

**University of Bahrain**

**College of Information Technology**

**Department of Computer Science**

**ITSE305**

**Online Blood Bank Management System**

Team Members:

20170305 - Shaffa Abdul Sattar

20170523 – Faiza Faisal

20173794 – Syeda Afnan Javed

20177427 – Aaisha Nazeer Ahmed

20177820 – Maria Rashid Mehmood

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1. **Introduction**

This project is aimed to develop and implement an online blood bank management system. Blood transfusion safety and availability is an important concern in the kingdom of Bahrain, which aims to establish an excellent healthcare system for the citizens. To achieve that, a proper efficient blood bank system is required.

Blood transfusion is a medical operation where a patient requires blood or blood products as a life saving measure. Most blood banks are still running manual system for its processes because of which there is a lack of efficiency, high risk of loss of donor’s records, unavailability of blood products, contamination of blood bags which happens due to loss of data such as shelf life of blood bags. Blood products unavailability or unsafe blood products put the lives of the citizens at high risk, in most cases death and thus, increase mortality rate in the kingdom.

By establishing an efficient online blood bank system, we can minimize the probability of such adverse situations, and reduce related risks such as shortage. Support fast searching to find the right matching blood bag. Increase proper blood donor’s records documentation and their blood donation activities, blood bag collection and information such as collection and expiry dates and provides all-time availability of blood products inventory records which is crucial for hospitals.

The system also aims to promote the act of blood donation by providing the citizen with various facilities such as online donation appointments, and home collection of blood donation.

The manager and team members along with CEO discussed about the project in detail for better understanding and figuring out the budget. The manager drafted a business case, shared sample templates and divided the project into different phases with the help of team members.

**2.0 Pre-Initiation and Initiation**

The initiation stage is the initial part of a project, as it will give us a realistic overview into the future in which the project will progress by specifying the scope, time, and cost, and will help us identify whether we should progress with the project.

Continuing with the project and if it is feasible or not were the major concerns. After solving that, we wanted to figure out the outcomes and limitations of this project. We also worked on time to avoid any amount of delay in the work.

**2.1 Business Objective**

To draft the business objective, Shaffa and her team sat together and discussed important issues regarding the project about critical assumptions, constraints, preliminary requirements, problem statement, budget and financial analysis, schedule estimate and success criteria and the following table was drafted by Afnan along with the team and manager as shown in the table 2.1.

Table 2.1: business case

|  |
| --- |
| **Project Name: Online Blood Bank Management System** |
| **1.0 Introduction/ Background**  The project aims at developing a blood bank system that digitalizes the current work of blood management. The system will be accessible to donors, administrators and licensed hospitals, clinics and blood bank organizations. Our project aims to manage inventory in the blood bank for storage and issuing of the blood and to help the hospitals in case of emergency by providing them the right blood on time.  Our system's central aim is to build an efficient online blood bank system for the people of the kingdom of Bahrain. The project contains a main bank containing various blood deposits available along with their details (blood type /age/patient history/name etc.). It also allows to check whether required blood of a certain group is available in the blood bank. The system has added features such as patient history / blood booking / posting blood requests to find donors in emergency situations.  Recently, we are not able to find blood donors as all are afraid to go to hospitals or blood banks for donation. Keeping this in mind, we aim to develop such a system that gives an opportunity to those who are interested to donate the blood from home by just taking an appointment. The staff taking all the precautions will come at the donor’s place to collect the blood after COVID test and several other checkups. |
| **2.0 Business Objective**  The objective behind the creation of this system is to save more lives of the citizens of Bahrain by providing an efficient way of blood collection and supply to the hospitals. The system aims to ensure that there is mobility of blood bags across the country i.e., make it easier to check for hospitals that have needed blood types, this can avoid shortage of blood bags of blood type in emergencies. Promote and ease the process of blood donation by providing facilities for the donor. the system will include blood donors’ registration and health details, thus, ensuring that blood transfusion services will be safe and secured. The blood bank system is of great help for doctors, nurses, medical practitioners, patients and others in ensuring a better health care system and avoid / reducing the possibility of unfavorable situations due to lack of blood.  This web-based application allows hospitals to make inventories of their blood bags online, thus, allowing each hospital to check the availability of blood bags anytime. Likewise, proper accounting of blood donors ensures that the expected blood transfusion services will be safe and secured. |
| **3.0 Current Situation and Problem/Opportunity Statement**  In the current situation of covid-19 no one wants to go outside to donate the blood and most patients came to the hospitals in an emergency and they needed blood quickly, sometimes the hospitals did not have that required blood in their blood bank or the blood did not match with the patients’ blood then only their families or friends came to the hospital to give them the blood. Some patients need red blood cells, stem cells or plasma. So, for these patients, hospitals normally do not have these cells stored then they take someone's blood and separate these cells from the blood, and it takes time. Also, many patients have a disease like leukemia, thalassemia, and anemia these patients need blood weekly or monthly. It is also one of the major problems that these types of patients die due to the shortage of blood in the hospitals or they do not find anyone to donate them the blood because of not having a system of large blood storage.  So, we are developing a system that will be available on the website. The website will be used for keeping records of the hospitals, clinics and health centers to whom the bank delivers the blood, and collecting the information related to the donor and giving opportunity to donors for taking an appointment to donate a blood either by going to the blood bank or by donating it from home. |
| **4.0 Critical Assumption and Constraints**  1. This project will need to have high quality hardware.  2.     The system must be accessed through multiple operators like that can run on Windows, Linux, and Android.  3.      The software should be accessed by the Hospitals and clinics and controlled by the Blood Bank Administrator and operator.  4. All team members must need to have all required skills to complete this project.  5. The project will be completed within budget and time, any delay in the project will be required to increase the work hours for the team members. |
| **5.0 Analysis of Options and Recommendation**  Options:   1. The system administration must implement the IT policies and standards as per required by the organization. 2. Use of Modular design and UML:  * Modular design helps us to continuously refine our solutions and contributes to production efficiency by reuse. * UML allows one to organize programs into traditionally reusable pieces of code (blueprints).  1. In-house design and development of the latest intranet capabilities, often utilizing existing hardware and software. 2. Data Backup: Recovery is necessary in case of loss, corruption or deletion of original data. Creating backup helps in duplicating the original data.   Recommendations: Based on discussion with stakeholders, option 2,3,4 is best recommended for an Online Blood Banking system. |
| **6.0 Preliminary Project Requirements**   * Ease of use /useability: The system will be simple and easy to use for users of all backgrounds. The layout of the website will aim at easy navigation and access to all available features through a menu. The website will also be considerate of users with disabilities and will provide suitable options such as voice assistance, color adjustments and size of the page. The system will support multiple languages such as Arabic, Urdu, Hindi, Filipino apart from the default site language English. Medical terms that will be used shall have a definition or description in easy words for better understanding by the users not related to medical fields. * Privacy and confidentiality: medical records are extremely sensitive information. The system ensures that all user data will be private and highly protected by taking proper measures. The data displayed or accessed will be limited. The results from a search will depend on the type of user logged in. * Records such as inventory of all blood types, donors and receivers, hospitals stock of all blood types, and blood bag information will be stored and will be accessible by the registered authorities such as hospital administration * Availability: The site must be available 24 hours a day, 7 days a week. * The site will be accessible on browsers such as chrome, Mozilla, Firefox, Opera, safari, Internet explorer * Hospitals’ Blood receptionists can check for availability of specific blood types and place a request through the system. * Booking blood test appointments: Donors can book appointments for blood test either from home or by going to the blood bank. Due to the given circumstances, a COVID-19 test will also be performed. Based on their test reports, the eligible donor then can choose the blood donation date as per their ease. The system provides facilities for the eligible donor to choose blood donation date, time and method. * View eligibility test reports: The results can be viewed by the donor. The result of blood test reports will decide the eligibility of the donor to donate blood. * Receive Notifications: The system should notify the admin whenever a donor books an appointment and when a hospital requests blood. The hospitals will get confirmation notifications. Donors will receive notifications regarding the eligibility test reports. * Request blood: The hospital can request for specific blood group blood bags by placing a request through the system. |
| **7.0 Budget Estimate and Financial Analysis**  The entire budget the company can loan is BD 75,000/-. To a full extent, the budget is totally under the detailed budget estimate of BD 71,600/-  The company is expected to gain a profit of BD15,000/- and BD3400/- is being kept aside for any unexpected consequences.  Hardware, deployment, download and all other related system activities are expected to cost a sum of total BD 30,000/-.  All the internal staff are expected to work a total of 40 hours a week for a period of 3 months. The manager will be paid BD9/- per hour and the total is BD4320/-. The Systems analyst and designer will both be paid BD7/- per hour which amounts to Bd6720/-. The programmer and tester will be paid BD6/- per hour which equals BD5760/-.  The external consultant, Dr Jones, will be paid BD600/- for 60 hours of presence in 3 months, any extra hour will be paid by BD10/-  The company will take care of initial storage setting and blood collection which is expected to cost a sum of 10,000/- but later the storage, collection, transport, delivery, system maintenance and everything will be overseen and managed by the MOH. |
| **8.0 Schedule Estimate**  The sponsor might want to see the project finished inside a half year, yet there is some adaptability in the timetable. We likewise accept that the new framework will have a valuable existence in any event in five years if updated and maintained accurately. |
| **9.0 Potential Risks**  There are many risks associated with the system,  In a business context, it is to get the money put in developing the system back within a certain number of years. In everyday cases, the risks are that the system contains highly confidential data of donors and patients and maintaining confidentiality will forever be a risky and difficult task. Since it is a blood bank, there can be misuse of others' blood for illegal activities and any wrong information given by patients or hospitals can cause large problems. This system serves as an often lifesaving one and any unexpected problem can cause lives. Wrong classification and storage of blood within and outside of the system will be a very high risk. Low level of user acceptance to the system. |

**2.2 Stakeholder Register for Online Blood Bank System**

Table 2.2 was drafted by Aaisha and Maria which shows who the sponsor is and what the role of each member in this project, it will facilitate them to communicate with each other. Also, there are positions for each member in this project it will be easy for them to divide the work in between them in future.

Table 2.2: Stakeholder Register

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Position | Internal/External | Role | Contact Information |
| Ministry of Health | CEO | External | Sponsor | moh.gov.bh |
| Shaffa Abdul Sattar | Manager | Internal | Team Member | 20170305@stu.uob.edu.bh |
| Faiza Faisal | Software Analyst | Internal | Team Member | 20170523@stu.uob.edu.bh |
| Afnan Javed | Software Designer | Internal | Team Member | 20173794@stu.uob.edu.bh |
| Aaisha Nazeer | Software Programmer | Internal | Team Member | 20177427@stu.uob.edu.bh |
| Maria Rashid Mehmood | Software Tester | Internal | Team Member | 20177820@stu.uob.edu.bh |
| Dr. Jones | Consultant | External | Team Member | Dr.jones@gmail.com |
| Eva Rose Smith | Risk Manager | Internal | Team Member | evasmith@gmail.com |

**2.3 Stakeholder Management Strategy**

After analyzing the stakeholders registered, team members decided to draft a table that includes the most prominent stakeholders, and their level of interest in the project and strategies to gain their interest to make the most of their potentials. Aaisha and Maria made the table as shown in table 2.3 along with the help of team and manager.

Table 2.3: Stakeholder Management Strategy

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Level of interest** | **Level of influence** | **Potential management strategies** |
| Dr Jones | Medium | High | Dr Jones is the representative from the medical side and plays a key role in informing us how the blood bank system works. He is a calm man, but it is better to not get on his nerves so that he should not purposely affect the creation of the system |
| Shaffa | High | High | Shaffa is the manager of the project and is deeply interested in the outcome of the project. She is very keen on managing time efficiently. She should be kept updated about all things related to the project |
| MOH | High | Low | They are the main stakeholders and sponsors, keeping them satisfied should be our main goal. |

**2.4 Project Charter**

Project charter is a short document which describes the project and plays an important role in planning out the project. Shaffa and Faiza along with the help of team members discussed the content and drafted it successfully as shown in table 2.4.

Table 2.4: project charter

|  |  |  |  |
| --- | --- | --- | --- |
| **Project Title**: ***Online Blood Bank Management System*** | | | |
| **Project Start Date: 10/1/2020 Projected Finish Date:** **12/31/2020** | | | |
| **Budget Information:** The firm/organization has allocated 75,000 BD for this project.  The initial estimate is based on all the internal staff working approximately for 40 hours a week for three months. | | | |
| **Project Manager:** Shaffa Abdul Sattar, (+973) 39019085, [20170305@stu.uob.edu.bh](mailto:20170305@stu.uob.edu.bh) | | | |
| **Project Objectives:**  This web-based application goal is to help the hospitals, clinics, and patients to get the blood supply by 24/7 whenever in a case of emergency or need. It also allows a donor to donate blood from home after several test. Without this, it would be difficult for the hospitals and clinics to arrange blood during emergency cases.  Also, due to recent pandemic people hesitate to go to hospitals to donate blood.  The registered users can view the available blood and can request for blood donation appointment. The hospital, clinic and blood bank administrator can maintain, and update information related to blood donors, available blood, and blood inventory management. | | | |
| **Success Criteria:**  The main success criteria are to complete the project with in given time and budget. | | | |
| **Approach:**   * The project proposal is to get official approval from the government. * develop a survey to get feedback from the hospitals, clinics. * review project templates and documentations * research software to provide security * Create and construct an estimated authorized budget from all relevant stakeholders for the development of the application. * Design and generate an Iterative approach due to its easier identification of risk and is more flexible which means less costly to change scope and requirements. | | | |
| **Roles and Responsibilities** | | | |
| ***Name*** | ***Role*** | ***Position*** | ***Contact Information*** |
| Ministry of Health | CEO | Sponsor | moh.gov.bh |
| Shaffa Abdul Sattar | Project Manager | Team Member | 20170305@stu.uob.edu.bh |
| Faiza Faisal Murtaza | Software Analyst | Team Member | 20170523@stu.uob.edu.bh |
| Afnan Javed | Software Designer | Team Member | 20173794@stu.uob.edu.bh |
| Aaisha Nazeer | Software Programmer | Team Member | 20177427@stu.uob.edu.bh |
| Dr. Jones | Consultant | Team Member | Dr.jones@gmail.com |
| Eva Rose Smith | Risk Manager | Team Member | evasmith@gmail.com |
| Maria Rashid | Software Tester | Team Member | 20177820@stu.uob.edu.bh |
| **Sign-off:**  Shaffa Faiza Afnan Aaisha Maria Jones Eva | | | |

**2.5 Kick-Off Meeting**

Our very first meeting with the whole project team and the sponsor for the online blood bank management system project is shown in the table 2.5 and was drafted by Shaffa.

Table 2.5: kick-off meeting

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2.5 Kick-Off Meeting**  **Date: 29-09-2020**  **Project Name: Online Blood Bank Management System**  **Meeting Objective:** Get the project off to an effective start by introducing key stakeholders, reviewing project goals, and discussing plans and meetings.  **Agenda:**   * Introductions of attendees * Review of project background * Review of project-related documents (i.e., business case, project charter) * Discussion of project organizational structure * Discussion of project scope, time, and cost goals * Discussion of other important topics * List of action items from meeting  |  |  |  | | --- | --- | --- | | **Action Item** | **Assigned To** | **Due Date** | | -Introduction/ background for business objective  -Schedule Estimate | Faiza Faizal Murtaza | 1/10/2020 | | -Introduction  -Analysis of Option and Recommendations | Shaffa Abdul Sattar | 1/10/2020 | | -Business objectives  -Preliminary project requirements | Syeda Afnan Javed | 1/10/2020 | | -Budget Estimate and Financial Analysis  -Potential Risks | Aaisha Nazeer | 1/10/2020 | | -Critical Assumption and Constraints  -Current situation and Problem/Opportunity Statement | Maria Rashid Mehmood | 1/10/2020 |   **Date and time of next meeting: On 01-10-2020 at 3:00 P.M** |

**3.0 Planning**

The planning process is creating and maintaining a practical framework to ensure that the project is in accordance with the organization’s requirements and creating precise boundaries.

This phase of the project includes management plans related to the scope, schedule, cost and procurement. All these plans define the knowledge area related to the project. This also includes project summary and deliverables, product characteristics/features and their requirements, project success criteria, and the WBS along with its dictionary which specifies the tasks to be done during the project. This will help the members to keep a track of tasks done and need to be done and stay on schedule.

**3.1 Team Contract**

The team contract is helpful for the team as well as the project. It states the ground rules and is to be used as a guide throughout the project. It should be respected and abide by all team members.

The project manager took into consideration various situations such as personal life issues (emergencies), internet issues as all meetings will be held virtually and allowed flexibility and adjustments to some extent to make sure that all members feel encouraged and respected.

The team contract was made through discussion with the team members. Each statement in the contract was noted down with full consent of the members. Table 3.1 was drafted and reviewed by project manager Shaffa.

Table 3.1: team contract

|  |  |
| --- | --- |
| **Team Contract**  **Date:14-10-2020** | |
| **Project Name: Online Blood Bank Management System** | |
| **Project Team Members’ Names and Sign-off:** | |
| **Name** | **Date** |
| **Shaffa Abdul Sattar** | **14-10-2020** |
| **Faiza Faisal** | **14-10-2020** |
| **Syeda Afnan Javed** | **14-10-2020** |
| **Aaisha Nazeer Ahmed** | **14-10-2020** |
| **Maria Rashid Mehmood** | **14-10-2020** |
| **Dr. Jones** | **14-10-2020** |
| **Eva Rose Smith** | **14-10-2020** |
| **Code of Conduct:** As a project team:   * Team members will work proactively, effectively, and smoothly. * Team members will use the project budget appropriately and keep sponsors updated about all the purchases. * Team members will follow a transparent decision-making process. * Team members must be working toward the progress of the project, anticipating their potential differences, and working to prevent them. * Team members will provide constructive, encouraging feedback and ensure honest and direct interaction. * Team members must be honest and act with integrity to ourselves, each other and external stakeholders, staff and users. * See the project through to completion. | |
| **Participation:** We will:   * Be honest and be open with each other during all project activities. * Encourage the diversity and different ideas in teamwork. * Provide an opportunity to all the team members for equal participation. * Let the project manager know well about the team member's attendance at the meetings in advance. * Ensure that the consent of all the team members is taken before taking any decision. | |
| **Communication:** We will:   * Use relevant technologies like, MS Teams, e-mail, and WhatsApp as the means of communication due to the current situations. * The Project manager will assign each team member with specific tasks and explain it with a deadline to submit it. * Keep all work in schedules and abide by it. * Always keep in touch with all the members of the team and be updated. | |
| **Problem Solving:** We will:   * Motivate the team members to actively take part in solving problems. * Use constructive criticism to solve problems, issues and respectfully challenge the idea, not blame the person. * Motivate the team members to share new ideas and draw on the ideas of one another. | |
| **Meeting Guidelines:** We will:   * Meet through Microsoft teams on Tuesdays and Thursdays at 2:00 pm. * Respect the scheduled timing and will be prepared for the meeting. * Arrange new meetings if needed and timings can be modified or adjusted if required. * Inform the agenda of the meeting in advance. * Oversee documenting the meeting agenda, meeting minutes and will be maintained by one member from the team. | |

**3.2 Requirement Elicitation and Analysis**

The system analyst is responsible for generating a list of requirements from the stakeholders which will become the basis of the project’s specifications.

The methods used for requirements elicitation include brainstorming, benchmarking and observation.

**3.2.1 Functional requirements**

A functional requirement defines a system; the things and functions that the user demands to be in the system. A function is inputs, outputs, calculation, business process, user interaction, services, tasks or any other functionality which defines “What should the software system do?”. Basically, they help to capture the intended behavior of the system. Other way round, if the functional requirements are not met, the system will not work as it is intended to.

**Description:** The online blood bank system makes it easier for hospitals to check the available needed blood types. Likewise, there will be blood donors’ registration, thus, ensuring that blood transfusion services will be safe and secured. The system will be of great help to all users; donors, hospital staff, administration in ensuring a better healthcare system. The system allows the blood bank to make inventories of their blood bags online, thus, allowing each hospital to check the availability of blood bags anytime. Likewise, proper management of blood donors ensures that the expected blood transfusion services will be safe and secured.

The user’s (donors/hospital staff) should register in the system by providing all the required information, then they can login (refer Table 3.3.1.1). The donors will take appointments to donate blood (refer Table 3.4.1.2) and can select a time and preferred method (refer Table 3.5.1.6) to first check if they are eligible or not. (refer Table 3.2.1.7). Admin can view all the records of the blood bags (refer Table 3.2.1.3), they can manage all records by updating, deleting or editing them, the admins can search for any donors based on their blood group (refer Table 3.2.1.4). The admin will upload blood reports in the system and the donor can view them (refer Table 3.2.1.7). The hospitals will place requests for blood through the system (refer Table 3.2.1.5). The system should notify whenever an appointment for donating blood is made or blood is requested by the hospital (refer Table 3.2.1.8).

The following tables show functional requirements required for this project and was drafted by Aisha and Maria along with the team.

Table 3.2.1.1: functional requirement-registration

|  |  |
| --- | --- |
| **Requirement ID** | **FUN.REQ.01** |
| **Title** | Registration/ login |
| **Priority** | High Priority |
| **Description** | The users are categorized into 3 types i.e. The admin, the hospital/clinic staff, and the donors. All users must register in the system as per their type to access the facilities provided by the system.  The users can then login with the unique id and password assigned during registration. |
| **Version** | V1.0 |

Table 3.2.1.2: functional requirement-booking blood test appointments

|  |  |
| --- | --- |
| **Requirement ID** | **FUN.REQ.02** |
| **Title** | Booking blood test appointments |
| **Priority** | High Priority |
| **Description** | Donors can book appointments for blood test either from home or by going to the blood bank. Due to the given circumstances, a COVID-19 test will also be performed. Based on their test reports, the eligible donor then can choose the blood donation date as per their ease. |
| **Version** | V1.0 |

Table 3.2.1.3: functional requirement-view blood information

|  |  |
| --- | --- |
| **Requirement ID** | **FUN.REQ.03** |
| **Title** | View Blood Information |
| **Priority** | High Priority |
| **Description** | Admin can view the blood stock as well as the blood bag information like blood group, blood donation date, expiry date. |
| **Version** | V1.0 |

Table 3.2.1.4: functional requirement-manage records

|  |  |
| --- | --- |
| **Requirement ID** | **FUN.REQ.04** |
| **Title** | Manage records |
| **Priority** | High Priority |
| **Description** | The admin can search, sort, add, update or delete any records related to donors and hospitals and blood inventory as well as blood bags. |
| **Version** | V1.0 |

Table 3.2.1.5: functional requirement-request blood

|  |  |
| --- | --- |
| **Requirement ID** | **FUN.REQ.05** |
| **Title** | Request blood |
| **Priority** | High Priority |
| **Description** | The hospital can request for specific blood group blood bags by placing a request through the system. |
| **Version** | V1.0 |

Table 3.2.1.6: functional requirement-booking blood donation appointment

|  |  |
| --- | --- |
| **Requirement ID** | **FUN.REQ.06** |
| **Title** | Booking blood donation appointment |
| **Priority** | High Priority |
| **Description** | The system provides facilities for the eligible donor to choose blood donation date, time and method. |
| **Version** | V1.0 |

Table 3.2.1.7: functional requirement-view eligibility test reports

|  |  |
| --- | --- |
| **Requirement ID** | **FUN.REQ.07** |
| **Title** | View eligibility test reports |
| **Priority** | High Priority |
| **Description** | The results can be viewed by the donor. The result of blood test reports will decide the eligibility of the donor to donate blood. |
| **Version** | ­V1.0 |

Table 3.2.1.8: functional requirement- receive notifications

|  |  |
| --- | --- |
| **Requirement ID** | **FUN.REQ.08** |
| **Title** | Receive Notifications |
| **Priority** | High Priority |
| **Description** | The system should notify the admin whenever a donor books an appointment and when a hospital requests blood. The hospitals will get confirmation notifications. Donors will receive notifications regarding the eligibility test reports. |
| **Version** | V1.0 |

**3.2.2 Quality Attributes**

Quality attributes defines the systems behavior, features and the general characteristics that affects the user experience. It defines the quality of the system.

Different attributes are defined in this system such as robustness of the system against any failure, availability, security, maintainability, performance, portability of the system and usability. These attributes explain how the system run under certain circumstances and how the system respond to specific user.

The following tables shows quality attributes required for this project and was drafted by Aisha, Shaffa, Maria along with the team.

Table 3.2.2.1: quality attributes-robustness

|  |  |
| --- | --- |
| Requirement ID | QA.01 |
| Title | Robustness |
| Priority | High Priority |
| Description | The system should automatically store all the information in the system such that no data will be lost in case any failure. |
| Version | V1.0 |

Table 3.2.2.2: quality attributes -availability

|  |  |
| --- | --- |
| Requirement ID | QA.02 |
| Title | Availability |
| Priority | High Priority |
| Description | The system should be available 24/7. |
| Version | V1.0 |

Table 3.2.2.3: quality attributes -security

|  |  |
| --- | --- |
| Requirement ID | QA.03 |
| Title | Security |
| Priority | High Priority |
| Description | The system should validate the username and password to login. The system prevents unauthorized users from accessing the system. |
| Version | V1.0 |

Table 3.2.2.4: quality attributes -modifiability

|  |  |
| --- | --- |
| Requirement ID | QA.04 |
| Title | Modifiability |
| Priority | High Priority |
| Description | The system should be flexible for adding or modifying different functions without any errors |
|  | V1.0 |

Table 3.2.2.5: quality attributes-performance

|  |  |
| --- | --- |
| Requirement ID | QA.05 |
| Title | Performance |
| Priority | High Priority |
| Description | The system should have response time of not more than 3 seconds. |
| Version | V1.0 |

Table 3.2.2.6: quality attributes -portability

|  |  |
| --- | --- |
| Requirement ID | QA.06 |
| Title | Portability |
| Priority | High Priority |
| Description | The system should be able to run on different browsers such as google chrome, Microsoft edge. |
| Version | V1.0 |

Table 3.2.2.7: quality attributes -usability

|  |  |
| --- | --- |
| Requirement ID | QA.07 |
| Title | Usability |
| Priority | High Priority |
| Description | The system should be simple and easy to use for users of all backgrounds. The layout of the website will aim at easy navigation and access to all the available features through a menu. |
|  | V1.0 |

**3.2.3 Requirement traceability matrix**

A requirement traceability matrix is a document that demonstrates the relationship between requirements and other artifacts. It captures all requirement processed by client and RTM in a single document delivered at the end of software development life cycle. The RTM is prepared by software tester, Maria with the help of software analyst, Faiza along with team and is shown in table 3.2.3.

Table 3.2.3: requirement traceability matrix

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement No.** | **Name** | **Category** | **Source** | **Status** |
| FUN.REQ.1 | Registration/ login | Functional Requirement | Software analyst | Complete |
| FUN.REQ.2 | Booking blood test appointments | Functional Requirement | Software analyst | Complete |
| FUN.REQ.3 | view blood information | Functional Requirement | Consultant | Complete |
| FUN.REQ.4 | manage records | Functional Requirement | Software analyst | Complete |
| FUN.REQ.5 | request blood | Functional Requirement | Consultant | Complete |
| FUN.REQ.6 | Booking donation appointment | Functional Requirement | Consultant | Complete |
| FUN.REQ.7 | view eligibility test reports | Functional Requirement | Software tester | Complete |
| FUN.REQ.8 | receive notifications | Functional Requirement | Software designer | Complete |
| **Quality Attributes** | | | | |
| NON-FUN.REQ.1 | Robustness | Quality Attribute | manager | Complete |
| NON-FUN.REQ.2 | Availability | Quality Attribute | Software tester | Complete |
| NON-FUN.REQ.3 | Security | Quality Attribute | Software designer | Complete |
| NON-FUN.REQ.4 | Modifiability | Quality Attribute | Software Programmer | Complete |
| NON-FUN.REQ.5 | Performance | Quality Attribute | Software Programmer | Complete |
| NON-FUN.REQ.6 | Portability | Quality Attribute | Software Programmer | Complete |
| NON-FUN.REQ.7 | Usability | Quality Attribute | Software designer | Complete |

**3.3 Project Scope Management**

Project Scope is the description of all the work that needs to be done to create deliverables and achieve the project objective. Project scope management includes defining and developing scope statement, scope baseline, work breakdown structure, WBS dictionary validate and control scope.

**3.3.1 Scope Statement**

Scope statement includes the project summary, justifications, characteristics, requirements, project deliverables, project management, project related activities and the project success criteria.

It outlines the entire project including any deliverables and their characteristics as well as a list of stakeholders who will be affected. It also includes any major project objectives, deliverables and targets to help determine success.

The scope statement was drafted by Shaffa with the help of team members as shown in table 3.3.1.

Table 3.3.1: scope statement

|  |
| --- |
| Scope Statement |
| **Project Title: Online Blood Bank Management System**  **Date: 15-10-2020** **Prepared by:** **Shaffa Abdul Sattar, Project Manager,**  **20170305@stu.uob.edu.bh** |
| **Project Justification:**  The Ministry of Health in the Kingdom of Bahrain has requested this project to facilitate the hospitals by providing them the required amount of blood anytime and provide an ease to the donor to donate the blood either by home or hospital after some tests. The budget for this project will be 75,000 BD. |
| **Product Characteristics and Requirements:**   1. Security: The main feature of this software is to maintain a very high level of security because it consists of people’s identity and information. A part of this system should be accessed by licensed hospitals and clinics and ministry of health, on the other hand, other share would be for the users. 2. Register and login: All the users must register and then login to the system. Also, the system will log out automatically after several minutes of inactivity. 3. Update information: Admin can update and provide accurate information about donor and available blood. 4. The website is designed to be very simple and efficient. It is also designed in such a way to help the disabled people to use it. 5. The system will be accessible and available 24/7 as there could be a case of emergency during any time. 6. Requesting appointment: Requesting an appointment and viewing the available blood is the only option visible to the public so they could get the required blood at the right time and they can serve or help other people in getting blood by donating at the right time. The request of appointments will be responded less within an hour. 7. The application will be tested monthly to avoid any inconvenience. 8. Search feature: The system allows the admin to search for donors through their blood group. 9. Reliability: The system must be flexible in such a way that it should not harm or loss data whenever system failure occurs. |
| **Summary of Project Deliverables**  **Project management-related deliverables:** business case, charter, team contract, scope statement, WBS, schedule, cost baseline, status reports, final project presentation, final project report, lessons-learned report, and any other documents required to manage the project.  **Product-related deliverables:** research reports, design documents, software code, hardware, etc.   1. Survey: survey issued from ministry of health for the hospitals and clinics to get more ideas and features required to develop the system. 2. Files for templates: during the first implementation phase, the system will include templates for at least 20 documents. 3. Examples of completed templates: templates used in this project are from the textbook. 4. Instruction for using project management tools: MS project is the project management tool which will be used for this project for work breakdown structures, Gantt charts, network diagrams, cost estimates, earned value management. 5. Example applications of tools: MS project is an example for the tool being used for the project. 6. Database: the system includes and access a database to the licensed hospitals, clinics and ministry of health. 7. Request appointment: the website allows the users to request for appointments at hospitals or at home. 8. Intranet site design: the web application will be simple, straightforward and user-friendly which makes all the users easy to understand. 9. Intranet site content: the intranet site will include different section for users like register, login, view available blood along with medical history, request appointment to donate blood and for the hospitals and clinics to accept appointments and for the admin to manage records (of donors, hospitals and blood). 10. Test plan: testing will be done by testing and quality assurance team first and then ministry of health. Once its approved, it would be available for all the hospitals, clinics and to the people of Bahrain. 11. Promotion: promoting the websites will be done through social media, advertisements and banners. 12. Project benefit measurement plan: benefit plan will measure the financial values and how the system has benefitted the hospitals and people. |
| **Product Success Criteria:**  Our goal is to finish this project within three months and within the given budget. |

**3.3.2 Scope baseline**

A project's scope is made up of the functionalities or specifications outlined in the requirements. Baseline is the starting point of your project plan. The scope baseline consists of the approved version of the scope statement, work breakdown structure and WBS dictionary.

Scope baseline is established by the team members with stakeholder’s requirements taken into consideration. Once the scope baseline is established, it can be changed only through formal control procedures if necessary and is used to measure progress and performance.

**3.3.3 Work Break Down Structure**

Work breakdown structure (or WBS) is a hierarchical tree structure that outlines your project and breaks it down into smaller, more manageable portions. The goal of a WBS is to make a large project more manageable. Breaking it down into smaller tasks ensures that the work can be done simultaneously by different team members, leading to better team productivity and easier project management overall.

WBS consist of five task levels, which further have multiple tasks that need to be completed within the duration as allotted by the project schedule.

The task levels are as follows:

·         pre-initiation and initiation

·         planning

·         execution

·         monitoring and controlling

·         closing

WBS was drafted by Faiza along with the manager and team members.

1. **Pre-Initiation and Initiation**
2. Appoint project manager and team
3. Define Project Goals
4. Kick-off meeting
5. Business Case
6. Develop Project Charter
7. Project Stakeholder Management
8. Develop Stakeholder Register
9. Develop Stakeholder Management Strategy
10. **Planning**
11. Team meeting
12. Develop project approach
13. Develop Team Contract
14. Requirement Management
15. Functional requirement
16. User characteristics
17. Concern and constraints
18. Requirement Traceability Matrix
19. Project Scope Management
    * 1. Scope Statement
      2. Scope Baseline
      3. Create WBS and WBS dictionary
      4. Statement of Work
      5. Verifying Scope of project Deliverables
20. Project Time Management
21. Schedule baseline
    1. Gantt chart
    2. Network diagram
    3. Critical path analysis
22. Establish Communication Management
23. Risk prioritization
24. Risk Management Plan
25. Risk Register
26. Establish Project Work Plan
27. Setting goals and objectives
28. Establishing team responsibilities
29. **Execution**
    * 1. Review/update requirements
      2. Design architecture
      3. Develop Use case Diagram
      4. Develop Class Diagram
      5. Develop Sequence Diagram
      6. Design Graphical User Interface
      7. Map UML Class Diagram to Create Database
      8. Implementation/Coding according to Class Diagram
      9. Milestone Report
      10. Perform Testing
30. Alpha Test
31. Beta Test
    * 1. Performance report
      2. Documentation
      3. Launch web Application
32. **Monitoring and Controlling**
33. Update status meeting
34. Update Milestone report
35. Change request form
36. Performance report
37. Issue log
38. **Closure**
39. Contract Closure Notice
40. Customer acceptance form
41. Lesson-learned report

**3.3.3.1 WBS dictionary**

The object of the dictionary is to describe the task information. This will help prevent the excessive work of project team members that is out of the reach of the project. In sense that holds the representatives inside a limit that cannot be exceeded, the boundary, in this case, is the scope. WBS dictionary is shown in table and was made by Faiza along with the team.

Table 3.3.3.1: WBS dictionary

|  |  |  |
| --- | --- | --- |
| **Reference** | **Title** | **Description** |
| **1.0** | **Pre-Initiation and Initiation** |  |
| 1.3 | Kick off meeting | A first formal meeting should be scheduled and held by the project manager with the sponsors and team members of the project team.  The purpose of this meeting is to present an opportunity for members to chat about their thoughts and offer their input into the project team. |
| 1.4 | Business case | Project manager with the help of software analyst document business objective and information related to project specifications, assumptions and  scope statements. |
| 1.5 | Project charter | A formal, typically short document that outlines the entire project objectives, goals, determining project approach, defining project scope, identifying stakeholders and listing their responsibilities  Since it is used in the project life cycle, it is a key ingredient in preparing the project. |
| 1.6 | Stakeholder management | Process of identifying of stakeholders, organizing and analyzing their needs and expectations; and planning and implementing various tasks to engage with them.  It also involves drafting formal stakeholder management register and strategy. |
| **2.0** | **Planning** |  |
| 2.3 | Team Contract | A contract that is used between the project manager and members of the team. The deal covers the terms and the regulations to be enforced during the working period. It also involves the number of working hours and how much each hour will be paid for. |
| 2.5 | Requirement Traceability Matrix | It is a good way to help ensure the project’s scope, requirements and deliverables maintain the same information throughout the project.  It helps track the status of any requirement during the project. |
| 2.6 | Scope Management | Process of defining what work is required and then making sure all that work is done. Scope management should include the scope baseline, scope statement, create WBS and WBS dictionary, statement of work and verifying scope deliverables. |
| 2.6.2 | Scope Baseline | The approved version of a scope statement, work breakdown structure (WBS), and its associated WBS dictionary. It consists of the scope statement and the defined work breakdown structure of that project, subject the approval of the relevant stakeholders. |
| 2.8 | Communication Management | The method of interaction used by team participants and stakeholders. |
| 2.9 | Risk prioritization | It involves risk manager and PM to draft formal risk management register by identifying potential risks, ranking the risk forms highest to lowest impact, create mitigation plan and monitor and control risks.  The risk manager should review the identified project risks and understand each one well to avoid unpleasant surprises and barriers that can arise. |
| **3.0** | **Execution** |  |
| 3.2 | Design Architecture | Identify a set of components that will perform a function required by the system. Identify a set of connectors that helps in coordination, communication, and cooperation between the components. |
| 3.7 | Map UML Class Diagram to Create Database | UML object models (Class Diagram) can be converted to create relational databases. |
| 3.8 | Coding according to class diagram | Start writing efficient code referring class diagram. |
| **4.0** | **Monitoring & Controlling** |  |
| 4.2 | Update Milestone Report | It documents the progress of projects relative to the specific requirements of each milestone.  It helps validate that the milestone has been achieved and project is on track. When a milestone is achieved, it is updated in milestone report. |
| 4.3 | Change Request form | A formal document for requesting change in any category like scope, cost, schedule, technology or other. It contains information related events that made this change necessary, justification for change and its impact on scope, cost etc. |
| 4.4 | Performance Report | A formal progress report for tacking progress of project include information related about how much work is completed in this reporting period and how much is due, how well is project going. |
| 4.5 | Issues log | A document that contains a list of ongoing or closed issues of project. It is used to manage issues and track error. |
| **5.0** | **Closure** |  |
| 5.3 | Lesson Learned Report | A report written by the team members that includes the lessons learned during the period that they worked in the project. |

**3.3.4 Statement of work**

The statement of work is the document that captures and defines all aspects of a project, such as the activities, deliverables, and the time schedule for the project. It is a very detailed document as it will set the foundation for the project plan.

It includes a description of the business need for the project, a summary of requirements, all deliverables and their due dates, the individual tasks and steps that lead to the completion of the deliverable, and who these tasks are assigned to and as well as the resources needed for the project including facilities, equipment, and quality assurance procedures.

**3.3.4.1 Scope of work**

**Task I: Pre-Initiation and initiation**

1. **Business management:** The project manager will prepare a business case to define the purpose, objective, scope and the problem for which the system is needed. Also, they will provide the preliminary requirements, constraints and assumptions as well as financial analysis and budget estimation.
2. **Pre-project initiation:** After determining the business needs and objectives of the project in brief, the project team sets basic project goals, then the manager drafts the project charter which will give an overview of the project. The stakeholders will be presented with the charter to get feedback and make changes if required.
3. **Stakeholder management:** Allstakeholders including internal or external will be identified and their opinions and requests will be documented. Analyze and prioritize the stakeholder’s requirement and communicate regularly. Ensuring good management of stakeholder will promote steady progress and eventually improve the quality of the product. For proper engagement of stakeholder, stakeholder registry and management strategy will be created.

**Task II: Planning**

1. **Communication plan:** The manager will plan all the meetings and record meeting minutes. They will decide which platform they will use for meetings. All team members can contact each other through chosen platforms. All the work will be distributed during meetings based on each member's area of interest.
2. **Requirement management:** During the meeting with stakeholders, it is the responsibility of the software analyst to gather all functional and non-functional requirements required for this project and will make a traceability matrix table and include the sources of all requirements needed for this project.
3. **Scope management:** The project scope and boundaries will be described by the Analyst along with the project manager. They will write the scope statement, scope baseline and create a WBS and WBS dictionary in which all the projects will be divided into different tasks in the WBS and the purpose of all tasks will be described in WBS dictionary. All the procedures will be documented in the statement of work. Also, all the project deliverable scopes will be verified.
4. **Time management:** To meet the official project end date,the project manager needs to develop a time management plan in accordance with the WBS. It is the management of time spent and the progress made on project’s tasks and activities. The project manager along with the team develops schedule baseline for assigning resources, duration to the tasks which helps in developing Gantt chart and network diagram.
5. **Risk management:** Risk manager and project manager will work together to identify the risks that might be encountered in the project lifecycle. Once the risk has been identified, it needs to be analyzed. Ranking the risks is based on their severity of the risk. The risk manager will develop mitigation plan to eliminate that risk. Not all the risks can be eliminated, some risk are always monitored and controlled by the risk manager and project manager, if not risks can be painful in terms of budget and time resources and hinder the success.
6. **Project work plan:** To ensure the success of the project, the project manager will set smart goals and objectives to finish this project on time and assign responsibilities and tasks to the team members according to their respective roles.

**Task III: Execution**

1. **Review requirements:** The software analyst validates the requirements and should meet the requirements of the stakeholders. In case of varying requirements, the software analyst must update the scope according to the requirements and other related deliverable documents. The software analyst must write the nonfunctional requirements as quality attribute.He should also establish user characteristics, concerns and constraints of the system.
2. **System design and architecture:** Based on the results from the above requirement reviewing, the software designer will propose and develop the software architecture design model. The software designer proposes the manager to use ADD design to create software design using architecturally important requirements and develop a detailed architecture to achieve relevant diagrams like class diagram, sequence diagram etc. The architect will be available later to update the architecture designs as new requirements and ideas are likely to appear.
3. **Implementation:** The manager will overlook all implementation processes and allocate responsibilities among team members for various tasks like designing user interface, mapping Class Diagram to create database etc. and making sure they are going according to the designed architecture. The software programmer will do a regular review of coding to ensure the success of the system.
4. **Testing and documentation:** The software tester will overlook all testing and documentation process and progress. Relevant stakeholders’ opinion will be taken regarding the testing outputs. Any problems or changes needed will be clearly dealt by relevant team members. Before launching the software, the software must be tested through alpha and beta test.
5. **Launch:** The official release of the software will include completely defined task list, templates, deliverables and a trained team. The manager should prepare the training tools needed. The manager should make sure that the tools can easily be understood by the trainers and beginners.

**Task IV: Monitoring and controlling**

1. **Update and monitor progress:** The manager will always be active and promote regular status update meetings where current situations and problems are discussed, and when milestones are successfully completed, they will be registered without fail. The performance of the team will also be noted into performance report. Any issue surfacing will be drafted in issue log.
2. **Configure and manage deviations:** The project manager will organize and update any changes occurring in the requirements, scope baseline, schedule baseline, cost baseline etc. and will ensure the changes made are properly documented and managed. Change request forms must be submitted to the manager which will then be discussed by the relevant team members to discuss its feasibility which will then be taken to the architecture and development team to make necessary amendments.

**Task V: Closure:**

1. **Closure reports:** The company will create a proper closure notice to notify MOH. A customary lesson learned report will be generated by the project members to close off the project. The report should provide overall goal of the project, methods used, results, results and adherence to time and budget.

**3.3.4.2 Location of work**

Due to the current conditions, all the work is scheduled to be at homes and if there will be any need for people to meet, the organization will take necessary precautionary steps for the safety of its employees. Current periodic meetings will be held through MS Teams and daily problems will be solved through either MS Teams, email or WhatsApp.

**3.3.4.3 Period of performance**

The project starts on 1 October 2020 and ends by 31 December 2020.

**3.3.4.4 Deliverables schedule**

Deliverables schedule helps in tracking the delivery of the project and is shown in table 3.3.4.4.

Table 3.3.4.4: deliverables schedule

|  |  |
| --- | --- |
| Week | Project activity |
| 1-2 | Pre-initiation and initiation |
| 2-5 | Planning |
| 5-8 | Execution/Implementation |
| 8 | Monitoring and controlling |
| 9 | Closure |

**3.3.4.5 Acceptance criteria**

Acceptance criteria are a set of conditions that is required to be met before deliverables are accepted. All the deliverables that are to be presented to MOH should meet their specified requirements. After a complete review of the project deliverables, all the adjustments will be made if needed. Formal acceptance will be requested once the project is approved by MOH.

**3.4 Project Time Management**

Time management is one of the major functions of project management.

A project, by definition, has an official end date. To meet this date, every project needs a schedule. Project managers needs to manage their own time and the team’s time to ensure that the schedule is met. Time management is the management of the time spent, and progress made, on project’s tasks and activities. For a better project time management, the team should focus on the planning, scheduling, monitoring, and controlling of all project activities. The aim is to provide a guidance on how project schedule will be managed throughout the project life cycle.

This includes defining and sequencing activities, estimating resources and durations, developing and controlling the schedule.

A Meeting was scheduled and conducted among the team members on MS -teams. All the members discussed and defined the activities of the project. After listing all the activities, they were ordered in a sequenced fashion .and then finally after a careful review by the project leader, the project time management plan was approved and was put into effect.

**3.4.1 Gantt chart**

Gantt chart shows project schedule, a calendar of tasks, dependency relationship between activities and schedule which helps to successfully manage time. Afnan made Gantt chart for our project along with the manager and other team members to organize the tasks and is shown in figure 3.4.1. All the tasks, duration, resources and dependencies were entered in the task sheet after discussion among the team.

Figure 3.4.1: Gantt chart

Table

Description automatically generated

Timeline

Description automatically generated

A picture containing indoor, sitting, table

Description automatically generated

Timeline

Description automatically generated

Timeline

Description automatically generated

A picture containing waterfall chart

Description automatically generated

The task sheets which was required to achieve a gantt chart and network diagram is shown in figure 3.4.1.1

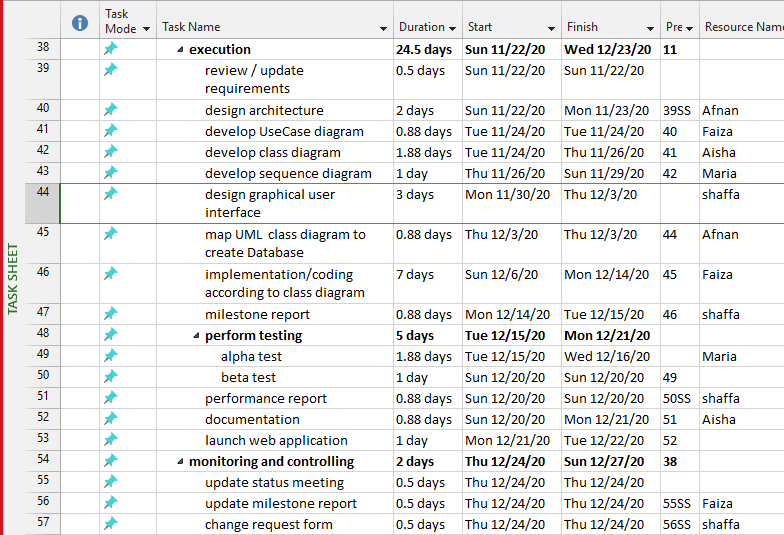
Figure 3.4.1.1: task sheets

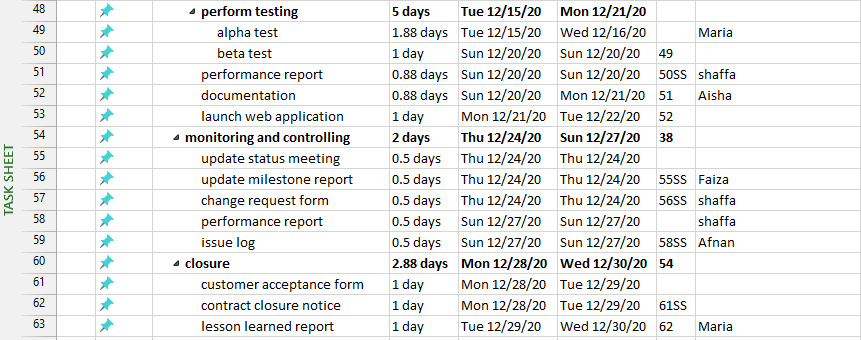
**Table

Description automatically generated**

Table

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**3.4.2 Network diagram**

A network diagram is a graphical representation of all the tasks, responsibilities, and workflow for a project. It is used to map out the schedule and work sequence for the project, as well as track its progress through each stage, up to and including completion. Since it encompasses every single action and outcome associated with the project, a network diagram also illustrates the scope of the project and the critical path.

A team meeting was held to discuss the network diagram. Afnan, with help of the team members created the network diagram which was then reviewed by the project manager and is shown in figure 3.4.2. The critical task is also shown in figure 3.4.2.1.

Figure 3.4.2: network diagram

**Diagram

Description automatically generated**

Figure 3.4.2.1: critical task

**Table

Description automatically generated**

**3.5 Project Communication Management**

Excellent communication is a critical part of a project success. Most projects fail due to poor communications hence establishing and managing the communication between all the stake holders is significant.

Project managers spend most of their time communicating with team members and project stakeholders, whether they are internal or external to the organization. Effective communication creates a bridge between diverse stakeholders who may have different cultural and organizational backgrounds, levels of expertise, perspectives, and interests, which impact or have an influence upon the project execution or outcome.

Due to the ongoing COVID-19 pandemic, and as per the instructions issued by the Ministry of Health, the team decided that means of communication for the project will be virtual. MS-Teams will be used to conduct virtual meetings, work division and reviews. Emails and WhatsApp will be used for exchanging messages, notifications and one to one communication.

Table 3.5 was drafted by Afnan along with the team and was approved by project manager.

All meeting minutes are noted and documented and can be found in the appendix.

Table 3.5: table communication strategy

|  |  |  |  |
| --- | --- | --- | --- |
| Recipient | Frequency | Mode | Responsibility |
| Ministry of health | Monthly | Email  MS-Teams | Sponsor |
| Project Manager | Weekly | Email  MS-Teams  WhatsApp | Project Team Member |
| Software Analyst | Weekly | Email  MS-Teams  WhatsApp | Project Team Member |
| Software designer | Weekly | Email  MS-Teams  WhatsApp | Project Team Member |
| Software Programmer | Bi-weekly | Email  MS-Teams  WhatsApp | Project Team Member |
| Software Tester | Weekly | Email  MS-Teams  WhatsApp | Project Team Member |
| Consultant | Weekly | Email  MS-Teams  WhatsApp | Project Team Member |
| Risk Manager | Weekly | Email  MS-Teams  WhatsApp | Project Team Member |

**3.6 Risk Management Plan**

Risk management plan is the process of identifying and analyzing the risk in the project. Project teams hold several meetings to identify, analyze, manage and control risks along with the risk manager. It is important to clarify roles and responsibilities, prepare budgets and schedule estimates for risk related work and carefully review the risks along with the team members. Ignoring any unclear task or any unclear analysis could increase the chances of risk. Identifying risk earlier is very important. Shaffa held a team meeting to identify the potential risks. Table no 3.6 was drafted by risk manager and approved by project manager and it shows how the risk management plan is carried out.

Table 3.6: risk management plan

|  |
| --- |
| **Risk Management Plan**  **Date: 24-10-2020** |
| **Project Name**: Online blood bank management system |
| **1. Methodology**  Many tools and techniques like brainstorming, SWOT analysis, risk register are available for identifying the risks. |
| **2. Roles and Responsibilities**   |  |  | | --- | --- | | **Roles** | **Responsibilities** | | Risk manager | * Plan and draft all the risk. * Identify the root cause, consequences of each risk. * Assess the probability occurrence and impact for each risk in a project. * Develop mitigation plan and preventive measures. * Facilitate risk review meetings. | | Project manager | * Participate actively in risk management plan. * Update the team about the risk. * Analyze, review and manage the risk. * Provide suggestions and solutions. | | Project team | * Participate actively in risk management plan. * Inform the manager about new risks. * Discuss about risk mitigation. | |
| **3. Budget and Schedule**  The estimated cost and schedules for performing risk related activities depend on their priority level and depends on the time taken to solve the problem. |
| **4. Risk Categories**   * Cost * Schedule * Quality * Environment * Client * Technical * Quality * People |
| **5. Risk Probability and Impact**  The risk manager and the entire project team including manager will discuss the issues of the project and once done, the risk manager would list them into potential risks based on risk category. The risk manager can plan the probability and impact on a chart which lists the relative probability and relative impact of the risk occurring. This would help the team to identify those risks that need maximum attention. For this, the risk manager would note down the risks that they think are likely to occur and label them as high, medium or low probability and impact. |
| **6. Risk Documentation**  Whenever the risk is identified by anyone in the team, it should be discussed to the risk manager and the team and form a document explaining briefly about the risk and mentioning the risk probability and risk impact. |
| **7. Risk Tracking**  Risk tracking is the procedure of examining and monitoring the risks regularly and documenting them whenever any modifications were made. The project manager tracks and controls the risk throughout the project by communicating with the related stakeholders and develop a potential solution to eliminate or reduce its impact. It is the responsibility of the risk manager to alert the team whenever risk mitigation plans are applied and update the risk register. |

**3.6.1 Risk Register**

The risk register is a tool used to record possible risk events and associated information to classify specific or unknown events that could arise to decide how these risks are handled and resolved. With the support of the team members, the project manager is responsible for writing certain activities.

Table 3.6.1: risk register

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID No** | **Rank** | **Risk** | **Description** | **Category** | **Root Cause** | **Triggers** | **Potential Responses** | **Risk**  **Owner** | **Probability of Occurrence** | **Impact** | **Status** |
| **R1** | **1** | Schedule Risk | The probability for a task to take longer than scheduled. | Time management | Lack of Intent,  Sluggish,  Not following Schedule | Loss of product delivery on  Time  Accumulation of costs and wasting resources | One potential solution would be to do overtime or depending on project budget and resources extend the deadline or in case of reserves overflow introduce more resources. | Team member,  Project Manager | High | High | The PM must call meeting to check progress of tasks and review all work monthly to ensure smooth project workflow. |
| **R2** | **2** | Poor Financial  Record | Inadequate Record | Financial Management | Inability to keep track of fund. | Poor Audit Report  Financial Irregularities | Financial Regulations must be in sited and reviewed monthly by Finance manager and approved by all sponsors. | Team Member  for managing  financial record | Medium | High | The PM must prepare a meeting to verify and review financial records. |
| **R3** | **3** | Inadequate  Reserves | Lack of funds to meet unexpected  expenditure | Financial Management | Poor forward planning  Poor management | Loss of stakeholder confidence  Poor Audit Report  Loss of product delivery | Selecting the sensible budgeting plan presented by risk manager. | Project Manager | Medium | High | The PM must prepare a meeting to discuss and develop a mitigation plan. |
| **R4** | **4** | Mishandling of Reserves | Loss of sponsor Reserves | Financial  Management | Theft /  Fraud /  Sabotage | Additional Costs and  Wasting resources | Sufficient Funds to cover repair or replacement of assets | Project Manager | Low | High | The PM must call a meeting to discuss the issue and review all reserves monthly. |
| **R5** | **5** | Failure to meet varying  Requirements of stakeholder | Unable to recognize the changing needs and expectations of the committee | Strategical  Issues | Poor decision making  No forward planning | Loss of community/  stakeholder confidence. | Follow continuous monitoring of stakeholder engagement ­­Strategy | Project Manager | Medium | Hight | The PM should set up a meeting with stakeholders to  discuss. |
| **R6** | **6** | System  Incompatibly | Component Inconsistency  (Unable to perform together) | Operational  Issues | Lack of regular Integration testing | Loss of product Delivery  Delays testing | The project manager should monitor, review and perform unit and integration testing. | Programmer,  Project Manager | Low | High | The PM should set up a meeting to discuss. |

**3.7 Establishing project work plan**

The table below shows distribution of work among the team members according to their respective roles.

Table3.7: distribution of work

|  |  |
| --- | --- |
| Role | Responsibilities |
| Project Sponsor | ·         Provide business context, expertise and responsible for the overall success of the project.  ·         Acts as an escalation point for decisions and issues that are beyond the authority of the project manager.  ·         Ensure the authenticity of the business case and the possibility of the business proposition.  ·         Ensure ongoing alignment to business objectives.  ·         Define project success criteria that align with the business objectives. |
| Project Manager | ·         Software project manager defines the requirements of the project, builds the project team, lays out a blueprint for the whole project.  ·         Initiation Phase  ·         Planning and defining scope  ·         Activity planning and sequencing  ·         Project Status Meeting  ·         Project time management  ·         Communication Plan  ·         Statement of Work  ·         Creating the WBS  ·         Conduct Project Management  ·         Monitoring and reporting progress  ·         Launch the website |
| Software Analyst | ·         Systems analysts collect and analyze the requirements for the system, perform complex analysis, designing and programming to meet business requirements.  ·         Requirements Management  ·         Requirements Elicitation and Analysis  ·         Interact with end-users and software consultants  ·         Requirements Traceability Matrix  ·         Develop the design architecture models |
| Software Designer | ·         Develop the design Architecture Models  ·         Start Prototyping  ·         Develop Interface Design  ·         Deploying software tools, processes and metrics  ·         Searching, designing, implementing and managing software programs  ·         Develop design specifications in accordance with business requirements and issues. |
| Software Programmer | ·      Determine the framework required for the web application (Laravel - php framework)  . Create the Database  . Writing and implementing efficient code  ·         Managing database systems  ·         Maintaining operating systems  . Identifying areas for modification in existing programs and subsequently developing these modifications  . Determining operational practicality  ·         Developing quality assurance procedures |
| Software tester | ·         Detect and track software defects and inconsistencies  ·         Perform testing  ·         Conduct the testing, analyze the results and submit observations to the development team |
| Risk manager | . Identify risks and analyze  ·         Develop risk management plan  . Conduct risk review meetings  ·         Develop mitigation plan and preventive measures.  . Develop risk register |
| Consultant | . Provide feedback and suggestions related to medical issues  . Share experience (medical insights related to the system) |

**4.0 Execution**

The project execution phase is the third phase of the project lifecycle. This phase is usually the longest phase in the project life cycle and it typically consumes the most resources.

The main objectives of this phase are creation of project deliverables, monitoring and controlling and reviewing. In execution phase, we implement tasks stated in the planning phase, monitor and control them by implementing the plans developed in the planning phase to manage time, cost, quality, change, and risks. Reviewing each completed task and deliverables is required to ensure that it is in accordance with the customer requirements. The deliverables produced are then presented to the customer for acceptance.

## 4.1 User Characteristics

**Admin:** Admins can search for donors, hospital staff and blood types as well as blood bags. Admins can view all the information in the database of the system as well as edit, make necessary updates, add or delete information such as blood inventory, blood bag information, all booked appointments for blood tests, and blood donations, as well as blood tests results for all donors and the blood requests sent by the hospitals. Admins upload the results of blood tests for donors, and sets eligibility based on the test results. Admin receives notifications regarding booking of appointments (blood tests and donation), blood test results and blood bag request from hospital staff.

**Donors:** Donors are one of the users of the system. They can view their information which they entered during registration and edit it if required. They can book blood tests appointments and choose type of collection method they prefer. They can view their blood test reports once the results are uploaded by the admin. Eligible donors can book blood donation appointments and are given the facility to choose the time and date that is suitable for them. They can also view their all their blood test results and blood donations records in their record history. Donors receive notifications regarding their appointment confirmation and blood tests results.

**Hospital staff**: Hospital staff can search for a specific blood type and view available blood bags for it. They can place a request for blood bags through the system and receive confirmation notification about the request. Hospital staff can view their information entered during registration and their request records.

**4.2 Use Case Scenarios**

**Use Case 1: Registration/Login**

*Primary Actors: User*

*Pre-Condition: There must be internet connection for accessing the website*

*Post-Condition: User will be able to register and login*

*Main Scenario:*

1. User will access the website.
2. User will select login or register.
3. User will select register.
4. System will ask the user to enter information.
5. User will enter the required information like first name, last name, CPR, phone number, username, password
6. User will click on “Register”.
7. System will show confirmation message.
8. User will click on “Sign in”.
9. System will ask the user to enter username and password.
10. User will input the username and password.
11. User will click on “Login”.
12. System will direct the user to the main page.

*Alternate Scenario:*

10(a): User entered wrong username or password.

10(a)1: System will ask the user to enter the username and password again.

Quality Requirements:

1. Security
2. Performance
3. Availability
4. Usability
5. Portability

Priority Level: High priority (Core requirements)

**Use Case 2: Booking Blood Test Appointments**

*Primary Actors: Donor*

*Pre-Condition: User is logged in.*

*Post-Condition: Blood test appointment is booked.*

*Main Scenario:*

1. Donor will click on the blood test appointment for safe blood transfusion (COVID-19 test and other medical check-ups).
2. System will ask the user to enter the method they prefer for blood check-up (at home, clinic or hospital).
3. If donor selects check-up at home, the system will ask the user to enter required information like address, date, time, CPR.
4. System will save the record.

*Alternate Scenario:*

3(a): Time and date slot selected is not available.

3(a)1: System asks the user to select new slot.

Quality Requirements:

1. Usability
2. Availability
3. Performance

Priority Level: High priority (Core requirements)

**Use Case 3: View Blood Information**

*Primary Actors: Admin*

*Pre-Condition: Admin is logged in.*

*Post-Condition: Admin should be able to view blood information.*

*Main Scenario:*

1. Admin clicks on “view blood information”.
2. System displays blood information like the blood group, blood donation date and its expiry date.

*Alternate Scenario:*

2(a): Internet connection fails.

2(a)1: the system asks the user to reconnect for viewing the information.

Quality Requirements:

1. Availability
2. Usability
3. Performance

Priority Level: High priority (Core requirements)

**Use Case 4: Manage Records**

*Primary Actors*: *Admin*

*Pre-Condition: Logged into the system*

*Post-Condition: the admin can search, add, update, delete records related to donor, hospital and blood inventory records.*

*Main Scenario:*

1. The admin clicks on “manage records”.
2. The system displays option of selecting donor record, hospital record, blood inventory.
3. Admin clicks on records of blood inventory.
4. System displays available options:

* Add
* Delete
* Update
* Search

1. Admin selects update blood inventory record.
2. System asks the user to enter information to update.
3. Admin enters the blood group, donation time and expiry date of the blood donated.
4. Admin clicks on save.

*Alternate Scenario:*

8(a): Unsuccessful update

8(a)1: The system allows admin to try again

Quality Requirements:

1. Robustness
2. Security
3. Availability
4. Usability
5. Maintainability

Priority Level: High priority (Core requirements)

**Use Case 5: Request Blood**

*Primary Actors: Hospital or clinic staff*

*Pre-Condition: Logged into the system*

*Post-Condition: the hospital/ clinic will be able to request the blood*

*Main Scenario:*

1. Hospital staff clicks on “Request blood”.
2. System asks the user to enter the blood group.
3. System displays the number of blood bags in the requested blood group.
4. System will ask the user to enter the number of blood bags required, date and time.
5. Hospital staff will enter the number of bags required, delivery date and time and clicks on submit.
6. System will save the information.
7. The staff will receive confirmatory notification via use case Receive Notifications.

*Alternate Scenario:*

3(a): The requested blood group is not available

3(a)1: System will display selected blood group bags are “not available”.

5(a): User enters the number of blood bags greater than the number of available bags.

5(a)1: System will notify the available number of blood bags

Quality Requirements:

1. Availability
2. Performance
3. Usability

Priority Level: High priority (Core requirements)

**Use Case 6: View Eligibility Test Report**

*Primary Actors: Donor*

*Pre-Condition: Donor is logged in and have given blood samples for the test*

*Post-Condition: The donor can see the eligibility of the donor for blood donation.*

*Main Scenario:*

1. The system will send the notification to the donor regarding the blood test report.
2. Donor will view the report.
3. If he is eligible, then he will proceed for donating blood [Extension point: XPbook].

*Alternate Scenario:*

3(a). Donor is not eligible.

Quality Requirements:

1. Availability
2. Usability

Priority Level: High priority (Core requirements)

**Use Case 7: Booking Donation Appointments**

*Primary Actors: Donor*

*Pre-Condition: Donor is eligible to donate blood*

*Post-Condition: Donor will be able to book appointment.*

*Main Scenario:*

[at extension point: XPbook]

1. Donor will click on “Booking” for booking donation appointment.
2. System will ask the user to choose blood donation date, time and method.
3. Donor will enter the blood donation date, time and method.
4. User will click on “submit”.
5. System will store the information.
6. System will notify the admin about donors request for appointment.

*Alternate Scenario:*

3(a): Time and date slot selected is not available.

3(a)1: System asks the user to select new slot.

Quality Requirements:

1. Usability
2. Availability
3. Performance

Priority Level: High priority (Core requirements)

**Use Case 8: Receive Notifications**

*Primary Actors: Users (Admin, Hospital staff, Donor)*

*Pre-Condition: Donor books an appointment or Hospital requests blood.*

*Post-Condition: Receive notification*

*Main Scenario:*

1. Donor books an appointment for blood test.
2. System sends the notification to the admin regarding the donor’s appointment.

*Alternate Scenario:*

2(a): Internet connection fails.

2(a)1: the system asks the user to reconnect for viewing the information.

Quality Requirements:

1. Availability
2. Usability

Priority Level: High priority (Core requirements)

**4.2.1 Use case description**

It provides the description of all the use cases as mentioned in the below table 4.2.1 and was drafted by Maria.

Table 4.2.1: use case description

|  |  |  |
| --- | --- | --- |
| **Use Case ID** | **Use Cases** | **Description** |
| **UC-1** | Registration/Login | The user (admin, Donor, Hospital/clinic staff) can register and login into the system |
| **UC-2** | Booking Blood Test Appointments | The donor can book an appointment for the blood test. |
| **UC-3** | View Blood Information | Admin can view the information related to the blood (and their groups). |
| **UC-4** | Manage Record | Admin can make changes in any record related to the donor, hospital, and blood inventory. |
| **UC-5** | Request Blood | The hospital can request for the blood from the blood bank. |
| **UC-6** | View Eligibility Test Report | The donor can view his/her eligibility by the result of his/her blood test report. |
| **UC-7** | Booking Donation Appointment | Only the eligible donor can take the blood donation appointment. |
| **UC-8** | Receive Notification | The admin should be notified by the system whenever a donor books an appointment and the hospital requests a blood.  Donors will receive notifications regarding blood test reports.  Hospitals will get blood test confirmation notifications. |

**4.2.2 Quality attributes**

It provides the description of all the quality attributes as mentioned in the table 4.2.2 and was drafted by Shaffa.

Table 4.2.2: quality attributes

|  |  |  |  |
| --- | --- | --- | --- |
| **Id** | **Quality attribute** | **Description** | **Related**  **Use case** |
| **QA-1** | Robustness | The system should automatically store all the information in the system such that no data will be lost in case any failure. | UC-4 |
| **QA-2** | Availability | The system should be available 24/7. | All |
| **QA-3** | Security | The system should validate the username and password to login. The system prevents unauthorized users from accessing the system. | UC-1, UC-4 |
| **QA-4** | Modifiability | The system should be flexible for adding or modifying different functions without any errors. | UC-4 |
| **QA-5** | Performance | The system should have response time of not more than 3 seconds. | UC-1, UC-2, UC-3, UC-5, UC-7 |
| **QA-6** | Portability | The system should be able to run on different browsers such as Google Chrome, Microsoft edge. | UC-1 |
| **QA-7** | Usability | The system should be simple and easy to use for users of all backgrounds. The layout of the website will aim at easy navigation and access to all the available features. through a menu. | All |

**4.2.3 Concerns**

Applying cultural views to model the design based on stakeholder concerns and table 4.2.3 was drafted by Faiza which shows main concerns of our system.

Table 4.2.3: concerns

|  |  |
| --- | --- |
| **ID** | **Concerns** |
| CRN-1 | Establishing an overall initial system structure. |
| CRN-2 | The team members are knowledgeable about php framework. |
| CRN-3 | Allocate work to members of the development team. |
| CRN-4 | The system must be able to maintain and update. |
| CRN-5 | The system must support logging, authentication, authorization and configuration. |

**4.2.4 Constraints**

Constraints are some conditions that are likely to happen or wish them to happen while designing. Table 4.2.4 was drafted by Aisha and it shows some of the constraints that our system will have.

Table 4.2.4: constraints

|  |  |
| --- | --- |
| **ID** | **Constraints** |
| CON-1 | Minimum of 500 users must be supported simultaneously. |
| CON-2 | The system must be completed within 3 months. |
| CON-3 | The system should be accessible by Android and IOS users. |
| CON-4 | Web application requires an active internet connection. |
| CON-5 | A database must be used to store all information about blood bank, hospitals and users. |
| CON-6 | Network connection to all the user’s workstations must have high bandwidth. |

**4.2.5 Use case diagram**

In 1986, Ivar Jacobson first formulated textual and visual modeling techniques for specifying use cases. A UML use case diagram is the primary form of system requirements for a new software program. The diagram is used to model the system of an application. A single use case diagram captures a particular functionality of a system. Use cases specify the expected behavior (what), and not the exact method of making it happen.

A key concept of use case modeling is that it helps us design a system from the end user's perspective. It is an effective technique for communicating system behavior in the user's terms by specifying all externally visible system behavior. Use case diagrams are used to Specify the context of a system, capture the requirements of a system, drive implementation and generate test cases. It is an effective technique for communicating system behavior in the user's terms by specifying all externally visible system behavior. The following figure 4.2.5 was sketched by Faiza and Shaffa.

Figure 4.2.5: use case diagram

Diagram

Description automatically generated

**4.2.6 Class diagram**

A class is a description of a group of objects all with similar roles in the system, which consist of structural (attributes) and behavioral (operations) features. In the Unified modelling language (UML), the class diagram is a type of static structure diagram that describes the structure of the system. it shows the system’s classes, attributes and methods for each class and the relationships between them.

The purpose of the class diagram is to show static structure of classes in a system as well provide a basic notation for other structure diagrams .class diagrams are helpful for developers and business analysts who can use the class diagram to model systems from a business perspective. The project manager along with the team discussed and created the class diagram.

Figure 4.2.6 class diagramDiagram

Description automatically generated

**4.3 The Design Process**

In this section, software designer Afnan with the help of project manager Shaffa starts the iteration process in the designing of the system or the translating system requirements into design decision.

## Step 1: Review Input

In the following step, reviewing the inputs and identifying requirements will considered as drivers and the input are summarized in the table. This table was drafted by Faiza.

|  |  |  |  |
| --- | --- | --- | --- |
| Category | Details | | |
| Design purpose | This is greenfield system from a mature domain. The purpose is to produce a sufficiently detailed design to support the construction of the system. | | |
| Primary functional requirements | From the use cases presented, the primary ones were determined to be:  **UC-2:** Because it directly supports the core business.  *(Book Blood Test Appointment)*  **UC-5:** Because it directly supports the core business.  *(Request Blood)*  **UC-6:** Because it directly supports the core business.  *(View Eligibility Test Report)*  **UC-7:** Because of the technical issues associated with it.  (Book Donation Appointment)  **UC-4:** Because of the technical issues associated with it.  (Manage Records) | | |
| Quality attribute scenarios | **The scenarios described have now been prioritized as follows:** | | |
| **Scenario ID** | **Important to the customer** | **Difficulty of implementation According to Architect** |
| QA-1  *(Robustness)* | High | High |
| QA-2  *(Availability)* | High | High |
| QA-3  *(Security)* | High | Medium |
| QA-4  *(Modifiability)* | High | High |
| QA-5  *(Performance)* | High | High |
| QA-6  *(Portability)* | High | High |
| QA-7  *(Usability)* | High | Low |
| From this list, only QA-2, QA-3, QA-4, QA-5 and QA-7 are selected as drivers | | |
| Constraints | All the constrains discussed in Section 1.2.3. are included as drivers. | | |
| Architectural concerns | All the architectural concerns discussed in Section 1.2.4. are included as drivers. | | |

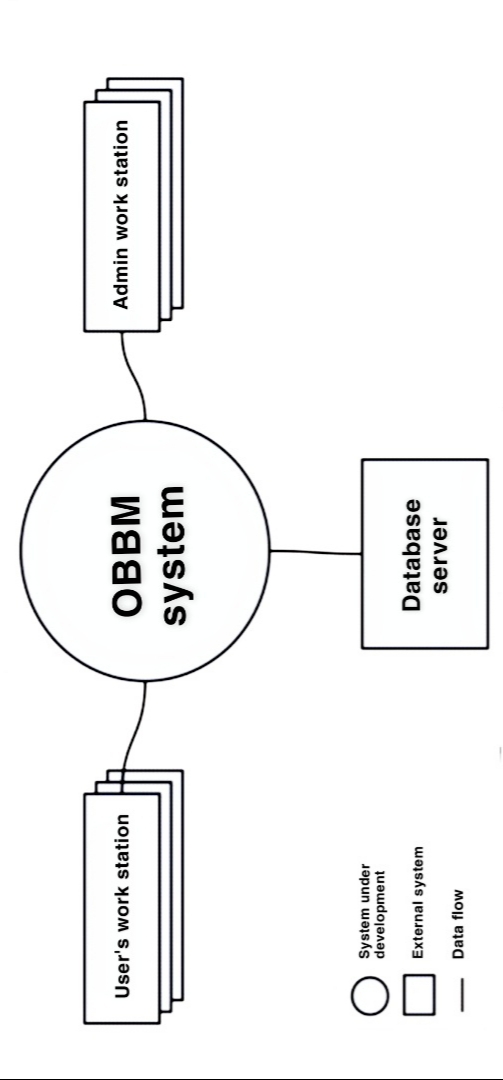
**Iteration 1: Establishing an Overall System Structure**

This section presents the results of the activities that are performed in each of the steps of ADD in the first iteration of the design process.

**Step 2: Establish Iteration Goal by Selecting Drivers**

This is the first iteration in the design of Greenfield system, in which the iteration goal is to achieve the architectural concerns.

Although this iteration is driven by a general architectural concern, the architect must keep in mind all the drivers that may influence the general structure of the system. In particular, the architect must be mindful of the following:

* **QA-2:** Availability
* **QA-3:** Security
* **QA-4:** Modifiability
* **QA-5:** Performance
* **QA-7:** Usability
* **CON-3:** The system must be accessed through different desktop browsers (chrome, internet explorer, Firefox) and through different mobile browsers (safari for IOS users, and internet for android users).
* **CON-5:** All the operations must be stored in the system database.
* **CON-6:** Network connection to user workstation must have high bandwidth.
* **CRN-1:** Establishing an overall system structure.
* **CRN-2:**  The team members are knowledgeable about php framework.
* **CRN-3:**  Allocate work to team members.
* **CRN-4:** The system must be able to maintain and update.
* **CRN-5:** The system must support logging, authentication, authorization, and configuration.

*Figure 4.3.1: context diagram*

## Step 3: Choose One or More Elements of the System to Refine

The entire OBBM system’s elements is refined and this refinement is performed through decomposition, as followed in Greenfield develop.

## Step 4: Choose One or More Design Concepts That Satisfy the Selected Drivers

The selection of design decisions is summarized below and was drafted by Shaffa:

|  |  |  |  |
| --- | --- | --- | --- |
| **Design Decisions and Location** | **Rationale** | | |
| The client part of the system is logically structured using **Web Application**. | This application is preferred as it supports all the mentioned use cases as it is implemented also keeping in mind that application needs to be accessible over internet, require portability of the user interface and to limit(minimize) the use of client-side resources. It also supports CON-3.  **Discarded alternatives:** | | |
| ***Alternate*** | ***Reason for discarding*** | |
| Rich Internet Application (RIA) | The client is not required to perform any sort of processing on his\her side. | |
| Rich Client Application | The Rich Client Application (RCA) reference architecture doesn’t support or run in a web browser. It rather needs deployment of application on the user’s PC’s and support intermittent or network connectivity. | |
| Mobile Applications | This reference architecture is oriented toward the development of applications that are deployed in handheld devices. This alternative was discarded because this type of device was not considered for accessing the system. | |
| The server part of the system is logically using the **Web Application**. | The components in the server side of the application structure supports all the concerns of this system drivers.  No other alternatives were considered and discarded as this architecture is fully adequate to meet the requirements. | | |
| **Three-tier deployment pattern** is used to physically structure the application | The accessibility of the system is done through a web browser (CON-3) which is available in the web-tier in the three-tier deployment. This tier also consists a database tier that can be used for the secure storage of information (QA-4 QA-3, CON-5). | | |
| ***Alternate*** | | ***Reason for discarding*** |
| Four- tier deployment | | This business logic tier in this the deployment pattern is not necessary for this system. |
| Two-tier deployment | | This is a server-client deployment pattern that doesn’t provide security and multiple user functionality. |
| Build the user interface of the client application using **MVC** **framework** | It is the standard web development framework (CON-3) to create scalable, extensible projects and it is what developers are familiar with (CRN-2)  Discarded alternatives include Swing Java framework because it supports Java Rich Clients that is not necessary for our system. | | |
| Deploy the application using **Laravel with Xampp.** | XAMPP comes with pre-configured Apache wed server along with PHP (CON-3) and MySQL cloud ensures security (CON-5, CON-6) that facilitates developer’s ease of access. Moreover, Laravel framework comes with ORM (Object-Relational Mapping) and offers built-in authentication mechanisms and caching mechanism.  Discarded alternatives include Java because it requires to have an SDK and it cannot run on a web browser. | | |

## Step 5: Instantiate Architectural Elements, Allocate Responsibilities, and Define Interfaces

The instantiation design decisions considered and made are summarized in the following table and was drafted by Aisha:

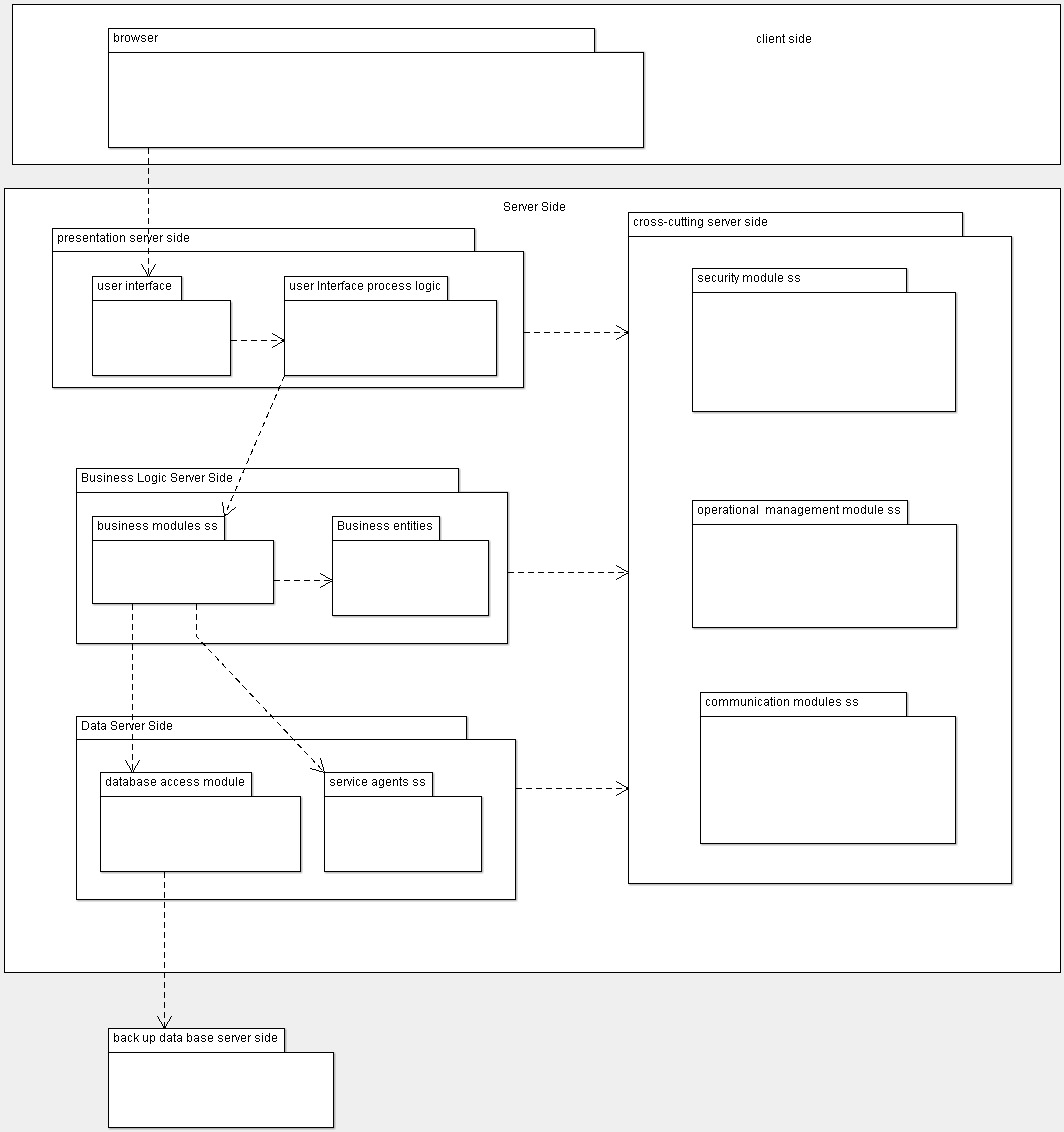
|  |  |
| --- | --- |
| **Design Decision and Location** | **Rationale** |
| Remove helpers and utilities from the web application. | The system does not require an additionally functionality that is not specific to others. |
| Create backup database in the server side of the web application. | The backup stores crucial information that can be retrieved later in case of virtual attack. |

The results of this instantiation decisions are recorded in the next step. In this initial iteration, it is typically too early to precisely define functionality and interfaces. In the next iteration, which is dedicated to defining functionality in more detail, interfaces will begin to be defined.

## Step 6: Sketch Views and Record Design Decisions

Diagram 4.3.2 describes the sketch of a module view of the reference architectures that were selected for the client and server applications that is now adapted to the design decisions that we have made.

Figure 4.3.2: Modules obtained from the selected reference architectures



The diagram was sketched using Argo UML tool by Afnan. Through this tool, selected elements with a short description of their responsibilities and noted. The description merely contains the functional responsibilities without any detail.

|  |  |
| --- | --- |
| Element | Responsibility |
| Browser (CS) | A web browser runs on the client side (CON-3). |
| Presentation (SS) | Responsible for managing user interaction (represents both IU components and UI process logic components). |
| User Interface (UI) | This component is responsible for enabling user interaction and presenting information to the users and controls the flow of all use cases. |
| UI process logic | These components are responsible for managing the control flow of the applications use cases |
| Business logic SS | These components are responsible for retrieving and processing application data and applying business rules on the data. |
| Business Modules SS | These modules either implement business operations that can be performed locally or expose business functionality. |
| Business entities | These components represent the entities from the business domain and their associated logic. |
| Cross cutting SS | The functionalities that go across different layers such as security, logging, and I/O are carried out in this layer which supports (QA-3) and (UC-4). |
| Security module SS | Authorization, authentication and other security aspects (QA-3, QA-4) are handled in the security component in the cross-cutting module. |
| Operational Management. Module SS | Exception management, logging, instrumentation and validation that is efficient for all the use cases are all incorporated in cross cutting module. |
| Communication Module SS | These components include cross-cutting functionality that handles communication mechanisms across layers and physical tiers. |
| Data SS | This layer contains modules that is responsible for the data persistence. |
| DB access modulus | This module is responsible for persistence of business entities (objects) into the relational database. It performs object oriented to relational mapping and shields the rest of the application from the persistence details. |
| Service Agents SS | This component abstracts communication mechanisms used to transfer data to external services. |
| Backup DB SS | This is used to duplicate the information stored in the original database to enhance security. |

Figure 4.3.3: initial deployment diagram

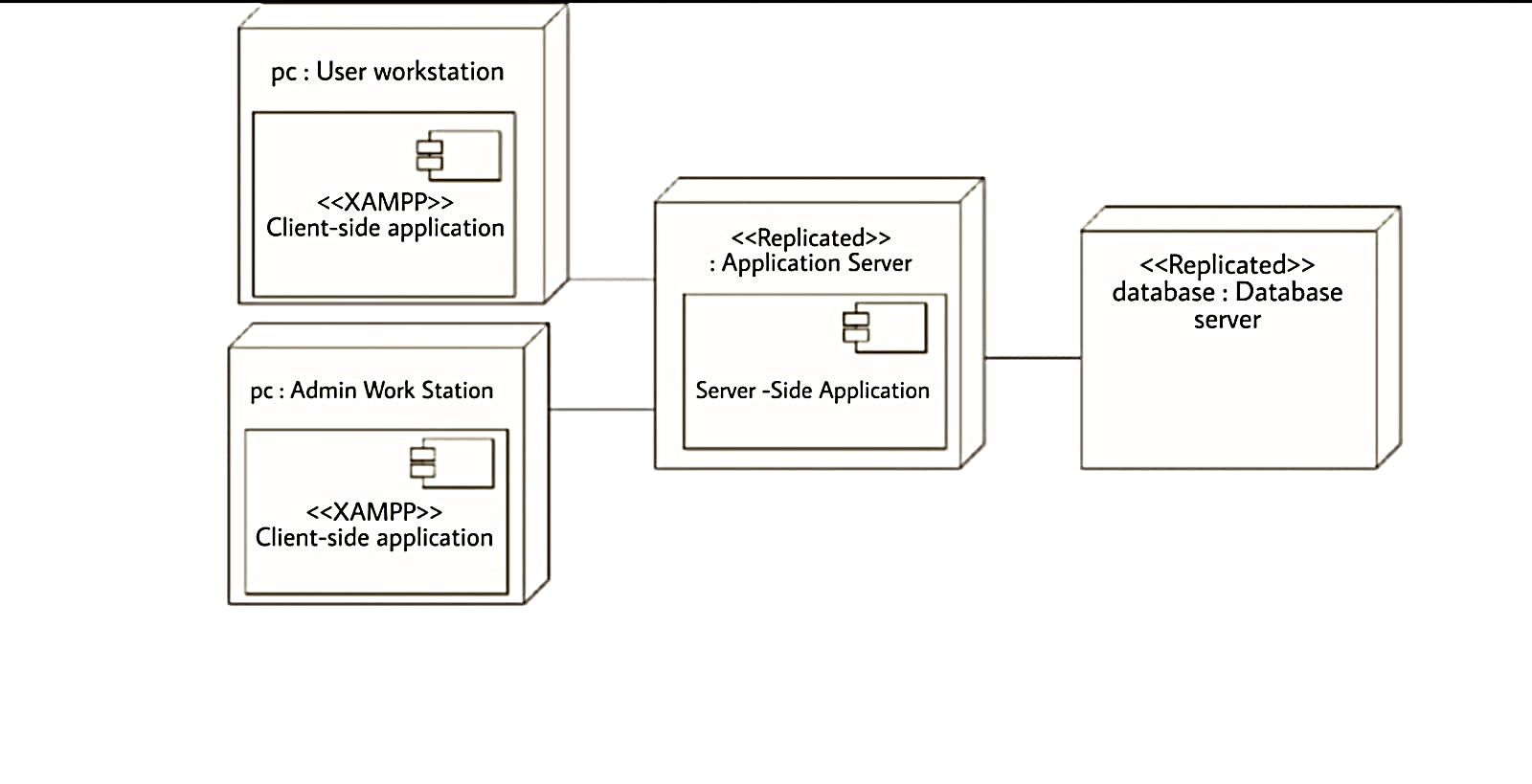


Diagram 4.3.3 is the deployment diagram sketched by Maria that sketches an allocation view that demonstrates where the components associated with the modules in the previous diagram will be deployed.

The responsibilities of the elements are summarized here:

|  |  |
| --- | --- |
| **Element** | **Responsibility** |
| User Workstation | The customer’s PC which hosts all the client-side logic application. |
| Admin’s Workstation | The employee’s PC’s which hosts all the client-side logic application. |
| Application Server | The server that hosts server-side logic of the application also serves the web pages. |
| Database Server | The server that hosts the legacy relational database. |

Also, information about relationships between some elements in the diagram that is worth recording is summarized in the following table drafted by Shaffa:

|  |  |
| --- | --- |
| **Relationships** | **Description** |
| Between web/app server and the database server | Communication with the database is done using MySQL and PHP. |

## Step7: Perform Analysis of Current Design and Review Iteration Goal and Achievement of Design Purpose

The following summarizes the design progress using the Kanban Board technique discussed and was drafted by Faiza.

|  |  |  |  |
| --- | --- | --- | --- |
| Not Addressed | Partially Addressed | Completely Addressed | Design decision made during the iterations. |
|  | UC-2 |  | Selected reference architecture establishes the modules that will support this functionality. |
|  | UC-4 |  | The login will be carried out through cross cutting server-side layer. |
|  | UC-5 |  | Selected reference architecture establishes the modules that will support this functionality. |
|  | UC-6 |  | Selected reference architecture establishes the modules that will support this functionality. |
|  | UC-7 |  | Selected reference architecture establishes the modules that will support this functionality. |
| QA-7 |  |  | No relevant decision made. |
|  | QA-3 |  | It will be carried out through cross cutting server-side layer and security module server side. |
|  | QA-4 |  | It will be carried out through cross cutting server-side layer and security module server side. |
| QA-2 |  |  | No relevant decision made as it is necessary to identify the elements that participate in use case associated with the scenario |
|  | QA-**5** |  | It will be carried out through cross cutting server-side layer and security module server side. |
|  |  | CON-5 | The database server permits the storage of information with an additional backup database. |
|  |  | CON-3 | Supports execution through different browsers. |
| CON-6 |  |  | No relevant decision made. |
|  |  | CRN-1 | Selection of reference architectures and deployment pattern. |
|  |  | CRN-2 | All the team members are professional with using PHP language. |
| CRN-3 |  |  | The work was distributed equally between members. Each member is knowledgeable of the work assigned. |
| CRN-4 |  |  | No relevant decision made. |
|  | CRN-5 |  | The operations will be incorporated in cross cutting server side. |

# **Iteration 2: Identifying Structure to Support Primary Functionality**

In this section present the result of the activities that are performed in each of the steps of ADD, in the second iteration of the design process for the OBBM. Here we go in more detailed decision that will drive implementation. Our goal for the first iteration was to establish an overall system structure. Now that this goal has been met, our new goal for this second iteration is to reason about the units of implementation.

## Step 2: Establish Iteration Goal by Selecting Drivers

The goal of this iteration is to address the general architectural concern of identifying structure to support primary functionality. Identifying these elements is useful not only for understanding how functionality is supported, but also for addressing CRN-5, that is the system must support logging, authentication, authorization, and configuration and CRN-4, that is the system must be able to maintain and update. In this second iteration, besides CRN-5, CRN-3 and CRN-4, the architect considers the system’s primary use cases:

Image UC-2: Book Blood Test Appointment

Image UC-4: Request Blood Test

Image UC-5: View Eligibility Test Report

Image UC-6: Blood Donation Appointment

Image UC-7: Manage Records

## Step 3: Choose One or More Elements of the System to Refine

The elements in the modules that are situated in different layers defined by the chosen reference architectures from the previous iteration in general are refined in this iteration. The support of functionality in this system, in general, includes the collaboration of modules-related elements that are in various layers.

## Step 4: Choose One or More Design Concepts That Satisfy the Selected Drivers

The selection of design decisions is summarized below and was drafted by Afnan:

|  |  |
| --- | --- |
| **Design Decisions and Location** | **Rationale and Assumptions** |
| Create a Domain Model for the application. | Before beginning a functional decomposition, it is important to establish the initial domain model for the system, to define the major entities in the domain along with their relationship.  No better alternatives to this method have been identified. A domain model must finally be developed to avoid achieving an unmaintainable and nonsensical ad hoc architecture. |
| Identify Domain Objects that map to functional requirements. | Each functional element of the application needs to be encapsulated in a domain object  Alternative: decompose layers into modules, but this increases the risk of not considering a requirement. |
| Decompose Domain Objects into general and specialized Components. | Domain objects represent complete sets of functionalities, but this functionality is supported by elements located within the layers. The components are what we have referred to as modules.  Specialization of modules is associated with the layers where they are located (e.g., UI modules)  There are no alternatives to decomposing the layers into modules to support functionality. |
| Use MVC framework. | Model – View – Controller (usually known as MVC) is a software design pattern widely used to build user GUI for web applications typically based on programming languages such as JavaScript, Python, Ruby and PHP straight out of the box for web application design.  Other alternative frameworks are not considered because MVC framework is well suited for the project and the programmers are well familiar with it. |

## Step 5: Instantiate Architectural Element, Allocate Responsibilities, and Define Interface

The instantiation design decision made in this iteration are summarized in the following table and was drafted by Aisha:

|  |  |
| --- | --- |
| **Design Decision and Location** | **Rationale** |
| Create only an initial domain model | Entities must be identified and modeled and these entities should participate in the primary use cases but an initial domain model is created to accelerate this phase of design. |
| Map the system use cases to domain objects | By analyzing the systems uses cases, an initial identification of the domain objects is made. Domain objects are identified for all the use cases. |
| Decompose the domain object across the layers to identify the layer- specific modulus with an explicit interface. | The support of all the functionalities is identified through this technique.  Just for the primary use cases the architect will perform the task which provides the identification of the rest of the modules by the team member for the allocation of the work among them. |
| Connect component associated with modules MVC framework. | This framework provides structure and guidance when developing web applications which serves the main purpose of the system. |
| Associate frameworks with a module in the data layer. | This framework provides the baseline and can capture all the system drivers. It also provides the manipulation of both server and client-side aspects through the various provided coding languages. |

In this step, the structures and interfaces are identified and in the next (step 6), they are structured.

## Step 6: Sketch Views and Record Design Decisions

Figure 4.3.4: class diagram

Diagram

Description automatically generated

Figure 4.3.5: Domain objects associated with the use case model

Diagram

Description automatically generated

Figure 4.3.6: Modules that support primary use cases

Diagram

Description automatically generated

The following table summarizes the information that is captured and was drafted by Faiza:

|  |  |
| --- | --- |
| Element | Responsibilities |
| Interface | Displays the view of the system to the user of the system. There they can select from the choices provided to them. |
| Controller | Responsible for providing the necessary information to the presentation layer for displaying the system interface. |
| Request Manager | Responsible for communication with the server-side logic. |
| Request Service | It provides the front view that receives requests from the client-side. |
| Availability Checker | It checks if the requested service is available or not. |
| Database | This will access the database to check the availability and saves the data on the server-side. |

**SEQUENCE DIAGRAM**

Sequence Diagrams are interaction diagrams that show how operations are carried out in detail. They describe interactions among classes in terms of an exchange of messages over time. They are also called event diagrams. A sequence diagram is a good way to visualize and validate various runtime scenarios. These can help to predict how a system will behave and to discover responsibilities a class may need to have in the process of modeling a new system.

They capture the interaction between objects in the context of a collaboration that is based on a use case. Sequence Diagrams are time focus and they show the order of the interaction visually by using the vertical axis of the diagram to represent time and the horizontal axis shows the elements that are involved in the interaction; what messages are sent and when. The Purpose of Sequence Diagram is to show and model the high-level interaction between active objects in a system.

Figure 4.3.7: UC2- book blood test appointment

Diagram

Description automatically generated

The following table summarizes the information that is captured and was drafted by Shaffa:

|  |  |
| --- | --- |
| **Method Name** | **Description** |
| **Element:** Interface | |
| bloodTestAppointment() | This allows the donor to book blood test appointment. |
| **Element:** Controller | |
| initialize() | The system will take all the attributes given to the system and put them in to the system. |
| **Element:** RequestManager | |
| selectAppointmentMethod() | This allows the donor to select method depending on their wish to choose home or bloodbank. |
| **Element:** RequestService | |
| requestAppointment() | Request the appointment detail from the server side |
| **Element:** Availability | |
| checkAvailability() | This allows the system to check if the requested appointment is available or not. |
| verify() | The system will verify if the request is valid or not and sends true or false message to the system. |

Figure 4.3.8: UC4-manage record

Diagram

Description automatically generated

The following table summarizes the information that is captured and was drafted by Aisha:

|  |  |
| --- | --- |
| **Method Name** | **Description** |
| **Element:** Interface | |
| enterDonor() | This allows the admin to enter any donor. |
| updateRecord() | After all the modification, new or modified record is updated. |
| **Element:** Controller | |
| modify() | The system will take all the attributes given to the system. |
| **Element:** RequestManager | |
| customize() | The system will then put them into the system. |
| **Element:** RequestService | |
| sendRequest() | Request the new details from the server side |
| **Element:** Database | |
| makeChanges() | Makes all the new changes and saves into the database. |

Figure 4.3.9: UC5-request blood

Diagram

Description automatically generated

The following table summarizes the information that is captured and was drafted by Faiza:

|  |  |
| --- | --- |
| **Method Name** | **Description** |
| **Element:** Interface | |
| requestBlood() | This allows the hospital staff to request for blood groups. |
| **Element:** Controller | |
| customize(bloodGroup, noOfBags) | The system will let the staff to select blood group and number of bags. |
| **Element:** RequestManager | |
| updateCustomize(bloodGroup, noOfBags) | This allows the staff to choose blood group, number of bags depending on how much they require. |
| **Element:** RequestService | |
| sendRequest() | Request the details about the blood to the server side. |
| **Element:** Availability | |
| checkAvailability() | This allows the system to check if the requested blood group and blood bags are available or not. |
| verify() | The system will verify if the request is valid or not and sends true or false message to the system. |

Figure 4.3.10: UC6-view eligibility test report

Diagram

Description automatically generated

The following table summarizes the information that is captured and was drafted by Afnan:

|  |  |
| --- | --- |
| **Method Name** | **Description** |
| **Element:** Interface | |
| viewReport() | This allows the donor to view their test reports. |
| displayReport() | The test report is displayed to the donor whether eligible or not. |
| **Element:** Controller | |
| initialize() | The system will take all the required information to get access to their report. |
| **Element:** RequestManager | |
| searchReport() | This allows the donor to search their test reports |
| **Element:** RequestService | |
| requestReport() | Request the test report to the server side. |
| **Element:** Availability | |
| checkReport() | This allows the system to check if the test report is available or not. |
| verify() | The system will verify if the request is valid or not and sends true or false message to the system. |

Figure 4.3.11: UC7- book donation appointment

Diagram

Description automatically generated

The following table summarizes the information that is captured and was drafted by Maria:

|  |  |
| --- | --- |
| **Method Name** | **Description** |
| **Element:** Interface | |
| bloodDonationAppointment() | This allows the donor to book blood donation appointment. |
| **Element:** Controller | |
| initialize() | The system will take all the attributes given to the system and put them in to the system. |
| **Element:** RequestManager | |
| selectDonationMethod() | This allows the donor to select method depending on their wish to choose home or bloodbank. |
| **Element:** RequestService | |
| requestAppointment() | Request the appointment detail from the server side |
| **Element:** Availability | |
| checkAvailability() | This allows the system to check if the requested blood donation appointed is available or not. |
| verify() | The system will verify if the request is valid or not and sends true or false message to the system. |

## Step7: Perform Analysis of Current Design and Review Iteration Goal and Achievement of Design Purpose

The following summarizes the design progress and was drafted by Faiza:

|  |  |  |  |
| --- | --- | --- | --- |
| Not Addressed | Partially Addressed | Completely Addressed | Design decision made during the iterations. |
|  |  | UC-2 | Modules across the layer and preliminary interfaces to support this use case have been identified. |
|  |  | UC-4 | Modules across the layer and preliminary interfaces to support this use case have been identified. |
|  |  | UC-5 | Modules across the layer and preliminary interfaces to support this use case have been identified. |
|  |  | UC-6 | Modules across the layer and preliminary interfaces to support this use case have been identified. |
|  |  | UC-7 | Modules across the layer and preliminary interfaces to support this use case have been identified. |
| QA-2 |  |  | No relevant decision made. |
|  |  | QA-3 | The element that supports the associated use case (UC-4) has been identified. |
| QA-7 |  |  | No relevant decision made. |
|  |  | QA-4 | The element that supports the associated use case (UC-4) have been identified. |
|  | QA-5 |  | The element that supports the associated use case (UC-5, UC-7) have been identified. |
|  |  | CON-6 | Modules responsible for collecting data have been identified. |
| CRN-4 |  |  | No relevant decision made. |
| CRN-5 |  |  | No relevant decision made. |
|  |  | CRN-3 | Modules associated with use case have been identified. |

# **Iteration 3: Addressing quality attributes scenarios driver**

This section presents the results of the activities that are performed in each of the steps of ADD in the third iteration of the design process. Building on the fundamental structural decisions made in iterations 1 and 2, we can now start to reason about the fulfillment of some of the more important quality attributes.

## Step 2: Establish Iteration Goal by Selecting Drivers

## For this iteration, the architect focuses on the QA-2 quality attribute scenario:

1. Availability (QA-2): The system should be available 24/7.
2. Usability (QA-7): The system should be simple and easy to use for users of all backgrounds. The layout of the website will aim at easy navigation and access to all the available features.
3. Performance (QA-5): The system should have response time of not more than 3 seconds.

## Step 3: Choose One or More Elements of the System to Refine

For availability scenario and Usability Scenario, the elements that will be refined are the physical nodes that were identified during the first iteration:

* Application Sever
* Database Server

For Security Scenario, the elements that will be refined are the physical nodes that were identified during the first iteration:

* Application Sever
* Database Server
* User’s Workstation

## Step 4: Choose One or More Design Concepts That Satisfy the Selected Drivers

The design concepts used in this iteration are the following and was drafted by Afnan:

|  |  |
| --- | --- |
| Design Decisions and location | Rationale and Assumptions |
| Introduce State resynchronization tactic by replicating the application server. | Through the replication of the critical element, the system can withstand the failure of one of the replicated elements without affecting functionality. |
| Introduce limit access tactic by introducing an element firewall. | A firewall is a software that is enforced for the limiting the private networks and unauthorized internet users from accessing it. (QA-5,  QA-3) |

## Step 5: Instantiate Architectural Elements, Allocate Responsibilities, and Define Interface

The instantiation design decisions are summarized in the following table and was drafted by Shaffa:

|  |  |
| --- | --- |
| Design Decisions and Location | Rationale |
| Use state resynchronization and load balancer in the application server | Due to the use of two duplicate application server that are passively active there exist a necessity to balance the load between the servers. |
| Implement load balance and redundancy using technology support. | The implementation of load balancing and redundancy can be achieved without the need for external technology. |
| Introducing element firewall. | Firewall is introduced to barrier between secured internal networks and outside untrusted network |

The results of these instantiation decisions are recorded in the next step.

## Step 6: Sketch Views and Record Design Decisions

The deployment diagram is refined through introducing redundancy and firewalls and was drafted by Maria.

Figure 4.3.12: refined deployment diagram

Diagram

Description automatically generated

The following table describes responsibilities for elements that have not been listed previously and was drafted by Faiza:

|  |  |
| --- | --- |
| Element | Responsibilities |
| Load Balancer | Balances the load of requests coming from the users to the application servers. It also presents a unique IP address. |
| Firewall | It monitors all the incoming and outgoing network, requests and data and decides whether to allow or block specific traffic based on a defined set of security rules. |

The UML sequence diagram shows how the firewall was introduced in this iteration and was sketched by Shaffa and Aisha:

Figure 4.3.13: Sequence diagram illustrating the messages exchanged between the physical nodes to support QA-3(security)

Diagram

Description automatically generated

Figure 4.3.14: Sequence diagram illustrating the messages exchanged between the physical nodes to support QA-5(performance)

Diagram

Description automatically generated

**Step 7: Perform Analysis of Current Design and Review Iteration Goal and Achievement of Design Purpose**

The following table summarizes the status of the different drivers and the decisions that were made during the iteration. Drivers that were completely addressed in the previous iteration have been removed from the table. In this iteration, important design decisions have been made to address QA-2, QA-7, QA-5 and was drafted by Afnan.

|  |  |  |  |
| --- | --- | --- | --- |
| Not Addressed | Partially Addressed | Completely Addressed | Design decision made during the iterations. |
| QA-7 |  |  | No relevant decision made. |
|  |  | QA-2 | By making the application server redundant, we reduce the portability of failure of the system. Furthermore, if the load balancer fails, a passive replica is activated, so in case the server fails the alternate the functions. |
|  |  | QA-5 | The element that supports this quality attribute, a firewall was defined and demonstrated. |
| CRN-4 |  |  | No relevant decisions made. |
| CRN-5 |  |  | No relevant decisions made. |

**5.0 Monitoring and Controlling**

It involves monitoring the overall success of the project with a planned project activity. It can be interpreted specifically as a controlled mechanism that takes place from initiation to closure at all levels of the project. It helps controlling the project work in terms of tracking, reviewing and regulating the progress to meet the performance objectives.

**5.1 Process**

Our plan is to complete the project within the duration of three months (01-10-2020) to (31-12-2020).

The main aim of monitoring and controlling is

* Evaluating the Actual work with the Planned work
* Analyzing Performance to decide whether any preventive step is indicated or not
* Collecting Information to generate a report on status and progress of the project
* Evaluating Critical path and building a strategy on how to avoid budget and time deviations successfully.

Maintaining and controlling of a project is divided into different areas like schedule, cost, risk, performance, quality and change. The method of maintaining all these areas in a project makes up the fourth important phase Monitoring and controlling of the project lifecycle. How all these areas are monitored and controlled throughout the project lifecycle and how they impact the project is discussed below.

* + 1. **Schedule**

Monitoring and control processes track, review, adjust and report on the project’s performance. This enables the project manager to see how a project’s performing and whether it is on time, as well as implement approved changes. This ensures the project remains on track, on budget and on time.

After approval of the project management plan the execution begins. To ensure seamless execution of tasks, increase productivity and efficiency, all activities of project work must be monitored constantly. Any deviation from approved expectations of work must be identified and corrected. Projects have too many variables and constraints for everything to go exactly as per the plan and despite best efforts, many things go wrong as murphy’s law states.

It is the job of the project manager to make sure the team stays motivated and on track.

After establishing the project baselines, the project manager uses monitoring and controlling techniques such as a requirements traceability matrix, control charts and hold review and status update meetings to keep the project on track. The project manager compares the actual work performance with the expected performance in the plan and collect project performance information shown in Gantt chart in planning phase. Depending on the information, corrective or preventive actions are taken. The performance report is also distributed to the stakeholders to keep them updated about the project. In review meetings with the stakeholders, the project manager discusses the variations identified from the planned track and proposes the necessary corrective action or changes. Once approved, the project manager makes sure that the change requests are implemented properly. The project manager makes sure the necessary documentation such as issue logs are recorded and maintained.

* + 1. **Cost**

For managing and controlling the cost throughout the project life cycle, the project manager with the help of financial analyst allocate reserves for project, track deviation of project budget and perform earned value management. All these steps, how they are performed and what is their impact if not done is discussed below:

1. Allocate Reserves**:**

Management Reserves: This budget is allocated to manage the unidentified risks which can occur at any given time in project.

Contingency Reserves: This budget is allocated to manage the identified risks which can occur at any given time in project.

To help mitigate the risk of costs being significantly higher than expected and derailing the project, a contingency reserve is budgeted to help cover expected unfavorable budget variances. Without the contingency reserve and management reserve, those extra days and money come out of the actual schedule and budget, causing delays and cost overruns. If this happens, then the project will be disrupted. That is why it is necessary to keep these funds to ensure smooth running of project.

1. Deviation of planned Budget:

To track expenses and inefficiencies and to properly prepare for the unexpected problems, it is necessary to know how, when, where and why the budget deviated.

1. Earned Value Analysis:

It is a technique for measuring project performance and progress. At any given time predicting its completion date and final cost. It helps to find schedule and cost variance which helps us identify CPI and SPI. The value of CPI and SPI helps us to determine if we are over or under budget and ahead or behind the schedule. It provides the manger with the summary of effective decision making.

*Earned Value = % of completed work \* Budget at Completion*

* + 1. **Risk**

It is very important to monitor and control risk. It is responsibility of risk manager, project manager and team members to help identify risk which is a potential issue that may or may not occur and can influence the project negatively. The process of risk monitoring and controlling involves various stages such as identify risk, procedure and risk tracking.

1. Identifying Risks

The PM with the help of risk manager will help identifying and analyzing the risks in the project. The team holds several meetings to identify, analyze, manage and control risks along with the risk manager. It is very important to prepare budgets and schedule estimates for risks related work and carefully review the risks along with the team members. Ignoring any unclear task would increase the chances of risk. Identifying risk earlier is very crucial, as it helps see project to completion.

There are many methods used by risk manager nowadays to analyze the risks which include brainstorming, SWOT analysis, cost and time estimating, assumption analysis, risk register.

1. Procedure

It is very important for the project manager to participate actively in the risk management plan along with the risk manager and keep updating the team about risk.

The risk manager would list the risks into potential risks based on risk category and plan the probability and impact on a chart which lists the relative probability and relative impact of the risk occurring. This would help to identify those risks that needs maximum attention. The risk manager then notes down the risks that are likely to occur and label them as high, medium or low probability and impact.

1. Risk Controlling

Risk controlling is very important for examining and monitoring the risks regularly and documenting them whenever any modifications are made. It is the responsibility of the risk manager to alert the team and develop a mitigation plan. Risk register is a tool that records possible risk events and its related information to classify specific or unknown events and to decide how these risks are handled or resolved.

Example of a certain risk identified: schedule risk

This risk occurs when a task takes longer than scheduled due to lack of intent towards following the schedule. This eventually leads to loss of product delivery on time, accumulation of costs and wasting resources. To solve this issue one potential solution would be to do overtime or depending on project budget and resources extend the deadline or in case of reserves overflow introduce more resources. Table 5.1.3 shows issue log which was drafted by Afnan along with the team members.

Table 5.1.3: issue log

Table

Description automatically generated

**5.1.4 Performance**

Performance helps determine how well project is performing at a given time. It supports managing and tracking how work is progressing at a given time and how well a team is performing. Tracking team performance aids in determining the efficiency of project. The procedure for determining these steps is discussed below:

1. How is work progress?

To measure the progress of various activities, the project manager regularly keeps track of the project status. The project manager must ensure to review, trace and update project milestones. He must take preventive measure whenever a milestone is not achieved or delayed. He must investigate the issues which caused the delay and record the issues in Issues Log. He must act immediately to solve those issues, otherwise it will affect the performance of the project.

The project manager uses performance reports to reflect the status of the project and its performance against the planned baseline to stakeholders. In project communication management, it is an essential practice. The PM uses status report, progress report, trend reports and variance reports.

Performance reports reflect the status of the project and its performance against the planned baselines to the stakeholders. In project communication management, it is an essential practice. Examples of work performance reports include status reports, progress reports, earned value report, variance report etc.

We prefer to work with a progress report to track and manage the progress of different project tasks or stages against expected baselines.

The report includes analysis of past performance, a summary of changes approved in the reporting period, the status of issues, work completed during the reporting period and work to be completed during the next reporting period. Shown below is the table 5.1.4 progress report drafted by Afnan and milestone report drafted by Aisha along with the team.

Figure 5.1.4: progress report

|  |
| --- |
| Progress Report  Date: 12-12-2020  **Project Name**: Online Blood Bank Management System  **Reporting Period**: 1st October 2020 to 23rd December 2020  **Work completed this reporting period:**  All the tasks and subtasks specified in the pre-initiation, initiation and planning phases have been successfully completed during this reporting period  ***The deliverable documents produced at the end of this reporting period are*:**   * Business case * Project charter * Stakeholders register and management strategy * Team contract * Requirement traceability matrix * Scope statement and baseline * Statement of work * Schedule baseline * Communication strategy * Risk management plan and register * Work plan   **Next Reporting period:** 21st December 2020 to 30th December 2020  **Work to complete in the next reporting period:**  *The remaining work or deliverables to be completed during this reporting period are*:   * Performance report * Update milestones report * Change Requests * Update changes made to schedule and scope baselines * Team performance assessment * Update lesson learned report * Update status meeting * Issue Log   **What is going well and why:**  Team members were actively participating and worked closely to produce the deliverables. A soft deadline of 1 month was set after the division of tasks and it was managed for each reporting period. All the required work was completed on time. Additional days were spent on reviewing the work done and considering and making the required changes as per the feedback.  We had frequent communication with the stakeholders and regular meetings with the project team to discuss the work and expectations as well as report the progress so far made.  **What is not going well and why:**  Longer durations of time to complete tasks should be allowed to the members to do some research about their work and then work with a better understanding of the tasks assigned, but this caused some issues as all the members were on different percentages of progress. This made scheduling meetings to fix small changes overwhelming and resulted in the stretching the schedule by 3 days.  Technical issues arose during the development of work breakdown structure and Gantt chart due to which things did not go as planned and this caused frustration.  Issues faced:   * Trying to place the activities in the correct sequence in WBS * Delaying WBS, cost us delay in other activities * Difficulty while setting up dependencies for activities in Gantt chart   **Suggestions:**   * Improve project Planning and Quality * Communicate with the customer three times a week * Help prioritize team members' tasks * Use intuitive time and expense technology   **Project changes:**  Due to the delay in the activities mentioned above, schedule risk was identified for these activities.  We attempted to make some late adjustments as per the feedback received by stakeholders.  These adjustments were not captured in the original scope.  **Changes Expected**:   * Record the risk in the risk register and maintain or try to eliminate the risk by developing a potential solution with the help of the risk manager and project manager. * Update the scope baseline |

Table 5.1.4.1: milestone report

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Milestone** | **Date** | **Status** | **Responsible** | **Issues/Comments** |
| **Pre-initiation and Initiation**  Business Case | 10/5/20 | Completed | Software designer  (Afnan) | Went as planned |
| Develop Project Charter | 10/7/20 | Completed | Project manager, software analyst (Shaffa and Faiza) |  |
| Kick-off meeting | 10/1/20 | Completed | Project manager  (Shaffa) |  |
| **Planning**  Develop team contract | 10/14/20 | Completed | Project manager  (Shaffa) | Finished on time |
| Scope Statement | 10/26/20 | Completed | Project manager  (Shaffa) |  |
| Risk Register | 11/17/20 | Completed | software analyst  (Faiza) | Went very well |
| Schedule Baseline | 11/9/20 | Completed | Software Analyst  (Faiza) |  |
| **Executing**  implementation/coding according to class diagram | 12/6/20 | Completed | Software designer  (Afnan) | Finished on time |
| **Monitoring and Controlling**  Performance reports | 12/27/20 | Completed | Project manager  (Shaffa) | Finished on time |
| Update status meeting | 12/24/20 | Completed |  |  |
| **Closure**  contract closure notice | 12/28/20 | Completed |  |  |
| Lessons-learned reports submitted | 12/29/20 | Completed | Software tester  (Maria) |  |

1. Team Performance

Teamwork is a key to effective performance in any work group. The performance of successful team is measured in terms of technical success according to be agreed upon project objectives, performance on project schedule and performance on budget. High performance teams are characterized by these tasks oriented and result oriented outcomes.

If there are any potential differences or no coordination between team members, they lose their focus on the goal and may result in the failure of the project. The PM must take responsibility to make the team bond well. The team must have an effective communication so that different ideas of individual combine to deliver the best result.

The project manager can assess team member individual performance based on various factors such as participation, communication, behavior. This helps project manager evaluate the effectiveness of team. Shown below is the table 5.1.4.2 team performance assessment drafted by Aisha along with the team members.

Figure 5.1.4.2: team performance assessment

|  |
| --- |
| Team Performance Assessment  **Project Name**: Online Blood bank management system  **Individual Name:** Shaffa Abdul Sattar  **Project Manager:** Shaffa Abdul Sattar  **Date:** 18/12/2020   1. **Using a scale of 0-100, assess how you think the project team is performing?**  * On scale of 0-100, the performance of the project team can be evaluated as 93/100  1. **Explain the rationale behind the above score.**  * The team members engage actively in the meetings and dedicate several hours of their time to make the project a success. Moreover, they review, discuss, and come up with better solutions to narrow the chances of any mistakes. * Sometimes the team do lag and cannot keep up with the deadlines, but in such unfavorable situations, the team works together to finish the work with quality and as soon as possible * Due to the current situation, the meetings are conducted online, which is unfavorable to the team at certain times.  1. **Using a scale of 0-100, assess how you think you are performing on this project?**  * On a scale of 0-100, I would assess my performance as a score of 96/100  1. **Explain the rationale behind the above score. What are your roles and responsibilities, and how well have you performed them?**  * As the manager, I made the best use of my leadership and communication skills, made sure everybody participates in the project and gets the work they are knowledgeable about. I also encouraged them to take on new tasks so that they learn new skills, while providing constant guidance and support as the leader. I also made sure to meet with the sponsors and stakeholders and deal with them in an effective manner to get a better understanding of their viewpoints to increase the compatibility of the system. I considered all objections and suggestions of my team and stakeholders and tried to make as sound and logical decisions as possible.  1. **Briefly assess each team member’s performance. If you had to give each person a score between 0-100, what would it be?**  * Faiza (95): A hardworking person who keenly takes part in all aspects of the project and communicates very well with the team members as well as keeps the project manager informed of all progress. * Afnan (95): Competent member who keeps up with the project and works well with people on her team and is incredibly knowledgeable about the job, solves any problems with viable solutions. * Maria (95): Takes part in all team meetings; very liked and respected by team members, has a friendly attitude; a team player as well as gives quality work and never misses any deadlines. Is available to aid any member when required. * Aaisha (95): a team player, completes her work with quality and on time, requires minimum supervision on her tasks and is aware of all the mission and goals of the project. * Sometimes the team members lag and are not able to submit their work on time and sometimes some members are unable to attend meetings due to technical or personal issues, but they still always try to their best to stay on track. The overall performance of all team members is excellent.  1. **To compare individual contributions, if you had 100 points to allocate to your team, how would you allocate them?**   Faiza (27) Afnan (26) Maria (24) Aaisha (23)   1. **What suggestions do you have for improving team performance?**   Make sure the team members all interact with each other in completing the work and think of everything as a ‘whole’ instead of treating the project as individual tasks. |

* + 1. **Quality**

It is important to know how the quality will be managed throughout the project’s lifecycle. The tasks and practices used to manage quality are defined by Quality Management Plan. It specifies Quality Control functions, duties, criteria, procedures, and monitoring specifications that shall be used on the Project. It is important to know that quality control strategy is a document that keeps changing as per the conditions and expectations. Every member is encouraged to make recommendations to increase the efficiency of the project.

Quality mainly consists of:

1. Developing and tracking an approach for measuring all the expectations and achievements.
2. Quality assessments by the stakeholders.
3. Regular meetings between quality manager, project manager, team members to discuss the assessments.
4. Actions to improve the quality and updating the quality plan.

The main responsibility and roles for quality management includes Project manager and Quality manager. Project manager is responsible for Expanding and maintaining the quality plan, keeping track of the milestones, activities, timelines, budgets and resources and Expanding and tracing project metrics. Quality manager is responsible for Identifying and reporting issues to the project manager, collecting, identifying and analyzing project metrics and standards, regular reviewing and maintaining quality management, examining artifacts and ensuring quality objectives are satisfied.

Quality management approach consists of 2 components:

1. Process quality

Under the guidance of the project manager, regular assessments are organized to verify whether the ongoing work fit in to the plans or not. The quality manager audits and reviews the projects performance to know if the plan is being followed or needs any improvement. The keystones in overall improvement depends on the process of reviewing, examining and reporting. Some specific success criteria that are documented are:

* Producing crystal clear, complete, well written, accurate baseline documents for functional and business requirements
* Achievement of a team with the skill and motivation to develop a solution that meets stakeholders’ needs within budget and time constraints.
* Set of system requirements that has been validated through certain criteria and methods.
* Completing the project within the time, budget

1. Product quality

Ability to create the system components based on functional requirements and must be reliable with the business objective. Work product is presented to the stakeholders for their feedback and approval.

**Pareto Chart**

A Pareto Chart is a basic quality tool that helps to identify the most frequent defects, complains as well as their cumulative impact. Pareto Charts are useful to find the defects to prioritize to observe the greatest overall improvement.

In a Pareto Chart, each bar usually represents a type of defect or problem. The height of the bar represents any important unit of measure — often the frequency of occurrence or cost. The bars are presented in descending order (from tallest to shortest). Therefore, you can see which defects are more frequent immediately. The line represents the cumulative percentage of defects. Shown below is the diagram sketched by Afnan and Maria along with the team.

Figure 5.1.5.1: pareto chart I

Table

Description automatically generated

Figure 5.1.5.2: Pareto chart II

* + 1. **Change**

It is very important to follow a change control process because it helps ensure that you are not changing things in the project that do not need to be changed. The last thing you want to do is disrupt the project for no good reason, wasting valuable time and resources.

A change request is usually the trigger that starts the process of change control. The proposal for improvement will come from stakeholders asking for new functionality, the need to repair anything that during the execution process proves faulty or require upgrades. Where or wherever the change comes from, control of change defines its value and how to execute it feasibly. Change control process is a part of change management plan which defines activities and roles for managing and controlling change when executing a project.

1. Process

The process of managing and controlling change includes four steps:

* Introduce Change
* Change Impact
* Deciding about change
* Implementing change

Identify the change. This can come from anybody, a stakeholder or even a client on the project team. For these suggestions to flow, there must be a channel available. The change proposal must describe the change and how it would benefit the project include. If there are other reasons for the change, outline them on the change request form. That would then be added to the change log.

Once the change has been proposed, it is now up to the project manager to consider it in the larger situation of the project. There are some questions that need to be answered. How will that change impact several variables and constraint? What is the cost required, is it from the allocated budget or need extra amount for implementing it? How will the change impact your schedule? Will you need to assign more resources? Will the change bring new risk or issues to the project? Once the project manager has answered all these questions, he recommends the change is either approved or denied.

The project manager makes the recommendation but does not always have authority to make final decision. Project manager will present his and team observations regarding that change to the person or persons who has authority to decide regarding the change. Then, the person or persons authorized to make the decision will either accept the change (conditions may apply but not necessary) or reject the change or defer the change which means the change is suspended at this time, but it will be further pondered over later.

However, if a change that has been accepted. It moves on to the planning stage where the project manager will develop a plan of action, including a schedule with start and end dates, all of which must meet with the approval of the project stakeholders. If the change is too problematic to carry through to the end, the plan should include a reversal test (turn around) and the project must return to its original purpose. Upon completion of the change plan, it is normally accompanied by an evaluation to review any mishaps and milestones.

The last thing to do is to have the person making the change supervise the final deliverable to ensure that they comply with it. When they have signed off on the move, all unfinished records, such as the change log, must be completed and filed away for potential use.

To get in the project on schedule and under budget, it is important to handle change efficiently. Change is a way for the staff to come together to find out how to respond to the call for change. The teamwork used in the control of progress will benefit to the whole project's competitiveness.

A poorly executed change control might hold the project or dismissed in some cases if difficult to recover. There are many downsides of poorly change control plan in terms of cost, resources, schedule or not reaching your project goals.

So, it is necessary to ponder over everything or have a basic overview of whole project while considering a change request. Shown below is the table 5.1.6 of change request form drafted by Maria along with the team.

|  |  |
| --- | --- |
| Table 5.6.1: change request form | |
| **Change Request Form** | |
| **Project:** Online Blood Bank System | **Date:** 18/12/2020 |
| **Change Requestor:** Faiza Faisal | **Change Req ID:** 01 |
| **Change Category (Check all that apply):**  ☑Schedule ☑ Cost ☑Scope ☑ Requirements/Deliverables  □Testing/Quality ☑ Resources | |
| **Does this Change Affect (Check all that apply)?**  □ Corrective Action □ Preventative Action □ Defect Repair □ Updates  ☑ Other | |
| **Change Being Requested:**  Addition of mobile application of the system. | |
| **Describe the Reason for the Change:**  A survey was conducted to get feedbacks and suggestions. majority of the responses suggested the addition of the mobile application of the system. | |
| |  |  | | --- | --- | | **Impact of the change** | | | **Category** | **Impact** | | Cost | High | | Resources | Medium | | Risk | High | | Time | High | | Schedule | High | | Scope | Medium | | |
| **Disposition:**  □ Approve ☑Reject □ Defer | |
| **Justification of Approval, Rejection, or Deferral:**  The system can be accessed on both desktops and mobile phones through various browsers such as Chrome, Firefox, Microsoft Edge, Opera, Safari.  So, making the mobile application is not necessary given that its average impact on the project is high. | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Change Board Approval:** | | | |
| **Name** | **Disposition** | **Signature** | **Date** |
| Sponsor | Rejected | Sponsor | 18/12/2020 |
| Project manager (Shaffa Abdul Sattar) | Rejected | Shaffa Abdul Sattar | 18/12/2020 |

**6.0 Close down**

This is the final phase in the project and making sure all the deliverables are handed over successfully.

**6.1 Lesson learned report**

Lesson learned report is a document that shows if all the requirements, aspects, goals of the project were met or failed, completed on time or not, managed within the budget or not. What went wrong while working on the project, what lessons we learnt from this project are all explained in the below document.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| |  | | --- | | **Project Name: Online Blood Bank System** | | **Project sponsor:** Minister of Health | | **Project manager:** Shaffa Abdul Sattar | | **Project dates:** 1st October 2020 – 31st December 2020 | | **Final budget:** BD 75,000/-. |  1. **Did the project meet the scope, time, and cost goals?**   Yes, we met the scope, time, and cost goals with the help of project management strategies.   1. **What were the success criteria listed in the project scope statement?**   Below is what we put in our project scope statement under project success criteria*:*  *‘’Our goal is to finish this project within three months and the given budget*.’’   1. **Reflect on whether you met the project success criteria.**   As stated above, our goal was to finish the project as scheduled that is within 3 months, do not exceed the allotted budget and make sure the success criteria are met. We were able to achieve all the goals with the help of suitable project management strategies.   1. **In terms of managing the project, what were the main lessons your team learned from this project?**  * Teamwork was crucial for the success of the project. Instead of every member working on the tasks separately, working as one whole team is very important for consistent work. * The kickoff meeting was an efficient way to get to know everyone and create a bond with team members. * team contract proved to help create and maintain an efficient productive environment throughout the project. * establishing good communication and holding regular meetings is the best way to avoid any inconsistencies and misunderstandings regarding the project.  1. **Describe one example of what went right on this project?**   The requirement elicitation and analysis were done well in this project because of which the project all the stakeholder’s need. Moreover, this project also was completed on the planned time meets the scope.   1. **Describe one example of what went wrong on this project?**   The risk management plan was not completed on time which caused the project to be behind the planned schedule, but this delay was soon overcome by working overtime.   1. **What will you do differently on the next project based on your experiences working on this project?**   Although this project progressed smoothly, there were still a few problems that were faced during the project.  Based on the experience gained from this project, I will have a more thorough understanding of allocating resources and determining tasks completion. I will plan more carefully so that we can avoid and not repeat the mistakes made in this project. |

**6.2 contract closure notice**

|  |
| --- |
| **Contract Closure Notice**  **Date:28-12-2020**  As described in our contract/service agreement, this letter provides formal notice that the work you were contracted to perform for the project- online blood bank management system has been completed. Payment is being processed based on working hours of the team members.  By: Shaffa Abdul Sattar (Project manager)  Date: 28-12-2020 |

**6.3 Customer acceptance form**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Customer Acceptance/Project Completion Form**  **Date 28/12/2020**  **Project Name: Online Blood Bank System**  **Project Manager: Shaffa Abdul Sattar**  **I (We), the undersigned, acknowledge and accept delivery of the work completed for this project on behalf of our organization. My (Our) signature(s) attest(s) to my (our) agreement that this project has been completed. No further work should be done on this project.**   |  |  |  |  | | --- | --- | --- | --- | | **Name** | **Title** | **Signature** | **Date** | | MOH | Sponsor | moh | 28/12/2020 | | Shaffa | Manager | shaffa | 28/12/2020 |  1. Was this project completed to your satisfaction? \_\_\_\_ Yes\_\_\_\_\_ No 2. Please provide the main reasons for your satisfaction or dissatisfaction with this project.   All the requirements we needed in the application were successfully built and tested.   1. Please provide suggestions on how our organization could improve its project delivery capability in the future.   The delivery capability was excellent and I personally do not think there is a need for any kind of improvements.  **Thank you for your inputs.** |

**Appendix 1**

**Meeting Minutes**

**Meeting No.1**

* **Date**: 1/10/2020
* Meeting started: 3:00 pm
* Meeting ended: 3:45 pm
* Duration: 45 minutes.
* **Meeting objectives**: discuss the agenda of the first phase of the project, as well as *Review* the action item or task assigned for each member on and have it submitted by given time.
* **Note:** Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication

|  |  |  |
| --- | --- | --- |
| Action task | Assigned to | Due Date |
| * Introduction and background * Schedule Estimate | Faiza Faizal Murtaza | 5/10/2020 |
| * Scope Statement * Analysis of Option and Recommendations | Shaffa Abdul Sattar | 5/10/2020 |
| * Business objectives * Preliminary project requirements | Syeda Afnan Javed | 5/10/2020 |
| * Budget Estimate and Financial Analysis * Potential Risks | Aaisha Nazeer | 5/10/2020 |
| * Critical Assumption and Constraints * Current situation and Problem/Opportunity Statement | Maria Rashid Mehmood | 5/10/2020 |

**Meeting No.2**

* **Date**: 6/10/2020
* Meeting started: 3:00 pm
* Meeting ended: 3:57 pm
* Duration: 57minutes.
* **Meeting objectives**: discuss the agenda of the first phase of the project, as well as assign an action item or task for each member to work on and have it submitted by given time.
* **Note:** Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication

|  |  |  |
| --- | --- | --- |
| Action task | Assigned to | Due Date |
| * Project charter | Faiza Faizal Murtaza | 8/10/2020 |
| * Project charter | Shaffa Abdul Sattar | 8/10/2020 |
| * System Introduction * Meeting minutes | Syeda Afnan Javed | 8/10/2020 |
| * Stake holder register * Stakeholder management strategy | Aaisha Nazeer | 8/10/2020 |
| * Stake holder register * Stakeholder management strategy | Maria Rashid Mehmood | 8/10/2020 |

**Meeting No.3**

* **Date**: 8/10/2020
* Meeting started: 3:10 pm
* Meeting ended: 4:02 pm
* Duration: 52 minutes.
* **Meeting objectives**: discuss the agenda of the first phase of the project, as well as Review the assigned action item or task for each member, and have it submitted by given time.
* **Note:** Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication

|  |  |  |
| --- | --- | --- |
| Action task | Assigned to | Due Date |
| * Project charter | Faiza Faizal Murtaza | 9/10/2020 |
| * Project charter | Shaffa Abdul Sattar | 9/10/2020 |
| * System Introduction * Meeting minutes | Syeda Afnan Javed | 9/10/2020 |
| * Stake holder register * Stakeholder management strategy | Aaisha Nazeer | 9/10/2020 |
| * Stake holder register * Stakeholder management strategy | Maria Rashid Mehmood | 9/10/2020 |

**Meeting No.4**

* **Date**: 13/10/2020
* meeting started: 3:10 pm
* meeting ended: 4:02 pm
* duration: 52 minutes.
* **meeting objectives**: discuss the agenda of the second phase of the project; the planning phase. Identify the tasks that need to be done and divide the work / assign team member’s work.
* **Note**: Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication

|  |  |  |
| --- | --- | --- |
| Action task | Assigned to | Due Date |
| * Requirement traceability matrix | Faiza Faizal Murtaza | 15/10/2020 |
| * Develop team contract * Introduction on team contract | Shaffa Abdul Sattar | 15/10/2020 |
| * Introduction on planning * Requirement elicitation introduction | Syeda Afnan Javed | 15/10/2020 |
| * Functional requirements * Description of functional requirements | Aaisha Nazeer | 15/10/2020 |
| * Functional requirements * Requirement Traceability matrix | Maria Rashid Mehmood | 15/10/2020 |

**Meeting No.5**

* **Date**: 15/10/2020
* meeting started: 3:10 pm
* meeting ended: 4:02 pm
* duration: 52 minutes.
* **meeting objectives**: discuss the agenda of the second phase of the project; the planning phase. Identify the tasks that need to be done and divide the work / assign team member’s work.

as well as Review the assigned action item or task for each member, and have it submitted by given time.

* **Note**: Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication

|  |  |  |
| --- | --- | --- |
| Action task | Assigned to | Due Date |
| * Create WBS and WBS dictionary | Faiza Faizal Murtaza | 20/10/2020 |
| * Scope statement * Scope baseline | Shaffa Abdul Sattar | 20/10/2020 |
| * Gantt chart introduction * Network diagram introduction | Syeda Afnan Javed | 20/10/2020 |
| * Statement of work * Verifying the scope of the project deliverables | Aaisha Nazeer | 20/10/2020 |
| * Statement of work * Verifying the scope of the project deliverables | Maria Rashid Mehmood | 20/10/2020 |

**Meeting No.6**

* **Date**: 20/10/2020
* meeting started: 3:10 pm
* meeting ended: 4:02 pm
* duration: 52 minutes.
* **meeting objectives**: discuss the agenda of the second phase of the project; the planning phase. Identify the tasks that need to be done and divide the work / assign team member’s work.

as well as Review the assigned action item or task for each member, and have it submitted by given time.

* **Note**: Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication

|  |  |  |
| --- | --- | --- |
| Action task | Assigned to | Due Date |
| * Gantt chart | Faiza Faizal Murtaza | 22/10/2020 |
| * Gantt chart | Shaffa Abdul Sattar | 22/10/2020 |
| * Gantt chart | Syeda Afnan Javed | 22/10/2020 |
| * Gantt chart | Aaisha Nazeer | 22/10/2020 |
| * Gantt chart | Maria Rashid Mehmood | 22/10/2020 |

**Meeting No.7**

* **Date**: 22/10/2020
* meeting started: 3:10 pm
* meeting ended: 4:02 pm
* duration: 52 minutes.
* **meeting objectives**: discuss the agenda of the second phase of the project; the planning phase. Identify the tasks that need to be done and divide the work / assign team member’s work.

as well as Review the assigned action item or task for each member, and have it submitted by given time.

* **Note**: Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication

|  |  |  |
| --- | --- | --- |
| Action task | Assigned to | Due Date |
| * Risk register | Faiza Faizal Murtaza | 27/10/2020 |
| * Risk management plan | Shaffa Abdul Sattar | 27/10/2020 |
| * Project time management introduction | Syeda Afnan Javed | 27/10/2020 |
| * Nonfunctional requirements | Aaisha Nazeer | 27/10/2020 |
| * Nonfunctional requirements | Maria Rashid Mehmood | 27/10/2020 |

**Meeting No.8**

* **Date**: 27/10/2020
* meeting started: 3:10 pm
* meeting ended: 4:02 pm
* duration: 52 minutes.
* **meeting objectives**: discuss the agenda of the second phase of the project; the planning phase. Identify the tasks that need to be done and divide the work / assign team member’s work.

as well as Review the assigned action item or task for each member, and have it submitted by given time.

* **Note**: Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication
* *29 October 2020 was declared as a holiday by the government of Bahrain.*

|  |  |  |
| --- | --- | --- |
| Action task | Assigned to | Due Date |
| * Risk register | Faiza Faizal Murtaza | 3/11/2020 |
| * Risk management plan | Shaffa Abdul Sattar | 3/11/2020 |
| * Project work plan | Syeda Afnan Javed | 3/11/2020 |
| * Nonfunctional requirements | Aaisha Nazeer | 3/11/2020 |
| * Nonfunctional requirements | Maria Rashid Mehmood | 3/11/2020 |

**Meeting No.9**

* **Date**: 03/11/2020
* meeting started: 3:10 pm
* meeting ended: 4:02 pm
* duration: 52 minutes.
* **meeting objectives**: discuss the agenda of the second phase of the project; the planning phase. Identify the tasks that need to be done and divide the work / assign team member’s work.

as well as Review the assigned action item or task for each member, and have it submitted by given time.

* **Note**: Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication

|  |  |  |
| --- | --- | --- |
| Action task | Assigned to | Due Date |
| * Risk register | Faiza Faizal Murtaza | 05/11/2020 |
| * Risk management plan | Shaffa Abdul Sattar | 05/11/2020 |
| * Distribution of work | Syeda Afnan Javed | 05/11/2020 |
| * Nonfunctional requirements | Aaisha Nazeer | 05/11/2020 |
| * Nonfunctional requirements | Maria Rashid Mehmood | 05/11/2020 |

**Meeting No.10**

* **Date**: 05/11/2020
* meeting started: 3:10 pm
* meeting ended: 4:02 pm
* duration: 52 minutes.
* **meeting objectives**: discuss the agenda of the second phase of the project; the planning phase. Identify the tasks that need to be done and divide the work / assign team member’s work.

as well as Review the assigned action item or task for each member, and have it submitted by given time.

* **Note**: Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication

|  |  |  |
| --- | --- | --- |
| Action task | Assigned to | Due Date |
| * Reviewing Gantt chart | Faiza Faizal Murtaza | 7/11/2020 |
| * Reviewing Gantt chart | Shaffa Abdul Sattar | 7/11/2020 |
| * Reviewing Gantt chart | Syeda Afnan Javed | 7/11/2020 |
| * Reviewing Network Diagram | Aaisha Nazeer | 7/11/2020 |
| * Reviewing Network Diagram | Maria Rashid Mehmood | 7/11/2020 |

**Meeting No.11**

* **Date**: 10/11/2020
* meeting started: 3:10 pm
* meeting ended: 4:02 pm
* duration: 52 minutes.
* **meeting objectives**: discuss the agenda of the second phase of the project; the planning phase. Identify the tasks that need to be done and divide the work / assign team member’s work.

as well as Review the assigned action item or task for each member, and have it submitted by given time.

* **Note**: Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication

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| Action task | Assigned to | Due Date |
| * Reviewing phase 2 | Faiza Faizal Murtaza | 05/11/2020 |
| * Reviewing phase 2 | Shaffa Abdul Sattar | 05/11/2020 |
| * Meeting minutes | Syeda Afnan Javed | 05/11/2020 |
| * Reviewing phase 2 | Aaisha Nazeer | 05/11/2020 |
| * Reviewing phase 2 | Maria Rashid Mehmood | 05/11/2020 |

**Meeting No.12**

* **Date**: 12/11/2020
* Meeting started: 2:00 pm
* Meeting ended: 4:00 pm
* Duration: 2 hours
* **Meeting objectives**: Discuss the agenda of the third phase of the project, as well as assign an action item or task for each member to work on and have it submitted by given time.
* **Note:** Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication

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| Action task | Assigned to | Due Date |
| * Introduction | Syeda Afnan Javed | 17/11/2020 |
| * Use case scenarios | Shaffa Abdul Sattar | 17/11/2020 |
| * Use case scenarios | Faiza Faizal Murtaza | 17/11/2020 |
| * Use case scenarios | Aaisha Nazeer | 17/11/2020 |
| * Use case scenarios | Maria Rashid Mehmood | 17/11/2020 |

**Meeting No.13**

* **Date**: 17/11/2020
* Meeting started: 2:00 pm
* Meeting ended: 4:30 pm
* Duration: 2 hours 30 minutes.
* **Meeting objectives**: Discuss the agenda of the third phase of the project. Identify the tasks that needs to be done and divide the work / assign team member’s work as well as review the assigned action item or task for each member, and have it submitted by given time.
* **Note:** Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication

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| Action task | Assigned to | Due Date |
| * Use case description | Maria Rashid Mehmood | 20/11/2020 |
| * Concerns | Faiza Faisal Murtaza | 20/11/2020 |
| * User characteristics | Syeda Afnan Javed | 20/11/2020 |
| * Constraints | Aaisha Nazeer | 20/11/2020 |
| * Quality attributes | Shaffa Abdul Sattar | 20/11/2020 |

**Meeting No.14**

* **Date**: 20/11/2020
* Meeting started: 4:00 pm
* Meeting ended: 5:00 pm
* Duration: 1 hour
* **Meeting objectives**: Discuss the agenda of the third phase of the project. Identify the tasks that need to be done and divide the work / assign team member’s work as well as review the assigned action item or task for each member and have it submitted by given time.
* **Note:** Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication

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| Action task | Assigned to | Due Date |
| * Use case diagram | Faiza Faizal Murtaza | 24/11/2020 |
| * Use case diagram | Shaffa Abdul Sattar | 24/11/2020 |
| * Introduction on class diagram | Syeda Afnan Javed | 24/11/2020 |
| * Class diagram | Aaisha Nazeer | 24/11/2020 |
| * Class diagram | Maria Rashid Mehmood | 24/11/2020 |

**Meeting No.15**

* **Date**: 24/11/2020
* Meeting started: 2:00 pm
* Meeting ended: 4:15 pm
* Duration: 2 hours 15 minutes.
* **Meeting objectives**: Discuss the agenda of the third phase of the project. Identify the tasks that need to be done and divide the work / assign team member’s work as well as review the assigned action item or task for each member and have it submitted by given time.
* **Note:** Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication

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| Action task | Assigned to | Due Date |
| * Design process iteration 1 | Faiza Faizal Murtaza | 26/11/2020 |
| * Design process iteration 1 | Shaffa Abdul Sattar | 26/11/2020 |
| * Design process iteration 1 | Syeda Afnan Javed | 26/11/2020 |
| * Design process iteration 1 | Aaisha Nazeer | 26/11/2020 |
| * Design process iteration 1 | Maria Rashid Mehmood | 26/11/2020 |

**Meeting No.16**

* **Date**: 26/11/2020
* Meeting started: 2:00 pm
* Meeting ended: 3:45 pm
* Duration: 1 hour 45 minutes.
* **Meeting objectives**: Discuss the agenda of the third phase of the project. Identify the tasks that need to be done and divide the work / assign team member’s work as well as review the assigned action item or task for each member and have it submitted by given time.
* **Note:** Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication

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| Action task | Assigned to | Due Date |
| * Design process iteration 2 | Faiza Faizal Murtaza | 1/12/2020 |
| * Design process iteration 2 | Shaffa Abdul Sattar | 1/12/2020 |
| * Design process iteration 2 | Syeda Afnan Javed | 1/12/2020 |
| * Design process iteration 2 | Aaisha Nazeer | 1/12/2020 |
| * Design process iteration 2 | Maria Rashid Mehmood | 1/12/2020 |

**Meeting No.17**

* **Date**: 01/12/2020
* Meeting started: 2:00 pm
* Meeting ended: 3:00 pm
* Duration: 1 hour
* **Meeting objectives**: Discuss the agenda of the third phase of the project. Identify the tasks that need to be done and divide the work / assign team member’s work as well as review the assigned action item or task for each member and have it submitted by given time.
* **Note:** Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication

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| Action task | Assigned to | Due Date |
| * Design process iteration 3 | Faiza Faizal Murtaza | 3/12/2020 |
| * Design process iteration 3 | Shaffa Abdul Sattar | 3/12/2020 |
| * Design process iteration 3 | Syeda Afnan Javed | 3/12/2020 |
| * Design process iteration 3 | Aaisha Nazeer | 3/12/2020 |
| * Design process iteration 3 | Maria Rashid Mehmood | 3/12/2020 |

**Meeting No.18**

* **Date**: 03/12/2020
* Meeting started: 2:00 pm
* Meeting ended: 5:00 pm
* Duration: 3 hours
* **Meeting objectives**: Discuss the agenda of the third phase of the project. Identify the tasks that need to be done and divide the work / assign team member’s work as well as review the assigned action item or task for each member and have it submitted by given time.
* **Note:** Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication

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| Action task | Assigned to | Due Date |
| * Sequence diagram | Shaffa Abdul Sattar | 8/12/2020 |
| * Deployment diagram | Faiza Faizal Murtaza | 8/12/2020 |
| * Introduction on sequence diagram | Syeda Afnan Javed | 8/12/2020 |
| * Sequence diagram | Aaisha Nazeer | 8/12/2020 |
| * Deployment diagram | Maria Rashid Mehmood | 8/12/2020 |

**Meeting No.19**

* **Date**: 08/12/2020
* Meeting started: 2:00 pm
* Meeting ended: 2:45 pm
* Duration: 45 minutes
* **Meeting objectives**: Discuss the agenda of the fourth phase of the project, as well as assign an action item or task for each member to work on and have it submitted by given time.
* **Note:** Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication

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| Action task | Assigned to | Due Date |
| * Monitoring and controlling Introduction | Syeda Afnan Javed | 10/12/2020 |
| * Process | Shaffa Abdul Sattar | 10/12/2020 |
| * Process | Faiza Faizal Murtaza | 10/12/2020 |
| * Schedule | Aaisha Nazeer | 10/12/2020 |
| * Schedule | Maria Rashid Mehmood | 10/12/2020 |

**Meeting No.20**

* **Date**: 10/12/2020
* Meeting started: 2:00 pm
* Meeting ended: 3:00 pm
* Duration: 1 hour
* **Meeting objectives**: Discuss the agenda of the fourth phase of the project. Identify the tasks that needs to be done and divide the work / assign team member’s work as well as review the assigned action item or task for each member, and have it submitted by given time.
* **Note:** Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication

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| Action task | Assigned to | Due Date |
| * Risk | Maria Rashid Mehmood | 15/12/2020 |
| * Cost | Faiza Faisal Murtaza | 15/12/2020 |
| * Issue log | Syeda Afnan Javed | 15/12/2020 |
| * Risk | Aaisha Nazeer | 15/12/2020 |
| * Cost | Shaffa Abdul Sattar | 15/12/2020 |

**Meeting No.21**

* **Date**: 15/12/2020
* Meeting started: 4:00 pm
* Meeting ended: 5:00 pm
* Duration: 1 hour
* **Meeting objectives**: Discuss the agenda of the fourth phase of the project. Identify the tasks that need to be done and divide the work / assign team member’s work as well as review the assigned action item or task for each member and have it submitted by given time.
* **Note:** Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication

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| Action task | Assigned to | Due Date |
| * Performance | Faiza Faizal Murtaza | 18/12/2020 |
| * Performance | Shaffa Abdul Sattar | 18/12/2020 |
| * Progress report | Syeda Afnan Javed | 18/12/2020 |
| * Milestone report | Aaisha Nazeer | 18/12/2020 |
| * Change request form | Maria Rashid Mehmood | 18/12/2020 |

**Meeting No.22**

* **Date**: 18/12/2020
* Meeting started: 2:00 pm
* Meeting ended: 4:00 pm
* Duration: 2 hours
* **Meeting objectives**: Discuss the agenda of the fourth phase of the project. Identify the tasks that need to be done and divide the work / assign team member’s work as well as review the assigned action item or task for each member and have it submitted by given time.
* **Note:** Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication

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| Action task | Assigned to | Due Date |
| * Change | Faiza Faizal Murtaza | 22/12/2020 |
| * Quality | Shaffa Abdul Sattar | 22/12/2020 |
| * Pareto chart | Syeda Afnan Javed | 22/12/2020 |
| * Team performance report | Aaisha Nazeer | 22/12/2020 |
| * Pareto chart | Maria Rashid Mehmood | 22/12/2020 |

**Meeting No.23**

* **Date**: 22/12/2020
* Meeting started: 2:00 pm
* Meeting ended: 4:00 pm
* Duration: 2 hours
* **Meeting objectives**: Discuss the agenda of the last phase of the project. Identify the tasks that need to be done and divide the work / assign team member’s work and have it submitted on given time.
* **Note:** Due to ongoing pandemic and safety guidelines provided by the Ministry of Health. The meetings are conducted through MS Teams and WhatsApp is used for communication

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| Action task | Assigned to | Due Date |
| * Review all documents * Prepare presentation | Faiza Faizal Murtaza | 28/12/2020 |
| * Review all documents * Prepare presentation | Shaffa Abdul Sattar | 28/12/2020 |
| * Lesson learned report * Prepare presentation | Syeda Afnan Javed | 28/12/2020 |
| * Customer acceptance form * Prepare presentation | Aaisha Nazeer | 28/12/2020 |
| * Contract closure notice * Prepare presentation | Maria Rashid Mehmood | 28/12/2020 |