

SOFTWARE ENGINEERING PROJECT MANAGEMENT

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PROJECT TITLE: *HomeDoc*

PROJECT TEAM: 10

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Project Plan

HomeDoc

EPIC Solutions Ltd.

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PROJECT OVERVIEW

1. Project Overview

This document is an introduction to the “EPIC Solutions Ltd.” proposal to develop software application for The General Hospital. This Project Management Plan describes an outline to the purpose, scope and targets of the project for which the Plan is made, the project assumptions and requirements, an overview of project expectations, a synopsis of the project timetable and spending plan, and the plan for developing the “HomeDoc” Project.

1.1 Purpose, Scope, and Objectives

Purpose

Health is one of the biggest priorities of one’s life. It is of great advantage to be in control of your own health diagnosis and analysis. However, it is also beneficial if doctors can monitor regular health of patients or any threat of upcoming disease for individuals without any effort to come to hospitals for regular checkups. The aim is to provide a Medical informatic system which can be easily accessed by both the patients and the doctors.

Scope

The scope of the project is to successfully plan and implement a Medical Informatic System which will modernize the home health division of TGH and deliver quality user experience which is achieved by providing the user with control over their EHR thereby, reducing human efforts in health monitoring. In essence this system turns-out as a steppingstone for disease prediction and aids in e-health care.

Objective

Building a simple user-friendly application which assists both end users in accessing medical records. Provides in depth analysis of user data with the help of modern technologies like AI and ML to provide an accurate healthcare system capable of predicting of future health ailments. All this needs to be done in 18 months’ time in collaboration with The General Hospital.

1.2 Assumptions and Constraints

Assumptions

1. The cost of the project falls under the initial estimate
2. Every deliverable will be completed on time
3. Equipment provided is up to date with modern technologies and is highly compatible with every element of the system.
4. No extra training cost and time is allotted as the application is simple and easy to use

5. Every computing element has high processing power for the implementation of AI algorithms
6. Human resources provided for this project are highly knowledgeable and efficient
7. The allotted human resources are available for the total duration of the project
8. A certain source of uncertainties is taken into account for meaningful and accurate monitoring of results.
9. Cloud Server performs with maximum efficiency

Constraints

1. This limitation comes into the picture when the cost of completion of the project is higher than the initial restricted budget. This affects the project outcome and reduces the overall scope of the project. This also puts a financial burden on the customer.
2. Delay in the project completion reduces the value of the project to the customer.
3. Limited number of human resources allotted can lead to reduction in scope, quality and project performance.

1.3 Project Deliverables

- Medical data acquired in the form of patient's vitals will be logged into our system.
- Making logged data available and visible in our system.
- Scanning Barcodes of medicines to keep a record of daily dosages and having notifications for missed medicines and vitals.
- Data Storage - Getting enough storage to store patient data on cloud so that it can be accessible from anywhere.
- AI - make a database of already known diseases with their symptoms and continuously compare the patient data with it to make sure of any upcoming health issues for the patient.
- Medical processing - processing of medical data , decision making, and diagnosis of diseases is done in this phase.
- Security - make sure the communication channel is secure and end-to-end encrypted.
- Complete EHR availability and visibility
- Testing phase: Test and calibrate the algorithm to get more accurate in perceiving the dimensions.
- Trial Phase: Test and fixing issues period while creating a pleasant User Interface for application.
- App and Software releasing event

1.4 Schedule and Budget Summary

The project is scheduled to be completed in 18 months,

- Initiation of the project will start on the 4th March 2020.
- Software application is ready for use after 4th September 2021.

The overall budget for completing the software application with accurate EHR and full functionality with high quality is around \$4.415 Million CAD.

The project will be tracked using the AZURE DevOps.

1.5 Evolution of the Project

As we are in the smart era where data defines everything using AI and ML. Instead of walking into hospitals for regular health monitoring, we can just use our software/application to very precise details of health records and other related functionalities with it.

One can track his/her personal health records from home and without doctor's appointment while critical and sensitive issues are handled by the family doctor or hospitals health physicians. Critical health issues can be controlled and avoided by recognizing its symptoms in its early stages.

The developed software aims to provide a Medical informatic system which can be easily accessed by both the patients and the doctors. This results in early detection of any possible health ailments. The main motive behind our system is to effectively use EHR to correlate it with the real time monitored data acquired from the patients and predict complications using modern technologies like Artificial Intelligence, Machine Learning and Big data analytics which in turn, eliminates the excessive use of medical resources. Our system enhances the accessibility and provides a secure utilization of EHR by using encrypted cloud-based services.

The plan of the project will be updated accordingly on unscheduled basis and scheduled update to the plan will take place on monthly. Changes in the plan are communicated to all the members through emails, and a baseline of the plan is created with the final project plan. If there are any changes in the plan, these will be against the baseline. If any major changes in the scope, then the plan will be updated with new baselines.

1.6 References

1. <https://ieeexplore.ieee.org/document/8821845/authors#authors>

2. <https://ieeexplore-ieee-org.proxy.bib.uottawa.ca/document/8605142>
3. <https://ieeexplore.ieee.org/document/8777691/authors#authors>

1.7 Glossary and Acronyms

Glossary

S.NO	Word	Meaning
1.	Artificial Intelligence (AI)	It is simply the ability of a computer system to analyze and perform a task which requires human intelligence
2.	Cloud computing	Delivery of different services through internet. Some of these services include cloud storage, cloud analytic tools etc.
3.	Data refining	Converting abstract data into implementable data sets
4.	Machine Learning (ML)	An application of Artificial Intelligence, which enables a system to learn and improve from experience without being programmed

Acronyms

Sr. No	Abbreviations	Explanation
1	AI	Artificial Intelligence
2	HER	Electronic Health Record
3	ML	Machine Learning
4	TGH	The General Hospital

PROJECT OVERVIEW

2. Project Organization

2.1 External Interfaces

The organization chart of the company interprets the external structure of the firm relating the interests of the project.

External interface of the project describes how different members involved in the project communicates with the client or owner of the product firm.

External structures give a brief overview on overall responsibilities of a project manager at an external level.

Organizational chart is a hierarchical representation of personnel at different levels of roles and responsibilities.

In this project we are utilizing 4 Project managers –

Project Manager 1 –

- He is responsible for building milestones in order to achieve main goals of the project.

Project Manager 2 –

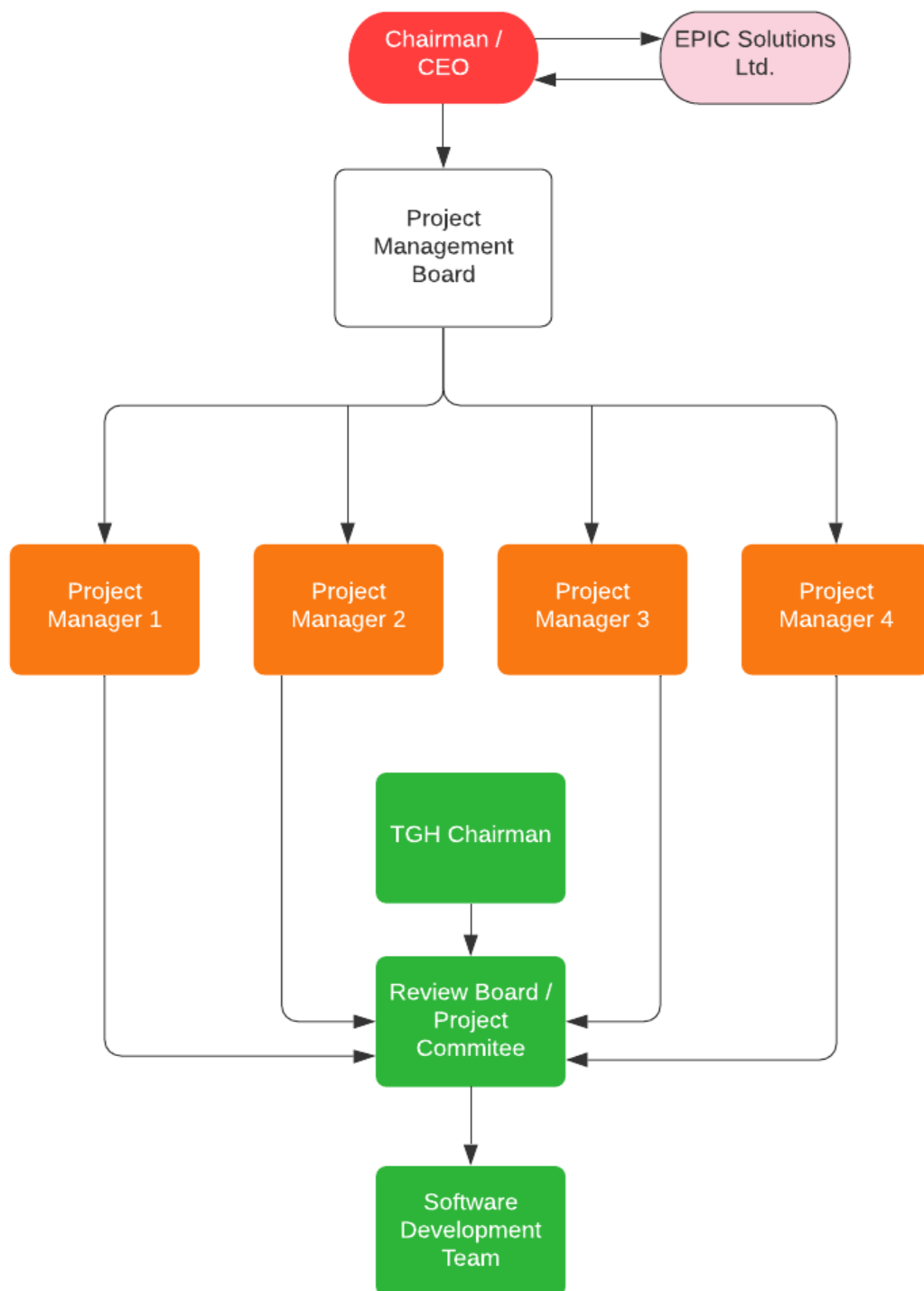
- He is responsible for estimating size, cost / budget, time and effort in simplicity it means estimating all the resources required for successful completion of the project.

Project Manager 3 –

- He is responsible for coordinating all the activities of all project team members.
- He also handles configuration management, thereby handling any new changes required by the client side.

Project Manager 4 –

- He is responsible for monitoring the progress of team members by keeping track of activities of the entire team and make sure that they do deviate from their established goals.
- His role is very crucial as he keeps evaluating the project and finding potential risks considering the assumptions of our project.

*Figure 1 External Interfaces*

2.2 Internal Interface

The IT department of the General hospital is providing a team of 19 software development professionals which includes 1 development manager, 2 analysts with good amount of experience in the field, 8 programmers with 5 or more years of experience and 7 programmers with less than 5 years of experience. All these professionals only report to their project manager. Epic solutions have a group of 4 who all act as a project manager and manages the project activities.

Our internal project team structure is as follows –



Figure 2 Internal Interfaces

2.3 Roles and Responsibilities

Refer “Appendix A” for detailed description of roles and responsibilities.

MANAGERIAL PROCESS PLANS

3. Managerial Process Plans

3.1 Start-Up Plans

The startup plan for the project is to develop the system that defines the highest accuracy in detecting the uncertainty from the data it collects from patient's side through Artificial Intelligence, keep track on patient medicine intake and securely store all the data in the database. The system is designed in such a way that it overcome all the challenges which initially made the system unable to implement. The system is built at the simplest level, keeping in mind that it will be used by public as well as hospital's staff.

3.1.1 Estimation Plan

3.1.1.1 Software size estimates

This estimation is a several step process which involves managers, domain experts and technology experts. To select the best matching way of size estimation the training is given to management team to make them better understand the complete procedure of software size estimation.

Line of Code(LOC) is considered for software size estimation, also to estimate the software size at early stage functional points are used while estimation.

The technique we used for estimation is **Wideband Delphi** because:

- It is history independent as to avoid same mistakes can be avoided which happened in past.
- To understand the good and worst experiences which the in-house experts gone through while dealing with similar projects
- To understand the time schedules and complexity we already have developed Proof of Concept
- The entire work to be done is given by the Work Breakdown Structure which help to makes the estimation process easy and accurate at the same time.
- The WBS also divides the entire project into smaller chunks for instance from deliverables to activities to tasks and so on.

Process:

- Firstly, we have team of four experts divided into two groups of 2 members each and each group gives independent estimations based on their own analysis.
- Estimation along with the justification is collected from each group.

- The deviations are estimated by the collation and comparison of estimates given by each group.
- As the result of discussion the estimates are handed over to groups again for re-estimation and this is repeated till the both the groups reach to similar estimations.

Implementation:

First round of the estimates:

Initially first group of experts gave the estimate as follows:

1. Functional points:
 - i) In the total of 14 environmental factors average was 4.0
 - ii) Detailed points are given in appendix
2. Lines of code : 55 KLOC
 - i) Code excludes all the configuration and data files
 - ii) ML module with 18.5 KLOC
 - iii) Application code will be 36.5 KLOC

Second expert group estimates are:

1. Functional Points:
 - i. There average was 3.9 for the 14 environmental factors.
 - ii. Detailed in Appendix.
2. Lines of code: 34 KOC
 - a. Code excludes all the configuration files and data files
 - b. ML module with 11 LOC
 - c. Application code will be 23 KLOC

The Second iteration:

Discussion held and both group agreed on same estimates which are:

1. Lines of Code: 45 KLOC
 - a. Code excludes all the configuration and data files
 - b. All automated tools are considered.
 - c. Excluding all test files and plans
 - d. ML module with 19.5 KLOC
 - e. Application code will be 38 KLOC
2. Estimation: 466 Staff-months

Reasons for huge size for the project:

1. The machine algorithms used has to be precise enough to give the real values, Hence it requires lot of efforts as the application they are going to be used in is directly related to the lives of the patients.
2. The implementation part of the project is crucial and no assumptions has to be considered everything has to be in the scope of top-notch which will obviously make the size of the project big enough as the implementation will be at huge level.

3.1.1.2 Software Duration and Effort Estimation:

Methods used:

1. Hybrid of COCOMO Model and Expert judgement method

Justification:

- As we are already using wide band Delphi method to estimate the size of project the same panel of experts can give their estimates regarding the time and effort for the project to complete.
- COCOMO method only depends on the size of project for estimation of time and effort required as it is independent of the cost factors.

Process:

- As mentioned earlier in 3.1.1.1 groups of experts estimated that the size of the project will be approximately 45 KLOC and accordingly the efforts as well as Duration can be estimated by implementing the COCOMO Model over this estimate.

Implementation:

Selection of appropriate model:

Although our project needs to be innovative but at the same time huge risk will be there while experimenting new aspects with the patients. So, it is better to be little innovative instead of risking the lives of patients and use **semi-attached** mode for our project.

In semi-attached mode the estimates are calculated as:

- $E = 3.0 * \text{Size}^{1.12}$
- $TDEV = 2.5 * E^{0.35}$

Where,

- E = Efforts in staff-months
- TDEV = Time to Develop the project in months
- Size will be used in KLOC

As mentioned earlier the **size = 455 KLOC**

$$E = 3.0 * 45^{1.12}$$

Effort = E = 213.16 = 214 staff-months Approximately

$$TDEV = 2.5 * 214^{0.35}$$

Duration = TDEV = 16.35 Months

NOTE- these are the estimates which does not includes the resources allocated to the project.

Estimation Summary:

To summaries the estimation, for the **size estimation** the method we used is **Wideband Delphi Method** where two group of experts comes with an estimate of **45 KLOC**. Furthermore, with the help of the size estimation by experts we estimated the **efforts as well as the duration** required to complete the project which comes out to be **214 staff-months and 16.35 months** for the efforts and size respectively with the help of COCOMO semi-attached model. In addition, for the **project tailoring** process it is assumed that **1.15 months** will be enough and around **15 days** are kept aside for the uncertainties which extends the duration in terms of **unscheduled works**.

So, the total duration considering unscheduled work and tailoring process comes out to be 18 months.

3.1.2 Staffing Plan

Staffing plan mainly focuses on the finance allocation for the staff and it also undertakes period plan which staff has to follow. The staff allocated to us includes 1 project manager, 1 development manager, 3 programming analyst, 8 Programmers with more than 5 years of experience and 7 software programmers with experience between 2-5 years. The payroll of all these will be managed by The General Hospital.

The staffing plan is given in 'APPENDIX A'

3.1.3 Resource Acquisition

Human resources along with their roles and responsibilities and cost associated is explained already in the 'Appendix A' These personnel resources are entirely dependent on the client i.e. The General Hospital as they are providing the staff except the management team.

For the Non-Human resources:

The Non-human resources are sub divided into few categories which are:

Hardware Resources:

These resources are provided by the client itself as the client place will be used for the development of project.

The resources must acquire the following specs to enable the staff to run heavy software-

- Operating System: Windows 10 or Linux
- Processor: Minimum 3.2 GHz
- Graphics card: Minimum 8GB
- RAM: Minimum 16 GB
- Storage: Minimum of 128 GB of free disk space

Hardware resources may also include Printers for printing services.

Software Resources:

All the Software resources such as Software Licenses, Server allocations and Web Services will be maintained by the Project Manager. The software resources will be operated by all the team members. The manager's duty is to ensure that any software required will be provided to the team beforehand on their work stations.

The resources required are:

- Bells Cloud Services (AWS) for storing unlimited amount of data
- Microsoft SQL Server for Database Management Operations
- Azure Software for developing Mobile Application
- Microsoft Cognitive Toolkit to implement deep learning algorithm
- Ansible for configuration management.
- Microsoft Visual studio for making prototype of medicine log feature.

3.1.4 Staff Training Plan

Keeping in mind that the project we are working on is new in the market, highly skilled programmers and developers with extensive experience has been provided by the client's company will be provided with training at different levels to make them familiar with this specific project and to make best utilization of their skill.

Type of Training	Method	Type of Personnel	Duration
Convolutional Neural Network	Lectures, discussions	Senior and Junior Programmers	2 Weeks
Bayesian Theorem	Lectures, discussions	Senior and Junior Programmers	2 days

Scrum Master	Lectures, discussions	The scrum team	1.5 weeks
Deep Learning	Lectures, discussions	Senior and Junior Programmers	2 Weeks
Team management	Discussions, Mentoring	Analysts	100 Hours
Optimal Resource Usage	Discussions, Mentoring	Analysts	60 Hours
Cloud Computing	Lectures, discussions	Senior and Junior Programmers	2 Weeks
Interface Designing	Computer-assisted training	web developers	2 Weeks
Table Normalization in Database	Lectures, Computer assisted training	Database developer	2 Weeks

3.2 Work Plan

3.2.1 Work Breakdown Structure

The detailed Work Breakdown structure can be referred to ‘Appendix B’.

3.2.2 Schedule Allocation

The detailed Schedule Allocation plan can be referred to ‘Appendix C’.

3.2.3 Resource Allocation

The Human Resources Allocation Plan can be referred to ‘Appendix A’.

The Software Resources Allocation Plan can be referred to ‘Appendix C’ & ‘Appendix E’.

3.2.4 Budget Allocation

The budget is allocated based on the type of work we have divided in the Work Breakdown Structure. Costs are purely for Project purposes and no recreational costs have been accounted.

Refer to 'Appendix D' for further details.

3.3 Project Controls

3.3.1 Requirements Control:

The software tool that is been used in this project to trace requirements from their initial entry through each of the phases through to delivery is Azure DevOps. In order to limit unnecessary work and ensure integrity of the product requirements, all work effort must be related to a traceable requirement.

Prioritization:

The priority of the requirement will affect the attention it receives when trade-offs become necessary, and when changes to requirements are requested. In addition to the above, to rate the priority of incorporating change to the requirement, a requirement change priority is needed. A priority is assigned to each requirement when entered in the system which helps in prioritization and are as follows:

- **3 = high** (critical and must be done)
- **2 = medium** (important, should be done, but not necessary)
- **1 = low** (change only if time permits)

Product Requirements Change Control:

Changes to product requirements will be based on the priorities, their extent of impact and introduction time in the project. All measures will be taken to handle the changes to priority 3 requirements, priority 2, and priority 1 requirements will be handled if only time permits and depending on the project budget and schedule.

As the project is based on solid requirements so it needs to be considered that any change introduced after the requirements phase is complete will come with expectation that project budget or schedule or both will be affected.

Assessment:

The impact of the change in requirements on the project is assessed by a meeting. In the meeting, it will be discussed that whether to introduce the change based on scope, delay it will introduce and quality of the project. Project Manager along with Project Specialist will lead this assessment. In the meeting the following aspects will be considered:

- product scope
- product quality
- project schedule
- project budget
- project resources
- project risks

Reporting:

All the assessments must be documented and taken to the consideration of the Project manager. When there are multiple changes to be considered at the same time, then according to the priority of the requirements change associated actions will be taken. All the necessary resources to approve or reject the requirements change negotiated budget or schedule will be taken care by the Project Manager.

3.3.2 Schedule Control

The Azure DevOps tool will be utilized to create project schedules for the 'HomeDoc' project, deliverables will be identified in the project's Work Breakdown Structure itself. We use activities will be defined to identify the specific work packages which has to be performed to complete each deliverable. Activity sequence will be used to determine the order of work packages. Activity duration estimating will calculate the number of work periods required to complete work packages. In order to complete schedule development. To assign resources to work packages, resource estimation will be used.

The following are the designated milestones for all project schedules

- Completion of WBS/WBS Dictionary
- Construction of non-conflicting project schedule
- Final project budget approval from authorities
- Approval of roles and responsibilities
- Approval of defined Requirements
- Data mapping completion
- Implementation of the Project
- Acceptance of final deliverables

The following are the roles and responsibilities for schedule development:

- The Project Manager will be responsible for expediting the work package definition, sequencing and estimating duration and resources with the project team. The Project Manager also uses scheduling tool to create the project schedule and validate the same with project sponsor, project team, stakeholders.
- The project team will review and validate the proposed schedule and perform the given activities once the schedule is approved. The project team will take the responsibility in work package definition, sequencing, duration and resource estimating.
- The project sponsor will analyze and review the proposed schedule and approve it before the schedule is implemented.
- The project stakeholders will participate in reviews of the proposed schedule and assist in its validation.

Measurement of progress

Considering the following metrics to monitor schedule progress:

- BCWS -Cost budgeted for the Scheduled Work
- BCWP- Cost Budgeted for the Performed Work
- SV- Variance of the Schedule
- SPI- Performance Index of the Schedule
- ETAC- Time Estimation at Completion

We can calculate the SV, SPI and ETAC at any time by using table values into the formulas bellow:

Schedule Variance(SV) = BCWP – BCWS

Schedule Performance Index(SPI) = BCWP/BCWS

Estimated Time at Completion(ETAC) = Original Time /SPI

This ETAC metric will be utilized for the estimation of the date on which the project will be complete, in accordance with the schedule of the project.

The SPI should be between 0.95 and 1.10. If it is not, an investigation of the cause and a solution will be proposed.

3.3.3 Budget Control

Project cost will be managed by the project manager throughout the lifecycle. Cost performance will be analyzed during each monthly meeting. Planning will be done to get the project back on track (Budget Wise) if any cost deviations will be there and the plan will be presented to the sponsors for approval as they are the one financing the project.

Work Breakdown Structure will be referred periodically for the tracking and managing the cost and performance to be on budget. Earned value calculations which applicable to project cost

accounts are utilized to measure the financial performance of this project. Cost as well as working hours will be rounded to their nearest values.

Cost and Schedule index will be to the project sponsor by the project manager on regular basis (bi-weekly in our project).

The status of the budget is as follows:

Cautionary: If the cost expended is varying by the 5% from the initial budget (Again the values may vary for different cases)

Critical: If the cost expended is varying by the 15% from the initial budget.

NOTE- The cautionary value is kept lower than the conventional projects so that the constraint will be always there to keep the project on budget without compromising quality.

The change in the status of budget is always reported by the manager and the measures will be taking to bring the budget on track.

Measurement of progress

Following metrics be followed to monitor schedule progress:

- BCWS -Cost budgeted for the Scheduled Work
- ACWP- Actual Cost for the Performed Work
- CV- Variance of the Cost
- CPI- Performance Index of the cost
- ECAC-Cost Estimation at Completion

We can compute the CV, CPI and ECAC at any time by using table values into the formulas bellow:

Cost Variance (CV) = BCWP – ACWS

Cost Performance Index (CPI) = BCWP/ACWS

Estimated Cost at Completion (ECAC) = BAC /CPI

This ECAC metric will be utilized for the estimation of the cost on which the project will be complete, in accordance with the schedule of the project.

The SPI should be between 0.95 and 1.10. If it is not, an investigation of the cause and a solution will be proposed.

3.3.4 Quality control

It is not only important to deliver project on time and on budget but, also equally important to deliver it with acceptable quality. Hence in order to deliver project with good quality, it is very important for a project manager to keep monitoring it and take necessary measures when needed. quality control is considered to be one of the important functionalities of a project manager as the quality of a product directly affects the product's popularity in market. To achieve quality control, we are utilizing 3 project analysts who invokes Software Quality Assurance Plan (SQAP). It is usually the project sponsor/customer who is responsible for setting the quality standards. All the changes which are made based on sponsor requests should mandatorily reviewed by the sponsors before project implementation/deployment.

The following are few steps to be followed in order to achieve quality control :

1. A clear understanding of project Requirements. (Software Requirements specifications)
2. A good work breakdown structure leads to a quality product. (WBS)
3. It's also important to spend enough time for design and implementation.
4. One of the important factors which affects quality is “feedback”, hence feedback should be considered after each stage of design and take necessary measures to improve it.
5. Proper monitoring of project tasks and activities eliminates the time required for risk analysis. (ie. Task monitoring).
6. Any new changes requested by the client should be considered and verification and validation test should be performed before applying the changes. (ie. Configuration and change management).

Meetings

Meetings should be conducted regularly by gathering experts (analysts in specific field) among the project team and take suggestions and reviews from them.

This meeting should include following members –

- Project sponsor
- Project manager
- Project analyst, who is an expert in a specific field.

3.3.5 Reporting plan

Reporting on software project management perspective means confronting appropriate project member and informing him about any updates or issues concerning the project. Reporting for each individual involved in project is different and it is usually done on the basis of hierarchy. For example, if there are any changes to be made then the project sponsors/ stakeholders call for a meeting which includes only stakeholders and project manager.

The following are few different scenarios of reporting during project development cycle –

1. Issues concerning the problems or errors occurred during program development –
 - Junior Programmers may report to either program analyst/ development manager.
 - Senior programmers directly approach development manager who has expertise in software development.

1. Change requests made by the stakeholders –

- In this scenario project sponsors directly reports to project manager who in turn calls for a meeting with development manager and program analysts (experienced in a specific field and take reviews from them before making any decision.

2. Issues concerning the budget or time of the project –

Initially we prepare some estimates on cost, time, effort required for completion of the project, which project sponsors agree with. But after a stage of project we might feel that we require additional time or financial resources. Now the project manager calls for a meeting with stake holders where he discusses the current project estimates. the result of this meeting is that they come up with a solution or an alternative in order to address this problem.

3. Risks found or encountered by the project team –

The program analysts usually will be responsible for finding potential risks which may arise in the later point of time in the project. These analysts will discuss these risks with project manager. Project manager using his experience as a tool comes up with a solution. If the risks found are very critical for the project then he also shares them with the stakeholders.

3.3.6 Document Distribution

- Labeling of documents is very important to avoid confusion while recalling them when required.
- Labels can be classified as Public, Internal, Confidential. It is self explanatory that public ones will not have any restrictions, internals can only be shared within the organization and Confidential documents usage need to have prior permission.

3.3.7 Metrics Collection Plan

There are three following categories for which metrics will be collected:

- Effort
- Reviews
- Change requests

Effort:

By having project team members fill out electronic timesheets as they work on the project the effort metrics can be collected. Each team member will login to the electronic timesheet software and allocate time to one of the listed categories. The team member will have access only to the categories related to his/her roles in the project in order to improve the accuracy of the data. Each team member will be asked to fill out a time sheet at least weekly or more often if he/she is involved in work on more than one category in a week. By doing so it will increase the accuracy of data by reducing the impact of time on human memory of effort expended. Each team members will be asked to make their effort data current in the electronic timesheet as soon as they complete a milestone, so that milestone-related reporting can be made to the performance reporting.

Every second weekly (i.e. every other week) project status meeting will be dedicated to reviewing effort metrics and those metrics to which effort metrics contribute for each week, in order to emphasize the importance of Effort metrics collection. Any questions related to the metrics will be clarified in the meeting and a summary about the metric will be given and the information produced from them will be high lightened

Reviews:

These Review metrics can be collected from the results identified in each of reviewed problems either as error or defect in the review meeting forms. The note taker will identify each problem entered in the review meeting forms and enter the review metrics in the metrics database.

Change Requests:

Change request metrics will automatically be collected as they are entered into the project's change management database, which is where changes are triaged and considered for implementation. An established change management process requires change requestors to fill out an electronic form in the organization's change management system. As part of this form, the change is identified as one of the following types of changes:

- Corrective
- Adaptive
- Preventive
- Perfective

3.4 Risk management plan

It is important to identify and plan to mitigate the possible risks that can occur and prioritize them accordingly at the early phase or prior to the project development phase.

During the risk assessment, if a potential risk occurs then we should be ready with a solution or a plan of action. This will be continuously monitored and updated throughout the life cycle of the project, with monthly assessments included in the status report and open to amendment by the project manager.

Possible Risks and their mitigation plans:

1. Data Security: The risk of Data theft and misuse is high by the data breach or ransomware. Database can be used to exploit the privacy of end users.

Consequences:

- Project Failure
- Misuse of data
- Loss of data
- Loss of privacy
- Exploiting of schedule

Mitigation:

- By using the highly protective data encryption techniques and database system
- Data backup at regular intervals and recovery options.

- Bells Cloud Services provides high level data security.

Authorities Accountable:

- Database Developers
- Programmer/Analyst

Probability of occurrence: High

Impact: severe

2. Cost Incremental Risk: Misunderstanding in requirements leads to change in scope which affects the budget planned at the initial phase of project.

Consequences:

- Force to change the budget.
- Lead to compromise in quality of system.
- Affects schedule also.

Solution:

- Better understanding of requirements itself and plan according to the scope of change in advance.
- By using scrum master.

Probability of occurrence: High

Impact: Medium

3. Scope Creep: High chances are there that the client will add the additional requirements which will lead to change in scope of project.

Consequences:

- It will result in change in schedule and delay might occur.
- More resources will be needed to satisfy the additional features.

Solutions:

- Make the schedule keeping in mind about the changes which might be asked by the client
- Make client aware about the details for the additional resources which may include change of budget and schedule.

Accountable Authority:

- Client
- Project Manager

Probability of occurrence: High

Impact: Moderate

4. Use of AI and ML: As the lives of patients will be accounted by the use of our system it is important to use Artificial intelligence and Machine Learning very carefully.

Consequences:

- Wrong use of AI can endanger the lives of patients.
- ML is dependent of data sets provided to it, inefficient set of data may result in less precise outcomes.

Solutions:

- Proper training of ML algorithms will help to achieve precise results.
- Regular testing and training of algorithms will reduce this risk

Probability of occurrence: Moderate

Impact: High

5. Schedule Exploitation Risk: It is directly related to the requirement change of the project by the client which is most likely to happen throughout the project.

Consequences:

- It can lead to miscommunication among team mates.
- It can affect the quality of system
- It can make the client less interested in system.

solution:

- Pre-planning of schedule keeping in mind that requirements may change.
- Using Agile methodology will help to compensate this risk.

Probability of occurrence: High

Impact: Moderate

6. Deployment and Integration: As the different teams will be working on different parts of project it is very important to continuously monitor about other team's part as to proper integrate all the parts.

Consequences:

- The quality will be compromised if integration will not have done in proper manner

- Conflict between peers will be there and blaming game will be played among each other,

Solution:

- Frequent Reviews will be done to understand each other's part to develop the part with efficient compatibility.
- Taking help from technically experienced person to integrate and deploy the code in the server to avoid conflict.

3.4.1 Change management

Change is inevitable, especially in a software project development. Our planning for the project should be such that there should be a scope of change and the changes should be accepted in a positive manner. The whole process should be defined at the start that how the change will be proposed, Identified, accepted, monitored, and controlled. In short there will be a change management plan which will include all the change control procedures which will be included in the work breakdown structure.

The changes will also bring change in the scope, budget and schedule of the project.

The change management plan should include:

- Identification of the change which has been requested
- Identification of the impacts which the changes will have on project.
- Approval or rejection of requested change based on the impact and guidelines.
- Documentation updation according to the impact of change.

Procedure:

- Any of the team member who feels there should be a change can come up with the change request to the project manager. The changed request form will be filled by the requester.
- Change requests will be logged by the project manager in a change control log every time the change will be proposed.
- The project manager will be assigned to analyze the change and to find what impact it will make on the project in every aspect. Only if the change will be viable to the project the change request form will be sent to project sponsors for further analysis.
- The project sponsors will update their decision on the change request form and forward the form to the project manager.

- The Manager will update the documentation accordingly if the approval will be granted and if not he/she will simply update the control log.

Change Request Form:

Project name:	
<input type="text"/>	
Requested by:	Date:
<input type="text"/>	<input type="text"/>
Request name:	Request number:
<input type="text"/>	<input type="text"/>
Change description:	
<input type="text"/>	
Change reason:	
<input type="text"/>	
Impact of change:	
<ul style="list-style-type: none">• Scope:• Budget:• Timeline:• Resourcing:• Communications:• Other:	
Proposed action:	
<input type="text"/>	
Associated cost:	
<input type="text"/>	
Approved by:	Date:
<input type="text"/>	<input type="text"/>

Figure 3 Change Request Form

3.5 Project Closet Plan

This is the last phase of the plan project will project will be considered complete, this is just the beginning of the completion of our project. For the transition of the project from development team to the client set of procedures will be followed in a proper manner.

- Team members, QA team will identify the pending task and development manager will coordinate with the team to ensure the proper delivery of outstanding deliverables which will be further approved by the project client.
- To verify that everything we did is up-to the defined standards review of defined goal, objective and scope will be done with in the allotted time slot. In case of any deviation found from defined parameters then reasons for the same will be reported and analyzed for future references.
- Approvals and documentation
 - a. All the approvals and signatures will be secured.
 - b. Ensure full stakeholder approval or customer satisfaction about your work by getting them to sign off on relevant deliverables.
 - c. Close all outstanding contracts and agreements with internal partners or third-party vendors.
 - d. Start preparation of all reports, both deliverable and non-deliverable ones.
 - e. Archive relevant documents that were used in the project from start to finish like requirements, project plans, meeting minutes, contracts, agreements, and other materials into your archives for future reference purposes
- Completion of all the legal obligations, contracts and agreements will be done. All the data will be analyzed regarding budget, variations and outstanding payments will be processed followed by the financial review meeting.
- Postmortem process will be conducted and feedbacks will be gathered from all the stakeholders regarding improvement for future versions of designed system.
- In the final step the project will be officially handover to the client with electronic copy of all the documents.

TECHNICAL PROCESS PLAN

4. Technical Process Plan

4.1 Process Plan

Our product development life cycle is based on the **Agile Development Process** in which multiple builds are carried out in parallel independent of each other. In Agile, the solutions evolve through the collaborative team effort of cross-functional teams and their customers. Documentation, meetings and consultations are mostly carried out phase by phase according to the delivery schedules. The major project activities include brainstorming for new ideas and then iteratively implementing it into the final product to generate new deliverable for the customer. This approach to product development gives pre-approval by the customer as customer as Customer Collaboration is one of the principles of the Agile.

Software lifecycle management

- Software lifecycle comprises of requirements gathering, analysis, initial design phase, clear documentation, construction phase and transition phase which includes the deployment and transfer of ownership to the client.
- Following flow chart shows the clear identification of different phases and transition charts.
- As the project is carried out using scrum framework, this diagram covers the total processes, with activities performed inside the scope of the scrum.

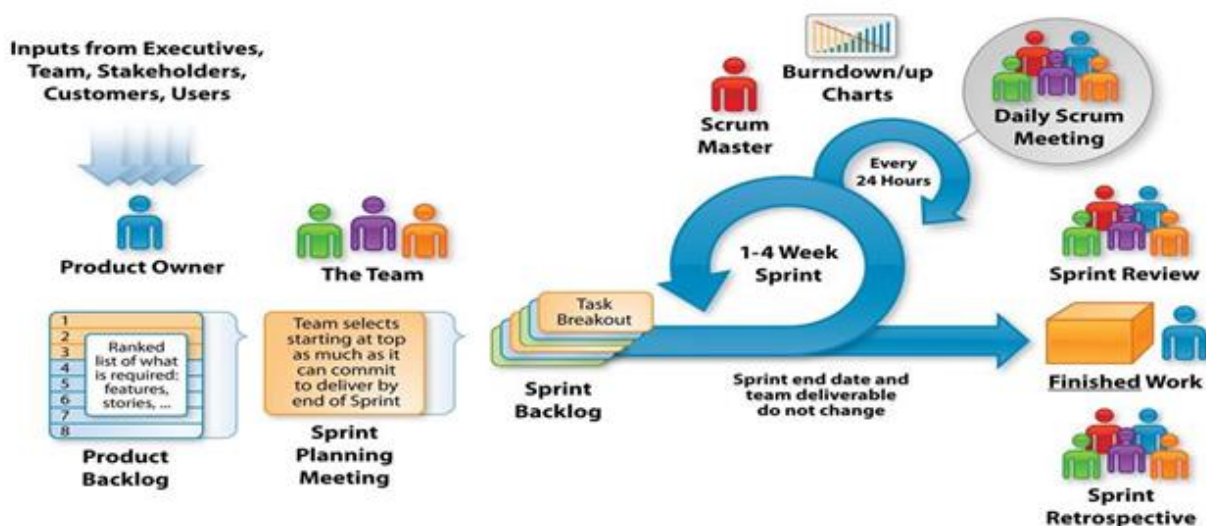


Figure 4 Agile Software Development Process

Module Structure

- The product is based on multiple technologies which needs to be integrated and regular communication between them is required to deliver the expected results.
- We will develop the HomeDoc software in a computer version and mobile application for android and iOS.
- Server in the backend acts as an intermediate channel between data in the database and the view in the app.
- Machine Learning module is developed independently by the ML & AI team.
- These two stand alone modules are integrated using API's.

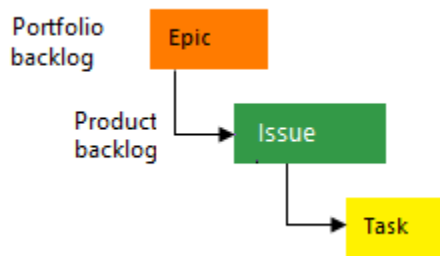
Azure

Part of our project plan is implemented in Azure DevOps Agile Boards Platform.

Azure Boards is a project plan implementation and tracking tool with which we can track tasks, features, and even bugs that are associated with project. User stories Hierarchy will be as below:

- Epics
- Issues
- Tasks

Here is the depiction in the form of an image (Image Source: Microsoft.com):



•

Dashboard:

- Contains all development related management, planning, scheduling, execution and tracking can be done here.
- Integrates all the resources with single dashboard, which includes Deliverables, Sprint planning, Repositories, Code, Deployment pipelines, Testing framework, test plans and artefacts.

- Day to day tracking, notification and team collaboration.

Refer to Appendix E for further details.

4.2 Methods, Tools and Techniques

The project will use the agile software development methodology with scrum framework to deliver the software products, with deliverables organized according to delivery schedule and product backlogs.

The decision to use the agile (Scrum) methodology is due to the following characteristics of the project:

- Multiple independent modules to be developed independently and parallel.
- Product involves much innovation and no references are available.
- Good communication and collaboration with client are key parts and it is better achieved in scrum process.
- Quick feedback cycle is possible.
- Prime focus in this product is on quality, which can be easily achieved in agile methodologies.

Processes in Scrum Framework

1. Total development is divided into several deliverables. Each of them is a ready-to-use product.
2. In every iteration, all the processes right from planning, defining requirements, designing, development, QA & Testing and Deployment are performed and a deliverable is released.
3. Then once again next iteration will begin. Generally, these iterations are called as sprints.
4. For our application sprints are of 4 weeks.

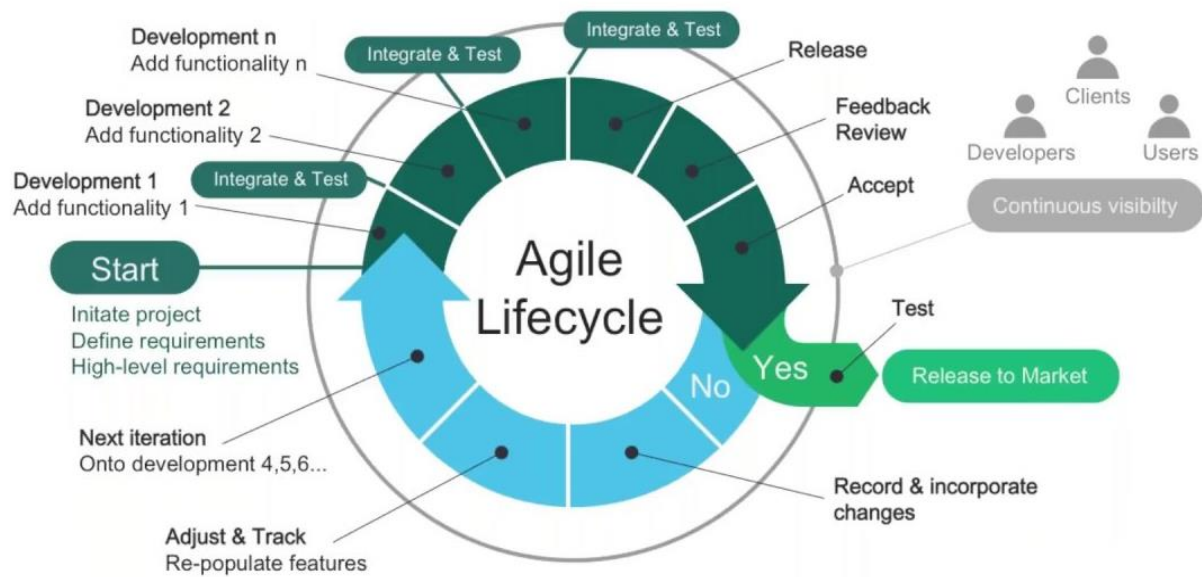


Figure 5 Agile Lifecycle

For every iteration or release one or more deliverables are delivered to a customer. Customer's feedback helps reveal possible problems or change the initial plan if needed.

Major Role Players in the Scrum

1. **Product owner** is customer who oversees product.
2. **Scrum master** is responsible for coordinating the whole scrum process, like conducting scrum meetings and training team to follow agile methodologies properly.
3. **Scrum team** is responsible for developing the product. It includes all programmers, analysis, testing teams.

Here we are following below steps in regular scrum development process

1. **Product backlog creation**
 - a. List of features and deliverables implemented during the development process.
 - b. Every item is called a user story and is ordered by priority.
 - c. Generated in Azure boards
2. **Sprint planning and Sprint backlog creation.**

- a. Adequate sprint duration will be decided, which is in our case 2 weeks.
- b. Work for the sprint is selected and feedback is obtained after each sprint to correct errors and bugs in time.

3. Scrum Meetings and working on sprints.

- a. Task boards are used to track progress of the work.
- b. Short scrum meetings are done with agenda to get full information of the current status of the project.
- c. Burn down charts are used to see work progress and shows the incomplete tasks. Needs regular updates after a scrum meeting.

4. Testing and Product Demonstration

- a. Continuous testing is performed.
- b. Test plans are created using Azure boards.
- c. Bugs are created and assigned to developers and tracked till closure.
- d. Product demonstration is created by the scrum team as a result of every sprint.
- e. Stakeholders review these demonstrations and take a decision for further tasks.

5. Retrospection and next sprint planning

- a. Discuss the results and short comings.
- b. Improving the development process on next step and rectifying mistakes.
- c. Plan next sprint effectively.

These are the standard scrum processes followed, which are also specified in the below diagram.

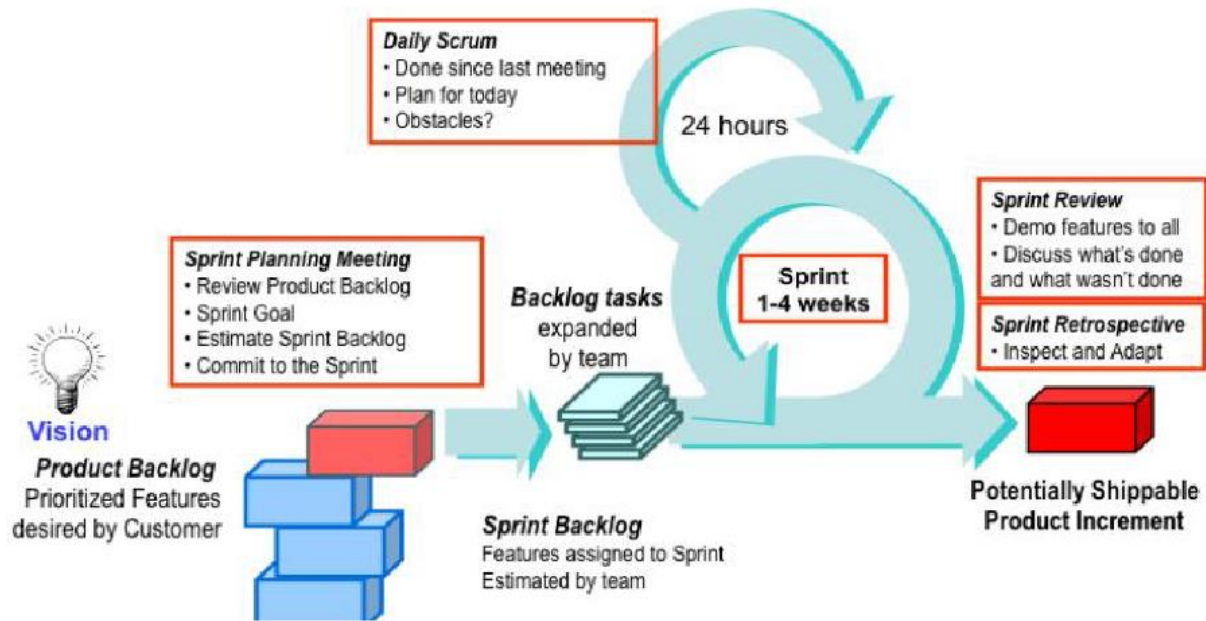


Figure 6 Scrum Development Processes

Tools for Various Processes

Most of the tools are part of ZOHO Suite, which is enterprise software suite to cater team needs end to end, starting from time entry and system set up to project management and cloud storage.

Workplace Tools

ZOHO WorkPlace - Integrating work Environment

People Plus - HR and Training related schedules

ZOHO Remotely (For VPM and Remote working)

1. Documentation

- Microsoft office 365.
- Presentations – Microsoft office 365 – Power point presentation
- Swagger for API Documentation.
- Change control - Zoho WorkDrive
- Cloud documentation and share point – ProjectFusion

2. Design

- Adobe Photoshop (Release 21.0)
- High level wireframes using MoqUps.
- Clickup

- d. End to end application proto typing using Axure.

3. Communication

- a. Internal team communication - Skype (for Business version)
- b. Zoom meetings for team meetings, invitations and recordings.

4. Project management

- a. Atlassian JIRA for Bug tracking.
- b. Microsoft Azure Devops Azure boards for developmet task tracking.
- c. Zoho Projects (cloud-based project management tool)

5. Development

- a. Webserver - NGNIX, Application server – Tomcat
- b. HTML 5, CSS 3, JavaScrip, Angular, Node, Ionic
- c. Cordova, Plug-in, Android Studio
- d. IOS App setup, emulator
- e. Python, Tensor Flow, Keras, PyTorch
- f. SHA and RSA Authentications

6. Quality Assessment

- a. Selenium Drivers – for automation testing
- b. Tabs (Android and IOS manual testing)
- c. Karma and Jasmine (Unit testing)

7. Editors

- a. PyCharm(Open Source)
- b. Visual Studio Code (Open Source)

8. Training

- a. Microsoft power point presentation
- b. ML Modules (AWS Cloud ML Modules)
- c. CodeAcademy - Online real time tutorial with editor.

4.3 Infrastructure Plan

Primary Workstation Initialization:

- The entire team should work in the client location that is The General Hospital.
- Office space for the employees of EPIC Solutions Ltd. that are directly linked to the completion of project is provided by The General Hospital.
- Team members who are employed directly to the EPIC Solutions Ltd. can enter and leave premises with their security access cards.
- Team members from EPIC Solutions Ltd., consultants will be provided with temporary access cards, which need to be collected at the front desk.
- Once the project is complete or consultant is released from project, team member should return their security access card.
- No advance notice is necessary for collection of guest security pass.

Hardware and Software Facilities:

- All the machines for existing employees are already provided by The General Hospital.
- Space for all or any hardware installation and further maintenance is provided by The General Hospital.
- In case extra hardware is needed like Tablet computers, Mobiles, and Systems are necessary they should be bought by Project Manager with project budget.
- Cloud and other licensed software vendors come under project scope, so expenses should be spent from project budget.

Servers:

- The General Hospital have their own internal IT team which operates and maintains the server facilities.
- If additional facilities are needed, a service request should be raised through product owner.
- Configuration management and document storage repositories reside on The General Hospital's Network (LAN).

4.4 Product Acceptance Plan

The products acceptance depends on the customer satisfaction and how well user stories have been implemented. The acceptance criteria for each user story is unique. Well-written acceptance criteria help avoid unexpected results in the end of a development stage and ensure that all stakeholders and users are satisfied with what they get. Customers will be informed in regular

intervals about the progress and the results of the application. One of the following acceptance criteria types will be applied to each user story:

- 1. Scenario-oriented (Given/When/Then)**
- 2. Rule-oriented (Checklist)**
- 3. Custom formats**

Most of the criteria are set by the *product owner* when he or she creates the product backlog. And the others can be further specified by the team during user stories discussions after sprint planning. There are no strict recommendations to choosing the person responsible for writing the criteria. The client can document them if he or she has ample technical and product documentation knowledge. In this case, the client negotiates the criteria with the team to avoid mutual misunderstandings. Otherwise the criteria are created by a *product owner*, *business analyst*, *requirements analyst*, or a *project manager*.

Some of the broad acceptance criteria's can be describes as follows, and other specific technical details for acceptance are mentioned per sprint.

- Project specifications are deliverable schedule is decided upfront.
- Acceptance criteria for the deliverable should be defined for each deliverable in the product backlog.
- Each user story and functionality should be defined by the project owner or if others are defining them, compulsory approval from project owner.
- After every backlog completion, or sprint demo or deliverable completion it should be validated by project owner and update the status of backlog to Approved.
- From coding perspective, every backlog or deliverable should be bug free for approval.

These are not the only acceptance criteria's as the Machine Learning algorithm is constantly evolving so outputs will be changed and as more used will become more accurate. Continuous development training and testing will help achieve these acceptance criteria's and on time. Other acceptance criteria's will also be mentioned during particular sprints.

SUPPORTING PROCESS PLAN

5. SUPPORTING PROCESS PLANS

5.1 CONFIGURATION MANAGEMENT:

Software Configuration Management is defined as a process to systematically manage, organize, and control the changes in the documents, codes, and other entities during the Software Development Life Cycle

CONFIGURATION MANAGEMENT TOOLS

- Deployment of the new releases and management of reliability of servers are done using Ansible
- Push configuration is used by this tool to apply configuration on nodes via SSH. No agent is employed over here. It uses playbooks, which are written in YAML, to give tasks.

COMPONENTS OF CONFIGURATION MANAGEMENT

The changes taking place in the project must be managed in an economical and efficient way. To do this we use we follow 4 main steps which are Identification, Control, Auditing, Status Accounting

CONFIGURATION IDENTIFICATION METHOD

It is the process which establishes the structure of the software item and the documents and files which define it.

The configurations are first identified by configuration control.

LABELLING

Unique labels and version numbers will be assigned to every component of the software. This helps in better tracking.

CONFIGURATION CONTROL METHOD

After a change is identified decision with respect to the implementation of the change is taken care of configuration control management

Presentation of the proposed plan- The proposed change of plan will be considered and plans regarding how it is communicated to the executives is drafted

Analysis of the change- The impact of the change on different components of the project like its features, duration, scope etc. is analyzed in this phase.

Review process- Review regarding the change of plan must be done in order to get everybody's approval. This review meeting can be put forward by the project manager to the executive committee.

Building/prototyping- Once the change in plan gets an approval, it is executed in a small scale and tested of any errors and compatibility issues

Deployment

- After the testing results are satisfactory the change is implemented and deployed on a large scale with respect to organization, Industrial and quality standards

Auditing

It is the process which informs the project manager whether or not the approved changes have been implemented or not.

This process has a direct link to status accounting

Status Accounting

The configured item is tracked and managed using this method.

Details regarding the latest approved version of the item, configuration control status and implementation status of the configuration item is present over here

Change Evaluation Method

The changes which are implemented have to be evaluated with respect to its performance. This evaluation is done by the change control board. This board contains members of different seniority levels. The changes will be evaluated by a group of analysts and developers. The team deployed will be dependent on the impact of the change on other configuration items. If it has a very high impact on other items, then senior level analysts and developers will be made to analyse and evaluate the change

RELEASE MANAGEMENT METHOD

Release management is the process of managing, planning, scheduling and controlling a software build through different stages and environments; including testing and deploying software release.

PROCEDURE FOR CHANGE LOGGING

If the customer is not satisfied with the configuration, he can submit a change request to the project manager.

This change is received and analysed by the project manager and is sent to the board for approval.

5.2 VERIFICATION AND VALIDATION PLAN

Verification:

Verifies whether the product of a given phase satisfies the requirements set at the beginning of the phase.

- Debugging and checking the documentation plans, design, code and program
- Verifies whether the given phase is functioning properly by conducting surveys, assessments and desk-checking
- Verification is also known as static testing
- QA group does confirmation and ensure that the product is according to the prerequisite
- Bugs can be detected at the starting phase of the software development life cycle
- Target is application and programming architecture, complete plan, elevated level, and database structure
- Checking if the given item satisfies our requirements
- Checking if the system is engineered and error free
- Verification is followed by validation

Validation:

After verification process is done the testing of the software is done in this phase. Validation is the way toward checking whether the software product is enough or at the end of the day item has high level prerequisites

- Dynamic testing and approving to check the genuinely of the product
- Rigorous testing of the code execution using Black box, White Box, Unit and Integration testing
- Errors not found in the verification process can be found in validation
- We target product proper mechanism
- With the contribution of testing group validation is executed on programming code
- Validation of whether it meets the prerequisites and customer values

- Target is actual product a unit, a module, a bowed of incorporated modules, and viable last item

Responsibilities

The team required for verification and validation will include -

1. Software Specialist
2. Project Specialist
3. Analyst-1
4. Analyst-2

Tools & Techniques

Black-box testing method will be used on each item described in this scope. Software Test Plan (STP) will describe the plan for validation and verification of these parts.

Team can also use application which will aid them in this process.

Reviews

Peer reviews will be held regularly

Reporting

The verification and validation phase of the project will be documented into a report under the following sections-

1. Problems discovered and corresponding solutions if any
2. Configuration items acceptance/ rejection with given reason

5.3 DOCUMENTATION PLAN

Every phase of the project must be well documented. This process must also follow project management standards. The documentation phase can be broadly divided into two parts- Deliverable documentation and Non-Deliverable documentation

Deliverable Documentation- These are the documentation which has direct effect on the project

a. It describes every phase of the project from the initiation phase to delivery phase.

b. Every document present should be drafted in such a way that every Standard, Drafting person details, reviewer details, version, iteration and time line of the versioning should be perfectly defined and explained

c. Product documents

i. **End user documentation**-This is the final document given to the end user. This document contains information about the total project. It is prepared by the project manager and lead managers from all departments

ii. **SRS(Software Requirement Specification)**- It is the document which contains every specification regarding the software requirements part of the project. It defines the scope of the project. It is developed by a team of analysts and the project manager.

iv. **Software Test Plan (STP)** -It is a document which has information about software testing and the scope of the environment. It is defined by the tech team

v. **Software Quality Assurance Plan (SQAP)** – Every aspect pertaining to the Quality standards of the software part of the project is defined here. It is also developed by the tech team

vi. **Configuration management.** – All software and hardware components of the firm is tracked with this.

vii. **Verification and validation document**-They are independent processes which are used together to make sure that the system meets the intended purpose

d. Process documents include

i. **Plan of the project**- The document which initially gives information about how a project can be handled and executed

ii. **Schedules** -List of project activities, milestones and deliverables required of a project from starting to the end

iv. **Business Correspondence**- Exchange of information with respect to business activities between the firm and the client

e. Technical documentation includes

i. **Mechanisms of code**- This document is with respect to the different algorithms used in the software project

ii. **Reference interfaces and Application protocol interface**-Different components of Data visualization tools which are used in the acquisition of data

iii. **Azure platform**- This document gives information about the project management tool used

f. User documentation includes

i. FAQs

ii. Video tutorials

iii. Embedded assistance

Non-Deliverable Documentation-

- a. These documents do not give any information about the delivery schedules. It includes minutes of retro meetings for sprint and demo agendas.
- b. Although these documents are not part of the regular documents it has to follow the company standards.

Some components of no deliverable documents are

- **Team meeting agendas of the project** – Gives information on what topics must be discussed regarding when team meetings are held
- **KT** – This document describes how knowledge transfer can be implemented if there is a change in role or position
- **Training plans and training modules** -Its gives information on how a training activity has to be planned and how it can be implemented when there is a need
- **Project team meeting minutes** -Gives information on the time aspect of the project meeting
- **Design review summary** – It gives a summary of how the project is designed
- User approvals for sprints grooming

5.4 QUALITY ASSURANCE PLAN

The quality of the project is a key aspect in the whole software lifecycle. We need to keep constant track of it in order to make sure that the overall quality of the project is maintained at the highest level. The plan for quality analysis will be developed by the QA team

Scope- The scope of the Q/A plan is to deliver the final product 90 % accuracy and zero bugs

QA Plan

- The Agile process is implemented over here
- Testing will be performed regularly on a sprint basis
- Individual testing for each deliverable is done as agile scrum is implemented over here
- Testing teams will have different environment to test the application
- All the testing plans and bugs are tracked and resolved using Azure DevOps

Test Estimates

Integration based estimates-At this process, integration of every module is tested, and bugs are fixed

Sprint based estimates-This testing is done for every sprint activity of the project

Deliverable based estimates-Testing is done after the completion of every deliverable

Quality meetings are conducted so that all the activities regarding the project are tested and regularly updated. Data from the development teams and the AI and ML teams are taken into consideration and review meeting are held.

The review meeting conducted must be attended by the following members-

- Project manager
- Analysts
- Development team lead
- Test engineers
- Quality assessment lead
- Test Engineers

Segregation of the work and Control of activities are done with in the audits. Agile Scrum employed over there increases the automation, testing, approval of test tasks and manual sign-offs. Internal and external audits are done in order for the project to function smoothly with respect to the plan. Internal audits are done by the project manager and external audits are done by the client-side team.

5.5 REVIEWS AND AUDITS PLAN

Review of a project is an essential part of the project to ensure that the project is executed with high precision. This section describes schedule, resources, methods and procedures used to conduct project reviews and audits. The project review is done by the project manager .As agile methodology is involved review is done after the completion of sprints and deliverables.

A review is conducted on project proposal, Contract, Schedule, Budget, SRS, SPP

Reviews and Audits will be held on a bi-weekly. To do review or audit, it is essential to have something on the list. Every meeting must have

following parts:

Method: a characterization of what will be done in the review

Procedure: how the review will be organized and communicated

Audit Plan

Audit planning is conducted at the beginning of audit process to make sure that suitable attention is given to important areas, potential bugs are promptly identified and project is completed and properly coordinated. It is generally performed to ensure that project is on the right track and customers requirements are met.

As we are following agile methodology the project manager and the scrum master are interviewed by the auditors. This audit also helps in productive use of the team members or project development

5.6 PROBLEM RESOLUTION PLAN

This section involves methods to resolve a problem if it arises

Problem Reporting

All problem relating to the project has to be submitted to the project manager with help of an electronic problem report form. No steps will be taken to resolve the problem unless this form is submitted.

Problem Analysis

Analysis of a problem is done to determine the risks and threats it poses to the project .

The problems will be analysed with the help of the risk categorization table, This table is also used to categorize any existing risk status present. If new risk arises due to the problem, then a new log will be made in the risk categorization table.

Appropriate team members will be selected and grouped to sufficiently analyse the problem depending on its nature. If the given problem is high on the complexity level, then senior level members will be selected. They also determine the resolution steps and the time required to resolve the problem. Mandatory participants are:

- Development team lead
- Project Manager
- Configuration Manager
- Quality Analyst

Project Prioritizing

Based on the impact of the problem on the project it is categorized into the following groups.

- Critical
- High
- Medium
- Low

Project Processing

After the analysis and prioritizing of the problem, another form will be created which will include information about level of problem (priority) along with the required resources for problem resolution. Additionally, to track the status of problem, an ID will also be assigned to it.

5.7 PROCESS IMPROVEMENT

Maintenance team-Feedback regarding project progress will be given by the project manager to the respective team members so that they can learn from it and become better at their respective fields. If there is no feedback then there will be lowest learning score, whereas highest score will be given to the process which include continuous improvement of work methods based on feedback.

Development team-The development team will have a lot of arenas to present feedback to the other's work status. Sprint retrospective is the most useful retrospective for the feedback process. The development team will discuss the process related problems to increase the fit of sprint for the organization. Usually two or three team members will be involved to discuss the user stories in detail and meeting spanned over two days for a long period of time, while others will only listen to their discussion.

Appendix A

Roles and Responsibilities & Staffing

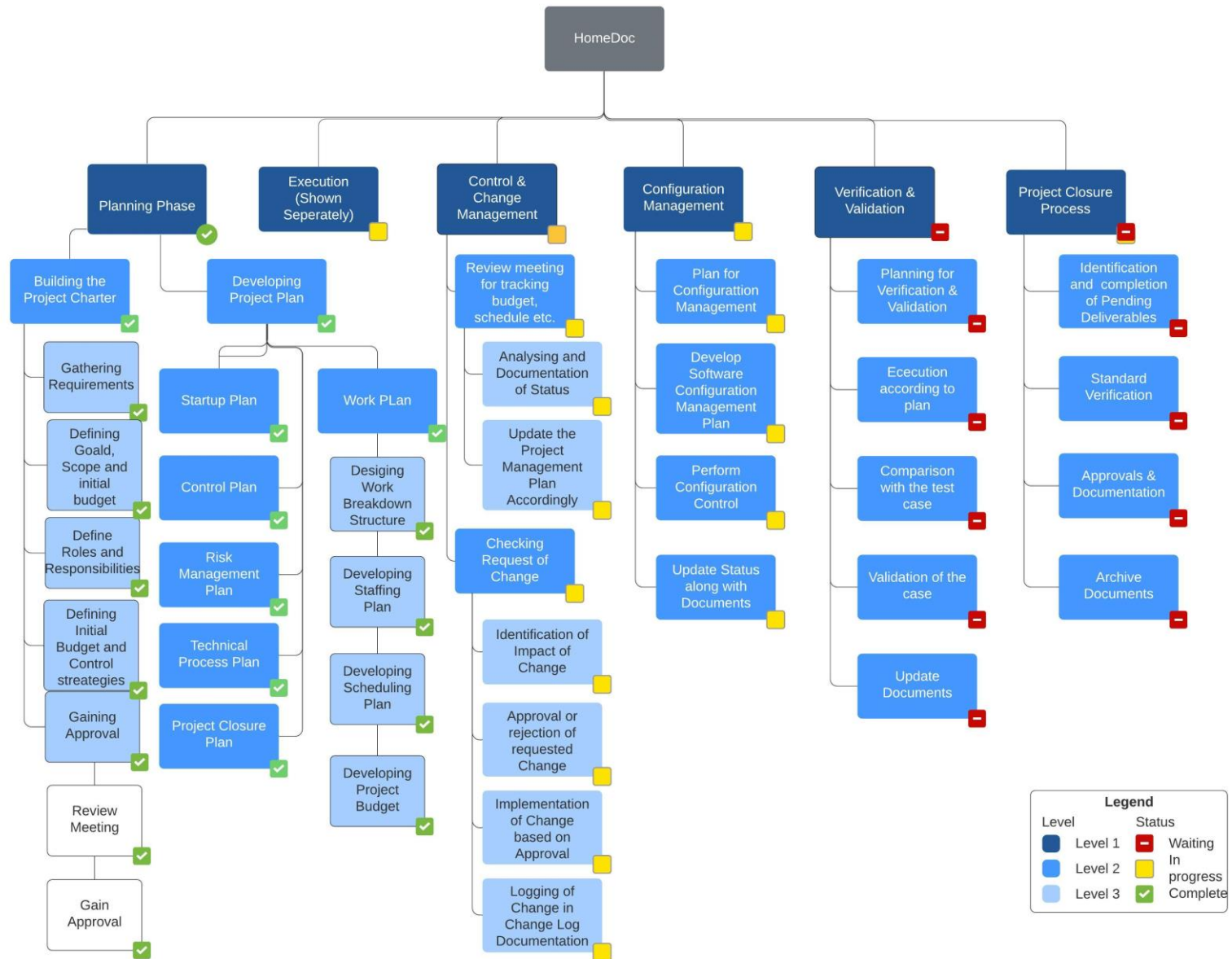
Project Role (positions)	Count	Responsibilities	Skills Required	Duration	Hourly Rate
Project Manager	1	<ul style="list-style-type: none"> Leading and Motivating team members Building weekly achievable milestones Resource management Cost Estimation and budget planning Risk assessment and management Tracking the status of the project To guide the whole team in achieving project goals. Should regularly interact with project sponsors and update them with the current status of project. 	Leadership, management, expertise in risk assessment and conflict resolution	Throughout the Project Lifecycle	\$95-115
Programmer/Analyst	2	<ul style="list-style-type: none"> Should build a basic workflow chart Should be capable of Designing, developing, analyzing, creating test cases and modifying software accordingly Assess the programmers' performance And assist them in their work with his expertise. 	<p>Should be well-versed in different programming languages.</p> <p>Should be excellent in debugging.</p> <p>Team Management Skills</p>	Throughout the Project Lifecycle	\$80-85

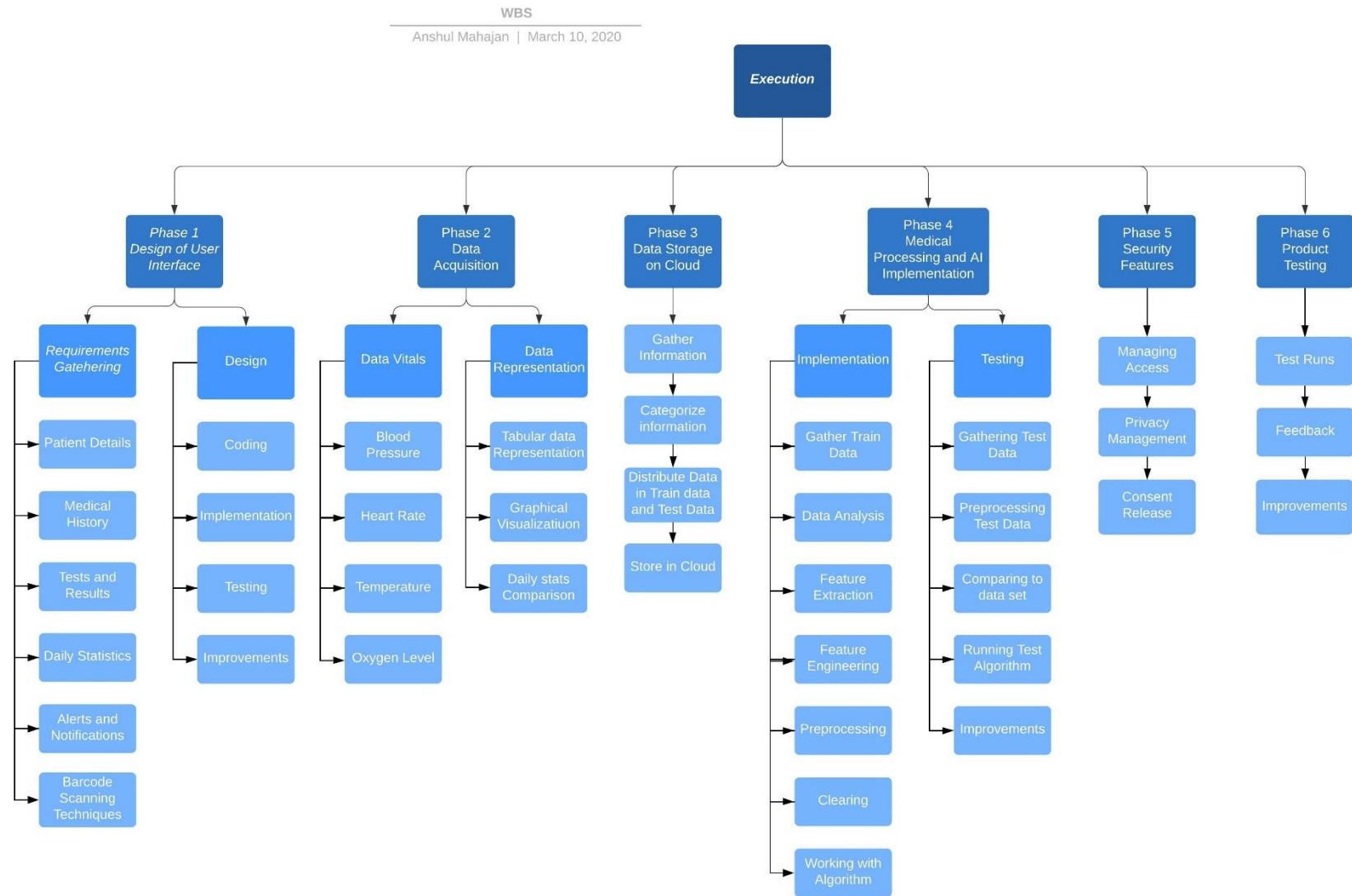
Project Role (positions)	Count	Responsibilities	Skills Required	Duration	Hourly Rate
Development Manager	1	<ul style="list-style-type: none"> • Should be capable of handling configurational changes. • Should provide proper Training for junior programmers • Should maintain a record of project status and should report the same to project manager on a regular basis. • Supervising the work of his subordinates and assist them • Prepare a project Life cycle • Needs to co-ordinate with team members and analysts. • Should be updated with status / progress of project. 	<ul style="list-style-type: none"> • Team Management Skills, should be updated with Knowledge on latest software technologies, • Expertise in Software development. 	Throughout the Project Lifecycle	\$60-70
Senior Programmers (3) and an analyst (1) (Coders)	4	<ul style="list-style-type: none"> • Coding the most important parts of main project. • Assist junior programmers with his experience. • Debugging the important parts of the code. 	Well-versed in many programming languages, App development skills, debugging	04/30/2020-07/31/2021	\$55-65

Project Role (positions)	Count	Responsibilities	Skills Required	Duration	Hourly Rate
Senior Programmer (Platform Management)	1	<ul style="list-style-type: none"> Mainly focuses on Developing and analysing compatibility of the programs running on different OS platforms Mainly focuses on handling compatibility issues 	Knowledge of different platforms and app development	04/30/2020-07/31/2021	\$55-60
Sr. Programmer (Testers)	3	<ul style="list-style-type: none"> Responsible for building test cases and running them on different OS platforms 	Expertise in developing test cases. Debugging	Throughout the Project Lifecycle	\$45-55
Sr. Programmer (Web Designer)	1	<ul style="list-style-type: none"> Designing and developing intuitive and appealing user interfaces. 	Expertise in Web designing	04/30/2020-06/30/2021	\$50 - 60
Jr. Programmers	7	<ul style="list-style-type: none"> Work along with Senior programmers for generating modules for the code. In general, handles all lower level services to be provided as a part of main project. Ex- cloud services, database management, generating modules for particular features of project. 	Basic Knowledge on variety of programming languages, cloud computing and some knowledge on AI.	04/30/2020-07/31/2021	\$35-45

Appendix B

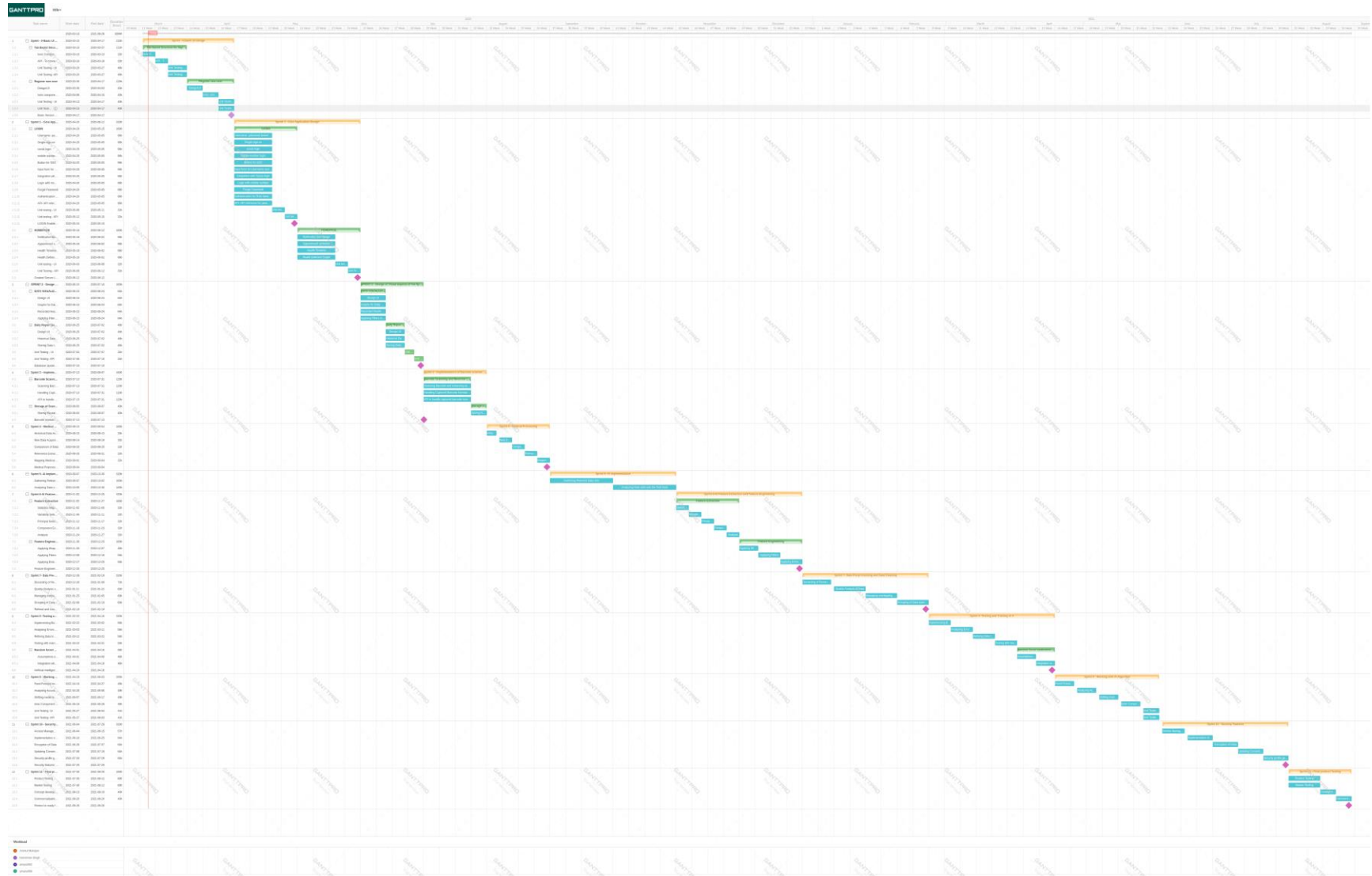
Work Breakdown Structure





Appendix C

Schedule Allocation



Appendix D

Budget Allocation

Workflow Item			COSTS	
Labour	Material	Misc.	Other	FY Total
1. Planning Phase				
1.1 Building the project Charter	\$50,000		\$0	\$50,000
1.2 Developing Project Plan	\$120,000			\$120,000
2. Implementation/Execution				
2.1 Design of User Interface	\$400,000		\$0	\$400,000
2.2 Data Acquisition	\$530,000	\$0	\$50,000	\$580,000
2.3 Data Storage on Cloud	\$100,000	\$0	\$0	\$100,000
2.4 Medical Processing and AI Implementation	\$1,000,000	\$0	\$0	\$1,000,000
2.5 Security Features	\$500,000	\$0	\$0	\$500,000
2.6 Product Testing	\$500,000	\$0	\$0	\$500,000
4. Close the Project	\$50,000	\$0	\$0	\$50,000
3. Control and Change Management				
3.1 Review Meetings	\$50,000	\$0	\$50,000	\$100,000
3.2 Checking Request of Change	\$25,000	\$0	\$0	\$25,000
4. Configuration Management				
Whole Process	\$100,000	\$0	\$0	\$300,000
5. Verification & Validation				
Whole Process	\$100,000	\$0	\$0	\$300,000
6. Project Closure Process				
Whole Process	\$100,000	\$0	\$90,000	\$390,000
Total	\$4,225,000	\$0	\$190,000	\$4,415,000

Appendix E

Azure DevOps Tool

(Scrum Boards)



















Image : Dashboard - Day to day tracking, notification and team collaboration.

The screenshot displays the Azure DevOps interface for a project named 'HomeDoc'. The left sidebar contains navigation links: Overview, Boards, Work items, Boards, Backlogs (selected), Sprints, Queries, Repos, Pipelines, Test Plans, Artifacts, and Project settings. The main area shows the 'HomeDoc Team' backlog. The backlog is organized into a table with columns for Order, ID, and Title. The items are as follows:

Order	ID	Title
1	1	Base Configuration & Environment Setup
	4	Configuration and Operations setup
	5	Client/BA - Defining User stories
	6	Design - Preparation of mock up screens
	7	APP - Base Configuration setup in ionic - Android - IOS
+	8	Services and API setup
	14	Setting up Ngnix Server
	15	Connection of web server with Node Server
	16	Defining basic services
	17	Import and configuration of Swagger for Documenta
	18	Global Error handler service
	9	Data Base - Setup of DB servers
2	2	Design of User Interface
3	3	Data Acquisition
4	10	Data Storage on Cloud

On the right, the 'Planning' section shows a 'HomeDoc Team Backlog' and a list of sprints. The current sprint is 'Sprint 2' (23/03/2020 - 03/04/2020) with a planned effort of 10 working days and 6 items. Other sprints include 'Sprint 3' (06/04/2020 - 17/04/2020), 'Sprint 4' (20/04/2020 - 01/05/2020), and 'Sprint 5' (04/05/2020 - 15/05/2020). An 'Activate Windows' watermark is visible in the bottom right corner of the planning section.

User Stories Hierarchies:

 	Order	ID	Title
	1	1	  Base Configuration & Environment Setup
		4	 Configuration and Operations setup
		5	 Client/BA - Defining User stories
		6	 Design - Preparation of mock up screens
		7	 APP - Base Configuration setup in ionic - Android - IOS
		8	  Services and API setup
		14	 Setting up Ngnix Server
		15	 Connection of web server with Node Server
		16	 Defining basic services
		17	 Import and configuration of Swagger for Documenta
		18	 Global Error handler service
		9	 Data Base - Setup of DB servers
	2	2	 Design of User Interface

Project Progress Tracking:

Tracking can be done on real time day to day in the boards with three statuses for the tasks assigned.

To Do: Assigned to particular developer, but not started.

Doing: Accepted tasks and working on them.

Done: Tasks which are completed, this notifies the particular person or associated team member to test or proceed with further work.

The screenshot displays a Kanban board interface with three columns: 'To Do', 'Doing', and 'Done'. The 'To Do' column contains three tasks: '6 Design - Preparation of mock up screens', '8 Services and API setup', and '9 Data Base - Setup of DB servers'. The 'Doing' column contains two tasks: '4 Configuration and Operations setup' and '7 APP - Base Configuration setup in ionic - Android - IOS'. The 'Done' column contains one task: '5 Client/BA - Defining User stories'. Each task card shows its title, a 'State' indicator (a colored dot), and a progress bar. The 'To Do' column has a 'New item' button and a search icon. The 'Doing' column has a '2/5' indicator. The 'Done' column has a '<' arrow. The top navigation bar includes 'Board', 'Analytics', 'View as Backlog', 'Issues', and a settings icon.

Column	Task ID	Task Description	State
To Do	6	Design - Preparation of mock up screens	To Do
To Do	8	Services and API setup	To Do
To Do	9	Data Base - Setup of DB servers	To Do
Doing	4	Configuration and Operations setup	Doing
Doing	7	APP - Base Configuration setup in ionic - Android - IOS	Doing
Done	5	Client/BA - Defining User stories	Done

Image : Azure Boards gives complete control about project to the authorized persons, Right from permissions and access control to resources like databases and repositories.

Project Settings

HomeDoc

General

- Overview
- Teams
- Permissions
- Notifications
- Service hooks
- Dashboards

Boards

- Project configuration
- Team configuration
- GitHub connections

Test

- Retention

Visibility

Public

This determines who can view this project. [Learn more about project visibility.](#)

Save

✓ Anshul Mahajan successfully added to Project Administrators. ✕

Project administrators

- AP** Abhishek Mysore Prakash
amyso092@uottawa.ca
- AM** Anshul Mahajan
amaha085@uottawa.ca
- HS** Harsimran Singh .
hhars062@uottawa.ca

+ 2 more

Add administrator