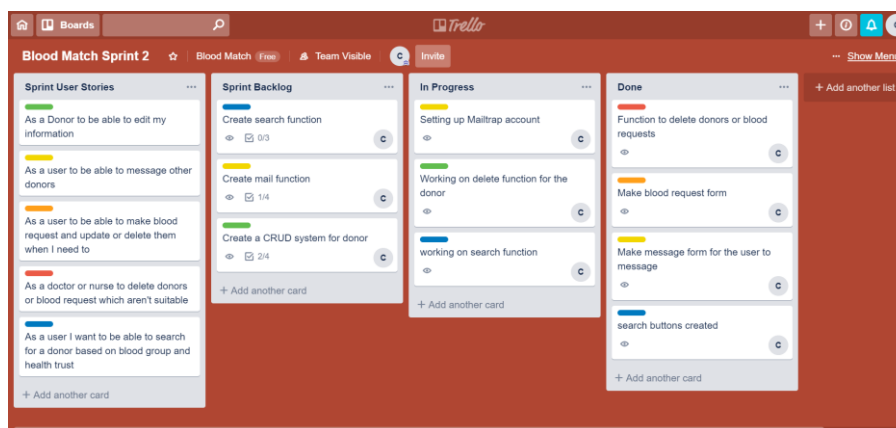
Figure 34:Using Trello

4.4 Notable Challenges

Mailing

One of the major requirements for the Blood Match application was to be able to email donors, a mailing function was created so that it allowed a user to email a donor directly It was very important to first find a way to not actually send email, especially since a lot of the test donors were just fake emails. For development sending real emails wouldn't be a good idea for testing so

a fake SMTP server called Mailtrap was used. Mailtrap allows emails to be sent to any address , where they can be viewed, seen in **figure 35.**
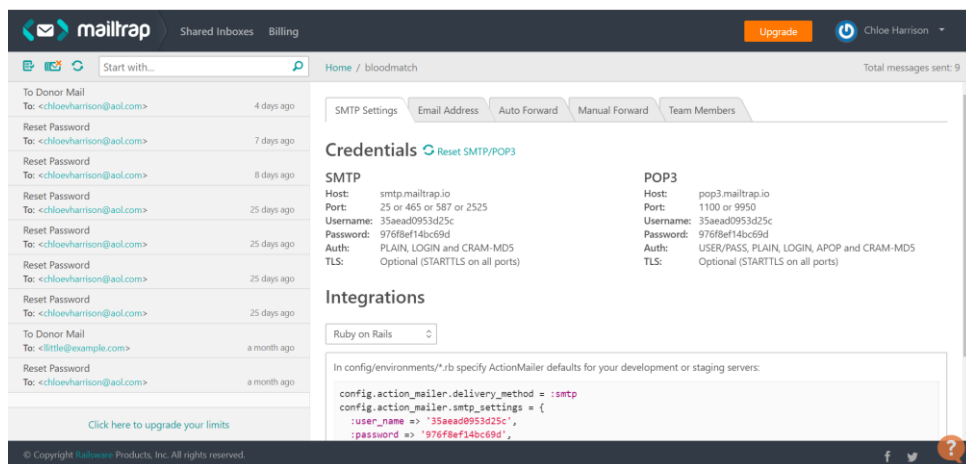
Figure 35:Mailtrap account where the emails go

The user can click the send email button when looking at the donor information, which brings they to the mail page which allows the user to type in their name, subject of the email and the content they wish to put into the email. The code used was easy to implement , a view page was created with a Bootstrap form ,as seen in **figure 36**.

Figure 36: The Email form used to allow users to message

There were two functions used in mail controller, one to getMailtoDonorPage() which selects the donor by its id, this was especially needed to help identify what donor to message . The function postMailtoDonorPage () collects the data that is inputted from the fields as seen in **Figure 37**,

which requires them to be filled in and put into a mail array which is displayed using the email format as seen in **Figure 38**.

```php
namespace App\Http\Controllers;

use Illuminate\Http\Request;
use App\Models\User;
use App\Models\Donation;
use App\Mail\ToDonorMail;
use Session;
use Auth;
use Carbon\Carbon;
use Mail;


class MailController extends Controller
{
    public function getMailtoDonorPage($id){

        $donor = User::find($id);
        return view('mails.mailtodonor')->withDonor($donor);
    }

    public function postMailtoDonor(Request $request){

        $this->validate($request,[
        'name' => 'required|max:150|min:3',
        'message' => 'required',
        'subject' => 'required'
        ]);

        $donor_id = $request->donor_id;
        $donor = User::find($donor_id);

        Mail::send(new ToDonorMail($request));

        Session::flash('registerdonor','Mail Sent Successfully....');

        return redirect()->back();
    }
}
```

Figure 37. The postMailtoDonor function used in the MailController.php

```html
<!DOCTYPE html>

<html>

<head>

    <title>Blood Request</title>

</head>

<body>

 <h1 style="color: green;">This mail is from "Blood Match":</h1>

 <p><b>Name:</b> {{$name}}</p>

 <p><b>Subject:</b> {{$subject}}</p>

 <p>{{$messagebody}}</p>

</body>

</html>
```

Figure 38: How the Email is Formatted

Charts

The use of charts allowed the doctor or nurse to visually see how many donors are a certain blood group, how many people have registered per month and by local health trust. This will allow doctors or nurses to see what the most popular blood group is and what blood group they need to encourage more. The information that goes into the charts comes from the database and is regularly updated when new information goes into the database. The package consoletvs charts makes it easier to create different types of charts for example line chart and bar chart which can is a good tool to visually show the information from the database. Has shown in **figure 40** the analysis controller specifies what information is to be taken from the database and shown on the charts.

```php
use Illuminate\Support\Facades\DB;
use Auth;
use ConsoleTVs\Charts\Facades\Charts;
use Session;
use Carbon\Carbon;

class AnalysisController extends Controller
{
    public function getAnaylysisPage(){

        /** Donor Section **/

        $donors = User::where(DB::raw("(DATE_FORMAT(created_at,'%Y'))"),date('Y'))->get();
        $donorchart = Charts::database($donors, 'bar', 'highcharts')
                    ->title("Donors Registration Details")
                    ->elementLabel("All Donors")
                    ->dimensions(1000, 500)
                    ->responsive(true)
                    ->groupByMonth(date('Y'), true);
```

Figure 40: Analysis Controller| AnalysisController.php

To create the charts, you need the title and labels of the chart with what size you want the chart to be which also requires a blade where the charts will be shown as seen in **figure 41**.

Figure 41: Analysis blade| Analysis.blade.php

5.0 Testing

5.1 Test Approach Selection

Once the development of Blood Match application was complete , the next stage was test different areas of the system. This was a necessary step to make sure the application worked well and met all the requirements planned beforehand. And how it works.

5.1.1 White Box Testing

White box testing, which is known as Glass Box testing ,tends to involve someone that has web development experience and understand the different technologies used and how they work. **(softwaretestinghelp.com 2018).** Not only does this type of user look at how the website looks from the front end but also looks at the code for the system. The code would be inspected and validated by a developer; the developer would test the different functions of the website to see if the code does what it is expected to do from their own experience. For example, if the user has typed in an incorrect password , it would tell the user their password is incorrect and wont' let them into the application. This is a very helpful method of receiving feedback from a user that has the web development knowledge and knows what should happen.

5.1.2 Black Box Testing

Black Box testing, which is known as Behavioural Testing, is a method where the user has no knowledge on the design and development of the application (**softwaretestingfundamentals.com 2018)**. This monitors how the user uses and reacts to the website. This method of testing helps identify what type of user the application is for. This testing will help make it clear if the users enjoy and find using Blood Match easy to use. Also, it will help to identify and functions that could be added and improved. This will also help get rid of any errors or issues that the application that weren't identified during the development stage. By creating different scenarios and different tasks for the user to carry out will help evaluate how the tasks were carried out. For example, how did they arrive at a specific page.

5.1.3 Cross Browser Testing

When testing the functionality of the application was completed, it was important to see how the application behaves on other browsers. From testing the application, it proved to be the fastest on Safari. Overall it worked well on all the other browsers, apart from Chrome who had some issues with being responsive due to some of the Bootstrap 4 classes not being compatible.

5.2 Test Process

The test process will use the black box method and the white box testing methods which will then have a feedback survey . The specification for testing is taken from the user requirements in **(Appendix E)**. In **figure 40** an example of the format of testing the requirements, the rest can be seen in **Appendix J.**

Test ID	Description	Results	Response (If Failed)
1	The doctor/nurse to create an account for the application.	Passed	

Figure 40:User Flow for a doctor or nurse

5.3 Test Results

In total there were 24 requirements which most of them passed. However, there were 2 that failed, and all marked as future development as there was no time to include them. The cross-browsing testing proved very successful will a few minor changes needed in Chrome to make it responsive.

5.4 User Survey

Once the user tested the application, they all filled out a survey which asked them for their own opinions of the Blood Match Application. The questions asked were based on the requirements of the application which asked the usability of the website and the users overall experience of the website. Here are the questions that were asked in the survey:

1. What is your age range?
2. What is your gender?
3. How computer literate are you?
4. On a scale of 1-10 (1 being the lowest and 10 being the highest) , How attractive do you find the Blood Match Application?
5. On a scale of 1-10 (1 being the lowest and 10 being the highest) , How confident are you using the Blood Match without prior training?
6. On a scale of 1-10 (1 being the lowest and 10 being the highest) , How easy did you find using the Blood Match application?
7. How easy do you think it is to understand the purpose of the Blood Match Application?
8. What would you use the application for?

6.0 Evaluation

6.1 Evaluation of User Survey Results

The feedback provided from the survey was very useful and beneficial. The survey happened after each person tested the application. In total twelve people participated and ranged from web developers and some just standard users. The questions looked at the age of the user, the knowledge they have of computers and if they knew the purpose of the application. This was important as it helped assess what the user thought of the application.

One of the biggest concerns was that if the purpose of the Blood Match application was clear to the user and what the user would use the Blood Match application for. The results in **Figure 41** asked **'What would you use the application for?'** with most users selecting that they would use the Blood Match Application to search for donors. This is a great result as one of the main

application objectives was to be able to search for donors and show that a user can see themselves using the application for that purpose.

What would you use the application for?
12 responses

- Make blood requests
- Search for Donors
- Look for blood requests

33.3%
41.7%
25%
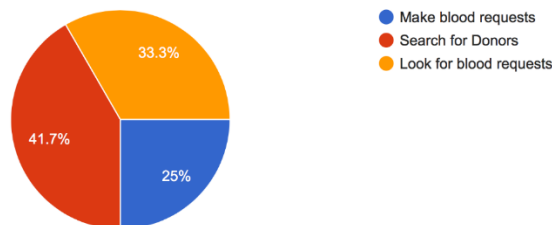
Figure 41:Showing what the application would be used for?

To address any issues that the user would have in using the Blood Match application . In **Figure 42** shows the result from the question **'How easy do you think it is to understand the purpose of the Blood Match Application?'**. With 58.3% of the users having no problems understanding the purpose of the application, with 41.7% thinking it was quite clear, although it is a good result it shows that more improvements could be made to help the users understand the purpose of the application better. The other set of results showed great potential, with 50% scoring the website 9 out of 10 for how attractive the website is. 41.7% of users scored the website 10 out of 10 for being confident on using the Blood Application without prior training, although this result could be higher by making some adjustments. The completed survey can be seen in **appendix K.**

How easy do you think it is to understand the purpose of the Blood Match Application?
12 responses

- Very easy to understand
- Quite easy to understand
- A little complicated
- Have absolutely no idea

41.7%
58.3%
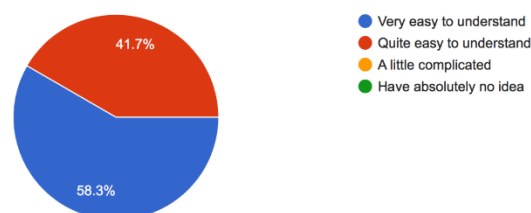
Figure 42:Showing how easy it was tounderstand the purpose of Blood Match

6.2 Evaluation of Project Outcomes

The development process of Blood Match was filled with challenges and provided the opportunity to learn new skills and technologies as well as expand on current knowledge. The beginning of the process was difficult with learning a new framework without any experience proved to be the most challenging part of the process. This project helped improve organisational skills by being able to complete deadlines on time which is what is expected in a work environment.

The main goal for the application from the beginning was to help find donors. To be able to make and search for blood request and to be able message the donors. The doctors and nurses can analysis the donor's information in different graphs. These aims were achieved, and this reflected in the survey results which said that the users would benefit from using Blood Match to make and look for blood requests and to search for donors. The user experience of the application was well received, and the functionality of the application was understood. Now Blood Match is an application that provides users with an option to create an account, create ,update, delete and view blood requests, search for donors, allow doctors and nurses to delete blood requests and donors and for doctors and nurses to analysis all the donor's information in graphs. The interface is straight to the point and the design of the application meets with the needs of the user.

The core functionalities stated in the requirements in the Blood Match application have been achieved. However, there are some features in the application were not fully developed due prioritising other features and lack of time. For example, to be able to undo the delete of a donor and blood request if they have made a mistake which is then followed up by an incident report. The features that weren't fully developed had to be considered for future development with some of the functions not requiring new knowledge has they have already be done before for other parts of the application.

6.3 Evaluation of Methodology

For the development of the Blood Match application the agile methodology has proven to be effective. Due to having two different types of users this methodology helped to develop an overall user-friendly application as it provided a lot of flexibility when developing different aspects

of the application and also made it possible to go back and change some functions or completely re-do them if they weren't working the way they should.

7.0 Conclusion

7.1 Summary

Blood Match proved to be a very challenging project and a frustrating project in the early development stages due to having limited knowledge on the Laravel framework. However, these challenged helped encouraged and motivated to learn and develop new skills as well as improving on current skills, especially has some of the skills were outside the course specification. Finding good sources proved difficult but once found the knowledge increased which made the project very rewarding. For the whole process to run smoothly the importance of having a well-structured application became clear has this helped achieve the applications requirements in good time and completing them with good practices. At the early stages of development, a lot of time was given to learn and practice using the Laravel framework. Although there was some basic knowledge of php this proved not good enough and required more advanced skills to be learned due to different functions planned for the Blood Match application.

7.2 Reflection on What Happened

The year was dedicated to creating Blood Match alongside other commitments outside of university. This was important has the Blood Match application was a required to complete the degree . The overall process had its challenges with some of the requirements struggling to be fully developed but overall it went well and was a smooth process due to having a structured plan for the development the application and undertaking research allowed for potential issues to be detected early at an early stage which allowed the application to be completed with plenty of room for unexpected issues and to reflect on possible changes.

7.3 Reflection on the Role

This was the first project where I had to be a project planner, designer , developer and tester without a team to help. This really pushed me out of my comfort zone as for a project like this I am

used to working in a team but was a very enjoyable challenge. My preferred role was always designer instead of planning and development, but after being exposed to other roles in web development this has encouraged me to explore other areas of web development and has given me an insight on the work that is required for bigger projects.

7.4 Suggestions of Future Work

When the required application functionalities were completed, looking at different concepts that could be added allowed to see the full potential the Blood Match application has and what future developments could be undertaken. The option to have the doctor or nurse undo the delete of a donor and blood request if they have made a mistake so that the blood request and donor isn't completed deleted of the database . Along with the undo delete option the doctor or nurse must fill out an incident report explaining the details on why a donor or a blood request was deleted so that it can be investigated properly and highlighted in the database. In **figure 43** is a sketch on what the incident report would have looked like.

Currently the graphs could be refined further by notifying the doctor or nurse by email when certain blood groups are dropping in number as they currently must be checked manually by the doctor or nurse.
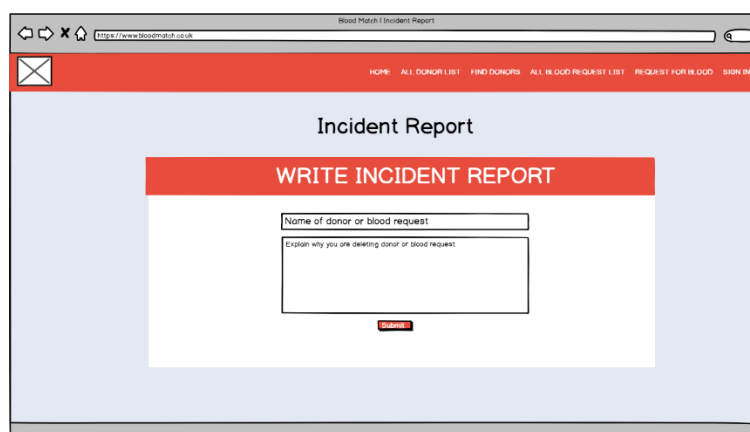
Figure 43:Incident Report for the Blood Match Application

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accessed 11th Oct 2018.

9.1 Appendix A – Gannt Chart

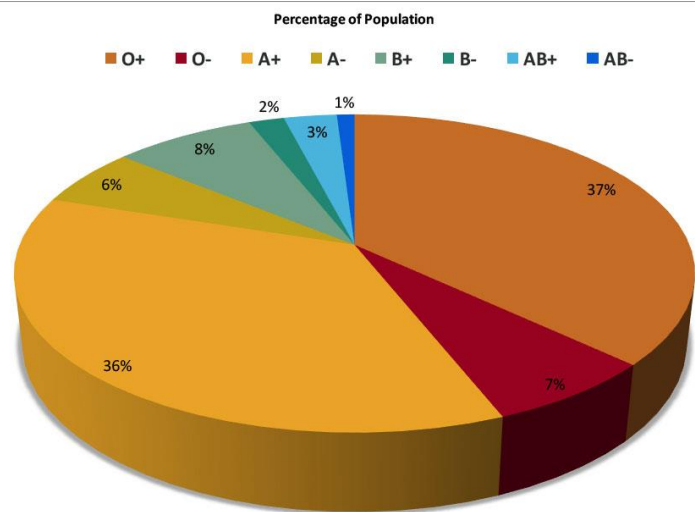| Blood Match	start	end											
			9/18	10/18	11/18	12/18	1/19	2/19	3/19	4/19	5/19		
Project Timeline	24/09/18	07/05/19											
Overall Project	24/09	07/05											
Semester One	24/09	14/12											
Semester Two	28/01	19/04											
Technical and Assignment Deadlin...	28/09/18	24/05/19											
Concept Report	28/09	12/10											
User needs analysis	12/10	26/10											
BCS and Ethics	26/10	26/10											
Initial User Experience design and re...	26/10	09/11											
System Design and Technologies Rev...	09/11	23/11											
Risk Analysis	23/11	07/12											
First prototype	07/12	07/01											
Final system design and technology ...	01/02	15/02											
Final user experience design	15/02	08/03											
Final Website	08/03	07/05											
Finished Report	02/04	07/05											
Project Demo and Oral Exams	20/05	24/05											
Planning	28/09/18	26/10/18											
Concept	28/09	05/10											
Features	05/10	12/10											
Requirements	12/10	19/10											
User Needs Analysis	19/10	26/10											
User Experience Design	26/10/18	08/03/19											
Wireframes and Site Map	26/10	02/11											
User Flows	02/11	09/11											
Design Layout	09/11	16/11											
User Experience	16/11	23/11											
Finalise User Experience	15/02	08/03											
System Design	09/11/18	15/02/19											
Research other Systems	09/11	16/11											
User Case Diagram	16/11	23/11											
Sequence Case Diagram	16/11	23/11											
ER Diagram	16/11	23/11											
Database Design	16/11	23/11											
Finalise Systems	01/02	15/02											
First Prototype	28/09/18	07/01/19											
Risk Analysis	23/11	07/12											
Create Database	14/12	21/12											
Set up and learn Laravel Framework	07/12	21/12											
Create Charts	21/12	01/01											
Draft Report	28/09	07/01											
Video Walkthrough	06/01	07/01											
Functional Prototype	07/12	07/01											
Second Prototype	01/02/19	07/05/19											
Refine Database	01/02	08/02											
Create login and registration for user...	08/02	15/02											
Create login and registration for adm...	15/02	22/02											
Create, Read, Update and Delete Blo...	22/02	01/03											
Create, Read, Update and Delete Do...	01/03	08/03											
Allow admin (doctor or nurse) to del...	08/03	15/03											
Search donors based on location and...	15/03	22/03											
Allow user to change their details	22/03	29/03											
Improve and add to CSS	29/03	19/04											
Finalise Prototype	19/04	23/04											
Final Report	01/05	07/05											
Testing	23/04/19	01/05/19											
System Testing	23/04	30/04											
Database Testing	30/04	01/05											

9.2 Appendix B – Blood Research

9.2.1 Blood Type Percentage

Percentage of Population

Legend: O+ | O- | A+ | A- | B+ | B- | AB+ | AB-

- 37% (O+)
- 7% (O-)
- 36% (A+)
- 6% (A-)
- 8% (B+)
- 2% (B-)
- 3% (AB+)
- 1% (AB-)

9.2.2 Blood Matches that work together

	You Can Give Red Cells To:	You Can Give Platelets To:	You Can Give Plasma To:
O–	O–, A–, B–, AB–, O+, A+, B+, AB+	O–, O+	O–, O+
O+	O+, A+, B+, AB+	O+	O–, O+
A–	A–, AB–, A+, AB+	O–, A–, O+, A+	O–, A–, O+, A+
A+	A+, AB+	O+, A+	O–, A–, O+, A+
B–	B–, AB–, B+, AB+	O–, B–, O+, B+	O–, B–, O+, B+
B+	B+, AB+	O+, B+	O–, B–, O+, B+
AB–	AB–, AB+	O–, A–, B–, AB–, O+, A+, B+, AB+	O–, A–, B–, AB–, O+, A+, B+, AB+
AB+	AB+	O+, A+, B+, AB+	O–, A–, B–, AB–, O+, A+, B+, AB+

9.3 Appendix C-Other Blood Websites

9.4 Appendix D-User Stories

User Story 1
As a user I want to be able to make blood request based on blood type and the amount of blood needed which can be updated and deleted when needed. This is to encourage more people to donate especially if the blood type is rare.

User Story 2
As a donor I want to be able to edit my details. So that the information is relevant and that the correct people make contact at a time the donor wants

User Story 3
As a doctor or nurse, I want to be able to search for donors based on health trust and blood type. So , that patients can receive blood donations quicker.

User Story 4
As a doctor or nurse, I want to be able see how many donors and what blood types are on the application. This is to get an overview on who is using the system and to see if more campaigns are needed to boost certain numbers.

9.5 Appendix E- User Requirements

9.5.1 User Survey

Blood Management System User Requirements

To gather responses to help create user requirements

*Required

1. Have you ever used an application to help find and search donors for blood donation? *

Mark only one oval.

◯ Yes

◯ No

2. What features would you like to see in a blood management system? *

Check all that apply.

☐ Message other donors

☐ View how many donors are on the system

☐ Make blood requests

☐ Search for donors

☐ For a health professional to supervise all donors and requests

☐ Other: _____

3. Would you use a web application to help find donors for blood donation? *

Mark only one oval.

◯ Yes

◯ No

◯ Maybe

4. What information would you like to be able to view about a donor? *

Check all that apply.

☐ Name

☐ Age

☐ Blood type

☐ Weight

☐ Drug Addicted

☐ Smoker

☐ Gender

☐ Amount of donations

☐ Other: _____

5. In your opinion how useful would a blood management system be? *
Mark only one oval.

1	2	3	4	5	6	7	8	9	10
◯	◯	◯	◯	◯	◯	◯	◯	◯	◯

6. How useful would it be to be able to search for blood donors? *
Mark only one oval.

1	2	3	4	5	6	7	8	9	10
◯	◯	◯	◯	◯	◯	◯	◯	◯	◯

7. When you first use a web application, do you like to have a walk-though of the website? *
Mark only one oval.

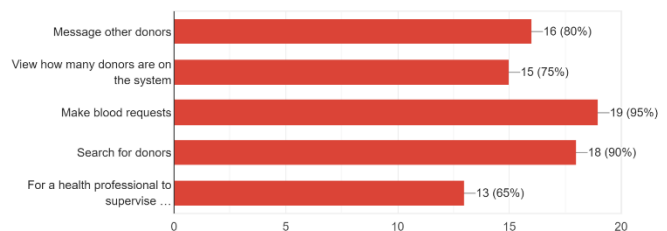◯ Yes

◯ No

◯ If there is an option to skip

◯ Not bothered

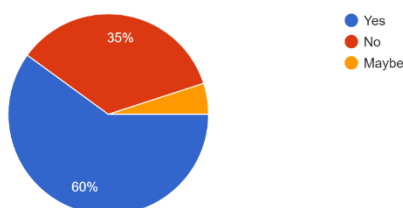Have you ever used an application to help find and search donors for blood donation?
20 responses

- Yes — 25%
- No — 75%
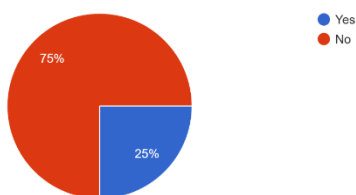
What features would you like to see in a blood management system?
20 responses

- Message other donors — 16 (80%)
- View how many donors are on the system — 15 (75%)
- Make blood requests — 19 (95%)
- Search for donors — 18 (90%)
- For a health professional to supervise … — 13 (65%)

Would you use a web application to help find donors for blood donation ?
20 responses

- Yes — 60%
- No — 35%
- Maybe

What information would you like to be able to view about a donor?
20 responses

- Name — 3 (15%)
- Age — 20 (100%)
- Blood type — 20 (100%)
- Weight — 19 (95%)
- Drug Addicted — 18 (90%)
- Smoker — 18 (90%)
- Gender — 19 (95%)
- Amount of donations — 19 (95%)
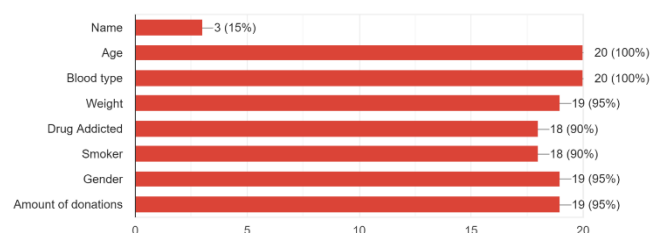
When you first use a web application, do you like to have a walk-though of the website?

20 responses

- Yes
- No
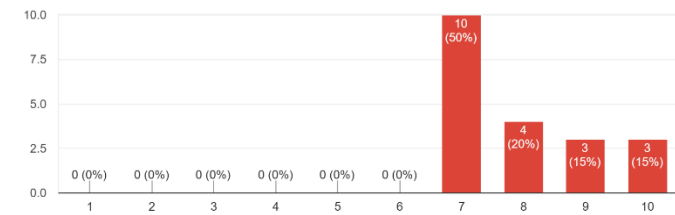- If there is an option to skip
- Not bothered
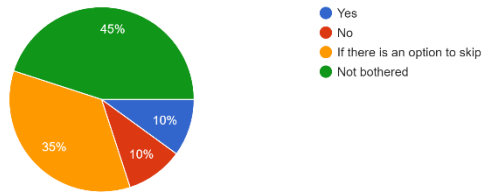
How useful would it be to be able to search for blood donors ?

20 responses
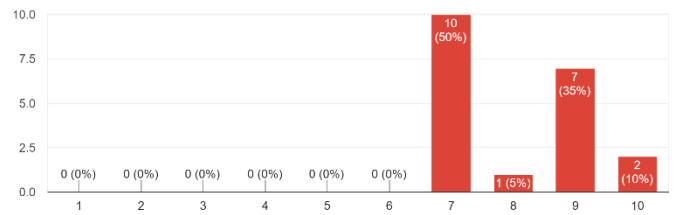
In your opinion how useful would a blood management system be?

20 responses

9.5.2 List of user requirements

Requirement #:	1
Requirement Type:	Functional
Description:	The application will allow the doctor/nurse to create an account for the application.
Rationale:	The doctor/nurse will need to have an account to be able to search the different blood donors for their patients
Dependencies:	N/A
Fit Criterion:	When an account is created, the doctors/nurses ID, name and role will be added to the database
Priority No:	6

Requirement #:	2
Requirement Type:	Functional
Description:	The application will allow the volunteer donor to create an account for the application.

Rationale:	The volunteer donor will need to have an account to be able to add their details and information about themselves
Dependencies:	N/A
Fit Criterion:	When an account is created, the volunteers name, address, gender, if they are available or unavailable to donate, how much they have donated, and general health questions added to the database.
Priority No:	6

Requirement #:	3
Requirement Type:	Functional
Description:	The create account forms for the doctors/nurses will have form validation which will inform the users of any errors in the form
Rationale:	When filling out forms there can be human error and has it is to do with medical information and health it is critical that the information given is accurate from all the users.
Dependencies:	N/A
Fit Criterion:	If the user has made an error on the form, it will not be submitted, and error messages will appear explaining their mistake.
Priority No:	6

Requirement #:	4
Requirement Type:	Functional
Description:	The create account forms for the volunteer donors will have form validation which will inform the users of any errors in the form
Rationale:	When filling out forms there can be human error and has it is to do with medical information and health it is critical that the information given is accurate from all the users.

Dependencies:	N/A
Fit Criterion:	If the user has made an error on the form, it will not be submitted, and error messages will appear explaining their mistake.
Priority No:	6

Requirement #:	5
Requirement Type:	Functional
Description:	To login as the doctor/nurse using their existing account
Rationale:	The doctor/nurse can search for donors for their patients
Dependencies:	Requires the doctor/nurse to already have an account
Fit Criterion:	The doctor/nurse can login once their details are matched from the database, they can login. Once logged in will only see the information that is relevant to them. For example, doctors/nurse can see all the volunteer donors, but the volunteer donors can't see other donors or doctor/nurses.
Priority No:	7

Requirement #:	6
Requirement Type:	Functional
Description:	To login as the volunteer donor using their existing account
Rationale:	The volunteer donor to say if they are available or unavailable to donate.
Dependencies:	Requires the volunteer donor to already have an account
Fit Criterion:	The volunteer donor can login once their details are matched from the database, they can login. Once logged in will only see the information that is relevant to them. For example, doctors/nurse can see all the volunteer donors, but the volunteer donors can't see other donors or doctor/nurses.
Priority No:	7

Requirement #:	7
Requirement Type:	Functional
Description:	The doctors/nurse can delete a donor's blood requests
Rationale:	If doctors/nurse don't feel a donor's blood request is genuine they can remove it from the application
Dependencies:	Requires doctor/nurse to already have an account
Fit Criterion:	The doctors/nurse details will be to delete the blood request of the application
Priority No:	12

Requirement #:	8
Requirement Type:	Functional
Description:	The doctors/nurse can delete a donor
Rationale:	If doctors/nurse don't feel a donor is genuine they can remove it from the application
Dependencies:	Requires doctor/nurse to already have an account
Fit Criterion:	The doctors/nurse details will be to delete the donor of the application
Priority No:	12

Requirement #:	9
Requirement Type:	Functional
Description:	Any user can make a blood request which can be updated
Rationale:	If the user is in desperate need of blood, they can make a request which can be shared on the application, which they can update and delete when they need to.
Dependencies:	N/A
Fit Criterion:	Their current details will be updated and replaced by the new details provided.
Priority No:	8

Requirement #:	10
Requirement Type:	Functional
Description:	The volunteer donors can update their account details
Rationale:	The volunteer donors can change over time for example volunteer donors may not be available to donate at that time
Dependencies:	Requires volunteer donors to already have an account
Fit Criterion:	Their current details will be updated and replaced by the new details provided.
Priority No:	8

Requirement #:	11
Requirement Type:	Functional
Description:	Doctors/nurses can search for donors based on the criteria they are looking.
Rationale:	The main purpose of this application is for doctors/ nurses to be to search for a blood donor based on the requirements they need
Dependencies:	Requires doctor/nurse to already have an account
Fit Criterion:	The doctor/nurse will be able to search for a donor based on the criteria they provide. For example, the blood type they are looking for.
Priority No:	2

Requirement #:	12
Requirement Type:	Functional
Description:	To see how many blood types that are on the system
Rationale:	Allow doctors / nurses to see through a graph how many donors they have by blood type.
Dependencies:	Requires doctor/nurse to already have an account and to have donors on the system

Fit Criterion:	Give an overview on what blood types they have on the system and allow them to look at the blood types they need more off
Priority No:	1

Requirement #:	13
Requirement Type:	Functional
Description:	Allow doctors to view donor's information
Rationale:	When the doctor/nurse wants to view the donor's information they should be able to have access to the information
Dependencies:	Requires doctor/nurse to already have an account and to have donors on the system
Fit Criterion:	When a doctor/nurse clicks on the donor their information will appear
Priority No:	3

Requirement #:	14
Requirement Type:	Functional
Description:	Allow doctors/nurses to contact donors
Rationale:	When a doctor/nurse has found the potential donor, they are able to contact the donor and request that they donate their blood
Dependencies:	Requires doctor/nurse to already have an account and donors to have an account
Fit Criterion:	The doctors/nurses to communicate with donors
Priority No:	9

Requirement #:	15
Requirement Type:	Functional
Description:	Allow donors to contact other donors
Rationale:	When another donor has contacted the donor. The donor should be allowed to response to the donor.
Dependencies:	Requires doctor/nurse to already have an account and donors to have an account
Fit Criterion:	The donors to communicate with the doctors/nurses
Priority No:	9

Requirement #:	16
Requirement Type:	Functional
Description:	The volunteer blood donor must be able to specify if they are available or not available to donate blood
Rationale:	Has there is a limited to how much a donor can donate and if they get a piercing or a tattoo in that time. It is important for the donor to specify when they are available to donate so that the doctor/nurse know if they should be contacted.
Dependencies:	Requires donors to already have an account
Fit Criterion:	To show if donor is available or unavailable to donate
Priority No:	4

Requirement #:	17
Requirement Type:	Functional
Description:	The volunteer donor must be able to edit their health information
Rationale:	Has the volunteer donor is donating blood it is important that the user can edit and change their health information has sometimes it isn't always suitable for them to donate blood.

	For example, if they have had major surgery, they need to give themselves time to recover.
Dependencies:	Requires donors to already have an account
Fit Criterion:	To also help the doctor/nurse pick the best donor for their patients and will help how if that donor is available to donate
Priority No:	8

Requirement #:	18
Requirement Type:	Functional
Description:	Allow the volunteer donor to see how much blood they have donated
Rationale:	Has a donor can only donate a certain amount of blood within a certain time it is important for them to clearly see how much blood they have donated.
Dependencies:	Requires donors to already have an account
Fit Criterion:	It will help donors keep track on how much they have donated and when they can donate
Priority No:	5

Requirement #:	19
Requirement Type:	Functional
Description:	Allow the volunteer donor to see how many times they have donated blood
Rationale:	Has a donor can donate a certain number of times within a certain time it is important for them to know how many times they have donated so that they know if when they can donate
Dependencies:	Requires donors to already have an account
Fit Criterion:	It will help the donor know how many times they have donated and when they can donate
Priority No:	5

Requirement #:	20
Requirement Type:	Functional
Description:	The doctors/nurse must be able to logout of their account
Rationale:	If the doctors/nurse wants to sign out of the account, they should be able to do so.
Dependencies:	Requires doctors/nurse to already have an account
Fit Criterion:	The doctor/nurses can click the log out button
Priority No:	10

Requirement #:	21
Requirement Type:	Functional
Description:	The volunteer donor must be able to logout of their account
Rationale:	If the volunteer donor wants to sign out of the account, they should be able to do so.
Dependencies:	Requires volunteer donor to already have an account
Fit Criterion:	The volunteer donor can click the log out button
Priority No:	10

Requirement #:	22
Requirement Type:	Non-Functional
Description:	The application must have a good user interface
Rationale:	A good user interface will provide the user with a good experience and will therefore make them more willing to use the application again
Dependencies:	N/A
Fit Criterion:	End users can test the application to see if it is appealing and easy to use
Priority No:	11

Requirement #:	23
Requirement Type:	Non-Functional
Description:	The application must be easy to use for all abilities
Rationale:	Although this application will be used for ages 18 and above, they will have all different abilities on technology
Dependencies:	N/A
Fit Criterion:	Users of all abilities can test the application to see if they can use the application with ease
Priority No:	13

Requirement #:	24
Requirement Type:	Non-Functional
Description:	The application can work on all devices
Rationale:	Has there are a range of all devices such as laptops, smartphones and mobile devices that are now able. It is important to ensure cross-compatibility of the application with it working properly on all the devices so that the user experience isn't affected
Dependencies:	N/A
Fit Criterion:	The application work properly and efficiently on a wide range of devices and be designed to be fully responsive
Priority No:	11

Requirement #:	25
Requirement Type:	Non-Functional
Description:	The application must work on all the different browsers which also have different versions that are used
Rationale:	Not all users have the same versions and different browsers. Therefore, to make sure that user experience is consistent it must be functional on all the browsers

Dependencies:	N/A
Fit Criterion:	The application will be tested on all the browsers
Priority No:	11

Requirement #:	26
Requirement Type:	Non-Functional
Description:	All information must be backed up regularly
Rationale:	The application needs the information to be stored. Therefore, it is vital that the information is backed up on a regularly
Dependencies:	N/A
Fit Criterion:	Checking that information is being backed up on a regular basis
Priority No:	14

Requirement #:	27
Requirement Type:	Non-Functional
Description:	Make sure that the application is secure
Rationale:	Has there is highly sensitive and private information stored on the application it must be protected and make the user feel that they can trust the application
Dependencies:	N/A
Fit Criterion:	By testing the application to see if the information is protected by password.
Priority No:	14

Requirement #:	28
Requirement Type:	Non-Functional
Description:	The application must be fast and quick to use and load

Rationale:	If the application is to slow to use and update the user will get impatient and will not bother to use the application
Dependencies:	N/A
Fit Criterion:	Testing the application will be carried out to ensure that it works at a fast speed on a wide range of internet speeds
Priority No:	11

Requirement #:	29
Requirement Type:	Non-Functional
Description:	The application should guide the user on how to use the application to ensure that there are no errors
Rationale:	Not every is computer literate so it is important to accommodate them. This will not discriminate against those with less knowledge and should make the process easier
Dependencies:	N/A
Fit Criterion:	A user test will be carried out to ensure that the application is easy to use
Priority No:	13

Requirement #:	30
Requirement Type:	Non-Functional
Description:	The application should be able to be used by people with no previous training
Rationale:	As this application would be used in a medical setting, there may not be enough in the health budget for training doctors/nurses to use the application
Dependencies:	N/A
Fit Criterion:	Users will be monitored using the application to ensure that it can be done without training
Priority No:	13

Requirement #:	31
Requirement Type:	Non-Functional
Description:	The application should be available for use 24 hours, seven days a week
Rationale:	Donors are always needed and isn't dictated by the time and day and therefore the application should be available to them whenever they want to use it. Also doctors and nurses work various of hours it should be available for them when they are on shift
Dependencies:	N/A
Fit Criterion:	N/A
Priority No:	14

Requirement #:	32
Requirement Type:	Non-Functional
Description:	Only donors should be able to view their own information and no other donors' information
Rationale:	Ensuring that donors' information is confidential to them and the doctors/nurse and not displayed randomly to other donors is essential to ensuring that the donors can trust the application and will want to trust the application
Dependencies:	N/A
Fit Criterion:	A test will be carried out to see if another donor's information appears on another donor profile
Priority No:	7

Requirement #:	33
Requirement Type:	Non-Functional
Description:	The application should prevent from intentional abuse

Rationale:	Preventing the application from being hacked is essential as there is donors and doctor/nurse information which private and confidential
Dependencies:	N/A
Fit Criterion:	Security vulnerabilities will try to be replicated
Priority No:	13

Requirement #:	34
Requirement Type:	Non-Functional
Description:	All users will be informed on how their data is being used
Rationale:	Informing the user on how their data is being used for the application will make the user trust the application and help know exactly how the information is being used
Dependencies:	N/A
Fit Criterion:	Before being able to the application the user will be made aware of this and if they don't agree to this, they won't be able to use the application.
Priority No:	13

Requirement #:	35
Requirement Type:	Non-Functional
Description:	All users will be informed on any changes on how their data is being used
Rationale:	Keeping the user informed on how their data is being used and stored is important has it makes the user trust the application and prevent any legal action.
Dependencies:	N/A
Fit Criterion:	Anytime there are changes on how their data is going to be used by the application the user will be made aware of this

and if they don't agree to this, they won't be able to use the application.	and if they don't agree to this, they won't be able to use the application.
Priority No:	13

Requirement #:	36
Requirement Type:	Non-Functional
Description:	Personal data shall be stored and processed and will comply with the data protection act
Rationale:	By complying with the data protection act on how personal data is stored and processed, this will therefore prevent any lawsuits
Dependencies:	N/A
Fit Criterion:	The storing and processing of personal data will be checked to insure it meets the standards of the data protection act
Priority No:	13

Requirement #:	37
Requirement Type:	Non-Functional
Description:	The doctor/nurse section of the application will not be able to be accessed unless you are a doctor/nurse
Rationale:	Due to the nature of the application only doctors/nurses are qualified in matching patients and donors together, so therefore anyone that isn't a qualified doctor or nurse can't use that section of the application
Dependencies:	N/A
Fit Criterion:	There are medical registers such as the GMC and NMC who will have to verify and say that this person is a doctor or a nurse
Priority No:	6

Requirement #:	38
Requirement Type:	Non-Functional
Description:	The donor's section of the application will not be able to be accessed unless you are a valid donor
Rationale:	Due to the nature of the application only valid donors can register and use the service has there are many restrictions to donating blood and health risks
Dependencies:	N/A
Fit Criterion:	To be verified by a medical professional
Priority No:	6

9.5.3 Prioritising user requirements

Requirements #:	User Value (5: Very Important 1: Not Important)	Difficulty (5= Difficult – 1= Easy)	Score (**User Value + Difficult**)	Priority
1,2,3,4,37,38	5	1	6	**6**
5,6,32	5	1	6	**7**
7,8	3	1	4	**12**
9,10,17	4	2	6	**8**
11	5	4	9	**2**
12	5	5	10	**1**
13	5	3	8	**3**
14,15	3	3	6	**9**
16	4	3	7	**4**
18,19	3	4	7	**5**
20,21	5	1	5	**10**
22,24,25,28	4	1	5	**11**
23,29,30, 33, 34,35,36	2	1	3	**13**
26,27,31	1	1	2	**14**

9.6 Appendix F-Wireframes
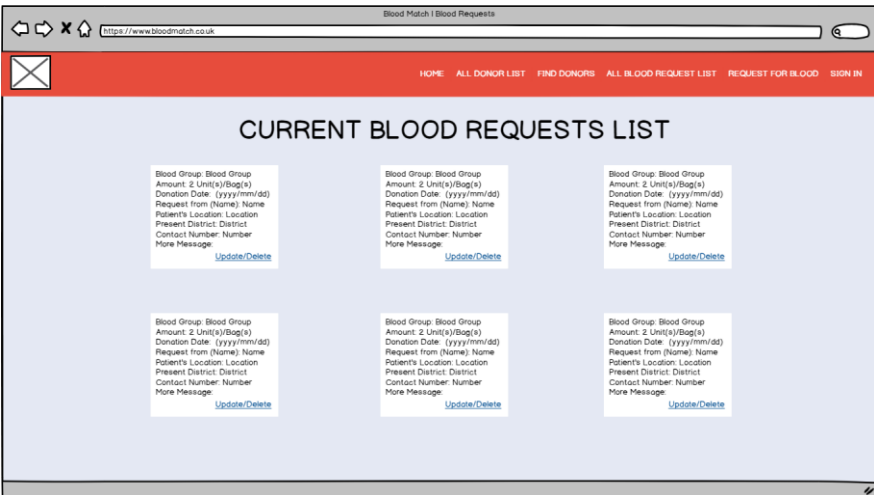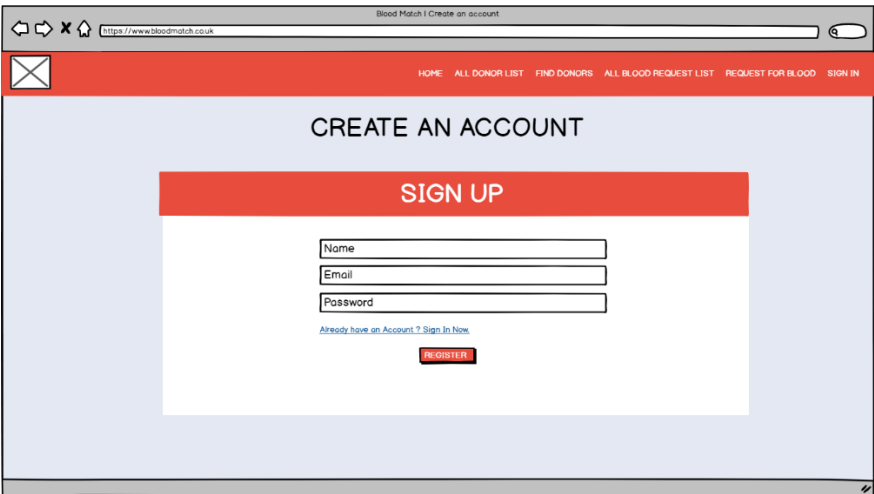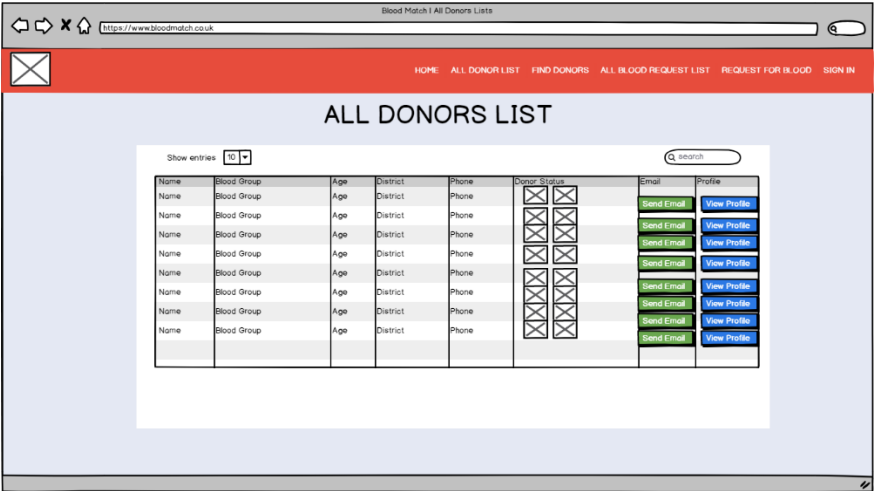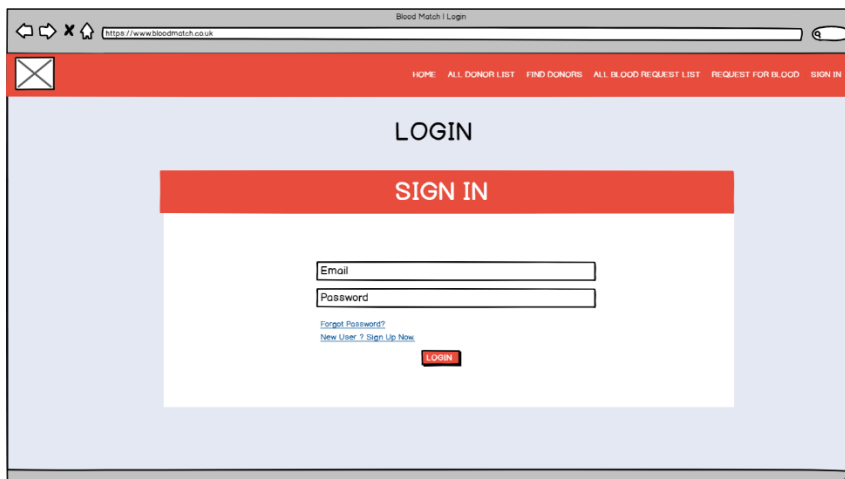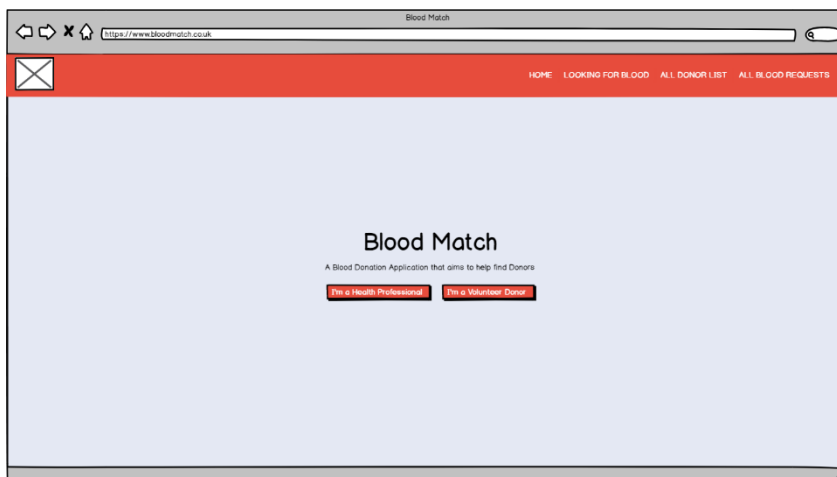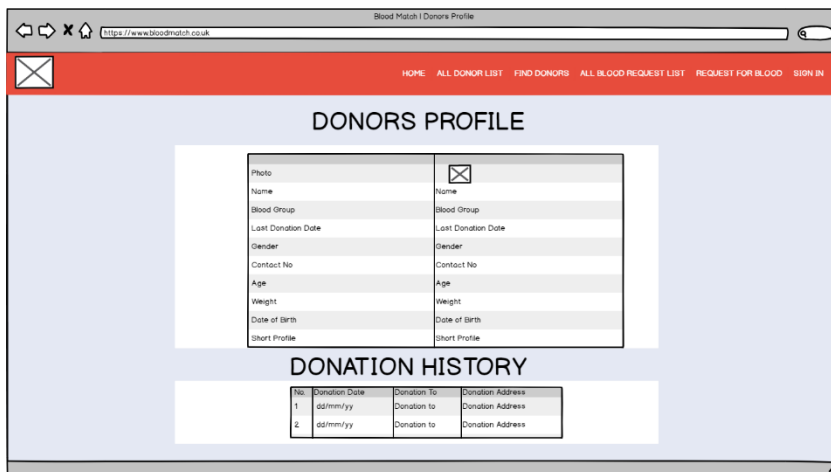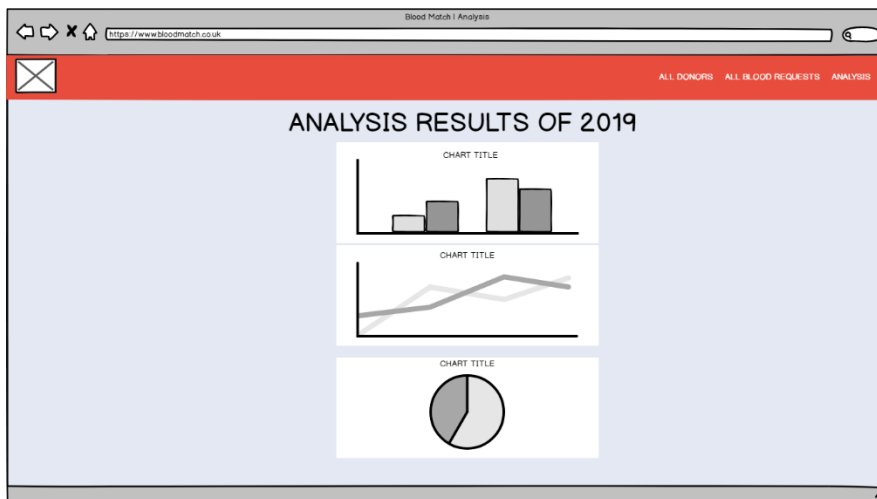
ANALYSIS RESULTS OF 2019

CHART TITLE

CHART TITLE

CHART TITLE

HOME   ALL DONOR LIST   FIND DONORS   ALL BLOOD REQUEST LIST   REQUEST FOR BLOOD   SIGN IN

SEARCH RESULT FOR (A+)

Name	Blood Group	Age	District	Phone	Donor Status		Email	Profile
Name	Blood Group	Age	District	Phone			Send Email	View Profile
Name	Blood Group	Age	District	Phone			Send Email	View Profile
Name	Blood Group	Age	District	Phone			Send Email	View Profile
Name	Blood Group	Age	District	Phone			Send Email	View Profile
Name	Blood Group	Age	District	Phone			Send Email	View Profile
Name	Blood Group	Age	District	Phone			Send Email	View Profile
Name	Blood Group	Age	District	Phone			Send Email	View Profile
Name	Blood Group	Age	District	Phone			Send Email	View Profile

---

HOME   ALL DONOR LIST   FIND DONORS   ALL BLOOD REQUEST LIST   REQUEST FOR BLOOD   SIGN IN

FIND / SEARCH DONORS

Find donors by blood groups

A+ (22)

AB- (21)

B+ (21)

Find donors by Health Trust

Belfast Health and Social Care Trust (22)

Southern Health and Social Care Trust (28)

Northern Health and Social Care Trust (24)

9.7 Appendix G-Mock-ups

ALL DONORS LIST

						Donor		

Show Entries 10

Search

Name	Blood Group	Age	District	Phone	Donor Status	Email	Profile
Alfreds Futterkiste	A+	22	Western Health and Social Care Trust	09837456789		Send Email	View Profile
Francisco Chang	A+	17	Southern Health and Social Care Trust	08345768903		Send Email	View Profile
Roland Mendel	A+	29	Northern Health and Social Care Trust	09837456239		Send Email	View Profile
Helen Bennett	A+	52	Belfast Health and Social Care Trust	09837456789		Send Email	View Profile
Yoshi Tannamuri	A+	56	Western Health and Social Care Trust	03456789034		Send Email	View Profile
Giovanni Rovelli	A+	69	Southern Health and Social Care Trust	09833456789		Send Email	View Profile

FIND/SEARCH DONOR

Find Donors by Blood Groups

A+(10)

B+(4)

Find Donors by Local Health Trust

Southern Health and Social Care Trust (8)

Belfast Health and Social Care Trust (6)

CURRENT BLOOD REQUESTS LIST

Blood Group: B negetive(-)
Amount: 2 Unit(s)/Bag(s)
Donation Date: 2020-03-02 (yyyy/mm/dd)
Request from (Name): jan
Patient's Location: dromore
Present District: South Eastern Health and Social Care Trust
Contact Number: 09372864756
More Message:

Blood Group: AB positive(+)
Amount: 3 Unit(s)/Bag(s)
Donation Date: 2019-04-12 (yyyy/mm/dd)
Request from (Name): John
Patient's Location: Derry
Present District: Northern Health and Social Care Trust
Contact Number: 09384653892
More Message:Blood

Blood Group: A positive(+)
Amount: 2 Unit(s)/Bag(s)
Donation Date: 1995-08-28 (yyyy/mm/dd)
Request from (Name): chloe
Patient's Location: belfast
Present District: Belfast Health and Social Care Trust
Contact Number: 02892698019
More Message:

9.8 Appendix H-User Personas

9.8.1 User Persona One

Dr Amanda Jones

"Simple way of finding blood donors for my patients."

Age: 42
Work: Doctor
Family: Married with 4 kids.
Location: Belfast
Character: This person is highly educated, conscious doctor who wants whats best for her patients.

Personality

Introvert — Extrovert
Thinking — Feeling
Sensing — Intuition
Judging — Perceiving

Bio

Dr Amanda Jones has been a qualified doctor for 20 years and works in her local hospital. After leaving university with her medical degree she decided to specialise in Heematology which is the study and treatment of blood. Everyday Dr Jones sees over 40 patients and would like to be able spend more time treating them by finding more blood donors to match her patients.

This is also a personal reason for Dr Jones has she herself required a blood transfusion after the birth of her third child. With her blood type being AB-negative which is a rare blood type , Dr Jones sees the importance of encouraging people to donate blood especially if they are of a rare blood type has she herself wouldn't be alive without that blood donation.

Goals

- Wants another quicker way of finding blood donors for her patients
- To be able to find ways of encouraging more people with blood types that are required
- Dr Amanda Jones herself has experienced on how blood donation can save lives as she required a blood transfusion after giving birth to her third child.

Frustrations

- Rules and regulations for blood donation
- Lack of certain blood types
- There is a way to view what blood types they are in need of and also reach out to other voluntary donors

Motivation

Helping her Patients

Easier way of finding blood donors

To encourage more donors

Be able to see what blood types are needed

Technical

Browsing the web

Online & Social Media

Using Microsoft products

Use mobile apps

9.8.2 User Persona Two

Andrew Brady

"To donate my blood to help other people"

Age: 23
Work: Student
Family: Single
Location: Belfast / Tyrone
Character: This person is a fun and caring guy who would go out of his way to help anyone in need

Personality

Introvert — Extrovert
Thinking — Feeling
Sensing — Intuition
Judging — Perceiving

Bio

Andrew Brady is a second year Computer Science student , he is currently living in student accommodation and is enjoying the freedom and the party life the Belfast has to offer. Andrew spend his days going to class, going out with friends, spending time on the internet such as social media. When not in Belfast he is back in his hometown of Tyrone working in his local Tesco and playing for his local club St Mary's GAC.

Andrew has never donated blood but has signed up to join the donor register when there was a talk at his school. He receives letters about blood donation but never attends their sessions.

Goals

- To help patients that need blood donations
- To be able to see how he is helping people by donating blood
- To keep track on when and how much he has donated blood

Frustrations

- Blood donation sessions not suiting Andrew's Schedule
- Doesn't understand the process of donating blood
- Doesn't know who to go and ask questions about blood donation

Motivation

Helping other people

Understanding Blood Donation better

To see the benefits blood donation have

To be able ask questions on blood donation if he doesn't understand

Technical

Browsing the web

Online & Social Media

Using Microsoft products

Use mobile apps

9.9 Appendix I-Risks

Risk	Level	Elimination	Backup
Using Laravel framework	High	The use of the Laravel framework with no previous experience could result in spending a large amount of time attempting to learn the framework. A prototype will be developed that will allow for basic use of the Laravel framework and help develop an understanding of the framework itself. A great tutorial series online called Laracasts will be very important in helping develop the application.	If the Laravel framework proves too difficult to use, then the application will be used using PHP.
Connecting to the database	High	The database is where the information will be stored and is a very important part of the application as the user will need to be able edit and change their details. Also, for the search part of the website the	There is no backup option for this and is a risk that needs eliminated straight away.

		results displayed on the screen is information from the database.	
Creating an interactive graph to show the blood types on the system using the information from the database	High	The graph to display the number of blood types and donors on the system. This will be calculated using the information from the database	If I am unable to create a dynamic graph, then the option will have to be changed. This will just be numbers with an image that represents
To be able to search and filter through all the donors on the system	Medium	Allowing the doctors/nurses to search for their donor by a filtering system and show only the donors	If I am unable to create a search filter, then there will be a simple search
Making sure that donors that don't want to be contacted are not contacted	Medium	It will clearly say if the donor is available at this time to donate but with user error, the doctor/nurse may still click on that donor and contact them which will be annoying for the donor. This will be done using JavaScript by making the button unclickable.	If I am unable to do this in the specified timeframe then I will leave this feature out has this isn't one of the essential features to have and doesn't affect how the application works.
The user can only see the information	Low	To prevent this from happening the user will	A basic login system can be used has a back until a

that applies to them and that the application is secure		be shown the login and the dashboard that is relevant to them and make sure that it secure. To ensure this there are two separate logins that will lead to two different dashboards that are relevant to them.	more secure login can be developed.
Profile Creation	Low	Profile creation will allow the user to update donor information and to show doctors/nurse blood information on the system.	Not meeting this feature will affect the overall application. So ,if failure to progress with this feature will require seeking help from a lecturer or mentors.

9.10 Appendix J-User Testing
9.10.1 Testing

Test ID	Description	Results	Response (If Failed)
1	The doctor/nurse to create an account for the application.	Passed	
2	The donors to create an account for the application.	Passed	
3	The doctor/nurse to login to their account	Passed	
4	The donor to login to their account	Passed	
5	The doctors/nurse must be able to logout of their account	Passed	
6	The doctors/nurse must be able to logout of their account	Passed	

7	The donor must be able to logout of their account	Passed	
8	The doctors/nurse can delete a donor's blood requests	Passed	
9	The doctors/nurse can delete a donor	Passed	
10	The create account forms for the doctors/nurses will be validation which will inform the users of any errors in the form	Passed	
11	The create account forms for the volunteer donors will have form validation which will inform the users of any errors in the form	Passed	
12	Any user can make a blood request which can be updated	Passed	
13	The volunteer donors can update their account details	Passed	
14	Doctors/nurses can search for donors based on the criteria they are looking.	Passed	
15	To see how many blood types that are on the system	Passed	
16	Allow doctors to view donor's information	Passed	
17	Allow doctors/nurses to contact donors	Passed	
18	Allow donors to contact other donors	Passed	

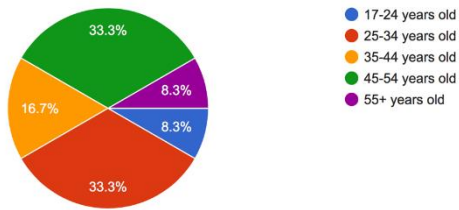| 19 | The volunteer blood donor must be able to specify if they are available or not available to donate blood | Passed | |
20	The volunteer donor must be able to edit their health information	Passed	
21	Allow the volunteer donor to see how much blood they have donated	Failed	Future Development
22	Allow the volunteer donor to see how many times they have donated blood	Passed	
23	Before a donor can sign up a pre-register form appears to assess if they are fit to donate	Passed	
24	If a doctor or a nurse deletes a blood request or a donor, they must fill out an incident report	Failed	Future Development

9.10.2 Cross Browser Testing

Browser	Outcome	Response (if Failed)
Chrome	Passed	Minor CSS changes to make the application responsive
Safari	Passed	
Internet Explorer	Passed	
Firefox	Passed	
Opera	Passed	

9.11 Appendix K-User Testing Results

What is your age range?
12 responses

- 17-24 years old
- 25-34 years old
- 35-44 years old
- 45-54 years old
- 55+ years old

33.3% — 8.3% — 8.3% — 33.3% — 16.7%

What is your gender?
12 responses

- Male
- Female
- Prefer not to say
- Other

41.7% — 58.3%
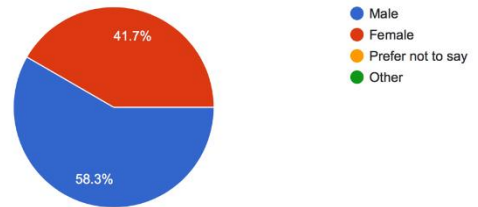
How computer literate are you?
12 responses
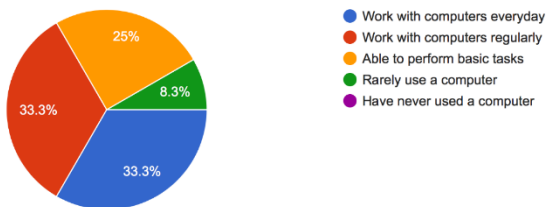
- Work with computers everyday
- Work with computers regularly
- Able to perform basic tasks
- Rarely use a computer
- Have never used a computer

25% — 8.3% — 33.3% — 33.3%

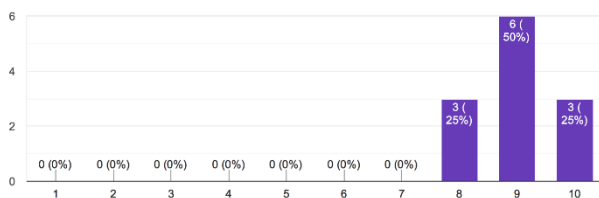### On a scale of 1-10 (1 being the lowest and 10 being the highest) , How confident are you using the Blood Match without prior training?
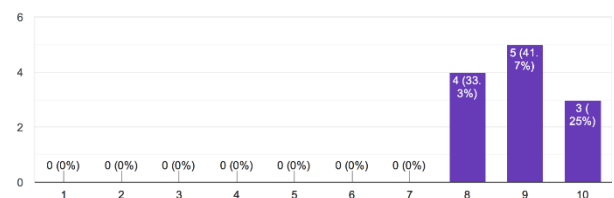12 responses
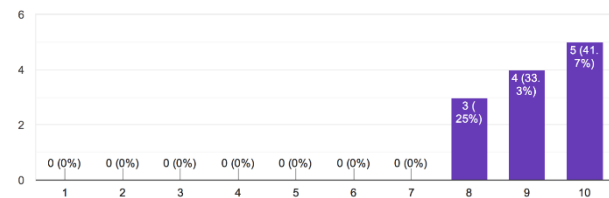
1: 0 (0%), 2: 0 (0%), 3: 0 (0%), 4: 0 (0%), 5: 0 (0%), 6: 0 (0%), 7: 0 (0%), 8: 3 (25%), 9: 4 (33.3%), 10: 5 (41.7%)

On a scale of 1-10 (1 being the lowest and 10 being the highest) , How attractive do you find the Blood Match Application?
12 responses

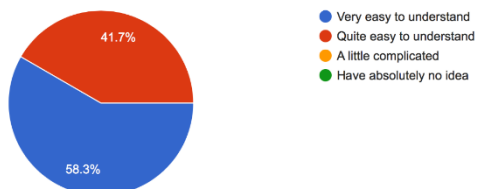1: 0 (0%), 2: 0 (0%), 3: 0 (0%), 4: 0 (0%), 5: 0 (0%), 6: 0 (0%), 7: 0 (0%), 8: 3 (25%), 9: 6 (50%), 10: 3 (25%)

On a scale of 1-10 (1 being the lowest and 10 being the highest) , How easy did you find using the Blood Match application?
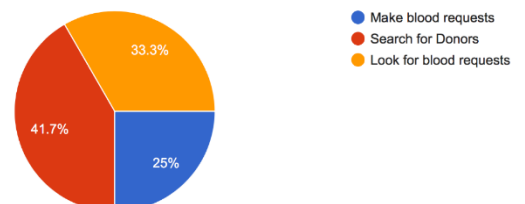12 responses

1: 0 (0%), 2: 0 (0%), 3: 0 (0%), 4: 0 (0%), 5: 0 (0%), 6: 0 (0%), 7: 0 (0%), 8: 4 (33.3%), 9: 5 (41.7%), 10: 3 (25%)

How easy do you think it is to understand the purpose of the Blood Match Application?
12 responses

- Very easy to understand
- Quite easy to understand
- A little complicated
- Have absolutely no idea

41.7% — 58.3%

What would you use the application for?
12 responses

- Make blood requests
- Search for Donors
- Look for blood requests

33.3% — 41.7% — 25%

9.12 Appendix L-Useful Information

Blood Match live link :
https://scm.ulster.ac.uk/~B00711636/workspace/COM559/BloodMatch/public/index.php/

To make changes to your **blood request** you will require the Edit and delete codes = **103**

To login for both health professional and donor

Username:test@test.com
Password:password