



INFO6007

Group41 Project Report

Dongrui Wang, Feifan Gao, Ruixian Liu, Tao Bai, Xiaotian Yang, Zijian Zeng

Contents

1.Project Charter	2
2.Project Scope Statement.....	5
3.Literature review	9
4. Work Breakdown Structure.....	12
5.Project Schedule/Time Management	14
6.Cost Management	16
7.Communication Management.....	20
8.Quality management.....	21
9.Risk Management	25
10.Reference.....	26

1. Project Charter

Project Titles: VCare health management project

Project Start Date: 2021-7-1

Projected Finish Date: 2021-12-1

Key Schedule Milestone:

- Project Kick-off on July 1, 2021
- Project management plan approval acquired July 15, 2021.
- Database Installation Completed September 21, 2021
- Vcare Health Application Completed October 18, 2021
- Visual Management Platform Completed October 18, 2021
- Testing Completed November 4, 2021
- Deployment Completed November 23, 2021
- Final Project Approval acquired December 1, 2021.

Budget Information: Budget \$842,358 for project management cost, \$34,750 for cloud services costs, \$842,358 for labor costs, and \$136,152 for training and support cost.

Project Purpose: The long-term goal of Vcare is to ensure the health and safety of the client's employees so that they can maintain a healthy workplace even during a global pandemic setting. It also helps the client's company to manage medical records and surpass ISO 45001 requirements.

Project Description (high-level): VCare is aimed to develop a corporate health management software system that can monitor and analyze the health condition of our client's employees. The system will collect the health data from the employees and provide the corresponding medical advice. Meanwhile, it also analyzes the data and visually presents the results to the employers regarding the potential risks caused by different health conditions.

Project Manager: Xiaotian Yang, 490145584

Project Objectives:

- The system can deliver varieties of health assessments to collect health data.
- The system can manage the medical records of the employees.
- The system will cover an individual's medical, mental, and physical health conditions.
- The system can provide sophisticated data analysis to calculate risks for diseases and conditions.
- The system can provide health advice to the employees based on data analysis.
- The system can visually perform the results of data analysis to the management team.
- The system is secured and only accessible within the company network.

Main Project Success Criteria: The project successfully implemented and rolled out within the next 6 months. After it is released, it will have a certain number of active users every day to ensure the data collected has meaningful value for analysis and reporting to the management team. The application and platform should aim to have minimal bugs and have the potential to be highly available and scalable for the long term.

Approach:

- Talk to the client company to understand their expectations and requirements.
- Develop the budget information and communicate that to the management team to seek approvals.
- Recruit developers to work on the system, go through user acceptance testing to ensure its required functionalities are all available.
- Regularly sync up with the client to share progress and ensure the application meets their expectations.
- Roll it out step by step and request ongoing feedback from internal staff for further improvements.
- Build a functional and secured database system.

Risks (high-level):

- Budget risk: when cost estimating is inaccurate, and the actual costs are above the budget set.
- Schedule risk: when the timeline of the project is not clearly design and communicated.
- Design risk: when the design of the project (e.g., objectives and deliverables) is not well-defined.
- Legal risk: when there are legal obligations that must be considered, and the processes can cause delays in the project.
- Technology risk: when the technology is new to everyone in the team and the process of learning about the technology can take time and cause potential delays.
- Communication risk: when the project requirements and expectations from the clients are not clearly communicated within the team, any misunderstanding can result in the inability to meet the deadlines.

Stakeholders List:

- CEO
- Employee
- CIO
- Project manager
- Project team member
- Project sponsor

ROLES AND RESPONSIBILITIES		
Name	Role	Responsibility
Xiaotian Yang	Project Manager	<ul style="list-style-type: none"> Organize project and resource planning. Develop timeline and monitor progress. Define action items and set deadlines.
Dongrui Wang	Quality Manager	<ul style="list-style-type: none"> Define quality measurement baselines. Develop a timeline for measurements. Assess the quality of different stages and final delivery
Ruixian Liu	Human Resources Manager	<ul style="list-style-type: none"> Recruit new team members based on requirements and assign roles. Establish and conduct performance reviews. Provide training and development programs to upskill individuals.
Zijian Zeng	Director of IT Operations	<ul style="list-style-type: none"> Manage the strategic approach for the IT implementation. Oversee the planning, development, and implementation of the application. Provide management to cloud solution architects and data analysts in the team.
Feifan Gao	Cloud Solution Architect	<ul style="list-style-type: none"> Design the overall solution architecture. Communicate with cloud vendors and create a sustainable cloud strategy. Develop and evaluate cloud applications and systems.
Tao Bai	Data Analyst	<ul style="list-style-type: none"> Manage the master data set. Provide data quality assurance. Handle data issues. Introduce advanced data analysis tools.

2. Project Scope Statement

2.1 Scope Description

VCare is aimed to develop a corporate health management software system that can monitor and analyze the health condition of our client's employees. The system will collect the health data from the employees and provide the corresponding medical advice. Meanwhile, it also analyzes the data and visually presents the results to the employers regarding the potential risks caused by different health conditions.

2.2 Product User Acceptance Criteria

- Project management success
 1. The products promised are delivered on time (26 weeks from start) with acceptable quality.
 2. The cost of the products is within our budget or not to exceed over 10% of the planned budget.
 3. The project charter and project management plan has been reviewed and signed off by the sponsors which indicates their acceptance.
 4. Any changes during the project are well documented, reviewed, controlled within planned time and budget.
- Product Success
 1. For usability, using the scorecard test method for project sponsors to show their satisfaction with the ease of the Health Screening Application. 80% of the sponsors show their satisfaction over 70%.
 2. For the functionality, a beta version of the Health Screening Application will be released for all the employees and managers to use for two weeks. After the two weeks, questionnaire surveys will be used to count the employees' satisfaction with software functions. 80% of the employees and managers show their satisfaction over 70%.
 3. For the reliability, a beta version of the Health Screening Application will be released for all the employees to use for two weeks. During the two weeks, the work logs of the software will be documented and reviewed by the quality management team. Quality manager shows his approval.

2.3 Project Deliverables

- Project management deliverables:
 1. Project charter
 2. Project scope management
 - Scope Statement
 - Milestone
 - WBS
 3. Project Time management
 - Gantt chart
 4. Project cost management
 - Budget table
 - Cost baseline
 5. Project communication management
 - Communication plan
 6. Project quality management
 - Quality management plan
 7. Project risk management
 - Risk register
- Product deliverables:
 1. Health Screening App
 2. Visual management platforms

2.4 Product Requirement (In-scope)

Functional Requirement:

- In terms of Health Screening App
 1. The application should be user-friendly and can be downloaded directly through various platforms.
 2. The application should deliver relevant health knowledge daily.
 3. The application should give users the location of the health devices in the company in case of an emergency.
 4. The application should give users an alert button to report emergency health events.
 5. The application should analyze and generate employee health risk reports.

6. If a public health emergency occurs, the app should mark high-risk areas on a map.

- In terms of Visual management platforms

2.1 The platform should evaluate the physical and mental health of employees.

2.2 The platform should enable managers to observe and recall employee health information from the database at any time.

Non-Functional Requirement:

1. Availability: The application should be highly available for all users regardless of where and when they access the portal. (Available for both Android and IOS).
2. Accessibility: The application should aim to be accessible for all users, which means the application is designed to be fully useful to all users.
3. Data security: As the application will obtain confidential health data from the users, the system needs to ensure the data are not used for any other purposes than the ones stated.
4. Usability: The application should provide a consistent and smooth experience for users
5. Scalability: in scenarios where the application is used by many users at the same time, it should be scalable, and the application should be able to handle increased demands.

2.5 Project Exclusion (Out-scope)

- Purchasing smartphones and download the app for customers.
- Updating the user end app on their devices
- Providing customers phone numbers as their username
- Purchasing devices and sensors for customer company
- Hiring specialized doctors for the health consultant

2.6 Constraints

- Time constraint

The project will be accomplished in 26 weeks. Since time is limited, time constraints may affect the quality of the product. Extension or early delivery can be applied at each stakeholder meeting.

- Scope constraint

To avoid project scope creep, the boundary of the project will be determined in the scheduling phase before the software development process. The project manager of the software development team created a list of deliverables and discussed the existence and priority of these deliverables with stakeholders. Some deliverables may change or be canceled at each stakeholder meeting.

- **Budget Constraint**

Resource of the project is limited. The cost estimate is based on the WBS categories. The total budget consists of the cost estimate, contingency reserve, and management reserve. All WBS items break their budgets in a time-phased table by project managers to build a cost baseline. The detail recorded in the 6.1 Budget table.

2.7 Assumptions

- All stakeholders will provide support and feedback during the development lifecycle of the project.
- All project members have the necessary skills and comply with the rules, regulations, and principles.
- All changes to the project management plan must be approved by the project sponsor.
- Generate project progress reports cyclically and meet with project sponsors.
- The cost of the whole project stays within the expected budget.

3.Literature review

1. Health of Enterprise Management

Employers influence the health of employees and their families through the work environment and employee benefits. In Pfeffer et al (2020)'s research. They tried to understand employer decisions on these topics. Method they used is by interviewing 21 executives from sampled companies, and then they used inductive and deductive methods to conclude. As a result, Companies generally keep employees healthy mainly for improving profitability is not the only goal. They believed that defusing stressful workplaces is necessary and inevitable. However, many possible measures are considered infeasible, including redesigning work and changing the welfare of administrators. For their conclusion: The company seems to be less committed to achieving employee health goals than they claim or should be.

On the contrary, Don and Monika (2020) in their research studied the impact from COVID-19 on enterprise risk management (ERM). Don and Monika (2020) defined that ERM is a management method that can help enterprises to achieve strategic goals by identifying and evaluating the potential risk in the enterprise. In their research, they agree with Pfeffer and others' views on the necessity of employee health management that the ERM after COVID-19 is inevitable and furthermore, they believed that the pandemic could affect the ERM on an unprecedented scale. In terms of risk identification and risk analysis, the ability to understand epidemics as end-events and manage them is necessary, and reasonable plans need to be formulated to deal with such risk events in the future. In addition, risk managers should address the challenges of existing risk response strategies for COVID-19 interference, as well as the emergence and applicability of new risk management methods.

After reviewing the conclusions of the above two authors, we believe that ERM will play a very important role in the organization in the future. An effective ERM should focus on governance and building culture. As part of ERM, health management can help companies align risk management with their business strategy.

2. Data visualization

Data visualization plays an important role in web-based health management platforms, which is a methodology to meet the requirement of company managers for getting the employee health information. Firstly, the paper written by Sorapure called "Text, Image, Data, Interaction: Understanding Information Visualization" stated that Information visualization is expanding further into people lives. With the technology of collecting, storing, and accessing data improvement, the interaction between people and data will become more and more important. visualization is becoming a popular way of communicating information (Sorapure, 2019). This article can give an inspiration for our project which company managers can access the visual dashboard of health management platform to view employee health information clearly and effectively. Interactive data visualization enables to display the data changes dynamically rather than static charts and maps which allows managers to better understand trends and correlations in employee health information. Secondly, when we are developing health management platforms for our projects, the development team also needs to focus on the format and style of data visualization to improve user satisfaction. The article "User choice of interactive data visualization format: The effects of cognitive style and spatial ability" written by Luo mentioned that many different factors will influence the choice of visualization style such as cognitive style of people and task difficulty of company. A good

visualization platform should provide users with many options so that they can explore and find a visualization format that conforms to their cognitive style and task characteristics (Luo, 2019). Next the article "Principles of Effective Data Visualization" written by Midway explained various of the design principles for effective visualization which include use of valid geometry to display data, appropriate captions and titles that produce positive visual effects and get opinion from stakeholders (Midway 2020). Both articles give some substantial advice in developing a health visualization management platform. Most of the viewpoints are valid and comply with the purpose of our project. Finally, we should summarize guidelines before designing the platform in order to build powerful visualizations to avoid the pitfalls of ineffective information.

3. Collecting data

This project needs to monitor employees' health condition and collect their health data, as stated before. In the past, paper-based surveys have been the most used method for collecting patient data in health research. However, it is always limited due to issues related to data entry and storage costs. The WHO defined a word called "mHealth". It is as the "medical and public health practice supported by mobile devices, such as mobile phones, personal digital assistances and other wireless device.

The first document related to this part is a paper written by Patricia Machel and Jonathan Downer entitled "Using Mobile Phone to Support Healthy Behavior in the Developing Countries". The emphasis of this paper is on the explanation and research of MHHealth, and how to develop a convenient MHHealth program. As stated in the article (Donner, j, & Mechael, p 2013), technology-supported about collect data require a multidisciplinary team. In addition, as mentioned in the article (Donner, J., & Mechael, p. 2013), the calibration of low-end and high-end in the technical field is also an essential factor to be considered. Our project needs to consider different and large number users. Someone has a smartphone. Some people have basic mobile phones which can only make voice calls and short messages. Therefore, balance the difference of basic equipment is necessary. However, in this paper, there is no more detailed comparative analysis of different methods of collecting data. So, it is necessary to read the second paper.

In second paper, the emphasis is on comparing two ways of collecting information with smartphones. This paper, written by Sinead Duane, Meera Tan Dan, Andrew W Murphy, and Akke Vellinga, is entitled "Using Mobile Phone to Collect Patient Data: Lessons Learned from the SIMPlE Study". For this project, chosen this paper is because it showed two different methods of mobile phone survey. About the observed result stated in the paper (Duane, s, Tandan, m, Murphy, AW, & Vellinga, 2017), the way of user chooses to collect data is related to their age. Therefore, our project can collect the collective age of the employees and their preferences and select the collection method that is the easiest to accept and use to make it easier to accept. The article also mentions that (Duane, s, Tandan, m, Murphy, AW, & Vellinga, a 2017), collected data were remotely uploaded and transferred to a secure password-encrypted database. All participants' answers were automatically entered into a data file. However, the article did not discuss the specific data security and privacy issues concretely.

Unlike the previous two papers, which focused on the method and techniques used to collect data, the third paper focuses on the privacy and security risks of collecting health data using MHHealth. This paper mentions "Privacy in mhealth "(Arora, S, Yttri, J, & Nilse, W, 2014). In

mHealth, information is usually transmitted at a high frequency and through wireless networks. Compared with broadband (Internet) networks, wireless networks are more susceptible to monitoring and interception, making security protocols protect data from attacks. Therefore, it is necessary to clarify what research data they need to collect and what control rights the participants have over these data in our project.

4. Notification

A feature of the Health Screening App is that it can deliver daily health-related knowledge or news. Push notifications are messages that an app can send to the user's phone or computer without any request, a service that exists in almost all smartphone applications. The selected papers discussed the benefits and drawbacks of push notifications on mobile phones.

The first literature is an article with the name Large-Scale Assessment of Mobile Notifications. The first finding of this article is that notifications may affect user productivity. Each pop-up notification takes time for the user to read or turn it off, distracting the user from the work process and reducing user productivity. (Alireza S et al. 2014) The second finding is that those important notifications are not necessarily tasks that need to be done immediately, resulting in users seeing the notification but not committing to it right away. So, notifications may not be handy in alerting users to critical events. This article concludes that notifications are not very effective in raising user's attention to the importance of things or tasks, as the analysis of users' evaluations shows. Instead, other forms such as calendars are more effective in getting the attention of users than notifications. (Alireza S et al. 2014) This article discussed the limitations of notifications and some drawbacks.

On the contrast, Afra Mashhadi et al. mentioned that even if a user ignores a notification, it is recorded in their consciousness and they will go back to review it later, after their study, the notification provides a visual cue for the user to go back and review the notification later. (Labs, A.M.B. et al ,2014) This article illustrates how even though notifications do not immediately catch the user's attention on some issues, they can leave an impression on the user's consciousness as a reminder to come back and pay attention to the matter mentioned. Another study on health apps says that users are more likely to use apps with notifications than apps without notifications, and the research shows that notifications grab users' attention most of the time. (Bidargaddi1, N. et al,2018)

In conclusion, the first literature lists some of the limitations and drawbacks of push notifications; instead, the last two articles list some of the roles that notifications can play and the benefits they can bring. Although push notifications from apps may distract users and affect their productivity, these disadvantages can be avoided by company regulations, such as banning the use of mobile phones during working hours. Conversely, adding the ability to push health information or news to this health app for employees can bring it to their attention, effectively increasing their awareness of their physical and mental health, and is likely to reduce the likelihood of absence due to sickness as a result, which is expected to increase employee productivity. So, to conclude, the Vcare Health Screening App should include a push notification service that provides users with health tips or the latest health news on a regular basis to remind them of their health and increase the likelihood that they will use the app.

4. Work Breakdown Structure

1. Project management

- 1.1 Project charter
- 1.2 Scope Statement
- 1.3 Budget table
- 1.4 Cost baseline
- 1.5 Communication plan
- 1.6 Quality management plan
- 1.8 Risk register
- 1.8 Project Closure

2. System analysis and design

- 2.1 Requirements collection
 - 2.1.1 Requirements analysis
 - 2.1.2 Software requirements specification clarifications
- 2.2 Interface Design
 - 2.2.1 User Research
 - 2.2.2 Interface design and Prototyping
 - 2.2.3 Evaluation
- 2.4 Architectural Design
- 2.4 Detailed Design

3. Development

- 3.1 Database creation and implementation
- 3.2 Health Screening App development
 - 3.2.1 Functionality implementation
 - 3.2.2 Map API implementation
- 3.3 Visual management platforms development
 - 3.3.1 Construction of the website
 - 3.3.2 Health analysis tool implementation
 - 3.3.3 Functionality implementation
- 3.4 Debug

4. Testing

- 1. Unit Testing
- 2. Integrated Testing
- 3. System Testing
- 4. Stress Testing
- 5. User Acceptance Testing

5. Deployment

- 5.1 Deployment planning
- 5.2 User support manual
- 5.3 User training
- 5.4 Deployment coordination

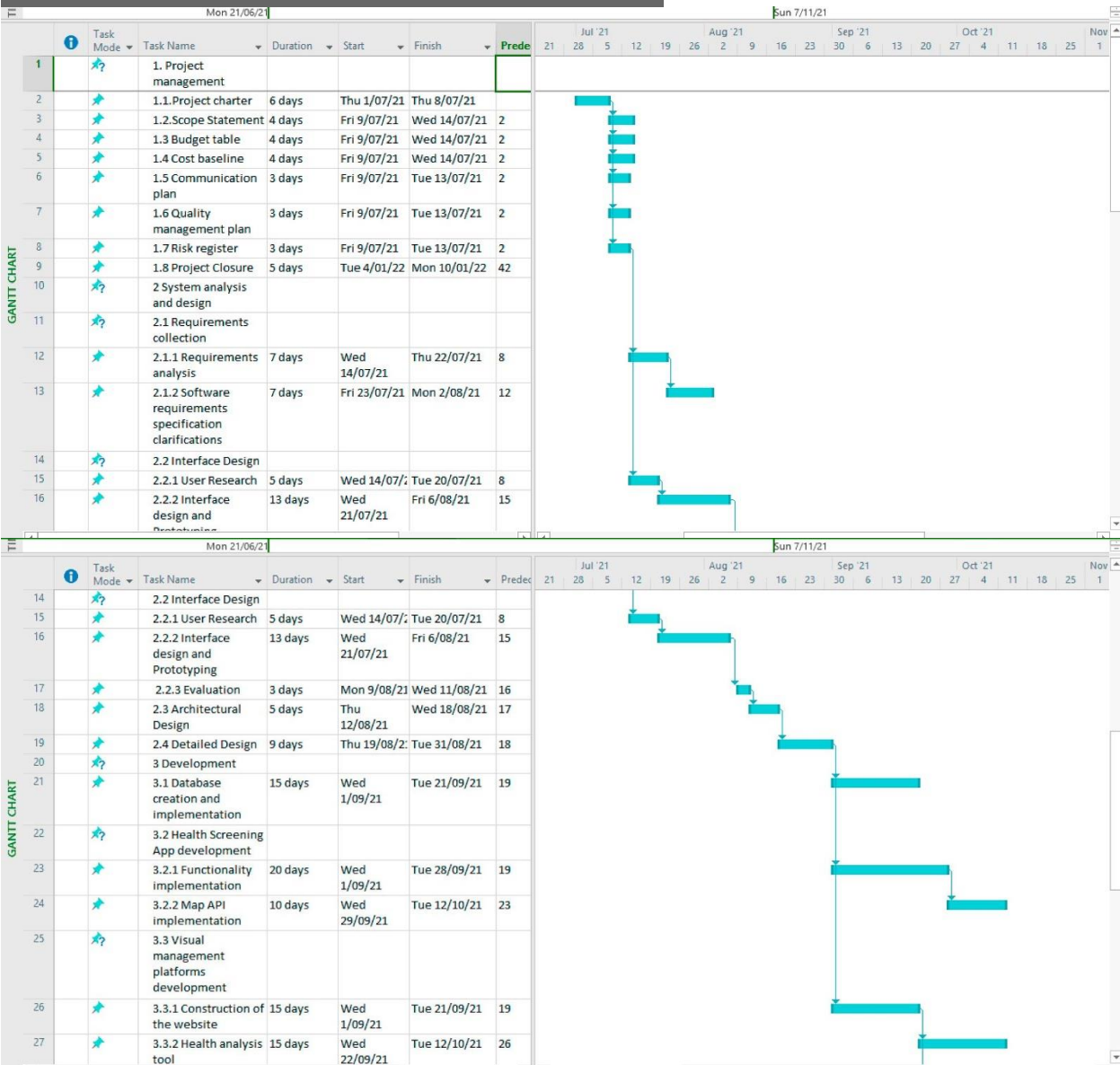
5.5 Installation testing

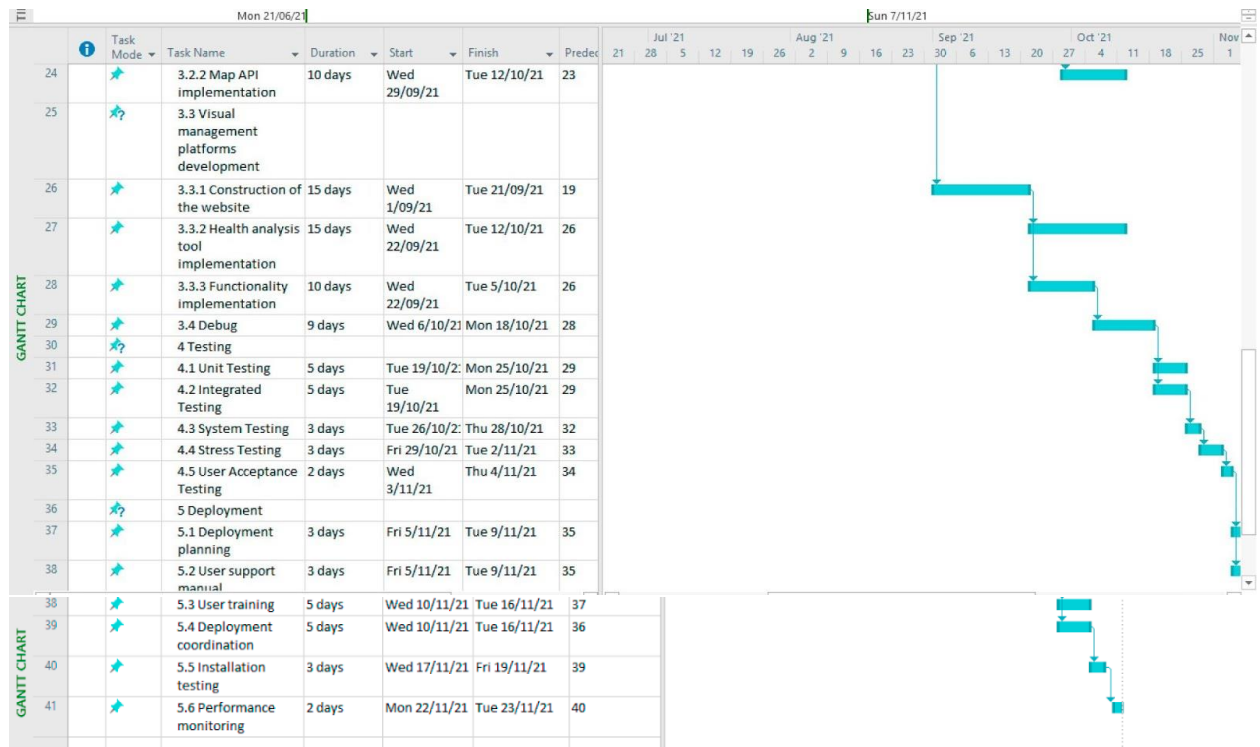
5.6 Performance monitoring

Table

B	C	D	E
level1	level2	level3	Description
1.Project management			
	1.1 Project charter		Describes the scope, objectives, and participants of the project
	1.2 Scope Statement		Describes the scope of the project, the project deliverables and describes the main objectives
	1.3 Gantt chart		A visual view of tasks over time.
	1.4 Budget table		A table records the budget.
	1.5 Cost baseline		Predicts the relationship between project cost and time.
	1.6 Communication plan		Identifies how will information be delivered to stakeholders.
	1.7 Quality management plan		Describes how applicable policies and proceduress will be implemented to achieve the quality objec
	1.8 Risk register		Identifies risks in the project.
2.System analysis and design			
	2.1 Requirements collection		
		2.1.1 Requirements analysis	Analyzing the requirements for the project.
		2.1.2 Software requirements specification clarifications	Defining the requirements for the Vcare health App and Visual management platform.
	2.2 Interface Design		
		2.2.1 User Research	Solicit suggestions for UI from customers.
		2.2.2 Interface design and Prototyping	Design the interface and use prototyping to simulate the user process.
		2.2.3 Evaluation	Make improvements based on feedback from prototypes.
	2.3 Architectural Design		Design of the software architecture
	2.4 Detailed Design		Deeper and more detailed design
3.Development			
	3.1 Database creation and implementation		Create database for the Vcare App to store health data.
	3.2 Health Screening App development		
		3.2.1 Functionality implementation	Write code to implement the basic functionalities of the app.
		3.2.2 Map API implementation	Use the Map API to implement functions related to location services.
		3.2.3 Application UI Design	Design the interface for the Vcare health App.
	3.3 Visual management platform development		
		3.3.1 Construction of the website	Build the website required for Visual management platform.
		3.3.2 Health analysis tool implementation	Implement health analysis tool to the platform.
		3.3.3 Functionality implementation	Write code to implement the basic functionalities of the platform.
		3.3.4 Website UI Design	Design the interface for the Visual management platform.
	3.4 Debug		Find potential bugs for the software.
4.Testing			
	4.1 Unit Testing		Test the software in individual units.
	4.2 Integrated Testing		Combine all units and test together.
	4.3 System Testing		Test the complete software.
	4.4 Stress Testing		Test the stability of the software.
	4.5 User Acceptance Testing		Test whether the users will accept the software.
5. Deployment			
	5.1 Deployment planning		Planning for the deployment of the project deliverables.
	5.2 User support manual		A guide for users.
	5.3 User training		Train the users how to use the software.
	5.4 Deployment coordination		Coordination of the deployment.
	5.5 Installation testing		Test the installation process of the software.
	5.6 Performance monitoring		Monitor the overall performance of the software.

5. Project Schedule/Time Management





6. Cost Management

Cost Budget Table

WBS Items	Units /Hrs.	Cost/ Unit/ Hr.	Subtotals	% of Reserves (5%-20%)	Reserves	Subtotals with Reserves	WBS LEVEL 2 Totals	% of Total
1. Project Management							\$842,358	28.6 %
Project manager (1)	1160	\$55	\$63,800	5%	\$3,190	\$66,990		
Frontend web developer (5)	792	\$30	\$118,800	10%	\$11,880	\$130,680		
backend developer (10)	792	\$30	\$237,600	10%	\$23,760	\$261,360		
Mobile application developer (10)	792	\$30	\$237,600	10%	\$23,760	\$261,360		
Testing engineer (4)	792	\$35	\$110,880	10%	\$11,088	\$121,968		
2. Hardware							\$45,145	1.5%
Computers			\$1,800	5%	\$90	\$1,890		
Local server			\$4,500	5%	\$225	\$4,725		
Cloud server			\$33,095	8%	\$1,655	\$34,750		
Mobile devices			\$3,600	5%	\$180	\$3,780		
3. Software							\$1,741,437	59.1 %
Operation software			\$1,920	5%	\$96	\$2,016		
Desktop software applications			\$17,940	5%	\$897	\$18,837		
Software development			\$1,433,820	20%	286,764	\$1,720,584		
4. Testing (10% of total hardware and software costs)							178,658	6.0%
5. Training and Support							\$136,152	4.6%
Travel cost	25	\$450	\$11,250	12%	\$1,350	\$12,600		
Project team member	4400	\$26	\$114,400	8%	\$9,152	\$123,552		
Total project cost estimate							\$2,943,750	

Function points

	Units/Hrs.	Cost/Unit/Hr.	Subtotals	Calculation
1. Labor Estimate				
Frontend web developer (5)	792	\$30	\$118,800	$792 \times 30 \times 5$
backend developer (10)	792	\$30	\$237,600	$792 \times 30 \times 10$
Mobile application developer (10)	792	\$30	\$237,600	$792 \times 30 \times 10$
Testing engineer (4)	792	\$35	\$110,880	$792 \times 35 \times 4$
	Quality	Conversion Factor	Function Points	Calculations
2. Function point estimate				
External inputs	67	4	268	67×4
External interface files	23	7	161	23×7
External output	16	5	80	16×5
External queries	35	4	140	35×4
Logical internal tables	39	10	390	39×10
Total function points			1039	
JavaSE language equivalency value			231	Assumed value
Source lines of code (SLOC) estimate			240,009	231×1039
Productivity*KSLOC^penalty(in months)			1,114.68	$3.13 \times 240.009^{1.072}$
Total labor hours (12 hours/function point)			12,468	1039×12
Cost/labor hours(\$115/hour)			\$115	Assumed value
Total function point estimate			\$1,433,820	12468×115

Definition of Cost Types

1. Project Management Team

1.1 Project Manager: \$55/hr

1.2 Frontend Web Developer: \$30/hr

1.3 Backend Developer: \$30/hr

1.4 Mobile Application Developer: \$30/hr

1.5 Testing Engineer: \$35/hr

All job average statistic depends on "PayScale" – Salary in Australia

2 Hardware

2.1 Computer

Need to prepare a high-performance computer for each staff.

2.2 Local Server

For better security and control, we need local servers to keep key functions running.

2.3 Cloud Server

We need a cloud server to handle a lot of workload and store a lot of user information and access automation service via API. The monthly cost of an advanced case of cloud server with virtual cloud servers, cloud load balancers and cloud database is \$6619.

2.4 Mobile Devices

We need both android and IOS mobile device to app testing.

3 Software

3.1 Operation Software

Each of windows 10 professional version is \$64.

3.2 Desktop Software Applications

License for desktop software application

3.3 Software Development

The cost of software development depends on above table.

4 Testing

It is a process of verifying software and hardware to identify all errors and missing in development with actual requirements. It will be spending 10% of software and hardware cost.

5 Training and support

The training of the project team is an important task also we will spend travel expenses to interview customers during the collecting requirements and testing phase.

Detailed Cost Baseline

	Month					
WBS Items	1	2	3	4	5	Totals
1. Project Management						
Project manager (1)	\$13,398	\$13,398	\$13,398	\$13,398	\$13,398	\$66,990
Frontend web developer (5)	\$26,136	\$26,136	\$26,136	\$26,136	\$26,136	\$130,680
backend developer (10)	\$52,272	\$52,272	\$52,272	\$52,272	\$52,272	\$261,360
Mobile application developer (10)	\$52,272	\$52,272	\$52,272	\$52,272	\$52,272	\$261,360
Testing engineer (4)	\$22,176	\$22,176	\$22,176	\$22,176	\$22,176	\$121,968
2. Hardware						
Computers	\$1,890					\$1,890
Local server		\$4,725				\$4,725
Cloud server		\$34,750				\$34,750

Mobile devices	\$3,780					\$3,780
3. Software						
Operation software	\$2,016					\$2,016
Desktop software applications	\$18,837					\$18,837
Software development		\$258,087.6	\$430,146	\$602,204.4	\$430,146	\$1,720,584
4. Testing (10% of total hardware and software costs)		\$35,731.6	\$35,731.6	\$35,731.6	\$71,463.2	\$178,658
5. Training and Support		\$24,710.4	\$24,710.4			
Travel cost		\$6,300		\$6,300		\$12,600
Project team member		\$30,888	\$30,888	\$30,888	\$30,888	\$123,552
Total	\$192,777	\$558,446.6	\$687,730	\$841,378	\$698,751.2	\$2,943,750

7.Communication Management

Communication plan

Type/List of stakeholders (do not private stakeholder's name in this column)	Level of interest in project	Description of interest or concern	Description name	Communication medium	Frequency of communication	Contact person	Communication owner
Team Leader	High	project arrangement and assignment.	Weekly status report	Face to face meeting	Everyday	Xiaotian Yang	project manager
CEO	High	project future risk and profit	Weekly status report	Email and meeting	Once a week	Dongrui Wang	project manager
Sponsor	High	profit scheme and cost of project investment	Monthly status report	Face to face meeting	Once a month	Xiaotian Yang	project manager
Customer management	High	explore existing and potential customers	Monthly status report	Email, telephone, and meeting	Once a month	Tao Bai	project manager
Customer business staff	Low	Total time required for completion	Monthly status report	Email and telephone	Once a month	DongRui Wang	project manager
Internal management	Low	Outsourcing team and technique staff of this project needed	Weekly status report	Email, telephone, and meeting	Once a week	Tao Bai	project manager
Internal business and technical staff	Low	The needs of project development participants	Weekly status report	Email and telephone	Once a week	ZiJian Zeng	project manager
Software subcontractor	High	remuneration from this project, scope of time and materials.	software implementation plan	Email, telephone, and meeting	Once a week	FeiFan Gao	project manager
Training subcontractor	Low	how to totally operate this project function	training plan	Email and telephone	After the accomplishment of all project function	RuiXian Liu	project manager
Advertisers	Low	project promotion	advertisement plan	Email and telephone	Depending on needs	RuiXian Liu	project manager

8. Quality management

8.1 Purpose of The Project Quality Management Plan

This section is going to describe the Project Quality Management Plan for the VCare health management project. The purpose of this plan is to make sure that the final deliverables are compliant with the requirements and expectations for both customers and project stakeholders. It also determines the quality standard and procedures this project should involve in order to ensure the project quality.

8.2 Quality planning

2.1 Define project quality

This project decided to follow ISO 25010, ISO 27000, and ISO45001 as the standard to justify and ensure the project quality based on the expectations for stakeholders. The high-level expectation of this project is to develop a successful and secure software health management system that can help large-scale enterprises to analyze and manage their employee's health condition.

The ISO 25010 standard would be followed in order to ensure the system and software quality of the project. It requires the project development team to act in accordance with criteria including usability, compatibility, maintainability and portability etc. The project quality of the software health system would be evaluated in regard to these criteria which will help the team to meet the expectation of a successful software system for corporate health management. (ISO,2011)

The ISO 27000 standard series would also be considered to provide information security management guidelines for the software system. This series of standards will focus on some practical recommendations for the team to protect the information assets of the system such as financial information and employees' personal details. In specific, it helps the team to highlight the potential threats and vulnerabilities of the system which will reduce the chances of security incidents in the future. therefore, it could be used to match the expectation of a secure software system for stakeholders. (ISO,2018)

Finally, the ISO45001 standard would also be a part of the quality standards of this project. This is because the expectation for stakeholders is to develop a software system that supports health management for large-scale enterprises. ISO45001 standard is designed to ensure workplace health condition and enhance employee safety. For instance, It requires the company to manage their employees' medical records and prevent work-related injuries and illness, especially with the COVID-19 setting. This aligns with the goal and expectation of the project. (ISO,2019)

2.2 Measure Project quality

Based on the quality standards of ISO 25010, ISO 27000, and ISO45001 discussed above, this project will measure project quality with the following performance criteria:

- Level of functional suitability: it completed all the functionalities and is able to produce correct and appropriate analysis results.
- Level of time behavior: low response time when performing the functionalities.
- Level of co-existence and interoperability: the system can exchange information with other systems with reliable API services.
- Level of usability: there is limited system error during a period of time which means no downtime and high scalability of the system.
- Level of accessibility: the system is designed to be accessible by a large number of people (more than 1000 people).
- Level of defects: assure that there is almost no defect regarding the results of the system (less than 10 defects per million opportunities)
- Level of fault tolerance and recoverability: the system will recover in a short time when software and hardware faults happen.
- Level of portability: the entire software system can be transferred to other hardware with few resources.
- Level of system security: the information and data are well protected in terms of both the internal and external networks.
- Level of secure authentic: the data is only available for the identities that are authorized.
- Level of modifiability: the system is well modularized which can be modified and upgraded in the future.
- Level of testability: different types of tests can be established for the system.
- Level of health control: the potential health-related risks of employees would be analyzed by the system with possible resolutions to handle.

- Level of health monitoring: the medical records and health condition of employees could be observed by the system with sufficient details.

8.3 Quality Assurance

3.1 Analyze project quality.

Project quality especially based on the performance criteria described above will be analyzed efficiently and effectively with different quality tools as we discussed in lecture 5. There are four basic quality tools that would be adopted in this project in order to provide a better analysis of the project quality.

Firstly, Cause-and-Effect Diagram can be used to identify the operations responsible for different quality problems and link the related complaints to corresponding production processes. This means that we can efficiently analyze the relationship between a specific quality issue and the step of the project that cause this problem.

Secondly, Quality Control Chart is adopted in order to provide a better understanding of the processes' results during each step of the project. According to the seven-run rules demonstrated in lecture 5, if seven data points run either below or above the mean value, or they have the same trend, then it might indicate a quality problem that needs to resolve. Therefore, this project will construct a quality control chart during each step of the project to identify any quality issues.

Thirdly, checklists will be constructed in order to collect the information for the project quality. For instance, there would be a checklist of performance matrix based on the performance criteria as discussed above. This can help the team to have a comprehensive overview of the project quality during each process in regard to the performance of the product deliverables.

Finally, this project will apply Pareto Diagrams to analyze and identify the areas that need to be improved for the purpose of ensuring project quality. This tool is supported by the 80-20 rule which means that around 80% of the quality issues are the results of 20% of the causes in most situations. Therefore, a Pareto analysis based on the complaints will help the team to efficiently identify the cause that raises a group of problem that downgrades the project quality.

In addition to the basic quality tools, there is a quality tool known as "Six 9s of quality" that would be applied to this project to analyze and improve the project quality. This tool refers to an indicator of quality control that only has one defect in 1 million opportunities. For instance, the chances of producing correct analysis results would be 99.9999%. This can be applied to most of the performance criteria described above which ensures an extremely high-level project quality.

3.2 Improve project quality.

Solutions that can lower the cost and accelerate the processes:

- Make sure to have a high level of modularization during the development of the project which helps the team to avoid repeating the same task repeatedly.
- Make sure to have Cause-and-Effect Diagrams to discover the relationship between quality issues and corresponding processes.
- Make sure to apply Pareto Analysis during each step of the project to identify the causes of quality issues.
- Make sure to minimize the scope changes during development to reduce the cost of time and resources.

Solutions to eliminate unsatisfactory performance:

- Make sure to constantly collect and analyze the complaints from stakeholders and customers.
- Make sure to use Quality Control Chart to determine the essential quality problems that can cause dissatisfaction.
- Make sure to construct checklists that are used to collect the information regarding the project quality such as a performance matrix or a complaints table.
- Make sure to apply “Six 9s of quality” to measure the project performance.

8.4 Quality Control

The first action is to apply testing as one of the quality control strategies defined in lecture 5 during every phase of the IT development lifecycle. In specific, the strategy includes integration testing, unit testing, system testing, and user acceptance testing. The developers will firstly test each of the individual components through the unit testing and the entire functionality with the integration test. After that, system testing will be able to validate all of the functionalities in the software system and user acceptance testing would be conducted by letting end-users try the system and provide valuable feedback.

Another monitoring and controlling action is to ensure the team workload is divided in a reasonable way. This is because if a developer is assigned to complete a huge amount of workload, he might juggle between different tasks and produce a poor outcome in terms of quality. This requires the team to carefully evaluate the specific skill-sets and strengths of each team member and make sure their assignments are acceptable. Lastly, In order to gain a competitive advantage in quality control, the team members should constantly seek and learn about recent quality standards and accordingly upgrade the performance matrix so that the final product of this project would be in lines with a high level of project quality management.

9. Risk Management

9.1 Risk Rating Matrix

Likelihood of occurrence		Impact level	
Rating	Scale	Rating	Risk Grade
Almost Certain	5	Severe	5
Likely	4	Major	4
Possible	3	Moderate	3
Unlikely	2	Minor	2
Very low	1	Insignificant	1

9.2 Risk Register

Risk No.	Risk name	Risk Description	Risk Owner	Category	Mitigation Plan (what to do to avoid the risk occurring)	Impact level	Description of impact	Likelihood of occurrence	Contingency Plan (what to do if the risk occurs)
R01	scope not well defined	project scope might be unclear which may affect project developing	Project stakeholder	Process risk	Define and document stakeholder's requirements clearly at the start of the project	5	Change of scope may delay the delivery of project. Project time management may fail.	4	Reschedule the project plan. Hold an additional stakeholder meeting and demonstrate the new documentation.
R02	pandemic recover too fast	Coronavirus pandemic stop spreading. Most Australian received vaccine.	Project stakeholder	Market risk	Define more common health management functions other than pandemic situation in the beginning	4	The demand for health management system decrease. The number of additional customers is less than estimate.	3	Our stakeholder is also ur first customer so it won't be a problem.
R03	stakeholder cancel the project	stakeholder or sponsor cancel the financial support of the project	Project team members	Financial risk	Stakeholders cancel the project because of their financial situation or business strategy.	5	Seek more investors as the project stakeholder. Sign contract about early payment.	2	Dissolve the development team
R04	software asset lost	Source code of the project due to attacking or software service crashing.	Risk Owner	Technology risk	Save mutple image of source code assets at different places (web servers, local servers). Hire security experts.	5	Developers of project team have to rewrite the lost code which takes additional time. The project time management fail.	3	Try to recover the lost assets and restore the source code as much as possible through the disk recovery tool.
R05	employee resign	Core developers may resign during the developing process	Project stakeholder	People risk	Establish employee incentive policy and reasonable employee welfare based on performance	4	Resign of employees in the develop team might extend the delivery of certain task. Which may impact the schedule and time management of the project.	2	Apply extention for certain activity and communicate with stakeholder. Or trying to fast track the activity to avoid delay of completion date that due to activity dependencies

10.Reference

‘ANSI/ASSP/ISO 45001--2018 Occupational Health and Safety Management Systems--Requirements with Guidance for Use’ 2019, Chilton’s Industrial Safety & Hygiene News, vol. 53, no. 1, p. 34–.

Arora, S, Yttri, J, & Nilse, W 2014, ‘Privacy and Security in Mobile Health (mHealth) Research’ *Alcohol Research*, vol. 36, no. 1, pp. 143–151.

Bidargaddi, N, Almirall, D, Murphy, S, Nahum-Shani, I, Kovalcik, M, Pituch, T, Maaieh, H, & Strecher, V 2018, ‘To Prompt or Not to Prompt? A Microrandomized Trial of Time-Varying Push Notifications to Increase Proximal Engagement With a Mobile Health App’ *JMIR mHealth and uHealth*, vol. 6, no. 11, pp. e10123–e10123, doi: 10.2196/10123.

Don Pagach & Monika Wieczorek-Kosmala 2020, ‘The Challenges and Opportunities for ERM Post-COVID-19: Agendas for Future Research’ *Journal of Risk and Financial Management*, vol. 13, no. 12, p. 323–, doi: 10.3390/jrfm13120323.

Donner, J, & Mechael, P (eds) 2013, *Mhealthy Messaging : Using Mobile Telephones to Support Healthy Behaviours in the Developing World*, Bloomsbury Publishing Plc, London. Available from: ProQuest Ebook Central. [7 May 2021].

Duane, S, Tandan, M, Murphy, AW, & Vellinga, A 2017, ‘Using Mobile Phones to Collect Patient Data: Lessons Learned From the SIMPLE Study’ *JMIR Research Protocols*, vol. 6, no. 4, pp. e61–e61, doi: 10.2196/resprot.6389.

Information technology — Security techniques — Information security management systems — Overview and vocabulary.2018, 1st ed., 2018-02., ISO, Geneva, Switzerland.

Luo, W 2019, ‘User choice of interactive data visualization format: The effects of cognitive style and spatial ability’ *Decision Support Systems*, vol. 122, p. 113061–, doi: 10.1016/j.dss.2019.05.001.

Mashhadi, A, Mathur, A, & Kawsar, F 2014, ‘The myth of subtle notifications’ in *Proceedings of the 2014 ACM International Joint Conference on pervasive and ubiquitous computing*, pp. 111–114, ACM, doi: 10.1145/2638728.2638759.

Midway, SR 2020, ‘Principles of Effective Data Visualization’ *Patterns*, vol. 1, no. 9, pp. 100141–100141, doi: 10.1016/j.patter.2020.100141.

Pfeffer, J, Vilendrer, S, Joseph, G, Kim, J, & Singer, SJ 2020, ‘Employers’ Role in Employee Health: Why They Do What They Do’ *Journal of Occupational and Environmental Medicine*, vol. 62, no. 11, pp. e601–e610, doi: 10.1097/JOM.0000000000001967.

Sahami Shirazi, A, Henze, N, Dingler, T, Pielot, M, Weber, D, & Schmidt, A 2014, 'Large-scale assessment of mobile notifications' in Proceedings of the SIGCHI Conference on human factors in computing systems, pp. 3055–3064, ACM, doi: 10.1145/2556288.2557189.

Sorapure, M 2019, 'Text, Image, Data, Interaction: Understanding Information Visualization' Computers and Composition, vol. 54, p. 102519–, doi: 10.1016/j.compcom.2019.102519.

Systems and software engineering: systems and software quality requirements and evaluation (SQuaRE) : system and software quality models. 2011, 1st ed., 2011-03-01., ISO, Geneva, Switzerland.