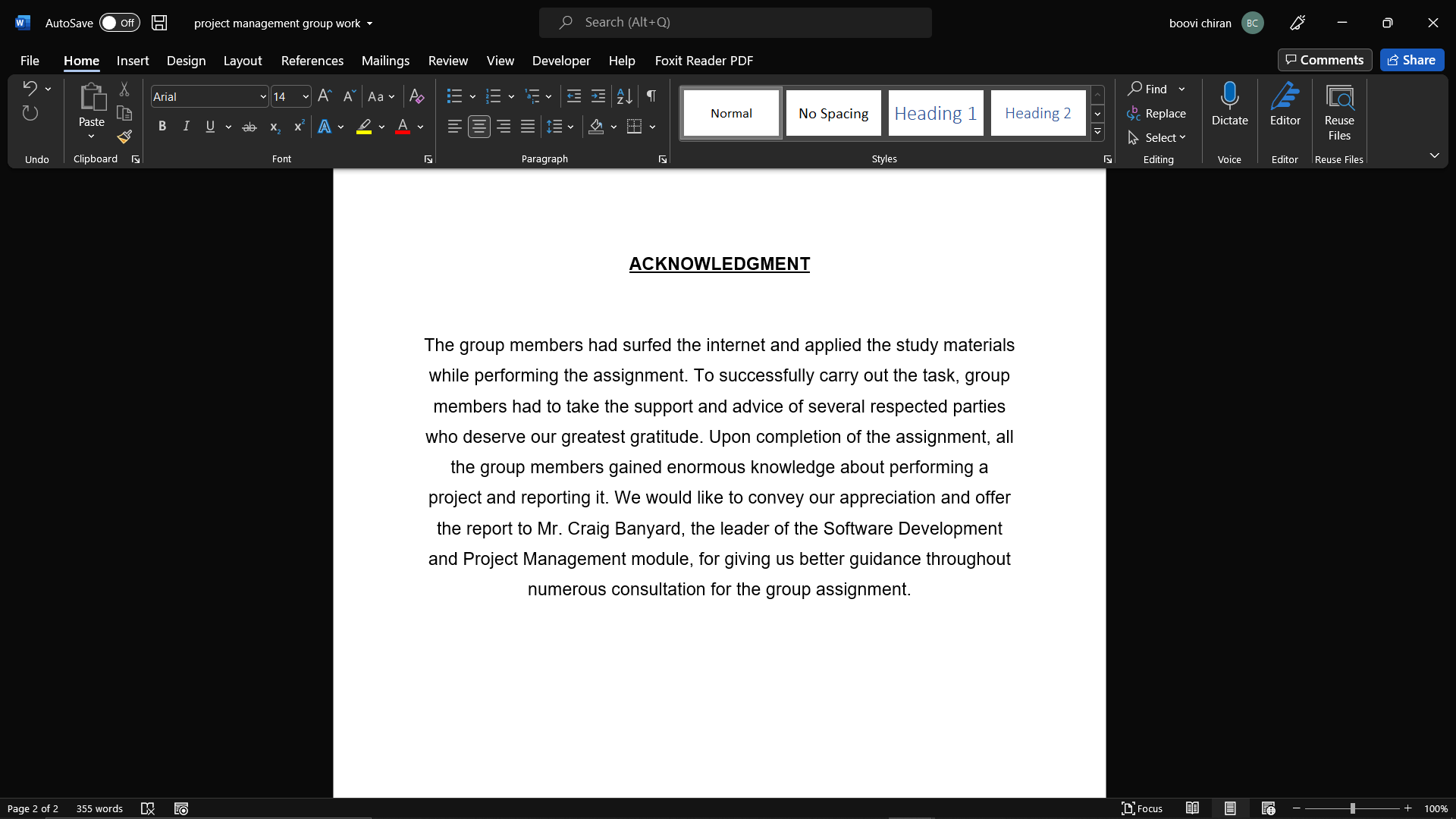
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# **1.INTRODUCTION**

## **1.1 Introduction**

As long as the execution of each step is accurate and precise, the hospital management system provides precise computerization of many important daily operations. The hospital management system includes a service that integrates and simplifies the work of the care staff and their communication with patients. The feature list for hospital management systems is focused on providing patients with a simple experience of staff and hospital authorities. Their prospects seem to be different; they are still covered by parts of the hospital management system.

Quality and security remain major conditions of the medical industry. Security is, one of the main essential sections of the hospital management system. There is a specific application called as “Database” to protect the private data. Database application delivers users with data security due to all policies. Database application should store medical records, test results, prescribed treatments, etc. for consumers. All data are securely kept for the approach of the doctor. Otherwise, it can be delivered to the patients by their needs. Moreover, the hospital database application is adept of producing reliable reports of the tracked data including healthcare, facility consumption, finances, staff productivity, etc.

The reason for creating a database application for a hospital is, to make the hospital management system easy to use, robust, comprehensive, and dependable. The entire project was run on the platform called “Project management life cycle” .

Diagram, bubble chart

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*Figure 1 : project management life cycle*

## **1.2 Problem Introduction**

* Lack of urgent retrievals: Without the database facility, its hard to find the most important details such as patient’s history.
* Lack of quick updating: Hard to find various information manually. such as immunization details of child.
* Difficult to preparate the exact and prompt reports by searching and gathering the information from various documents.

## **1.3 Aims and Objectives**

The main objective of the project is, maintain the smooth database application that is vital for hospital management system. Through the development of this application,

* Able to gather details of the patients, who came for the treatments
* Able to assist with treatments and diagnosis.
* Helps to manage documentation and billing.
* Helps to reduce errors in medical management and medical operations.
* Able to collect the history of the Vaccination gave to kids/patients.
* Helps to gather and maintaining data about different infections and meds accessible to fix them.

The following goals and objectives are achieved by the project.

1. Create the unique, complex, conformity, flexible, successful, and connected database application.
2. Create a chunk of work with the technical requirements.
3. The database application has backup DB.
4. Complete the entire project on time with reducing random variations.
5. Improving and maintain the interaction among the patient and healthcare.
6. Chasing the usage of the healthcare.
7. Handling the load balancing of the application.
8. Preventing the concurrency issues while active the application.
9. Protection for the patient details.
10. Lessening of the cost due to less paperwork.
11. Doctors or other data secured person who may require data, can be easily accessible for the database application.

## **1.4 Scope and Boundary**

**Boundary**

The database application includes enrolment of patients, storing that information in the system and computerized billing in the pharmacy or labs. DB is available either by an administrator or receptionist and they can seek out accessibility of a doctor and the details of the patient who was enrol the system. Administrator or receptionist has access to create, read, update, and delete records in the database. The records are retrieved simply. The interfaces of hospital management system are differed, and they are manageable. The data are well sheltered for individual use and the data processing very fast.

Database application is planned for cover a wide range of sections in the hospital administration and management processes. It is a combined end to end Hospital management system that delivers connected information across the hospital to maintain effective judgment making for patient care, hospital administration and financial accounting in a soft flow. Scope creep was used in the outcome. Therefore, in the original plan did not mention about the backup database. When developing the application, group members exposed backup DB is compulsory for the outcome. Project manager guided others to identify the changes. Managing the project lifecycle process efficiently was critical to the success of the database application.

**Project Scope**

1. Handle all the CRUD operations in the database application.
2. Introducing Online appointment system for patient and handle appointments via database.
3. Secure every data using the database application.
4. Generate bills & prescriptions, search availability of drugs, doctors, and dates, etc. by using database application.
5. Reducing time wasting and cut the manual workload in the hospital.

# **2****. BUSINESS CASE**

The hospital management system controls the quality of hospital products and services. It also enhances the transparency and visibility of the hospital. This will enable any department to monitor the patient doctor and physician details as well as all data. They also administer medications as well as conduct clinics, improve decision-making at those clinics, and protect data.

When it comes to a hospital, many people enter and leave the hospital daily. For the same reason, controlling and protecting the data of all those people is a very difficult task. It is also a burden on the hospital staff. Creating a hospital management system to manage the administration and clinical aspects of the hospital is a very important task to alleviate this situation. Also, this system will help consumer to be aware of and care about everything that is happening in or near the hospital and to be efficient. Information on all drugs is stored in this system. Data for each disease is also stored in tables. The hospital management application will be able to connect to any user.

Because the patient’s life depends on this information, it is important that the health care provider, the hospital staff, have access to this system in a short period of time. Those factors are more important when developing the database application for a hospital.

1. Efficiency
2. Exchange of Information
3. Value protection and enhancement of hospital

Data for the system set up at hospital will be sourced from various sources and institutions, such as other hospital regional organizations affiliated with the hospital. Specialist also monitor the hospitals database to verify the quality of the hospitals health services. In those cases, they may consider the following.

* + Can people in the hospital in the hospital area have access to health care facilities?
  + About the care they can afford in the current situation.
  + Barriers to their access to services.
  + And whether the service received for the disease is appropriate or necessary.
  + Go see how practical it is.
  + Giving data to the doctor and the hospital if the patient or the patient was admitted to another hospital.
  + Whether the service provided for the identified diseases is appropriate.
  + Innovations related to the health service.
  + Also, about the financial facilities that go to those health services.

# **3****. USER STORY**

The whole project mainly consists of 6 modules. Modules means those people have direct or non-direct relationship with the DB. Which are,

1. Administrator & receptionist module
2. Patient (User module)
3. Nurse module
4. Doctor module
5. Pharmacist module
6. Laboratories module

Administrator & receptionist module:

Administrator & receptionist are the main two characters who is used database directly. The details of the departments which the hospitals, patients, doctors, and nurses are handle by this administrator & receptionist module. All the details such as patients’ reports, doctor availability, appointment dates, tests categories and their features, bed/ward status , etc. are stored in the database. Receptionists have access to manage those details in correct way. Administrators provide their knowledge to maintain the database management system and they keep and avoid the errors which are occurred.

Patient (User module):

Patients able to get information about doctor/specialist details, hospital details, prescription/medication details and more. Similarly, they can manage own profile which in the DB by helping of the receptionist.

Nurse module:

Contribution of nurse is, they update all the details to the database which are in the hospital. Such as allocate bed/ward for patients, provide medication according to patient prescription, etc. Also, they gather facts (historical data) from the DB.

Doctor module:

The Doctor’s impact to DB is similar to the nurse module. Doctors update the patients’ details, prescription/medication details, operation/clinic details & view the history of each patient.

Pharmacist module:

Maintain medicine/medicine stock, prices detail by using CRUD operations of the DB is the main responsibility of the pharmacist, when using the database of the hospital.

Laboratories module:

Manage previous report files, preview & update latest files of the patients, gather past data are the activities which are managed by the laboratory workers.

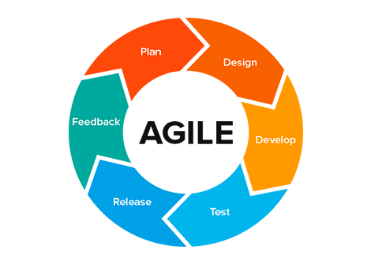
# **4. PROJECT PLAN**

## **4.1 Project plan**

Project planning and development is share of project management which relates to the usage of plans such as Gantt chart to plan and then article progress within the project environment. Originally the project scope is defined and the suitable methods for finishing the project are determined. Following this stage, the periods for the different tasks necessary to complete the work are registered and groped into a work break structure. These are some project managements approached used in this project,

1. Condition of satisfaction
2. Project scoping meeting
3. Requirement elicitation
4. Facilitated group sessions
5. Prototyping

In this project, user requirements expect more than the project managers and other group members deliver. Consumer’s wants and need were important to plan the project. Paid attention for why customer wants this application and what they are asking. reason for getting user requirement before planning the project is, excitement for a technology override what a person need. As a team, got knowledge about success/failure projects to develop this project (Behara, 2022) (Challenges while implementing the Hospital Management System, 2022)Agile planning method used for this project.



*Figure 2 : Agile planning method*

## **4.2 Step- wise Framework**

**Diagram

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*Figure 3 : Step- wise framework*

## Table Description automatically generated**4.3 Project time frame**

Table 1 – Project time frame

## **4.4 Gantt chart**

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*Figure 4 : Gantt chart*

Graphical user interface

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*Figure 5 : work breakdown structure*

# **5. PROJECT MANAGEMENT & ESTIMATION TECHNIQUES**

## **5.1 Cost Estimation**

When developing the cost estimation progress, considered these sections.

* When will we need staff and how many?
* What factors affect staff productivity?
* What properties of the product (size, constraints, type) and process need to be understood or estimated to answer the above questions?
* How much should we charge the customer?

(Shibboleth Single Sign-On service - Loading Session Information, 2021)

As the project team, hardware and software costs, travel and training costs, effort costs are included as in the “Cost Estimation” document. Effort cost is the biggest fact for the cost estimation. Salaries of the group members also consist of the effort cost. There are many ways used for cost estimation. Extrapolation & study historical data, Expert judgement, Pricing to win, bottom-up estimation is some of them. (What is Cost Estimation in Project Management?, 2021)

Story points are an important measuring tool to quantify the commitment required to do the project by the production team. In the agile method, story points are used to estimate the complexity of the user requirement. As the developing team, there are three measuring things used to develop the application & it helped to develop a successful project. They are,

1. The amount of work to do
2. The complexity of the work
3. The risk of doing the work

Even if this project is complex, there were huge effort, responsible, schedule and cost from the project manager & team members to do this successfully. According to (Harrin, 2016) money is also a major resource to succeed in a project. Money is needed for all projects, based on form, size, or difficulty. According to the “Creating database application” project, project manager was responsible for,

* Spending money on hosting some web application features
* Buying extra computers/components
* Hiring additional databases
* Paying the team's salaries.
* Paying transport cost for online orders which are essential to the project

The software & hardware components that used during the development of the project is, also a major resource. Computers, a strong network connection, and licensed software are some of major equipment that used in the project.

There was a critical issue occurring from the project staff and it also caused to cost estimation. therefore, project was not possible to appoint the ideal people to work on a project. used secondment of staff to the project, developed existing staff, built a quality & limited budget, checked the availability were some features that used to avoid the cost estimation matters.

Productivity measures of the project

PROD = LOC/PM

= {(200+500)/2 + (300+900)/2} /10

= 95

\*System programs 200-500

\* Commercial applications 300-900”

Cost drivers of the project.

1. Team support facilities
2. Personnel capability & experience of the team members
3. Project reliability and complexity
4. Required schedule
5. Depth & breadth services

## **5.2 Risk Management**

Risk management is a most important phare of the any project. As they be able to affect the project in a positive or negative way. As a group, this project planned the risks in the first stage of the planning stage. Brainstorming reserve analysis & SWOT analysis was applied in the entire project & the agile development methodology is designed to deliver a high-quality product on time while the user requirements are changing rapidly (Aalaa Albadarneh, Israa Albadarneh, Abdallah Qusef, 2015).

## 

**Risks Identification**

The project was started with the meeting of project manager and the team members. These are the risks that identified during the meeting,

1. Scope can be change or adding some different features
2. The project maybe cancels before it gets finish
3. After cancelling the project, client may be wish to the refund of the advance payment
4. Natural disasters
5. Limited time
6. Limited budget & weaknesses of the cost estimation

Further identify more risks of the project & prepared before it occurs, used a casual mapping mechanism. They are,

1. Users may not be having satisfy of the final product.
2. Team members may be absent when they have sickness or their family problems.
3. Different developers might use different version of platforms to develop the project

**Risk Assessment**

The risk manager has decided to calculate risk exposure for risks that the team has identified. In order to do that, he has to assign likelihood and the impact from that particular risk is happens. The following table shows the likelihood and impact of each risk.

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Table 2 – Risk Assessment

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Table 2 – Risk Assessment

The risk manager used to calculate risk exposure by multiplying likelihood by impact (Aalaa Albadarneh, Israa Albadarneh, Abdallah Qusef, 2015). By calculating risk exposure project manager is used to prioritize risk based on Risk Exposure. He used to evaluate by a value between 1-9. If any risk has an exposure between 6-9 it is important to manage, if risk exposure is between 1-5 value it's not worth to manage (Aalaa Albadarneh, Israa Albadarneh, Abdallah Qusef, 2015). Risks exposure values are as follows,

Graphical user interface, table

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Table 3 – Risk Management

Graphical user interface, table

Description automatically generatedThe following table will show the priority level of each risk that PM has allocated.

**Risk Mitigation**

To reduce the impact of the risks, the Risk Manager has decided on some risk mitigation techniques to reduce the impact. The Risk Manager is mitigating risks based on the priority of risks identified earlier.

Graphical user interface, application, table

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**Monitoring And controlling**

To monitor and control the situation, the risk manager has decided on a 25% safe zone for every sprint.

## **5.2 Software Quality Management**

According to (Luchen, 2020) quality management is a robust framework that is essential from the beginning to the end of the project. The project requires the contribution of all project teams and their members and stakeholders. QM process gave more benefit to the project. These include providing a quality product, improving team collaboration and review, greater efficiency, better control of core business processes, a better understanding of customer needs, and better risk management, Improving customer satisfaction, and so on.

**Quality planning**

Find out what will be the project's quality and how quality will be determined.

Processes

* Define project scope and customer requirements
* Team establishment
* Schedule/ activity development
* Estimates the resources
* The acquisition strategy of project delivery.

**Quality Control**

Observe certain project outcomes to decide whether they meet the limits for execution measurement defined in the quality management plan.

Processes

* Project execution and control
* Lessons learned

**Quality Assurance**

Find out whether the quality measurement is appropriate by regularly evaluating overall implementation to ensure that the project fulfills customer quality expectations.

Processes

* Project execution and control

**Quality Improvement**

Expand the project's efficiency and effectiveness when corrective measures such as requests for change are identified. There may be a need for adjustments to the quality management plan.

Process

* Change management

**Quality Management Plan**

**Graphical user interface

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**Graphical user interface

Description automatically generated with medium confidenceKey Responsibilities**

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**Implementation checklist**

Standards

1. IEEE 1074 – Software Development Lifecycle
2. IEEE 1233: System Requirements Specifications
3. IEEE 828 – Configuration Management in Systems and Software Engineering
4. ISO 9001:2015: Quality Management Systems - Requirements

Tasks to review

1. Configuration management plans and processes
2. High-level design/develop applications
3. Detailed design documents
4. Software/DB code
5. Functional and Technical requirements specifications
6. Unit test plans and results
7. Software development plans and standards

Graphical user interface

Description automatically generatedChecklist

## **5.3 Constraints**

This project is with more security, safety, conformity, reliability and going ahead with good performance. There was limited time to archive the scope which is created DB for hospital management system & used low budget. Agile method & project life cycle was based on this project. This high-quality project was done by using more resources & researches. Final testing was done by using selected customers & their satisfaction was with good feedbacks. Risk & quality management was done by using advanced technical methods such as SWOT analysis.

## **5.4 Verification and Validation Techniques**

Verification is the method of verifying the correctness of a built-in system by verifying that it meets all requirements without errors. Review, test, analyse are the techniques that used in verification of this project. This checks to see if there are any items needed to keep the system running and if there are any processes required to enter the information (Adams, n.d.).

Validation is the process of documenting that the system meets the requests. Decisions to validate the system are made by the validation plan. Prototyping and constraints reviews are the techniques which we have used as validation methods. In order to demonstrate the software to the user before development, we create prototypes. The customer and the developing team discuss the requirements to get a productive outcome (Anon., n.d.).

# **6. SUCCESS CRITERIA**

* Delivered the project before two weeks of the deadline within the budget and more than scope.
* Provided the high-quality database with the database management system.
* Developed the additional database which perform as backup database.
* Neat & tidy project finished with the team unity and spirit.

# **7. WORKLOAD MATRIX**

|  |  |  |
| --- | --- | --- |
| Name | Index number | Contribution |
| R.A.P.O.I.Perera | 10707316 | Introduction, Problem introduction, Risk management, Quality management, verification &validation techniques, constraints |
| A.N. Withanage | 10707425 | Introduction, Business case, , Risk management, Problem introduction |
| G.B.A.Samarajeewa | 10707150 | Scope & boundary, Gantt chart, Project plan, project time frame |
| K.A.I.A.S.Kuruppu | 10707250 | User story, Project plan, project time frame, Gantt chart |
| W.L.H.K.Piyasundara | 10707318 | Introduction, Aims & Objectives, Success Criteria |

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