



National
College *of*
Ireland

DAMMA

(Detect and Alert Messaging Monitoring App)

IEEE Requirements Specification Document

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Specialisation: Business Analyst

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Declaration Cover Sheet for Project Submission

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Name: Steven Kawala
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- prohibiting a student from sitting any examination or assessment.,
- the imposition of a fine and
- the requirement that a student to attend additional or other lectures or courses or undertake additional academic work.

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TITLE:” A mobile –based Detection and an Alert Messaging Mobile Application (DAMMA) for People with dementia: Ireland”

Abstract

The increasing aging population faces a lot of health challenges that include declining of mental ability in the form of Dementia or Alzheimer. People living with Dementia often wonder aimlessly which result to risk of falling without being noticed in good time, forgetfulness which may result in forgetting to take medication, missing appointments, even getting lost. According to (Health.gov.ie, 2019) the projection of people with dementia in Ireland for 2016 to 2046, based on Census of Population 2011 will continue to grow from 54,793 to 152,157 by 2046. To address these problems, the authors aim to generate an IEEE requirements specification document to elicit requirements for the detect and alert messaging mobile app. Authorised users will receive alert messages on their mobile phones when a person living with dementia moves outside the set parameters. This includes a person’s inactivity and instances like falling or missing medication. This application is suggested to be implemented on “Android” according to the survey results of this project. This application will have basic functionality like “GPS Navigator”, “Ambient Sensors”, and “Emergency contacts”. Alerts will be sent to carer if the person walks beyond a specified distance. The real-time alert what is suspected as dangerous activity and location of the patient to the caregiver mobile device as an alert message. The app will use combination of sound sensors for detecting sound during falling of the person and passive infrared motion sensors to detect the movement of the individual.

1.Requirements Elicitation & Analysis Planning

1.1 Introduction

The purpose of this document is to set out the requirements for the development of a detect and alert messaging mobile app (DAMMA). The age profile of the Intended customers is 55-75 years of age, in their early stages of dementia, living in their homes in Ireland.

DAMMA is A mobile –based Detection and an Alert Messaging Mobile Application for people living with dementia that can send sequential messages to authorised care givers and emergency contacts. Authorised users will receive alert messages on their mobile phones when a person living with dementia moves outside the set parameters. This includes a person’s inactivity and instances like falling or missing medication. The alert messages will be categorised by significant feature for the care givers to differentiate the type of services the client needs. Every recorded history of the messages and action taken will be stored on a database system for decision making.

This application is suggested to be implemented on “Android” platform. The suggestion came up from the results of the survey conducted where 103 participants were involved. Example of some stakeholders involved in the survey were; nurses, Community care assistants, Home care managers, Data analyst, Technology college students, Software engineers and Software Developers. The analysis results of this survey showed that 83.5% of the participants recommended android platform. (Google Docs, 2019). The main reason survey participants recommended Android was simply because, android is an open source operating system.

This application will have basic functionality like “GPS Navigator”, “Ambient Sensors”, and “Emergency contacts”. The GPS will have a microcontroller for real-time tracking wandering patterns of the person living with dementia. The real-time tracking system will send the coordinates of a location of the patient to the caregiver mobile device as an alert

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message. The GPS will function along with a combination of sound sensors for detecting sound when a person living with dementia falls and passive infrared motion sensors to detect the movement.

In this project, my role is of a business analyst who will gather requirements from different stakeholders, and generate a requirement specification document for the developers to use when developing this app. The techniques to be used to gather the requirements include many quantitative approaches: interviews, surveys, brainstorming session and requirement workshop as stated in A Guide to the Business Analysis Body of Knowledge(BABOK). Brainstorming technique will be used first followed by a survey. This will encourage engagement with stakeholders at early stage of the project and ideas to flow on areas the survey cannot elaborate. Interviews will be focused on specific stakeholders who are classified in power influence matrix as project controllers. This variety of stakeholders will voice out their opinion for me to fully understand the domain area and evaluate if the idea is ambiguous. One workshop will be done to allow stakeholders to see for the first time the prototype developed and come up with comments. Two sets of prototypes will be created (pre and post workshop prototype). Then from the gathered requirements a use case will be developed to describe successful sequence of events. Use cases will focus on the users of the system, not the system itself. This will help bringing, system needs at an earlier stage. Looking at the complexity of the project, the use case will bring clarity to all stakeholders, because of the narrative text incorporated in the visual presentation of the use case.

When all requirements are gathered they will be prioritised using MoSCoW analysis to generate structured requirements for the IEEE requirement specification document.

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1.2 Business Need

The business need addressed in this project is the use of technology to make life of vulnerable people living with dementia in Ireland more independent and secure. The relatives or care givers do not have to worry if their loved ones (clients) will be able to remember to take medication, detected when they fall or be in danger of accidents which may result to death. This app will benefit home-care companies, carers, family relatives and the persons living with dementia.

1.2.1 Benefits of the App

- ✓ It will bring back some independence to persons living with dementia in the sense that, they will be able to carry out their daily routines without worrying of getting lost or fall and not be detected.
- ✓ Caregivers and relatives will be able to set and monitors daily activities of the person living with dementia.
- ✓ Managers and other health professionals can use the stored data for decision making. For example:
 - Risk assessment of client needs
 - Progression of the dementia
 - Care worker response time to the alert messages
 - Frequency of the alert messages per client
 - Who gets more alert messages among carers and why?

1.3. Business Case

The DAMMA concept will benefit people living with dementia and caregivers. This include relatives, homecare managers, nurses and community care assistants.

The sponsor for this project is Dean Hart, Homecare manager for an Irish company called ISM home care recruitment.

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According to ismtraining.ie (2019), ISM was established in 1961. ISM has over 55 years' experience delivering a wide range of Health and Safety Training Solutions for clients. ISM enthusiasm in technology has led to the development of on-line Driving lesson booking system for the management and booking of lessons for pupils throughout Ireland. This technology is the first of its kind in the industry throughout Europe.

Dean decided to sponsor the development of this app after seeing a gap in the health care industry, to meet customer demands. Dean appointed me as a business analyst for this project. The primary reason for developing this app is to create an application that will bring back some independence to people living with dementia and simplify the work of caregivers. Dean understands the scale of the project and has involved different stakeholders. This include Testers, Developers, Nurses, Community care assistant, homecare managers, to gain different opinions on the development of the application. During this project different scrum meetings are scheduled with the Dean and project manager as follow up meetings on project progress.

1.4. Project Risks

Before considering any project, it is vital to understand the various project risks to different stakeholders in order to address them when carrying out the project.

Risks to the project sponsor:

- ✓ Risk of penetrating into the market where there are already established brands.
- ✓ Risk that may be DAMMA is not what the targeted audience want.
- ✓ Risk of data protection breaches.

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Risks to the user

- ✓ Risk of caregivers not being able to use the technology effectively.
- ✓ Risk of care-givers holding on information even after they have stopped working for the company.
- ✓ Risk of data breach. Information can be shared on other social media (WhatsApp)
- ✓ Risk of misusing the information. For example, sharing it on social media.
- ✓ The tolerance of the person with dementia to carry the device.

1.5 Technology risk

According to Rupert Mc Shane & Lindsey Skelt, (2009) research paper, there are pros and cons of using GPS independently for tracking people with dementia. This is why the author decides to embed the tracking device into the app so that it cannot be a standalone device. The figure below by Rupert Mc Shane elaborates clearly on this.

For

Against

Allowing the person with dementia to continue with their walking pattern.	Although GPS is very accurate in most tests, the position can occasionally be altered by the proximity of buildings or by being on a person. Occasionally accuracy is reduced to 100m
Freedom and independence to maintain well-being	Battery life varies and if the battery fails the person may be at risk.
Reassurance for the carer	Further tasks for the carer to remember. Charging the device and ensuring that the person has it on them.
Easy to use, especially for the 'techno-savvy'	Some carers find instructions difficult to follow especially if not used to the technology.

1.6. Stakeholder List

1. Project Sponsor
2. Business Analyst.

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3. Developer

4. Testers

5. Project Manager

6. Data protection Ethic Committee

7. Health Care Practitioners

8. Emergency Services (Ambulance, Gardai)

Stakeholder Matrix Explained:

“L-L & L-M”

The stakeholders that are in the bottom left of the matrix are regarded as of low influence and low impact to this project. These stakeholders are low priority and may have some involvement but relatively in lower priority. (Care Assistant, Nurses, Homecare Managers)

“H-H”

The stakeholders that are in the top right quadrant of the stakeholder matrix are regarded as of high influence and are of high impact. These stakeholders are Business owners that need a close relationship with, for the project to be successful. For instance: Project sponsor and Business analyst. The business owner is the most important stakeholder as he has the final say in the requirements list.

R	Responsible
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Diagram 1: RACI Matrix

A	Accountable	RACI MATRIX
C	Consulted	
I	Informed	



STAKEHOLDERS	INFLUENCE	IMPACT	RACI	Communication	Frequency
Project Sponsor	H	H	A	Email, meeting	Monthly
Business Analyst	H	H	R	Meeting, phone	Daily
Developer	L	H	C	Email, Meeting	Weekly
Tester	L	M	I	Email, Meeting	Monthly
Project Manager	H	H	C	Email, Face to face	Daily
Data protection officer	M	H	C	Email	Start & End of project
Health Care Practitioners	L	M	I,C	Email-Survey Meeting-Interview	Start &End of project



Power/Influence Matrix

H	High
M	Medium
L	Low

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Diagram 2: Stakeholder Influence Matrix

High I M P O R T A N C E	.3	.1	.5
	.4	.2	
Low	.7	.6	
	INFLUENCE	High	

1.7 Stakeholder Responsibility

Project Sponsor

Dean is the sponsor of this project and his main responsibility is to make sure that the project is managed properly by ensuring that the business need is valid and the project idea remains viable business proposition throughout the project.

Business Analyst

The author of this paper is the Business Analyst of the project and his role will include, organizing interviews, requirement workshops, brainstorming sessions and sending out surveys for requirements elicitation.

To structure and prioritize the requirements gathered and preparing a Requirement Specification Document to be used by developers for the development of the app.(DAMMA)

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Developer

The developer will be responsible for choosing the technology and language needed for the development of the app.

To evaluate the project idea if it is ambiguous from his point of view as a technical person.

To depict the stakeholders' requirements into a prototype so that the stakeholders can visualize the mockup of what the app will look like.

To give suggestions from the developer's point of view on the 'Must Have' features of the app.

Testers

Testers will give suggestions on the compatibility of the requirements gathered. This will be done through interview and workshop requirements sessions.

During development stage of the app, the Software testers will be responsible for functional testing of different units of the app at each stage and give feedback to the business analyst and Developers for modification or changes recommended to be made.

Project Manager

Dr Eugene is the project manager of this project and his main responsibility is to help the Business Analyst to define the scope, goals and deliverables of this project.

To give support where ever necessary and track down the set deliverables

He will be evaluating and assessing the results of the project.

Monitor the entire project to avoid slacks .

Data protection Ethic Committee

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To evaluate the idea and the techniques to be used to elicit requirements if they comply with GDPR. Since the idea will involve working with human beings, an approval will be sort from the Data Protection Ethic committee before the commencement of this project to give a go ahead with the idea and the requirements gathering.

Health Care Practitioners

Health practitioners will be responsible to give suggestions on requirements of the app since they will be the main users of the app. This will be done through interview and completion of the survey. They will suggest the requirements and verify the listed requirements to the Business analyst if they are in agreement.

2. Requirements Elicitation Techniques

2.1 Objectives

The techniques used in this project are to elicit the requirements needed for the development of this Application. Definition of requirements according to BABOK (IAB.2015) is a usable representation of a need. It focuses on understanding what kind of value could be delivered if a requirement is fulfilled.

2.2 Requirements Elicitation from Users

Elicitation of requirements from users of this application domain is the most intuitive of the elicitation approaches since it is the users who should 'know what they want. (*P. Loucopoulos & V. Karakostas ,1995*).

2.2 .1 Brainstorming

Description

'Brainstorming is a generally accepted elicitation technique, fostering creative thinking and allowing for a broad array of new, spontaneous ideas'. (*A Guide to Business Analysis*

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Body of Knowledge (BABOK Guide), 2009). BABOK® Guide outlines the guidelines for eliciting requirements to be complete, clear, correct, and consistent.

When doing brainstorming the needs are disorganised. 'The needs come out in a rush, a mixture of complaints, design decisions, interface descriptions, current situations, and from time to time specific human—machine interface requirements. It is sometimes possible to isolate chunks of this as definite functions.' (*D.Bradfield ,2018*).

Participants:

Seven Technology Management students

Date of Meeting:

Tuesday 12th February,2018

Time of Meeting:

10:00 – 11:00

Rules for conducting Brainstorming Session:

- Whiteboard will be used to write down all ideas from participants.
- Appropriate timeframe will be determined for each participant to put across his/her idea.
- Timekeeper and coordinator will be appointed.
- All participants must to actively participate, no spectators are allowed.
- No criticism is accepted during the session.
- Elicited requirements discussed will be evaluated.

Brainstorming Final Deliverables

A list of evaluated, discussed and condensed ideas is emailed to all participants after the brainstorming session.

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2.2.2 Interviews

Description

Interviews are the easiest interaction to conceive ideas. During interviews, stakeholders are in a relaxed atmosphere to facilitate the flow of information from them to the Business analyst, who is in this case the interviewee. Interviews are appropriate for obtaining the view of the domain and general requirements. (P. Loucopoulos & V. Karakostas, 1995).

Diagram3: Interview Plan- Interviewee Table

Interviewee name	Company	Title
Software Specialist	SAP	Software Developer
IT Specialist	Workday	Software Engineer
Entrepreneur	ISM	Health Care Manager
IT Student	NCRL	Family relative of person living with Dementia
Dementia Specialist	Caremark Dublin North	Home Care Manager
HealthCare Practitioner	ISM	Community Care Nurse

Figure 3: Potential Interviewees

Steps for the interview:

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- Identify potential interviewees (Fig 3)
- Conduct research to understand how the interviewee could contribute positively to the requirements elicitation
- Create the set of different interview questions
- Seek approval of the questions from the Project Supervisor (Dr Eugene)
- Set techniques for recording the information. (taking notes)
- Brief and familiarize the interviewee with the format and purpose of the interview.
- Conduct interview and summarise gathered requirements.
- Email interviewee to confirm on the requirement listing. (*Dr Eugene ,2018*)
- Structure the interview results.

Interview One

Participant:

Project Sponsor

Interview Location:

Unit 22, Jamestown Business Centre, Jamestown Rd, Finglas, Dublin 11

Date of Interview:

Monday 4th February, 2019.

Time of Interview:

15:30-16:00

Objectives of Interview:

The aim of conducting an interview with this stakeholder, is to ensuring that the project is properly understood and that the project remains a viable business proposition according to the sponsor's expectations. The interview will be structured with a set of 4 questions prepared before the interview because of time limitation. ensuring that the business need is valid and correctly prioritised

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Interview Questions:

Q1. What do you think of this app idea?

Q2. What would you like the app to do?

Q3. Is this idea worth going for? If yes, why do you consider this app is worth building?

Q4. Who would you consider the overall target audience to be?

Interview Two

Participant:

Software Engineer

Interview Location:

SAP,1012/1014 Kingswood Avenue, City West Business Campus, Dublin

Date of Interview:

Tuesday, 5th February, 2019

Time of Interview:

11:40 -12:00

Objectives of Interview:

The objective of this interview is to hear from a software tester's point of view and gain a better understanding of the security requirements for development of DAMMA. The requirements gathered from this interview will be structured and prioritised using MoSCoW methodology.

Interview Questions

Q1: From the brief description of the app given, do you think the concept of the app is worth developing?

Q2: What safety measures can be put in place in the app to ensure users client details are safe and secure?

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Q3. What can be the estimate cost for the this?

Q4: Apart from development costs, how much would you estimate for the maintenance to be for the smooth running of the app?

Q5: Overall, what else would you like the app to do?

Interview Three

Participant:

Software Developer

Interview Location:

Kings Building, May Ln, Dublin 7, D07 W310

Date of Interview:

Tuesday, 12th February, 2019

Time of Interview:

12:40 -13:00

Objectives of Interview:

The objective of this interview is to hear from the developer's point of view if the idea is over ambiguous and to gain a better understanding of the requirements for development of DAMMA. The interview will give me greater knowledge on what the users will expect the app to deliver.

Interview Questions

Q1: From the brief description of the app given, do you think the concept of the app is worth developing?

Q2. What suggestions can you give, on what platform can the app be implemented apart from?

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Q3: Do you have any experience migrating an app from one platform to another? If yes, how long would it take to develop this app?

Q4. What features would you suggest to put on this app?

Q5. Have you any suggestions going forward with the development of this app?

Interview Four

Participant:

Home Care Manager

Interview Location:

Caremark House,13 Blackwater Road, Glasnevin, Dublin 11

Date of Interview:

Monday 4th February, 2019.

Time of Interview:

14.00-14.25

Objectives of Interview:

The aim of conducting an interview with this stakeholder, is to understand the project domain and the stakeholder's expectations for the app. The interview will be structured with a set of 6 questions prepared before the interview. This face to face interview will be extremely beneficial because there will be a chance to probe for explanations of responses.

Interview Questions:

- 1.Do you think the concept of the app is worth developing?
- 2.What colour scheme would you recommend for the app?
- 3.What features would you suggest to put on this app?

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4. What major challenges of people living with dementia, do you think this app should address to benefit carers or clients?

5. Is there any other similar apps you know which are used to address the challenges faced by people living with dementia? If your answer is yes, please mention them.

6. Have you any suggestions going forward with the development of this app?

2.2.3 Survey

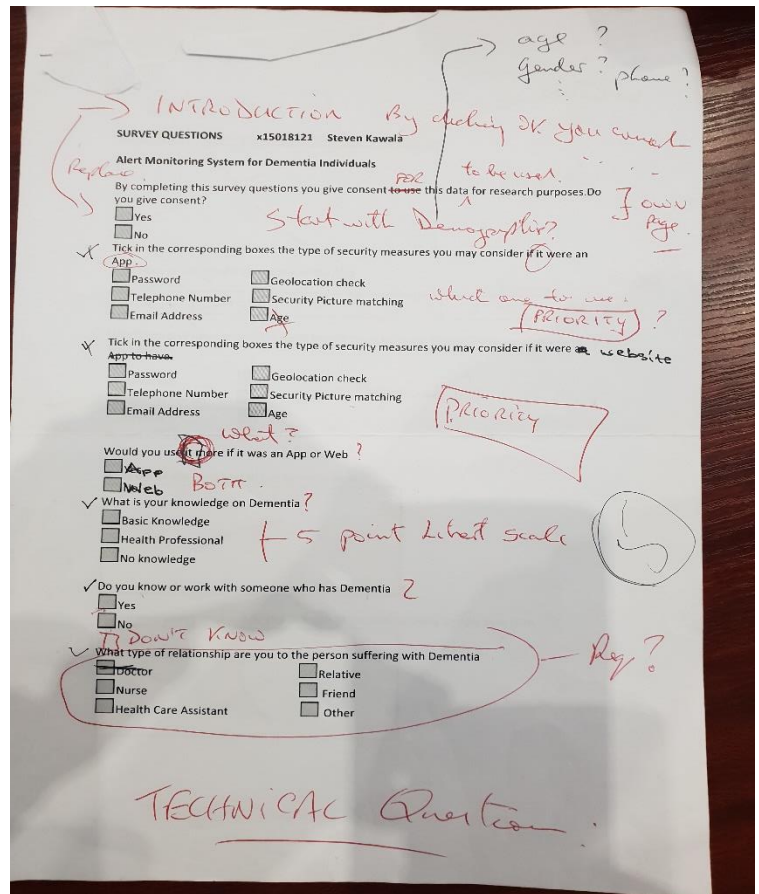
Description

Cadle, Paul and Turner described survey as “primary fact-finding technique”. It allows elicitation of requirements from a large pool of stakeholders.

A draft was prepared for approval to see if the questions were meeting the successful factors of the survey. (Picture1)

The following are the reasons for having survey drafts before the final sent out survey:

- To come up with a clear purpose of the survey.
- To come up with meaningful questions and measurable information.
- To come up with easy to complete questions.
- To come up with a realistic scope of the survey that will allow participants to understand why they are doing the survey and respond timely.



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Overview

The survey will describe the true characteristics of a large population that interview method cannot provide and gather accurate targeted results to draw conclusion on requirements.

Online survey is more effective than door to door paper survey, that's why Google Form has been used to draft the survey questions. There are other software platforms that could have been used like Survey Monkey.

The Google Form allows the author to customise the layout of the questions into drop down, multiple choice grid, checkbox and Likert type of questions.

Confidentiality

The information corrected in this survey will be anonymously analyzed and stored in a password protected college server.

Distribution method:

- Emailed to relevant participants
- Survey link shared on Facebook

Survey questions:

<https://goo.gl/forms/qDkIOQqeW86ieehu2>

Which of the following age brackets do you belong to?

- 18 -25
- 26-35
- 36-45
- 46-55
- 55-65
- 66+

What gender are you?

- Male
- Female
- Choose not to tell

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Which of the following do you use to access the internet?

- Laptop
- Mobile Phone
- Both

What is your knowledge on Dementia? (1-Basic,2-Novice,3-Intermediate,4 Advanced and 5-Expert)

- 1
- 2
- 3
- 4
- 5

If you are/were a care giver of a person with dementia, how would you prefer to be contacted?

- Voice Message
- Text Message
- Email Message
- Telephone call to landline
- other

If you have a mobile phone, what software does your mobile device operate on?

- Android
- Windows
- iOS
- Other

What security verification measures would you recommend using on a Mobile Application system?

- Password
- Pin number

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- Email address
- Geolocation
- Telephone number
- other

If you were to have a detect and alert monitoring application, how would you prefer to access this app?

- With Login feature
- Without Login feature
- Other

How do you feel about social media links such as WhatsApp being included in this App? (1-Disagree,5-Strongly Agree)

- 1
- 2
- 3
- 4
- 5

How long do you think should be the average response time for an alert message before the message is diverted to the next available helper?

- 2 Minutes
- 3 Minutes
- 4 Minutes
- 5 Minutes

Which of the following features would you recommend that will constitute to usability of the app for people with dementia?

- Audio function
- Voice Recognition
- Other

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Choose three information features you think would be helpful on an app for you to perform your duties for a person living with dementia?

- Family contacts
- Emergency contact numbers
- Medical history of the client
- Advice about dementia
- Age and Marital status

In the following features, which ones would you recommend for the detect and alert app? Choose the should have top 4 features?

- Geo location Map
- Contacts
- Picture gallery
- Emergency Services
- Activity reminder
- Transport booking system
- Information on Health Eating and exercise

2.2.4 Visual Prototype

Overview and Objectives:

According to a Guide to the Business Analysis Book of Knowledge (BABOK Guide 2015) Prototyping is used to elicit and validate stakeholder needs through an iterative process that creates a model or design of requirements. It is also used to optimise user experience and confirm expectations.

In this project the prototype generated will give my stakeholders a clear visual representation of the requirements elicited from the brainstorming session, survey and four interviews. After requirement workshop session, a second version of the prototype will be created to reflect changes and suggestions of the stakeholders. This

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pointing time the stakeholders will have the opportunity to suggest new features or request change to some of the features of the first version of the prototype.

Resources Required:

- Balsamiq for construction of the first prototype
- Emulator on Android studio for the final prototype.
- Elicited requirements from the brainstorming session, survey and four interviews.

Prototype Development Checklist:

- Summary and evaluation of requirements gathered from all elicitation techniques; the survey, brainstorming session and four interviews.
- Prototype version 1 using Balsamiq before requirements workshop.
- Prototype version 2 following recommendations from stakeholders after requirements workshop.

2.2.5 Requirements Workshop

Overview and Objectives:

The aim of the requirements workshop is to evaluate the first prototype for the app. During the requirements workshop, stakeholders will have the opportunity to suggest new features or request alterations to the design of the first prototypes. All the “Must Have” suggested features for the app will be implemented in the second and final prototype after verifying with the stakeholders that they are happy with the requirements.

Date of workshop:

Friday 8th March, 2019

Time of workshop:

10:00 – 11:00

Participants

Seven participating stakeholders out of eight sampled stakeholders invited attended the workshop. Participants were representatives from each group of stakeholder

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population. The sample for the workshop attendees is considerably small but adequate because of time availability constraint of the stakeholders.

Resources Required:

- Strong internet connection
- Laptop/NCIRL lab computers
- White board to write down all suggestions
- Balsamiq to display the first prototype of the app.

Workshop Agenda:

- 1) Present and evaluate the prototype 1.
- 2) Researching and compare identified competitor apps.
- 3) Identify features missing from the prototype1.
- 4) Implement identified design changes for the application.
- 5) Obtain consensus on the design, layout and features of the application.

Workshop Rules:

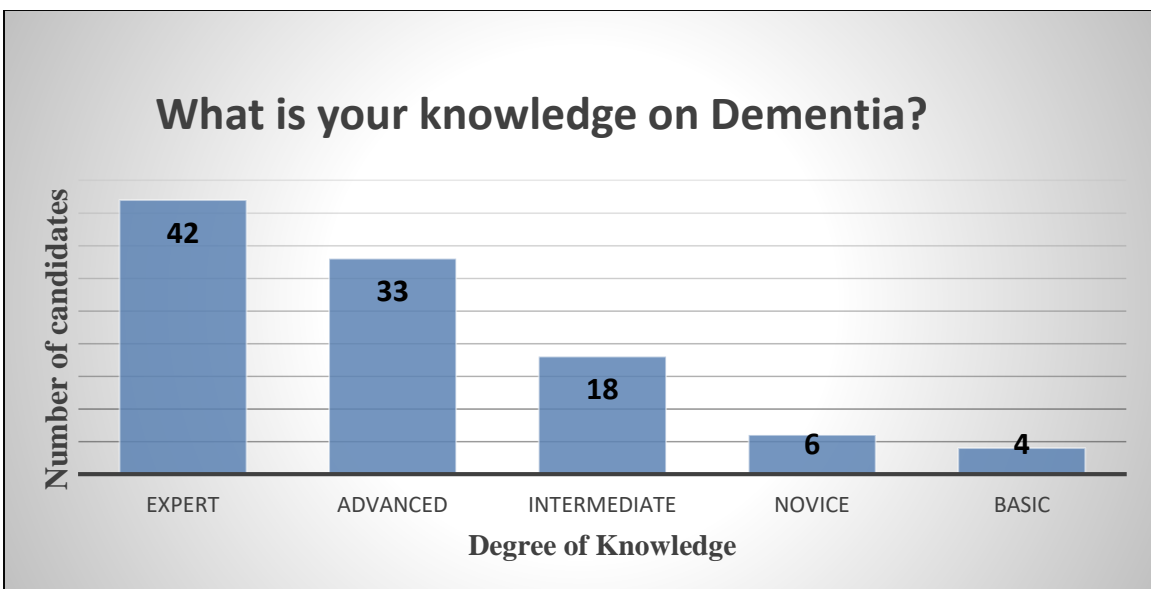
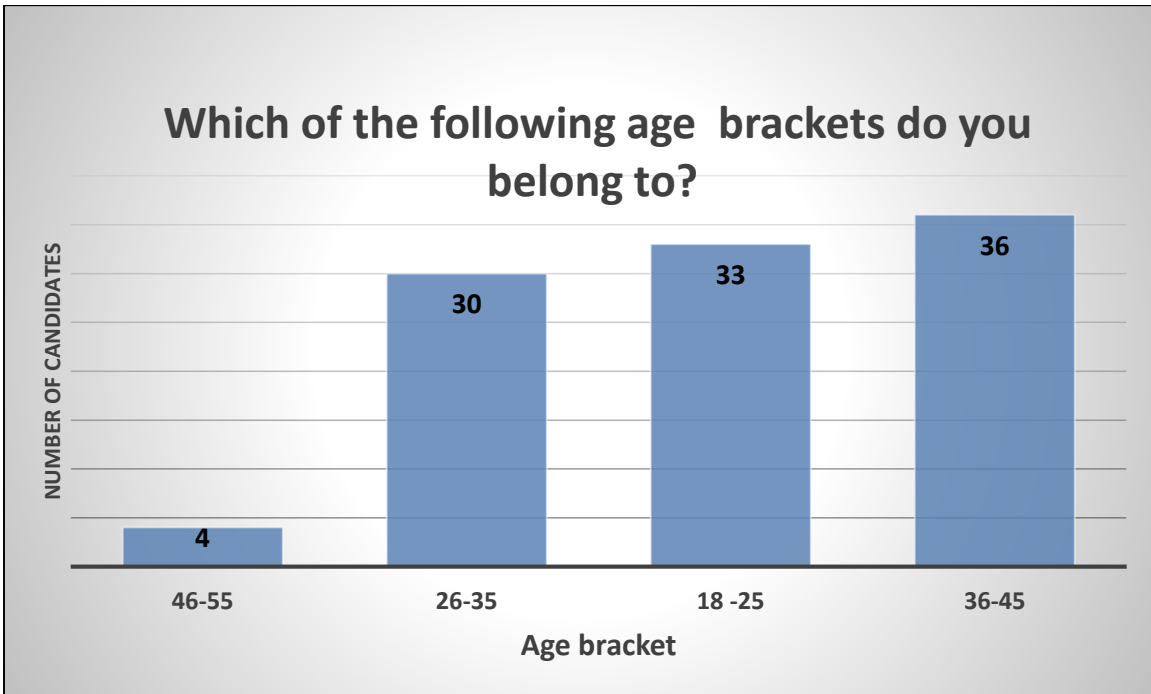
- 1) Participants are encouraged to be in time to avoid disrupting others.
- 2) Discipline and silence will be expected during the workshop. (No chit chatting and mobile phone should be put on silent mode)
- 3) All participants should familiarise themselves with the agenda notes given to them before the meeting.
- 4) Disruptive behavior will not be tolerated.

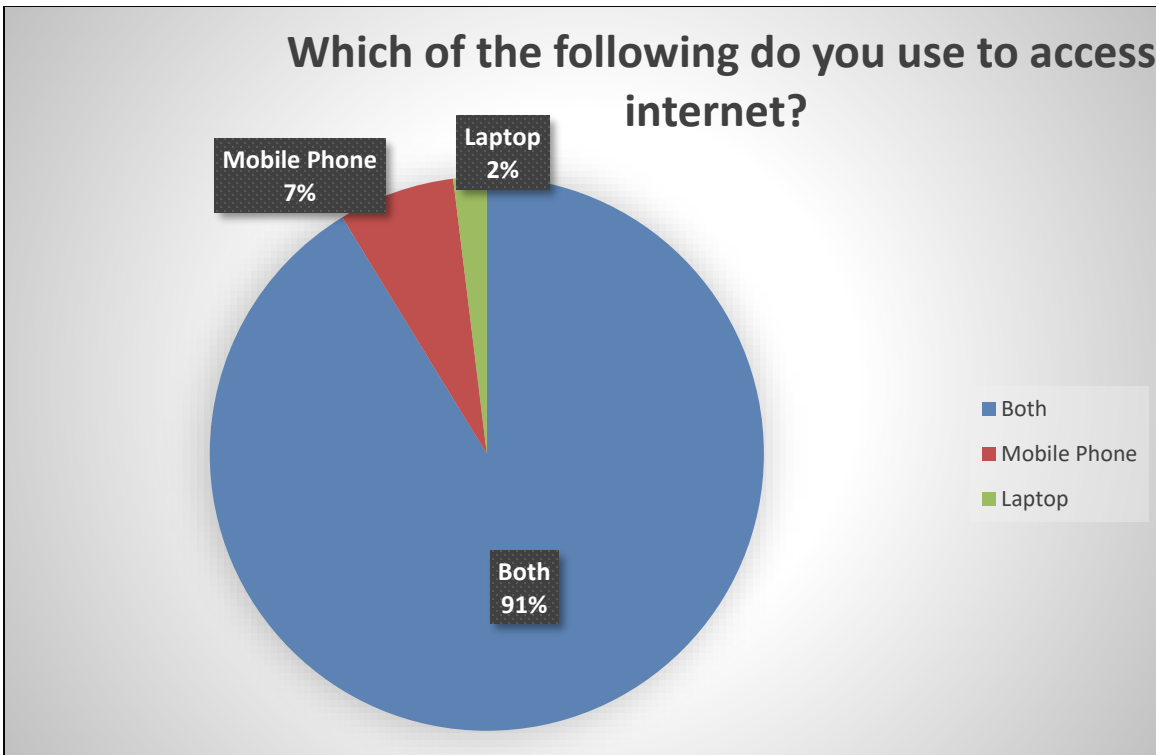
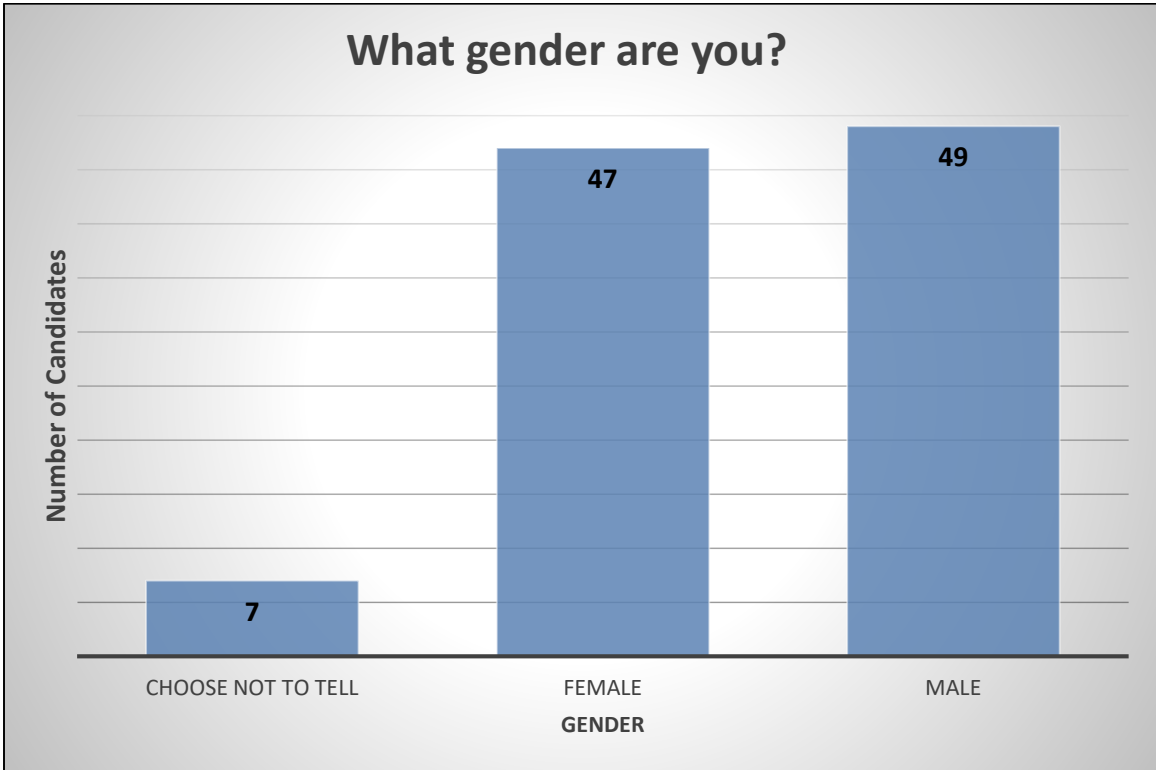
Workshop Final Deliverables:

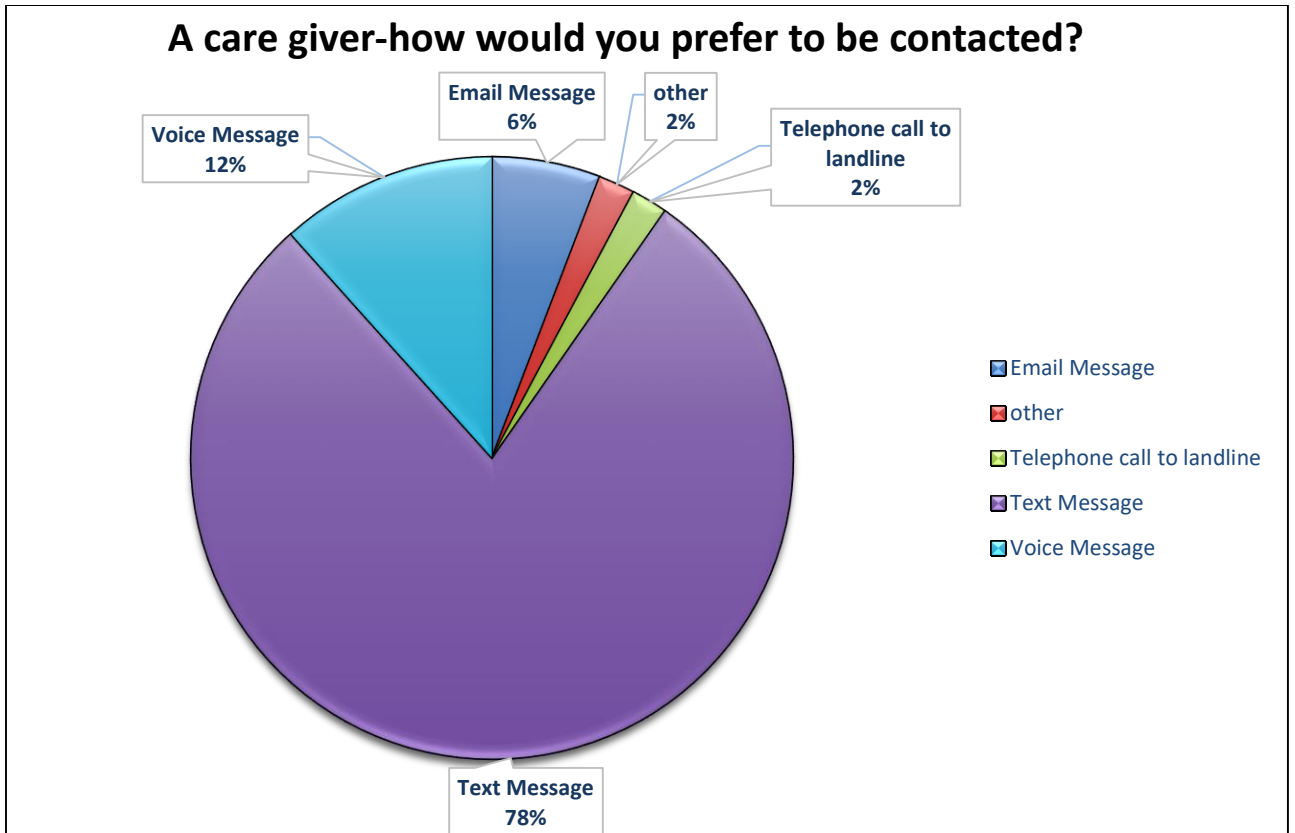
- 1) Documentation of participant's recommendations on the layout, design and features of the application.
- 2) Throwaway prototype version two.

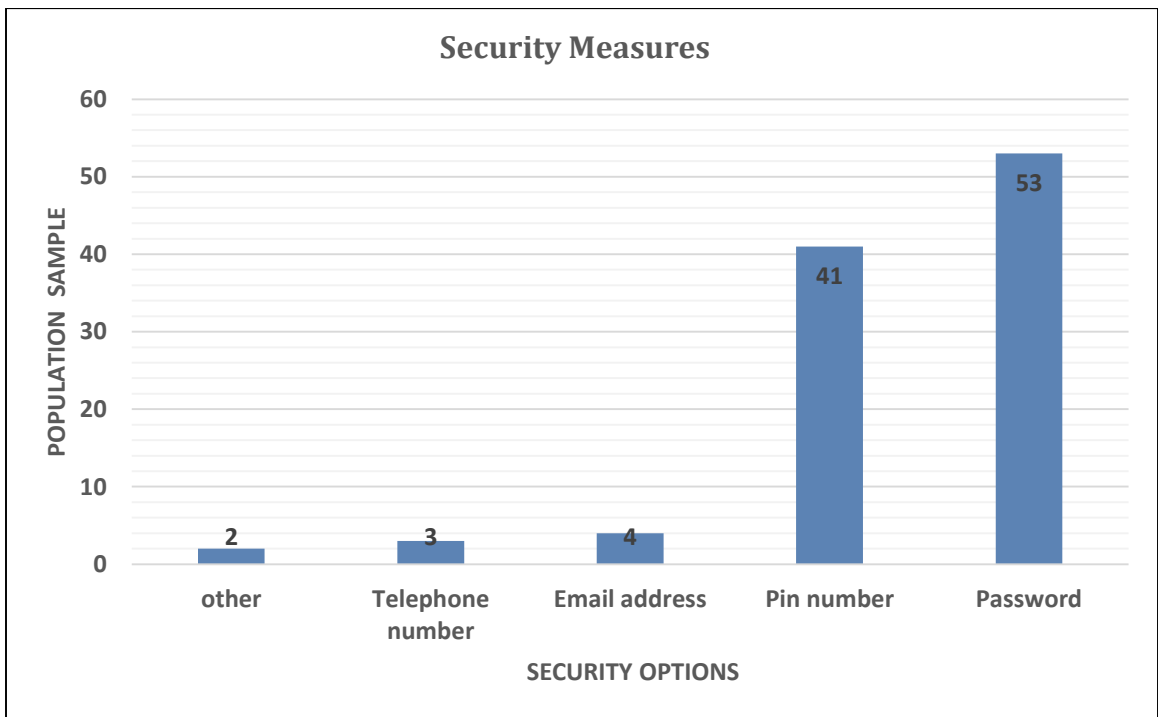
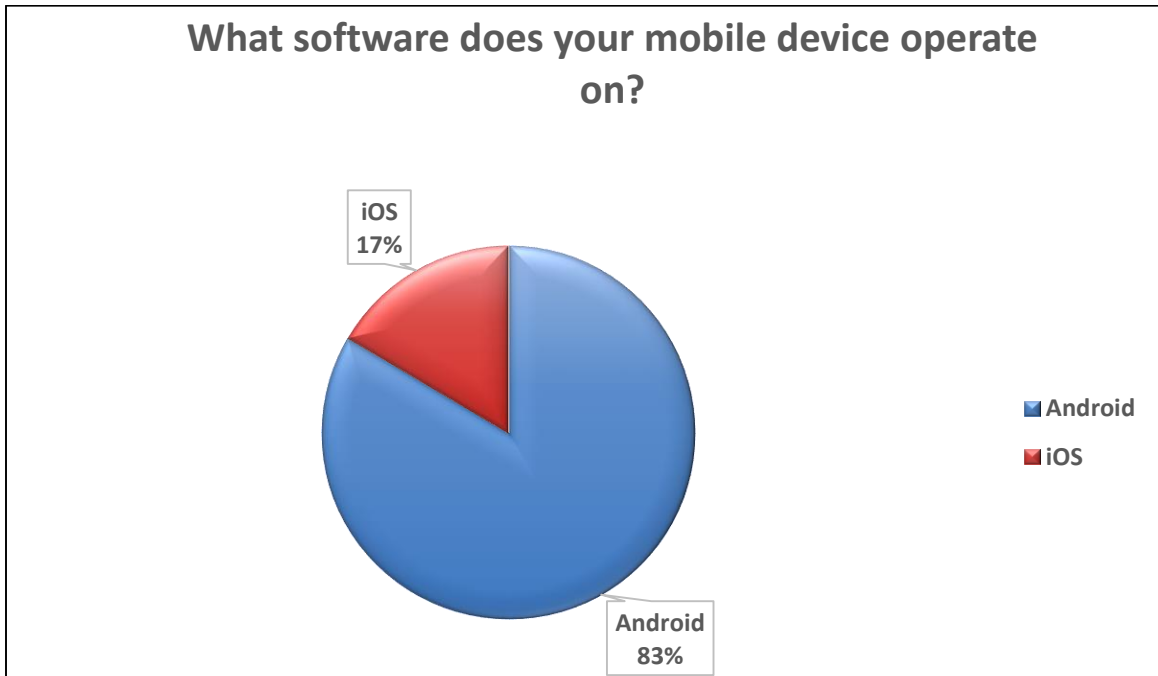
3.Requirements Elicitation & Analysis Results

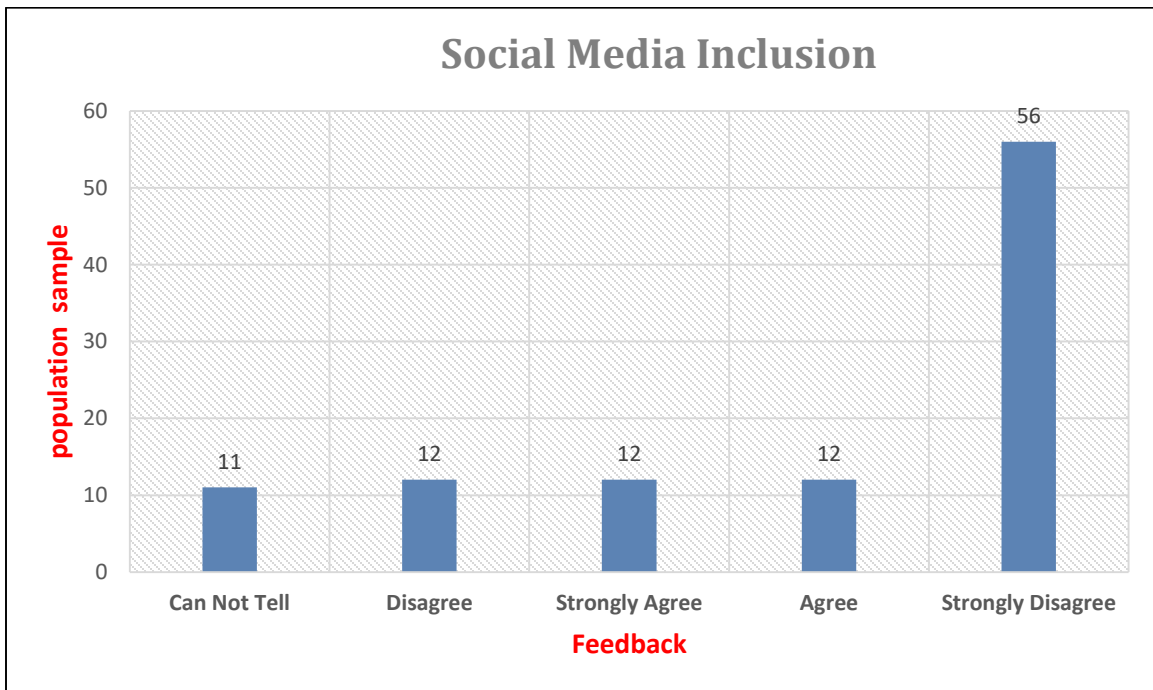
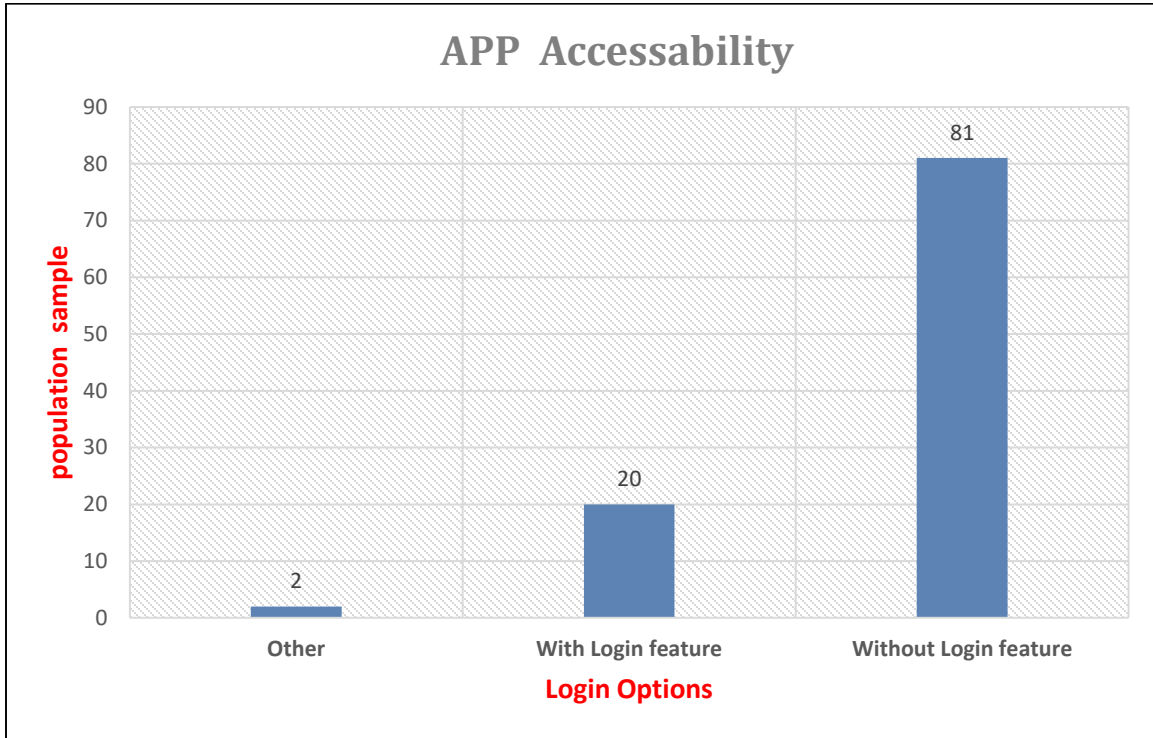
3.1 Survey

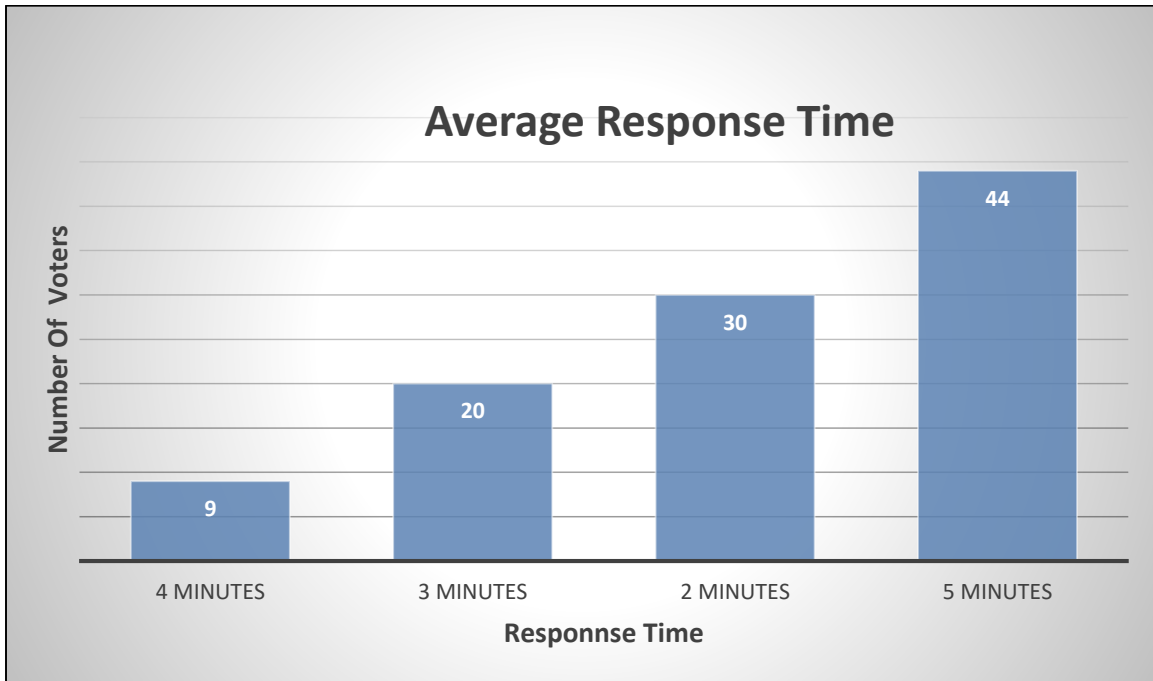


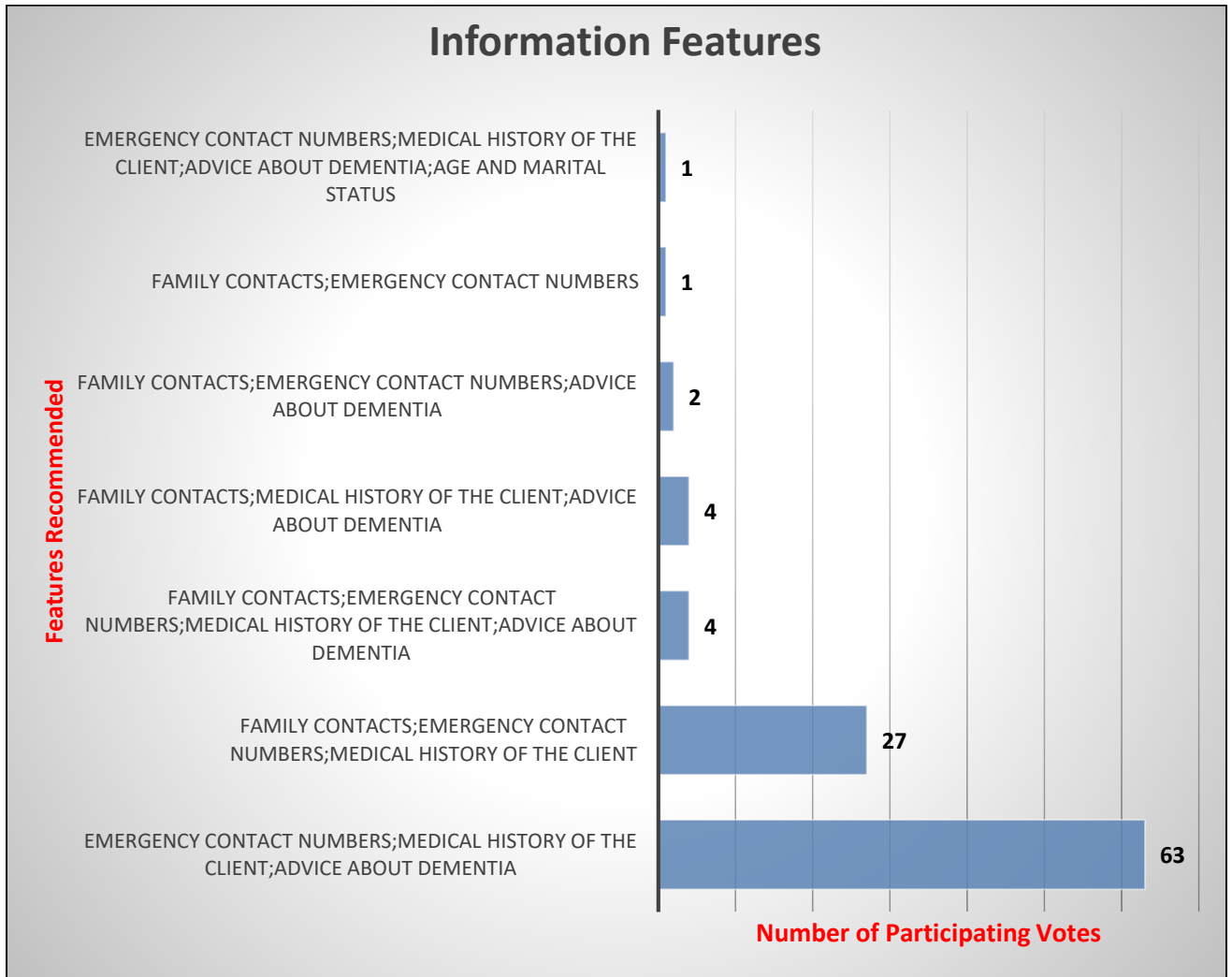




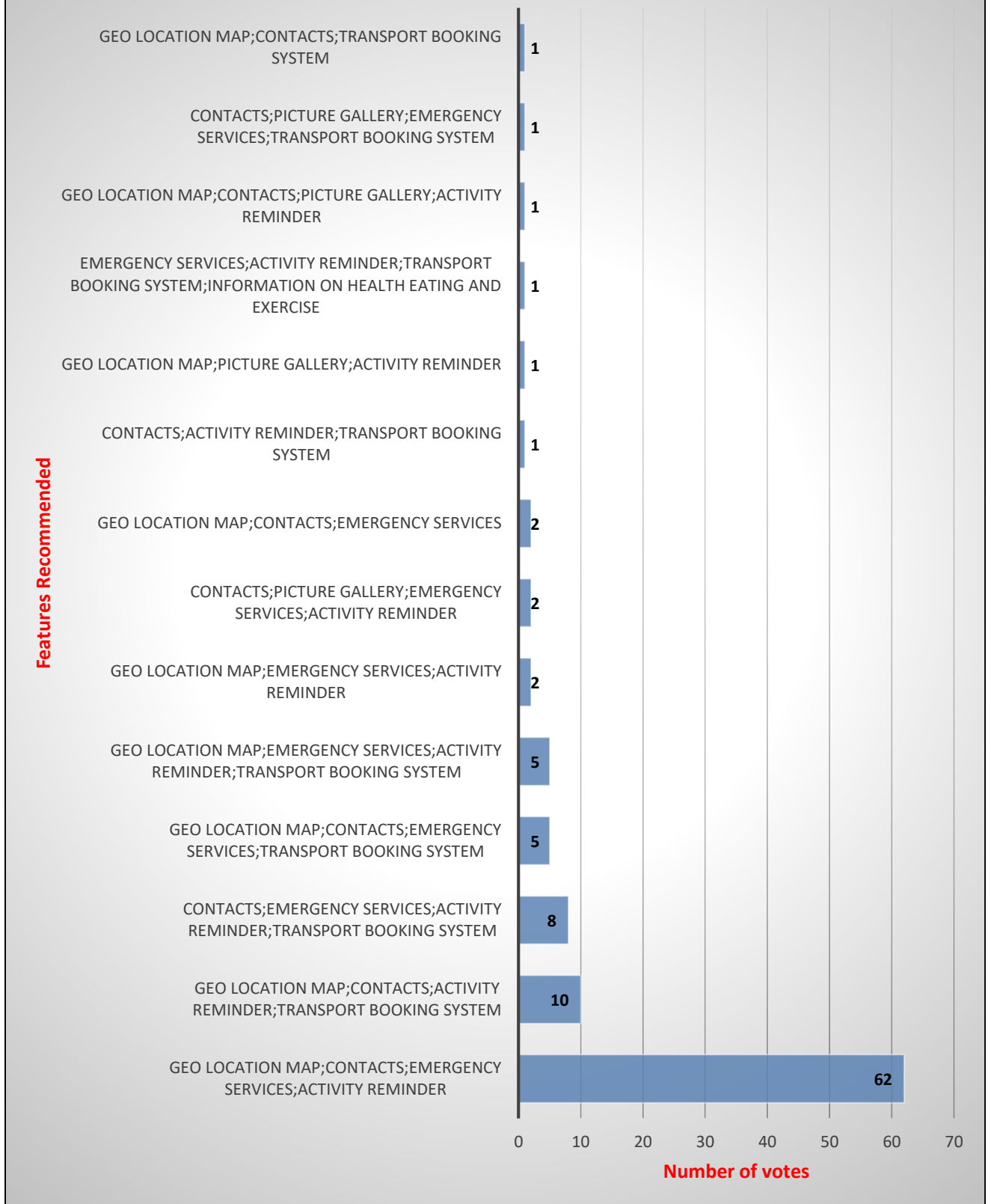








App Recommended Features



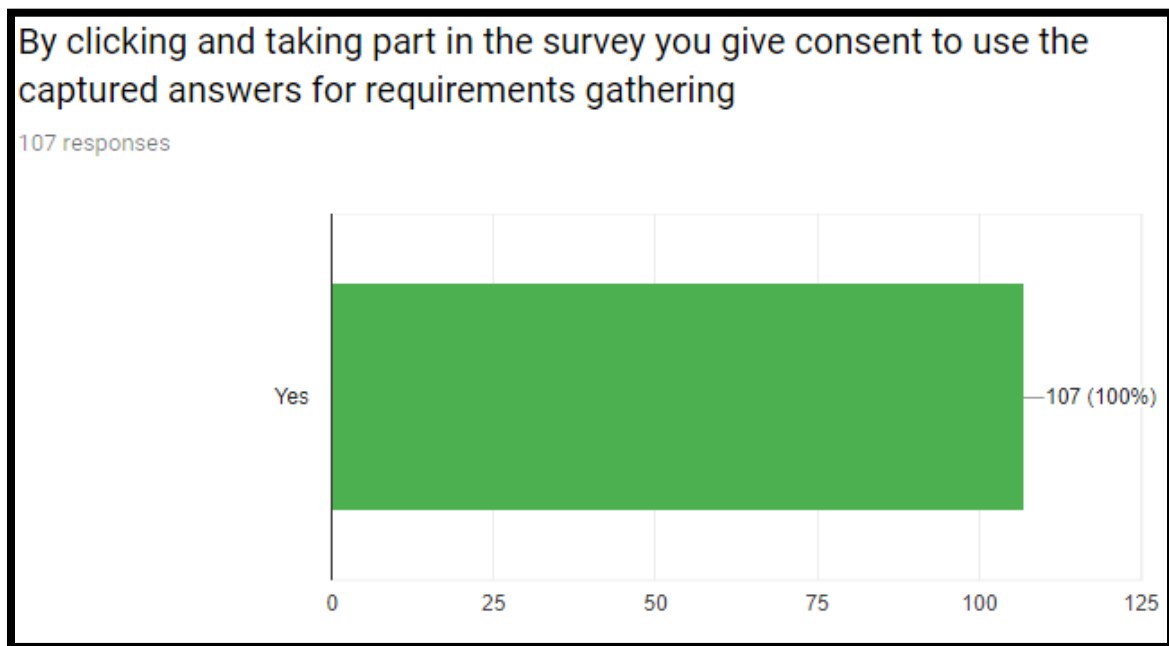
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Survey Conclusion

People who were easy to reach were contacted as a subset of the population of the stakeholders (convenient sample). One hundred stakeholders were confidently considered adequate to give enough requirements for the population preferences, considering the limitations of the project. The limitations included, time and project resources. If it was in the industry, 1000 stakeholders would have been considered an accurate representation of potential customer population in Ireland.

The survey was made using Google Forms and the analysis of the results were graphically presented using Excel data analysis tools. It took two weeks to conduct the survey. In order to achieve precision and accuracy for the analysis of the requirements obtained, a total of 110 participants were contacted through emails from all walks of life; Technology students, Care home managers, relatives of people living with dementia and care workers. Out of 110 sent out survey requests, 107 responded and 103 responses were declared as complete surveys.

Diagram 3: Survey Responses



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The aim of the survey was to gather requirements from potential users of the DAMMA app. Out of 103 responses 45.6% represented female and 47.6% represented male. The remaining number of participants chose not to tell their gender. In terms of age demographic, most participants were aged between 36-45 accounting for 35%. The least responses were from the 46+ age group accounting for 3.9%. The age group 55+ were not fully involved in the survey considering that most people in this age bracket are considered less tech savvy. This is why the requirements gathered have features easy enough for age bracket 55+ who are still looking after their old parents living with dementia. Question 4 in the survey demonstrated that the people involved in this survey most of them had knowledge of the problem being addressed. Either had someone they know has dementia or they care for a person suffering from dementia. 42% of the participants were experts in the subject and 4% had the basic knowledge of dementia. The question on the app accessibility and features required demonstrates the simplicity of the app. What users think it will be good for them. 62 % of the participants contributed to the same app features and 81% preferred the app to have no login feature.

All in all, the response to the survey was phenomenal and all responses will be used to determine requirements and they will be included in the MoSCoW analysis.

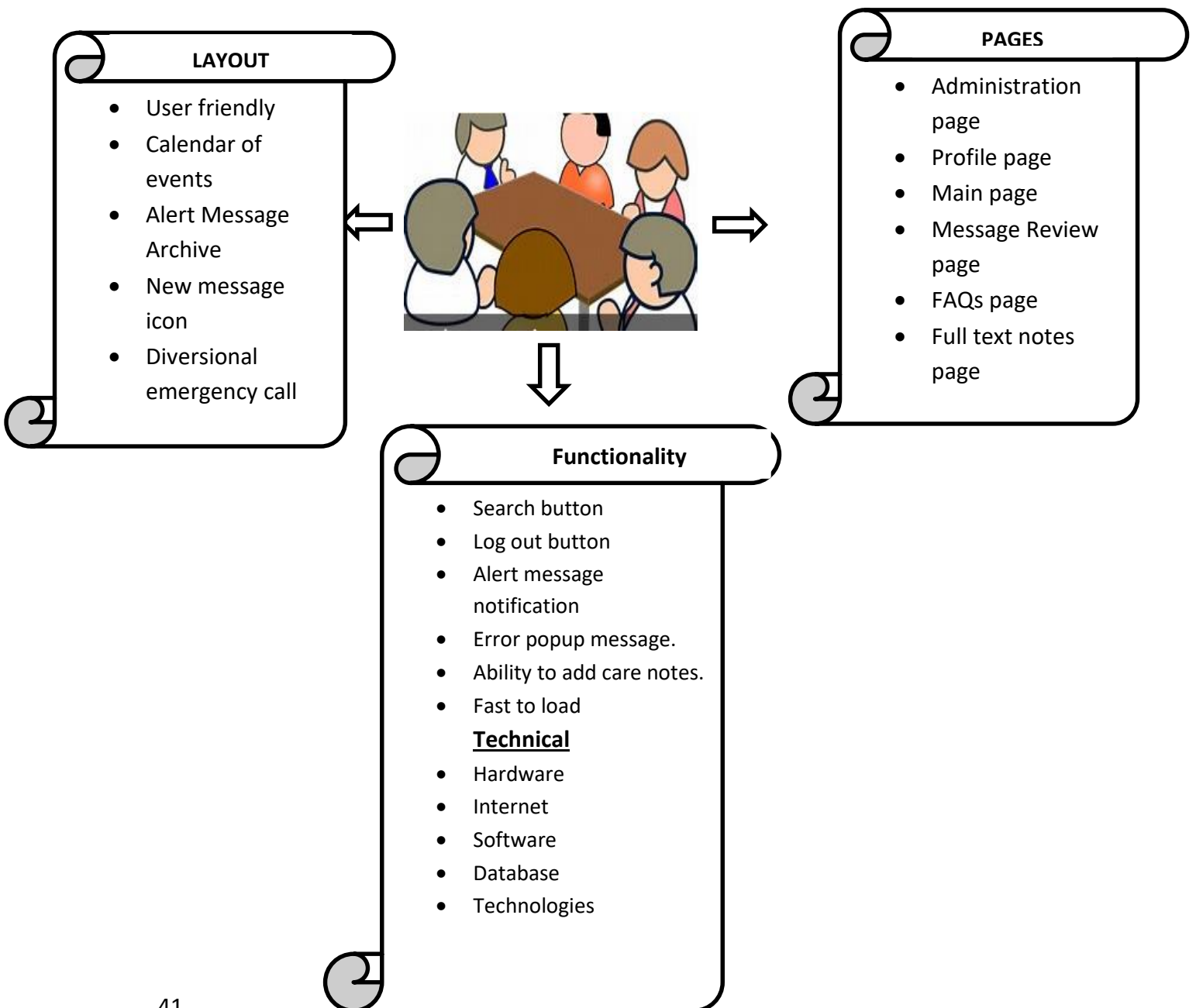
Requirements outcome from survey:

- The App must be available on android
- Switch over response time to be 5 minutes
- App should have no login feature.
- Information features on the app should include:
 - Emergency contact numbers
 - Advice about dementia
 - Medical history of the client.
- General App features should include:

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- Contacts
- Emergency services
- Activity reminder
- Geolocation

3.2 Brainstorming Session



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The brainstorming session resulted in elicitation of requirements potential users consider the app must have. The first phase of the brainstorming session allowed all seven participants contributed on features for DAMMA app successful. All ideas were written on the whiteboard. The second phase of the session was a recap of the requirements suggested and grouped into functionality, layout and pages of the app as above. The final grouped list of ideas was distributed to all participants. The list of requirements gathered and distributed were:

- Next of kin contact option
- Login and out button
- Administration page link
- Registration page link
- Main page link
- Resource page/Information page
- Message Review page link
- FAQs page link
- User friendly navigation
- Calendar of events
- Alert Message Archive
- Divert the call to emergency service if it has not been answered.
- Profile page
- Full text notes page
- Search button
- Alert message notification
- Error popup message.
- Fast to load
- Hardware
- Internet
- Software
- Database
- Technologies

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3.3 Interviews

Interview One:

Participant:

Project Sponsor

Interview Questions and Answers:

Q1. What are your initial thoughts on the app?

I think this is a very good idea and has great potential to fill the gap in the home care industry.

Q2. What you would you like the app to do?

The App should use a mixture of “primary sensors” on a wristband/bracelet including pressure sensor, motion sensor, camera and microphone to fully ensure safety. A pressure sensor would alert caregiver should a person fall, the motion sensor will catch the motion of falling which would then switch on the microphone and camera and provide a live feed to the caregiver who can then decide to call for ambulance or not. The motion sensor would also act as a warning if somebody has NOT moved for the past 20 minutes (in case of death) a caregiver would be notified. – These sensors should be directly coupled with a smart device such as phone app.

You could also place blood pressure monitors on the bracelet which can alert a caregiver of low blood pressure problem.

Q3. Do you consider this app worth building? If “YES”, why is it so?

Yes. The benefits are enormous. It will benefit all health care professionals and also people living with dementia to gain back their independence and confidence to do their daily life routines.

Q4. Who do you consider the target audience of this app?

The target audience of the app are health care professionals, emergency services, relatives of people and people living with dementia.

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Interview One Conclusion

This interview with my project sponsor was very informative as it provided an understanding of working relationship and also to ensure that the sponsor understands what to expect.

Q1: This question helped to get an initial understanding on the sponsor's thoughts of the app and his level of interest in the app.

Q2: This question brought an extension to the idea, like monitoring blood pressure though it's not the core feature of the DAMMA. The measure of success is to deliver a simple working app which can be compatible to other software and technologies. For example, sensors and camera.

Q3: Validated why this app should be built while providing further information on the background of this idea.

Q4: This question investigates the target audience for the app. The accurate identification of a target audience is vital to an apps success as it reduces the chance of wasting both time and resources. An app should be designed with the target audience in mind in order to address and meet their requirements. The target audience has been identified as health care professionals, relatives of people and people living with dementia.

Requirements from Interview One:

- User friendly
- Motion sensors
- Pressure sensors
- Timeline for inactivity
- Logout button
- User registration
- Compatibility with other software

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Interview Two:

Participant:

Developer

Interview Questions and Answers:

Q1: From the brief description of the app given, do you think the concept of the app is worth developing?

Yes. Development of the App would not be extremely complex to port and make this app cross platform. Tools like Xamarin allows us to create and target both Android and the iOS ecosystems. We could go further by diving into creating the interface for the web which would the app be available anywhere and not be dependent on what device the user is on.

Q2. What suggestions can you give, on what platform can the app be implemented apart from Android and iOS platform?

I think for the scope of this project, developing for the Web may be ideal to further target both desktop users and mobile users. Perhaps some sort of administrative dashboard for the care giver. Making the App cross platform would mean either using technologies compatible with all device types, example Xamarin, or making a separate app for, iOS and android.

Q3: Do you have any experience migrating an app from one platform to another? If yes, how long would it take to develop this app?

Yes, I have used Xamarin in order to simultaneously develop for both the Android and iOS platforms.

The app should take no longer than 4 months to complete. The most time consuming aspect of development is the testing. For this app I would predict most of the time to be spent on usability design, ensuring the app adheres to best design patterns. Time should

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be taking for this element as after all it is the end user that will be using your application and for the user to be hooked the interface should be simple and easy to use.

Q4. What features would you suggest to put on this app?

I think there should be some sort of messaging functionality between the care worker and the person living with dementia. Maybe if there were some health analytics added in? If the person's heart beat falls to a certain level alert the care giver etc

Q5. Have you any suggestions going forward with the development of this app?

Going forward I would careful consider the design of the app and perhaps further expanding on the functionality of the app.

Conclusion of Interview Two

This interview conducted with a developer resulted in a large number of technical requirements. It has revealed the complexity of the app and how exactly the app will work from a technical point of view.

Q1 & Q2: The first two questions of the interview with the developer has indicated that it would be possible to make this app cross platform but it would require either using technologies compatible with all device types, example Xamarin, or making a separate app for web, ios and android which is common.

Q3: Specifies a timeline for the project which is roughly four months to develop both the server and client side. This fits the academic timeline of the project.

Q4: This question provided requirements for analysis and communication. The messaging functionality between the care worker and the person living with dementia.

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Requirements from Interview Two

- Health analytics
- Messaging Functionality
- Project timeline
- Technologies
- Available on Android
- Webhost provider

Interview Three:

Participant:

Software Engineer

Interview Questions and Answers:

Q1: From the brief description of the app given, do you think the concept of the app is worth developing?

Yes. I think this sounds like a great idea and I personally know people that would benefit tremendously from an app such as this.

Q2: What sort of safety measures can you recommend to be implemented in the app to ensure users passwords and details are safe?

- Passwords should never be stored in plain text, but salted.
- Cookies should not store any information without user consent.
- Google's RECAPTCHA plugin could also be implemented.
- A limit on how many times a failed login is entered could also be implemented. If the user exceeds the amount of times they could either have to wait for a specified time before they can try login again or the account can be locked until the user is verified through clicking the verification link sent to them through their email account.

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- I would suggest making the password requirements a minimum of one capital letter and one number or symbol.

Q3. How much would you estimate this app would cost to develop?

There is no standardized price on the cost of developing an app. It all depends on the developer. Mostly it can range from 200 to 300 Euros per day for a backend developer. Total provision cost can be up to 30k minimum.

Q4: Apart from development costs, how much would you estimate for the maintenance to be for the smooth running of an app?

App maintenance costs are hard to estimate as they are based on the type of app, and how it was built. Some Tech companies would charge a fixed yearly charge which can be paid monthly or quarterly. You may as well have your own internal app administrators who can be doing the maintenance apart from out sourcing to cut the costs. The frequency of the maintenance depends on the complexity of the app.

Q5: From the brief description of the app given, what else would you like the app to do?

- Should send alert messages to caregivers when there is no activity of the person living with dementia. Let's say, inactive for 10minutes may mean the client has collapsed, sleeping or dead.
- Should have Geo-fencing function
- Location history function to trace the wondering person

For example, the Pseudocode:

```
detected= chkIntersection();
```

```
if detected is true then /*send notification to caregiver*/
```


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Conclusion of Interview Three

This interview conducted with a software engineer resulted in a large number of technical requirements that revolve costs to be incurred, safety and security measures of the app.

Q1: The first question of the interview with the developer has indicated that it would be possible to make this app cross platform and potential beneficiaries are visage.

Q2: Specifies safety and security measures to be considered to safeguard private information and meet the objective of the app. Results of this question provided requirements to do with security features that could be used to protect user information and security features elicited include salting passwords, no user specific information should be stored in cookies and the use of google RECAPTCHA feature to ensure the user is genuine.

Q3 & Q4: Provided an estimated cost for developing this app and the maintenance of the app. The cost figures given are provisional estimates based on the average cost of the app on the market. It can be +10% or -10% on the cost provided.

Q5: This question provided functionality requirements to be added to the app. Examples of functionality features include, Geo-fencing function, Location history function and messaging function.

Requirements from Interview Three:

- Development and maintenance costs
- Geo-fencing
- Password requirements
- Cookies not to store user private information.
- Google's RECAPTCHA
- Failed login
- Location History tracker

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- Timeline for app inactivity

Interview Four

Participant:

Home Care Manager

Interview Location:

Caremark House, 13 Blackwater Road, Glasnevin, Dublin 11

Date of Interview:

Monday 4th February, 2019.

Time of Interview:

14.00-14.25

Objectives of Interview:

The aim of conducting an interview with this stakeholder, is to understand the project domain and the stakeholder's expectations for the app. The interview will be structured with a set of 6 questions prepared before the interview. This face to face interview will be extremely beneficial because there will be a chance to probe for explanations of responses.

Interview Questions and Answers

Q1. Do you think the concept of the app is worth developing?

The GPS concept for people experiencing dementia is already out there. The function, accessibility and user-friendliness of the ambient sensors will affect its usefulness. There is also a Dementia Emergency app for caregivers with a contacts function. Maybe include a multi-function app which supports the person with the dementia experience being mindful of the emotional needs of a person during a challenging time within the dementia process

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Q2. What colour scheme would you recommend for the app?

Colour wise - Maybe consider Yellow. It is a stimulating Colour which can trigger cognitive functioning.

Q3. What features would you suggest to put on this app?

Familiar voice activation to give reassurance and safety advice

Q4. What major challenges of people living with dementia, do you think this app should address to benefit carers or clients?

Maybe a voice activated prompt or reminder of how to carry our daily tasks on request. Something like 'Alexa'

Q5. Are there any other similar apps you know which are used to address the challenges faced by people living with dementia? If your answer is yes, please mention them.

There are many other apps out there such as the daily aid apps which include Dementia Digital, Dementia Clock, Family Locator GPS Tracker, My Therapy (meds reminder), Memory Box, Dementia Emergency, Mind Mate etc. that can help people with deterioration in cognitive functioning.

Q6. Have you any suggestions going forward with the development of this app?

Include a focus on prerecorded instructions for everyday tasks that can be voice requested. Maybe combing the functions of the diverse apps available into one inclusive app.

Conclusion of Interview Four.

This interview conducted with a home manager was very enlightening as they represent the health care professional. The requirements elicited enriched the idea of developing DAMMA and resulted in a large number of requirements from user prospective, that could add a feature on the app and enhance the functionality.

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Q1: The first question of the interview with the home manager as a user of the app indicated that there is already different dementia apps existing but DAMMA can bring the difference if it can be a multi-function app which supports the person with the dementia experience being mindful of the emotional needs of a person during a challenging time within the dementia process.

Q2: This question was looking at stimulating colours which can trigger cognitive functioning and yellow was the colour identified.

Q3 & Q4: Provided additional feature on the app that will give reassurance and safety advice. Familiar voice activation, voice activated prompt and reminder of how to carry our daily tasks on request. Something like 'Alexa'

Q5: This question provided such similar apps like DAMMA for comparison purposes. This will help to do a hybrid version or look at what is missing in order to improve the already existing dementia apps.

Requirements from Interview Four:

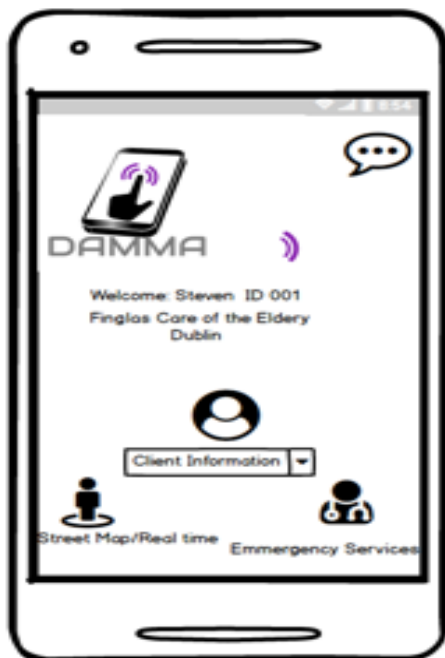
- Multi-function app for emotional needs.
- App colour-Yellow
- Familiar voice activation
- voice activated prompt
- Daily Reminder activated on request.
- Names of examples of Dementia apps:

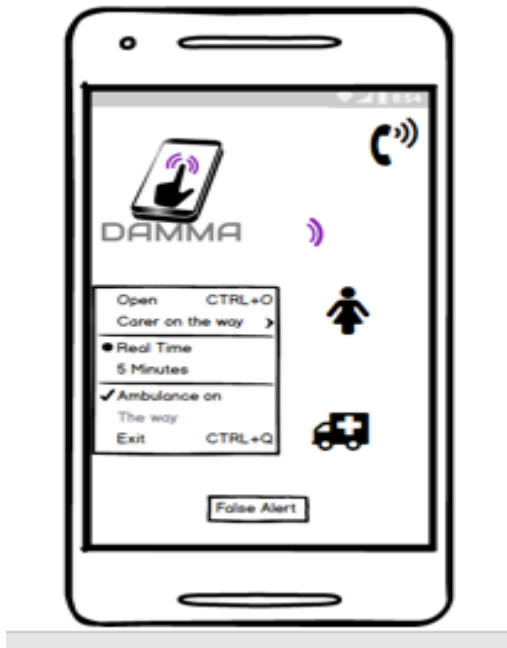
(Dementia Digital, Dementia Clock, Family Locator GPS Tracker, My Therapy), Memory Box, Dementia Emergency, Mind Mate)

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3.4 Prototyping

Picture 2 : Prototyping version one





Prototype Version One Conclusion

Version one prototype was generated based on the requirements elicited from the three techniques: brainstorming, survey and interviews with various stakeholders.

Using the MoSCoW analysis technique the “MUST HAVE” requirements were incorporated into the designing of the first prototype.

This prototype will be validated by stakeholders during requirement workshop in order to add and remove some features. The modification will maintain the number of pages of the app to a minimal to avoid ambiguity. So far the number of pages on the first version are five. This version one will be the basis for the designing of final version of the prototype which will incorporate any additional suggestions about the functionality and features of the app. The final version will be designed after the requirement workshop where stakeholders will have a chance to evaluate for the first time the first version of the prototype and come up with modification suggestions.

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3.5 Workshops

The whole idea of having the requirements workshop is to meet stakeholders for the purpose of refining, prioritising and validating the requirements elicited from the other elicitation techniques which later were used to design the first version of the app. The stakeholders will give a comprehensive “wish list” to be considered, discussed and understood before the final version of the prototype. All collected requirements based on the stakeholders attended the workshop were prioritised for the second design of the prototype.

From this workshop the suggestions raised regarding the first prototype that need to be addressed when designing the second version are:

- The images and features should be clear and easy to understand what they represent.
- The font size of the buttons should be bigger enough for easy operating.
- Features should be grouped according to pages to clearly differentiate the pages.
- The number of pages should be added. Five pages are not enough for an app of this kind.

All other features on the pages will remain unchanged following the positive feedback from the stakeholders. After the modification of version one of the prototype the stakeholders were happy and gave a go-ahead of the second version of the prototype.

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Prototype Version two

Log in Page



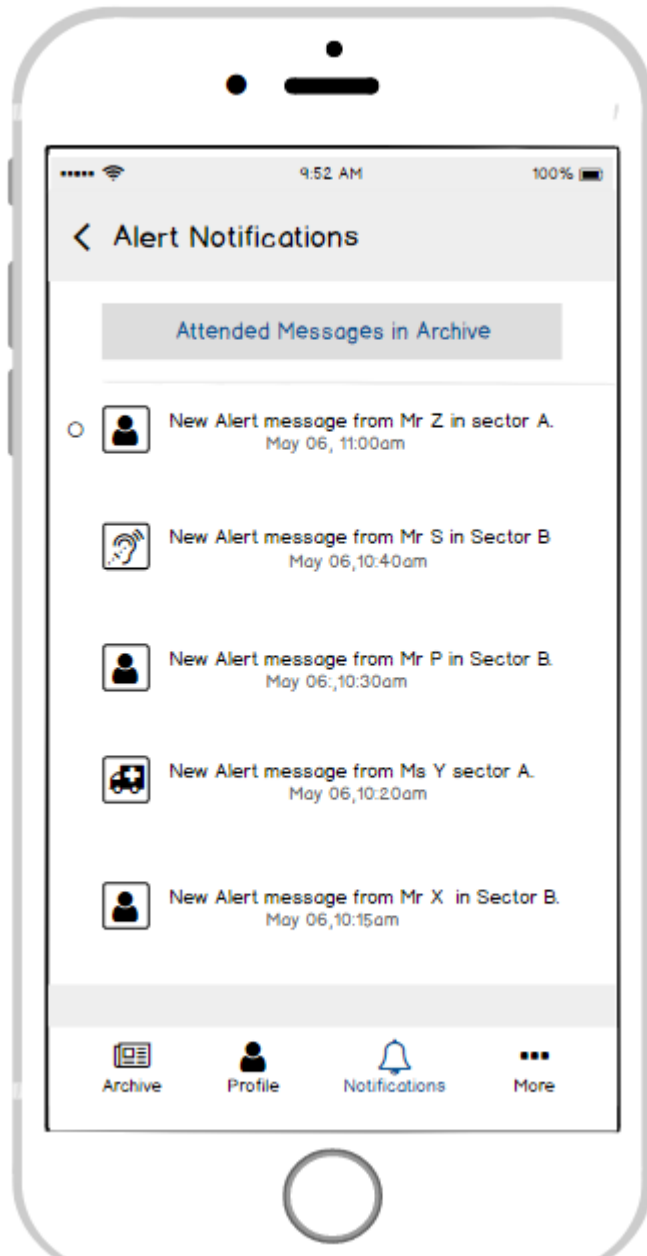
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User Registration

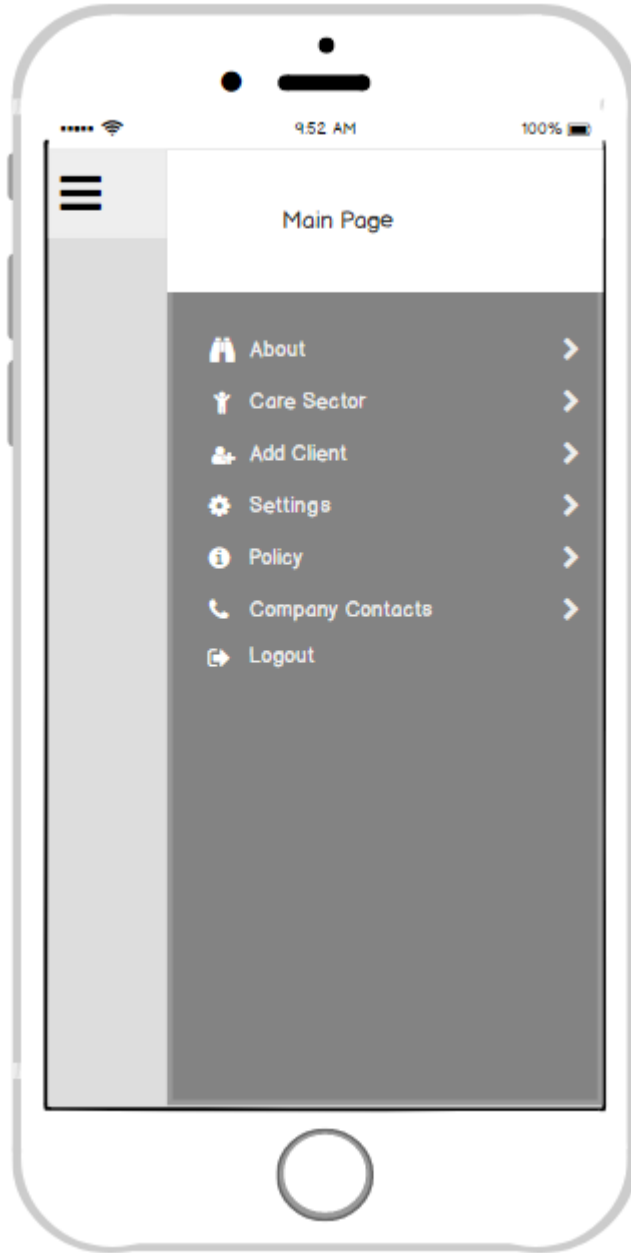
The image shows a mobile application interface for user registration. The screen is titled "Create An Account" and features four input fields: "First Name", "Last Name", "Email", and "Password". Below these fields is a prominent purple button labeled "Sign Up". Underneath the button, there is a line of text stating "By signing up, you agree with the [Terms of Service](#) and [Privacy Policy](#)". At the bottom of the form area, there is a button labeled "Already have an account?". The entire form is contained within a rounded rectangular frame that mimics a smartphone screen, complete with a notch at the top and a home button at the bottom.

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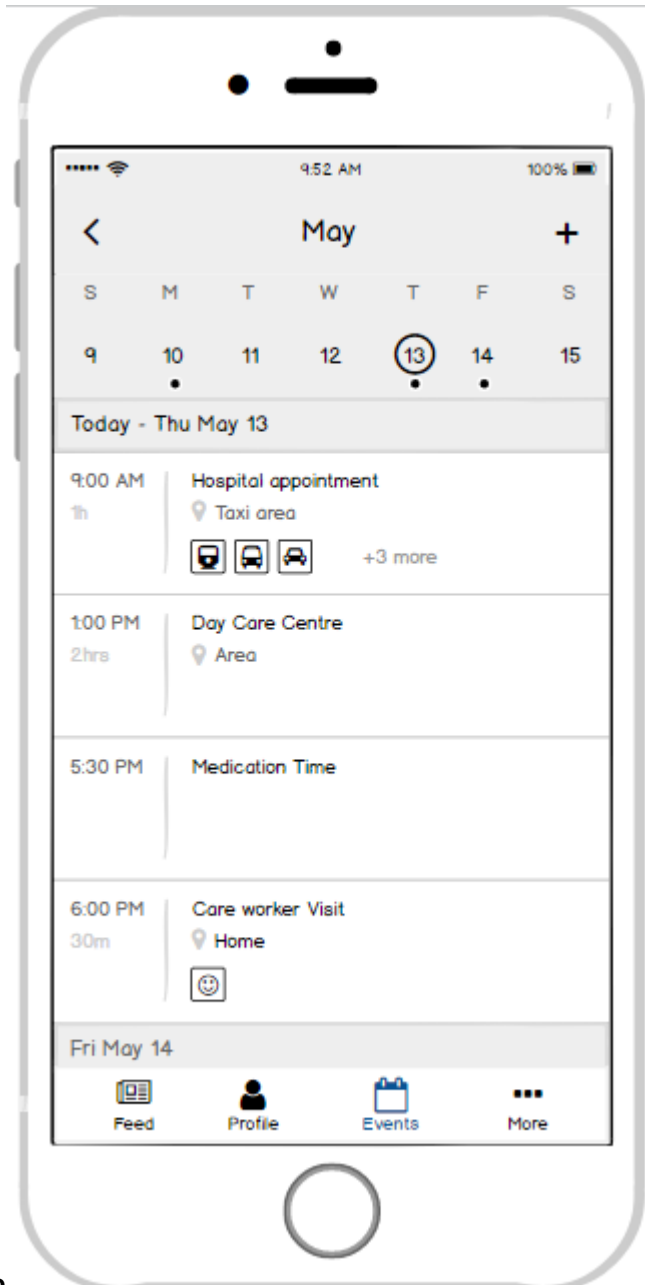
Message Review Page



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Main Page



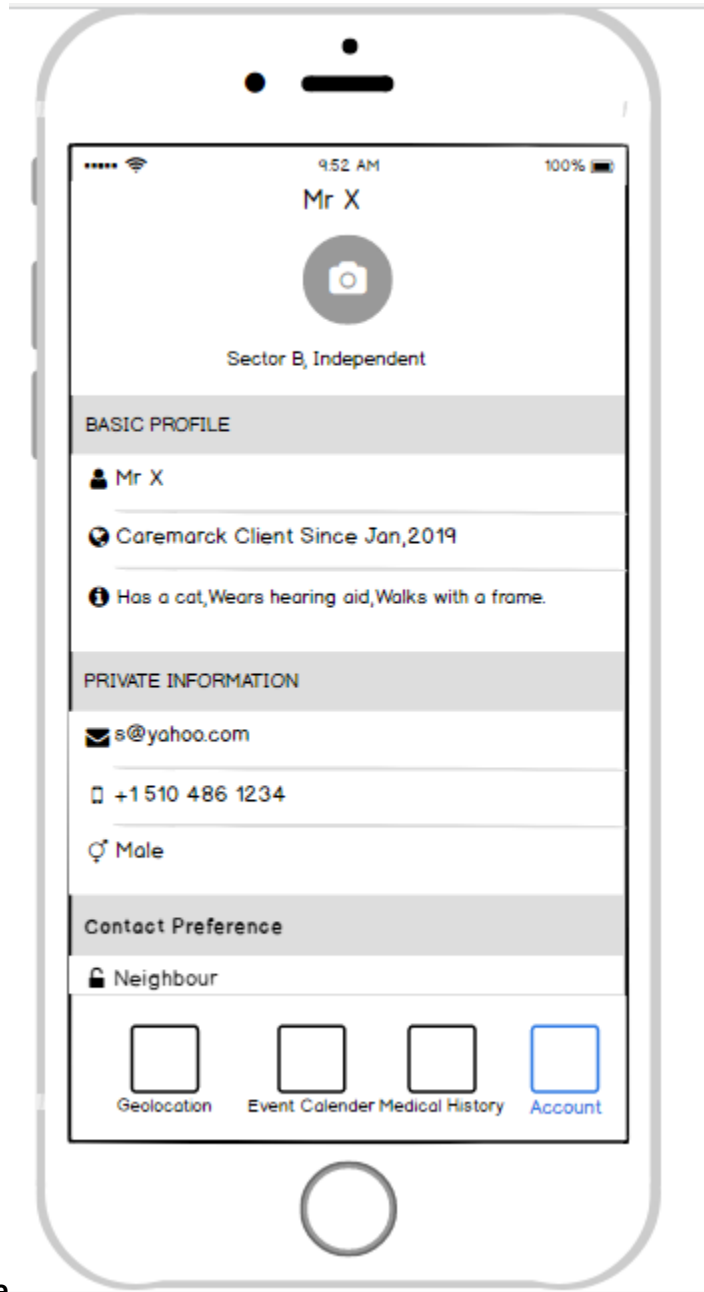
Event and Activity Page

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Geolocation Page

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Profile page

Prototype Version Two Conclusion

Prototype version 2 has taken into consideration all the concerns of the stakeholders. Raised during workshop meeting. There are a few modifications on the first prototype and more pages have been added as suggested. Familiar features and images have been used to make it clearer and easy to understand what they represent. Typography and button size has been changed for easy operation. Features have been grouped according to the user page to differentiate the pages and avoid confusion.

All stakeholders were happy with the final version and no more modifications are allowed

3.6 Interface Analysis

3.6.1 User Story AND Acceptance Criteria.

Table 1: User Story

Pages

User Story	Acceptance criteria
<ul style="list-style-type: none"> ➤ Home Page ✓ As a site editor, I would like to have some flexibility as to where things appear on the page so as to accommodate new features. 	<ul style="list-style-type: none"> • Clear visible features • Room for scalability
<ul style="list-style-type: none"> ➤ Profiles ✓ As a site administrator, I can edit client’s profile so that I can add or delete clients’ profile. 	<ul style="list-style-type: none"> • Database of clients • Able to delete and add client’s profile
<ul style="list-style-type: none"> ➤ FAQs ✓ As a user, I can do a full text search of the FAQs so that I can learn more about Dementia. 	<ul style="list-style-type: none"> • Have data base of resource information • Allow full plain text question
<ul style="list-style-type: none"> ➤ Non-Functional ✓ As a user I want to have error pages when something goes wrong so that I can trust the application. 	<ul style="list-style-type: none"> • Show login failure message. • Popup error message. • Display number of attempts remaining. • Ask for proof of Identification code sent to user email.

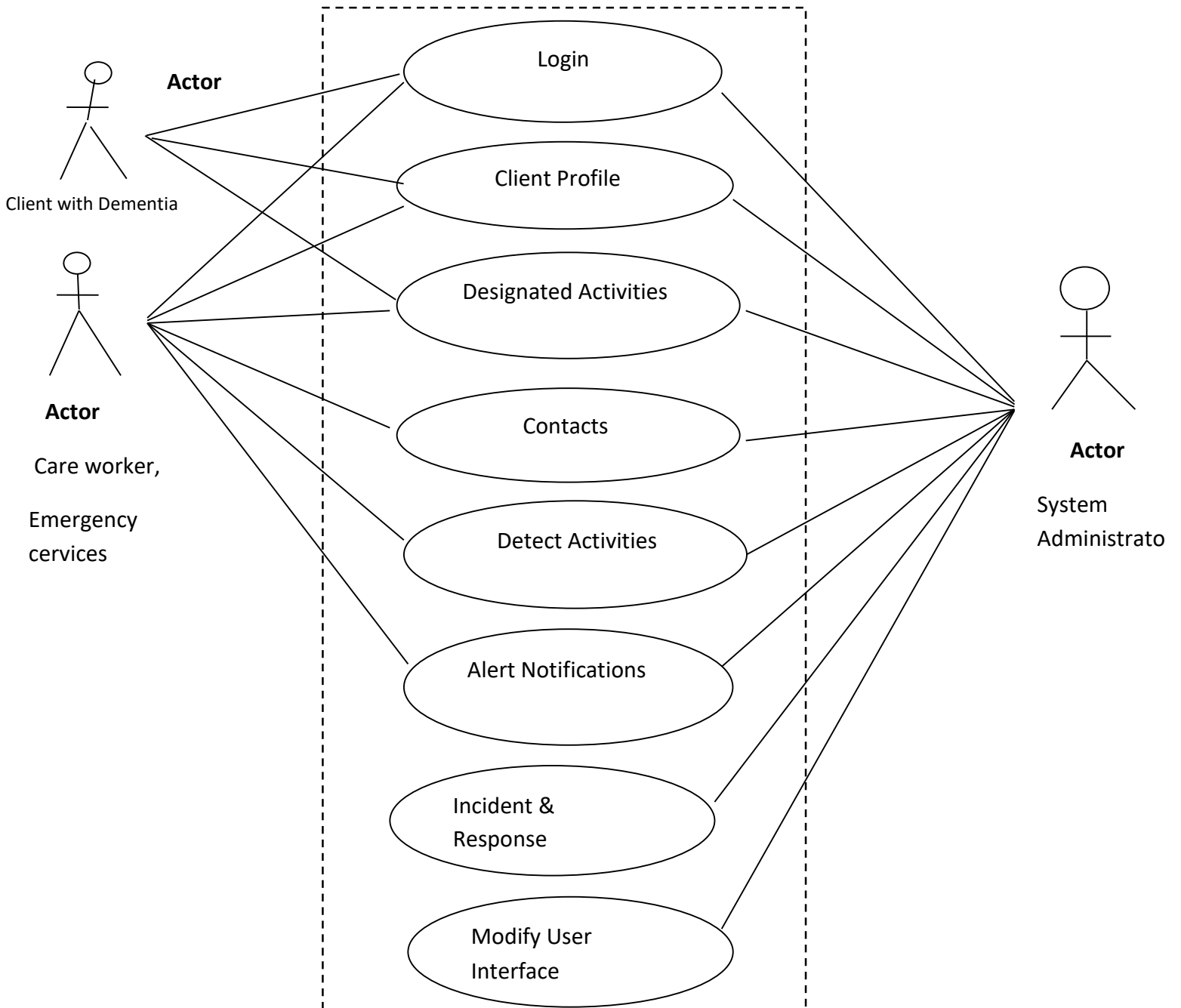
Customers

User Story	Acceptance Criteria
<p>Care Manager</p> <ul style="list-style-type: none"> ✓ As a user, I can be able to review the recorded messages so that I can be able to do risk assessments of the clients. ✓ As a user I can be able to keep the records of the alert messages attended so that I can appraise the performance of care workers. 	<ul style="list-style-type: none"> • Display caregiver’s response time • Display number of alert messages attended per caregiver • Show number of messages per client • Display frequency of messages per client • Display scheduled activities per client • Click to view client profile • Add and remove client’s activity
<p>➤ Care givers</p> <ul style="list-style-type: none"> ✓ As a user, I can be able to set parameters for the daily activities of my client so that I can receive notifications when the client is outside the set parameters. ✓ As a user I can be able to receive alert notifications, so that I can schedule my work around them. 	<ul style="list-style-type: none"> • Display error message if service not responding • Display daily activities of the client. • Display notifications of alert messages • Click to view client profile • Click to navigate to emergency services • Add and remove client’s activity
<p>➤ Patient (Person living with dementia)</p> <ul style="list-style-type: none"> ✓ As a user, I can be able to set my daily activities so that I can be reminded when I miss any activity. 	<ul style="list-style-type: none"> • Display daily activities • Receive notification reminders • Display caregiver attending my alert notification • Click to navigate to emergency services

3.6.2 Use Case

Diagram 4 : Use Case Diagram

The Use Case Diagram provides an overview of all functional requirements of detect and alert app.



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Use case (System interface)

Detect and Alert Monitoring Mobile App (DAMMA)

Scope

The scope of this use case is to detect safety issues on people with dementia in Ireland and alert the care givers through messaging and video system.

Description

This use case describes the detecting and message alerting system to a customer.

Flow Description

Precondition

The system is idle.

Activation

This use case starts when a customer or care giver login.

Main flow

1. The caregiver login to browse clients' profile and geo-location.
2. Caregiver designate certain activities as dangerous
3. The caregiver set personalised daily activities for the client.
4. The customer selects clients to visit in home care setting [a1 monitor in nursing home setting].
5. The system issues notification messages to all emergency contact person in sequence when safety issue is detected.
6. The caregiver pre-determine the estimated time of response.

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7. The system keeps record of the time the client was attended or had medication.
8. The system issues analysis of the time the client had incidents and time estimate for each response.

Alternate flow

(A1 Emergency Services)

1. If no one responds within a pre-determined time period, the system immediately calls emergency medical services for help for that individual.
2. The system issues geo-location of the client.
3. Continue in main flow point 6.

(A2 Non response)

5. The system indicates that the customer was not attended.
6. The system continues in main flow point 5.

Exceptional flow - Termination

The system stores all real time information of the incidents and response time.

Post condition

The system goes to a wait state.

Use Case (Client Interface)

Use case

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DAMM-End user

Scope

- The scope of this use case is the end user interface.

Description

- This use case describes how the end user interact with the app.

Flow Description

Precondition

- The user must download the app first.

Activation

- This use case starts when the user logs in.

Main flow

1. The user logs in (A1).
2. The user allows access to their camera for video viewing.
3. The user designate daily activities of the client.
4. The user receives alert messages for dangerous activities.
5. The user estimates the estimated time to attend the client.
6. The system alerts the client and emergency contacts estimated time help will
alive and attended.

Alternate flow

A1 Forgotten password.

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- The user is unable to log in.
- The user retrieves their new password.
- The use case continues on from position 1.

A2 Unattended Alert Message.

- The user misses their appointment
- The user receives their new ticket number.
- The use case repeats itself from position 4.

Termination

- When the user logs out.

Post condition

- The app continues to run until the user's appointment is over.

Production and Maintenance

- System will be reviewed to determine if any features need to be added or removed as mentioned already in section 2 (Technical Approach).
- Before launching the app there will be a formal post implementation audit document to detect errors and verify if system and user requirements are met.
- Changes in software, procedures to the application system to correct errors, meet new requirements, or improve processing efficiency.

3.7 MoSCow

The MoSCoW analysis method was used to prioritise the requirements and reach a common understanding with stakeholders on the importance they place on the delivery of those requirements. The elicitation process included the use of:

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- A brainstorming session
- A survey
- Interviewing stakeholders.
- Requirement workshop.

M: Must

These requirements are usually considered as mandatory for the project to succeed.

S: Should

These requirements are the next high requirements after the “Must have” requirements. They should be implemented if possible.

C: Could

These are the desirable requirement not necessarily important but would be good to have them if the resources are available.

W: Won't

These are the requirement that can be implemented at a future time or updated version of the app not the current version.

All requirements have been prioritised according to the importance stated by the stakeholders and the cost benefit of each within the project timeline. Below is the mapping of all requirements as described in the Requirement Catalogue Entry found in the in the Requirements specification section.

Table 2: MoSCow

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Ref	Task/Requirement	Type
NFR1	Available on Android	Must
NFR2	Maximum response time 5 minutes	Must
F3	Login feature	Won't
F4	Information Resource page	Must
F5	Geolocation feature	Should
F6	Emergency Service connectivity	Must
F7	Contact details	Must
NFR8	User Friendly easy to navigate	Must
F9	Calendar of events	Could
F10	Message Archive	Must
NFR11	New message popup	Must
F12	Search Button	Must
F13	FQs Page	Could
F14	Profile Page	Must
F15	Administrator Page	Won't
F16	Main Page	Must
F17	Message Review Page	Could
F18	Logout button	Must
NFR19	Error message popup – Login failure	Must
NFR20	Full text notes page	Won't
NFR21	Compatibility with other software	Must
NFR22	User Registration	Must
NFR23	Health analytics	Should
NFR24	Project timeline	Must
T25	Hardware	Must

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Ref	Task/Requirement	Priority
NFR27	Geo fencing	Won't
F28	Password requirements	Must
NFR29	Cookies not to store private data	Must
F30	Google RECAPTCHA	Should
T31	Internet/WIFI	Must
F32	Location history tracker	Should
NFR33	Timeline for inactivity	Must
NFR34	Emotional needs during first stages of dementia	Won't
NFR35	Voice activated prompt	Could
NFR36	Activated reminder	Should
T37	Software	Must
NFR38	Typography	Must
NFR39	Screen Resolution	Must
NFR40	Cross Browser	Must
NFR41	Images	Must
NFR42	Domain name	Must
NFR43	Layout and Colours	Must
NFR44	Advertisements	Won't
T45	Optimisation	Won't
NFR46	Content	Should
TR47	Technologies used	Must
TR48	Database	Must

4. IEEE App Requirements Specification

4.1 Introduction

The IEEE Requirements Specification document specifies requirements for the app, adapted from the IEEE Guide to Software Requirements Specifications (Std 830-1993).

4.1.1 Purpose

This IEEE requirements specification document developed for the DAMMA application to describes what the app will do and how it will be expected to perform. It will also describe the functionality the app needs to fulfil all stakeholders needs. This is the basis for the entire development project. It lays the framework that every team involved in development of this app will follow and ensure requirements are fulfilled. Therefore, it is essential that the stakeholders are happy with it and all changes suggested after requirement workshop are implemented before passing it on to the team of developers to start coding.

4.1.2 Scope

The aim is to generate a detailed requirement specification document using a standardised IEEE, following the listed requirement elicitation techniques; interview, brainstorming, survey and prototyping. Finally giving a presentation of the overall findings on the project.

The mobile based app shall have “Client Activity portal”, “Fall Detection System”, “GPS-Real time tracking system”, “Emergency contacts”, “Geo-fencing”, and’ ‘Alert system’’. The GPS will have a microcontroller for real-time tracking of dementia patients in order to monitor their safety when they go outside their homes or care homes. After receiving the latitude and longitude, the patient can be viewed on Google Maps if he is out door or video view if they have fallen in the house. The real-time tracking system will send the

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coordinates of a location of the patient with the aid of GIS to the caretaker's mobile device as an alert message.

4.1.3 Definitions, Acronyms and Abbreviations

NCI National College of Ireland

HCP Health Care Professional

GPS Global Positioning System

BABOK Business Analysis Body of Knowledge

GIS Geographical Information System

DAMMA Detect and Alert Monitoring Mobile App (DAMMA)

4.2 Requirements Catalogue Entry

Table 4: Solution Evaluation

Requirement ID:	F-28
Requirement Name:	Password Requirement
Business area:	Security
Source:	Developer Interview
Owner	Developer, Tester
Priority:	Must have – High priority
Stakeholders:	Health Care professional, Emergency services, Person with dementia
Type of requirement:	Functional
Requirement description	Having identified themselves as authorized customer, user should be able to access the system
Associated non-functional requirements	Access should be limited to the specific customers themselves and any other authorized users.
Acceptance Criteria	In additional to being able to login into the app, the system should confirm the login details by giving access code to the user and take note of the date and time that the app was accessed. This applies to the health care customer not the patient.
Justification	The developer stated that ,this is a high priority requirement as identification of users and passwords should be encrypted.
Related document	Interview results from the Developer.

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Requirement ID:	NFR-29
Requirement Name:	Cookies not to store private data
Business area:	Privacy & Data protection
Source:	Developer Interview
Priority:	Should have- Medium Priority
Owner	Developer, Tester
Stakeholders:	Data protection committee
Type of requirement:	Non-Functional
Requirement description	Having recorded customer personal information, user should be able to trust the system that their private information is safe and secure.
Associated non-functional requirements	Ensure levels of accessibility of the app. Not every user to have access to private information.
Acceptance Criteria	In additional to using cookies to keep track of activities on the app, the cookies should reset to zero every time you clicked a new client's profile.
Justification	The developer when interviewed stated that most of the data protection breaches happen when information stored in cookies is misused.
Related Documents	Email requirements confirmation from developer.
Requirement ID:	F-30
Requirement Name:	Google RECAPTCHA
Business area:	Security
Source:	Developer Interview
Owner	Developer, Tester
Priority:	Could have- Low priority
Stakeholders:	Business analyst, Developer
Type of requirement:	Functional
Requirement description	Having failed to identify the user as authorized person, Google RECAPTCHA should be used to confirm if the user is not a robot.
Associated non-functional requirements	Google RECAPTCHA should only be used if the authorized user is not identified from first login.
Acceptance Criteria	In additional to using Google RECAPTCHA, the user should not have any problems accessing the app.
Justification	Developer stated that this can be a second option for security of users.
Related Document	Requirements confirmation email from developer

Requirement ID:	NFR-19
Requirement Name:	Error message popup-login failure
Business area:	Security
Source:	Developer Interview
Priority:	Must-High Priority
Owner	Developer /System Administrator
Stakeholders:	Emergency services ,Health Care Professionals, Person with dementia
Type of requirement:	Non-Functional
Requirement description	Having failed to login into the system with correct credentials, the system should send a popup message on the number of attempts remaining.
Associated non-functional requirements	The customer should not use other customer's credentials to login into the system.
Acceptance Criteria	-In additional to failing to login into the system, the system should lock the customer after three attempts and then send reset instruction to her email. -Customer should be able to login again after 30Minutes.
Justification	The developer suggested that the locked customer should be able to login again within the shortest period of time and categorized it as high priority.
Related Document	Requirements listing from developer interview.
Requirement ID:	NFR-02
Requirement Name:	Maximum response time 5 minutes
Business area:	Performance
Source:	Survey group
Priority:	Must have – High priority
Owner	Developer, Tester
Stakeholders:	Project sponsor, Business analyst
Type of requirement:	Non-Functional
Requirement description	Having triggered the message for potential dangerous activity, the customer should respond within 5 minutes before the message is diverted to the next assistance on the que.
Associated non-functional requirements	Ensure timely response.
Acceptance Criteria	Response time should be within 5 minutes for 99.9% of the alert messages.
Justification	The groups had different interpretations on the response times. The results from the survey indicated most were in favor of 5minutes. 42.7%
Related document	Survey question number 10 .

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Requirement ID:	NFR-23
Requirement Name:	Health Analytics
Business area:	Performance
Source:	Interview
Priority:	Could have – Low priority
Owner	Developer
Stakeholders:	Business Analyst, Health Care Professional
Type of requirement:	Non-Functional
Requirement description	Having recorded the responses and number of alert messages per client, the business analyst should be able to analyze data for decision making.
Associated non-functional requirements	Data collected should be limited to personal private data.
Acceptance Criteria	Ensure filter of data for analysis. Data protection policy in place.
Justification	The requirement may be included if resources permit in revised version. Main while the focus is on detect and alert system.
Related documents	Interview 2 question 4
Requirement ID:	NFR-07
Requirement Name:	Available on Android and free download
Business area:	Availability
Source:	Survey group
Owner	Developer, Tester
Priority:	Should have
Stakeholders:	Health Care Professionals, Person living with Dementia, Project sponsor
Type of requirement:	Non-Functional
Requirement description	Having finalized the development of the application customers using Android phones should be able to download free and use the app.
Associated non-functional requirements	App should not be only available to Android users but also to iOS.
Acceptance Criteria	In additional to app should be compatible with android and iOS.
Justification	Survey group indicated higher percentage on Android compared to iOS.
Related documents	Survey question number 6 Interview 2 question 2 & 3

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Requirement ID:	F-10
Requirement Name:	Message Archive
Business area:	Recoverability
Source:	Brainstorming
Owner	Developer
Priority:	Must Have – High priority
Stakeholders:	Business Analyst, Health care manager
Type of requirement:	Functional
Requirement description	Having auto saved the messages ,the business analyst or other Authorised users should be able to retrieve old messages from the archive files.
Associated non-functional requirements	The messages should have auto transferred to archive once they are attended.
Acceptance Criteria	All attended messages should not be active.
Justification	The developer indicated that this is a high priority to differentiate attended messages and unattended messages, for traceability of responses.
Related Documents	Brainstorming requirements.
Requirement ID:	F-06
Requirement Name:	Diversional of messages to emergency contacts. Emergency service connectivity.
Business area:	Scalability
Source:	Brainstorming
Owner	Developer networking.
Priority:	Must have – High priority
Stakeholders:	Emergency service(Ambulance service, Gardai),Emergency contacts
Type of requirement:	Functional
Requirement description	An unattended messages within 5 minutes should automatically be diverted to emergency services system or next emergency contact on the que.
Associated non-functional requirements	This service can be an option where a user can chose to include during set-up of the system.
Acceptance Criteria	In additional the emergency service systems should be compatible with the DAMMA application.
Justification	The Tester put an emphasis that in order for this to work ,the system must be compatible with emergency services system.
Related Documents	Brainstorming requirements.

Requirement ID:	F-4
Requirement Name:	Information Resource page
Business area:	Reliability and Dependability
Source:	Brainstorming Session
Owner	Developer
Priority:	Must have- High priority
Stakeholders:	Health Care Professionals, Person living with Dementia
Type of requirement:	Functional
Requirement description	The application should have a page dedicated to resources: -Dementia information and advice. -Installation, operation information and demos of the application.
Associated non-functional requirements	Resource should not only be dementia information but also the effective use of the application.
Acceptance Criteria	In additional the page should be linked to the other pages for easy navigation.
Justification	The developer pointed out that this page can be like a manual for the app. Therefore it has to be on high priority.
Related Documents	Brainstorming sessions
Requirement ID:	F-3
Requirement Name:	Login feature
Business area:	Usage
Source:	Survey group
Owner	Developer
Priority:	Won't have
Stakeholders:	Health Care Professionals, Person living with Dementia
Type of requirement:	Functional
Requirement description	The user should be able to login into the application with registered credentials.
Associated non-functional requirements	Registered users should login using their registered details. If not registered, the user should register/create account first before they can login successfully.
Acceptance Criteria	In additional registered users no any other user should be able to login into the system.
Justification	Survey group strongly agree to have no login feature. 78.6% said no.
Related Documents	Survey Q8

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Requirement ID:	F-05
Requirement Name:	Geolocation feature
Business area:	Usability
Source:	Survey Group
Owner	Developer
Priority:	Should have
Stakeholders:	Health Care Professionals, Person living with Dementia
Type of requirement:	Functional
Requirement description	The care worker should be able to allocate the person with dementia his where about when there is risk of danger.
Associated non-functional requirements	A tracker system to allocate wondering clients.
Acceptance Criteria	In additional the alert message should be triggered when the set parameters of the client's location are breached.
Justification	78.6% of the survey group indicated to like the idea of having geolocation feature.
Related Documents	App recommended features survey results.
Requirement ID:	F-7
Requirement Name:	Contact Details
Business area:	Usability
Source:	Survey Group
Owner	Person with dementia, Health care professionals
Priority:	Must have- High priority
Stakeholders:	Health Care Professionals, Person living with Dementia
Type of requirement:	Functional
Requirement description	Contact details of relative or next of kin, Doctor, Care company providing the services and client with dementia.
Associated non-functional requirements	Client with dementia can chose who to contact in case of emergency.
Acceptance Criteria	Linked to main page as a sub page.
Justification	78.6% of the survey group voted for this information feature.
Related Documents	App recommended feature survey question.

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Requirement ID:	NFR-08
Requirement Name:	User friendly-easy to navigate
Business area:	Usability
Source:	Brainstorming Session
Owner	Tester
Priority:	Must have- High priority
Stakeholders:	Project sponsor, Project manager, Client with dementia, Health professional.
Type of requirement:	Non-Functional
Requirement description	Easy to navigate
Associated non-functional requirements	Typography and screen resolution
Acceptance Criteria	In additional the application should carter for all categories of users: Skilled and Non-skilled users.
Justification	Different stakeholders supported the requirement. User friendliness is the marketing tool for the app.
Related Documentation	Brain storming requirements results
Requirement ID:	F-09
Requirement Name:	Calendar of events
Business area:	Usability
Source:	Brainstorming Group
Owner:	Developer
Priority:	Should have
Stakeholders:	Health Care Professionals, Person living with Dementia
Type of requirement:	Functional
Requirement description	Pre-defined calendar of events and daily activities.
Associated non-functional requirements	Events and activities can be set on individual basis.
Acceptance Criteria	In additional to the set events ,activated reminder can be used to remind the client like "Alexa".
Justification	If a need be, activities events can be set on the app which will have an activated reminder.
Related Documents	Brainstorming results

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Requirement ID:	NFR-24
Requirement Name:	Project timeline
Business area:	Project Management
Source:	Sponsor Interview
Owner	Project Manager
Priority:	Must have – High priority
Stakeholders:	Project Sponsor, business analyst, Project manager
Type of requirement:	Non-Functional
Requirement description	The project should have the start date and finish date.
Associated non-functional requirements	Start and finish date of the project should assist in the allocation of resources for the project.
Acceptance Criteria	In additional the project plan must be drawn to monitor the progress of the project.
Justification	Project manager clearly stated that he should see the project plan before the project starts
Related Documentation	Face to face meeting with Dr Eugene (Project supervisor)
Requirement ID:	NFR-22
Requirement Name:	User Registration
Business area:	Security Compliance
Source:	Interview
Owner	Developer
Priority:	Must have – High priority
Stakeholders:	Health Care Professionals, Data protection Officer
Type of requirement:	Non-Functional
Requirement description	The User registration is needed for login access to the system. Given the user has downloaded the application; they should be able to create an account. The user must provide an email address and password in order to create an account. Once the user has registered an account they will have access to all pages in the app
Associated non-functional requirements	User identification and security criteria.
Acceptance Criteria	In additional the user must be registered into the system in order to be able to login as a user.
Justification	The developer stated that only registered users will be having access to the system.
Related Documents	Interview with developer requirements results

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Requirement ID:	NFR-21
Requirement Name:	Compatibility with other software
Business area:	Scalability
Source:	Interview
Owner	Developer
Priority:	Must have – High priority
Stakeholders:	Developer, Tester, emergency services
Type of requirement:	Non-Functional
Requirement description	The application should integrate with emergency services system.
Associated non-functional requirements	User can opt which emergency service contacts he wants the messages to be auto transferred to.
Acceptance Criteria	In additional the alert message should be auto diverted to emergency services and contacts.
Justification	Testers wanted that the systems for emergency services should be compatible with DAMMA for it to auto transfer messages.
Related Documents	Interview requirement results.
Requirement ID:	NFR-11
Requirement Name:	Notification popup- new message
Business area:	Reliability
Source:	Brainstorming Group
Owner:	Developer, Tester
Priority:	Must have – High priority
Stakeholders:	Health Care Professionals ,Developers, Testers
Type of requirement:	Non-Functional
Requirement description	New messages should popup on the main page.
Associated non-functional requirements	Popup messages should show date and time of message. Any diverted message should register as forwarded message..
Acceptance Criteria	Use high priority notifications(Show previews of notifications at the top of the screen)
Justification	Developer and the Tester marked this as high priority for users to differentiate the new message from the old messages.
Related Documents	Brainstorming requirement results.

Requirement ID:	NFR-33
Requirement Name:	Timeline for inactivity
Business area:	Performance
Source:	Interview
Owner	Developer
Priority:	Must have – High priority
Stakeholders:	Health Care Professionals, Person living with Dementia, Developer & Tester
Type of requirement:	Non-Functional
Requirement description	In additional where the client is not active for a while, alert message should be triggered.
Associated non-functional requirements	Time set for inactivity
Acceptance Criteria	User should receive the alert message when there is a prolonged inactivity of the client.
Justification	The stakeholder added that the alert messages should include the inactiveness of the client in case he has died.
Related Documents	Interview results with the project sponsor.
Requirement ID:	F-14
Requirement Name:	Profile Page
Business area:	Layout
Source:	Brainstorming Group
Owner	Developer
Priority:	Must have – High priority
Stakeholders:	Client with dementia, Care giver
Type of requirement:	Functional
Requirement description	Profile page describing the client’s location, age ,medical condition, doctor and contacts.
Associated non-functional requirements	Know your client page .Non-disclosure information.
Acceptance Criteria	In additional the policy on information disclosure.
Justification	Stakeholders during brainstorming voted for profile page to be one of the pages on the app.
Related Documents	Brainstorming Results

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Requirement ID:	F-16
Requirement Name:	Main Page
Business area:	Layout
Source:	Brainstorming Group
Owner	Developer
Priority:	Must have – High priority
Stakeholders:	Health Care Professionals, Person living with Dementia, Developer
Type of requirement:	Functional
Requirement description	Main page where all features and subpages are linked.
Associated non-functional requirements	Identified face of the app. This page will give guidance to what is next by displaying clear visual features and settings of the app.
Acceptance Criteria	In additional the page should have clear features and colour combination which will be suitable for its objective.
Justification	The stakeholders who attended the brainstorming suggested that this will be like the start page of the app where other pages will be linked.
Related Documents	Brainstorming Requirements results
Requirement ID:	NFR-35
Requirement Name:	Voice activated prompt AND activated reminder
Business area:	Scalability
Source:	Interview Group
Owner	Developer
Priority:	Could have
Stakeholders:	Person living with Dementia
Type of requirement:	Non-Functional
Requirement description	Prompt method which can be activated by a familiar voice.
Associated non-functional requirements	Identified familiar voice to activate prompt methods to facilitate usability.
Acceptance Criteria	The system will work like “alexa” when asked of an activity to remind the client.
Justification	When one of the Home care manager was interviewed, she she wished if the system could adopt the system of “Alexa “as the main problem with the clients its forgetfulness.
Related documents	Interview with home care manager (Caremark company)

Requirement ID:	NFR-36
Requirement Name:	Activated Reminder
Business area:	Scalability
Source:	Interview Group
Owner	Developer
Priority:	Should have
Stakeholders:	Person living with Dementia
Type of requirement:	Non-Functional
Requirement description	Activity voice activated reminder like “alexa”
Associated non-functional requirements	All activities will be recorded and activated on request to remind the client. Some similarity with nfr-35
Acceptance Criteria	In additional the reminders will be set and updated by the care giver.
Justification	When one of the Home care manager was interviewed, wished if the system could adopt the system of “Alexa “as the main problem with the clients its forgetfulness.
Related documents	Interview with home care manager (Caremark company)
Requirement ID:	NFR-34
Requirement Name:	Emotional needs during first stage process time of dementia
Business area:	Scalability
Source:	Interview Group
Owner	HealthCare Manager
Priority:	Won't have Not a priority
Stakeholders:	Person living with Dementia
Type of requirement:	Non-Functional
Requirement description	Enable client to deal with emotions as he will be going through the first stages of dementia.
Associated non-functional requirements	Identified how to deal with anxiety and emotions.
Acceptance Criteria	Analytics on behavior and emotions .
Justification	The care manager said there is no app developed yet which deals with this requirement and it could be beneficial if this app will incorporate this requirement. This requirement has to be researched well therefore not a priority now because of resources and time constraint.
Related Document	Interview results with care manager

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Requirement ID:	NFR-27
Requirement Name:	Geo fencing
Business area:	Scalability
Source:	Interview Group
Owner	Developer
Priority:	Won't have
Stakeholders:	Person living with dementia
Type of requirement:	Non-Functional
Requirement description	Client triggers the system to send message to care giver when he steps outside the set parameters.
Associated non-functional requirements	Incorporate different sensors.
Acceptance Criteria	Client aware of the set parameters.
Justification	This was not supported because it will be like restraining the client in his own home and will limit client independency.
Related Documentation	Interview meeting outcome.
Requirement ID:	NFR-43
Requirement Name:	Layout and colour
Business area:	Usability
Source:	Interview Group
Owner	Developer
Priority:	Must have
Stakeholders:	Health Care Professionals, Person living with Dementia, Project sponsor
Type of requirement:	Non-Functional
Requirement description	Stimulating colour for cognitive functioning.
Associated non-functional requirements	Identify screen resolution
Acceptance Criteria	Yellow colour stimulate cognitive functioning .
Justification	Care manager suggested Yellow colour to be the best for cognitive functioning
Related Documents	Interview requirements results with care manager.(Interview 4)

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Requirement ID:	NFR-38,NFR-39,NFR-40,NFR-41,NFR-42
Requirement Name:	Miscellaneous
Owner	Developer
Business area:	Usability and layout
Source:	Brainstorming
Priority:	Must have
Stakeholders:	Health Care Professionals, Person living with Dementia, Developer
Type of requirement:	Non-Functional
Requirement description	This covers the typography, screen resolution, images and domain name that makes the app attractive and easy to use.
Associated non-functional requirements	Font, colour, short name and clear images
Acceptance Criteria	Easy to use both skilled and non-skilled users.
Justification	Stakeholders listed these requirements to give the app a face and competitive advantage over other apps.
Related Documents	Brainstorming requirements outcome
Requirement ID:	F-32
Requirement Name:	Location tracking history
Business area:	Scalability
Owner	Developer
Source:	Interview 3
Priority:	Should have
Stakeholders:	Health Care Professionals, Person living with Dementia
Type of requirement:	Functional
Requirement description	To be able to follow the pattern of wondering clients.
Associated non-functional requirements	GPS real time tracker
Acceptance Criteria	Show real time location
Justification	The developer during interview mentioned that this requirement should be considered
Related Documents	Interview 3 requirements outcomes

4.3.1 Non-Functional Requirements

A description of these requirements can be found on MoSCoW section

Table 2: Non-Functional Requirements

Must	Should	Could	Won't
NFR1	NFR23	NFR35	NFR20
NFR2	NFR36		NFR27
NFR8	NFR46		NFR34
NFR11			NFR44
NFR19			
NFR21			
NFR22			

4.3.2 Functional Requirements

A description of these requirements can be found on MoSCoW section

Table 3 :Functional Requirements

Must	Should	Could	Won't
F4	F5	F9	F3
F6	F30	F13	F15
F7	F32	F17	
F10			
F12			
F14			
F18			
F28			

4.3.3 Availability

The mobile application is intended to be available through the Apple app store and Google store.

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4.3.4 Usability Requirements

This includes all the essential requirement of the mobile based application to function properly and yield user experience. The following are some of the fundamental usability requirements to be incorporated during the requirements:

- **Ease-to-use:** The usability of the proposed application must be very easy to use to allow user to interact with the application
- **Attractiveness:** The simplicity and usability of the application should make it easier to attract all user groups at client teir. (colour blind, sensory and hearing impaired users)
- **Operability:** the mobile based application for people with dementia should be develop to operate on software platforms that are compatible with i OS and Android phones.

4.3.4 Maintainability Requirements

- System will be reviewed to determine if any features need to be added or removed as mentioned already in section 2 (Technical Approach).
- Before launching the app there will be a formal post implementation audit document to detect errors and verify if system and user requirements are met.

Changes in software, procedures to the application system to correct errors, meet new requirements, or improve processing efficiency

4.3.5 Environmental Requirements

Environment requirement refers to the concerns of user and software application environment which implies those things that needs to be set up to enable the user to have the capacity of utilizing the Detect and Alert mobile application successfully. Should in case the environmental requirement is not met, the Detect and Alert application will not work effectively.

The most essential requirements for the mobile software application to function:

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- The mobile device must be capable of connecting to the internet.
- An identity number is required by the user to be able to login to the mobile app

The most essential requirements for the mobile device to function:

- The user must have a Smartphone powered by Android, Apple IOS or Windows operating system.
- The user must have access to download the app from any of the online app stores such as Android, Apple IOS or Google store.
- The user must have valid Gadai Vetting to work with Venerable people or care giver of the person with dementia.

4.4 Technical Requirements

There are many other apps out there such as the daily aid apps which include Dementia Digital, Dementia Clock, Family Locator GPS Tracker, My Therapy (meds reminder), Memory Box, Dementia Emergency, Mind Mate etc. that can help people with deterioration in cognitive functioning. This app is the hybrid of some of these apps and because of that it is one of its kind. For research purposes of this project, these apps will be used as the closest competitors.

Project steps taken:

1) Requirements Elicitation

Requirement elicitation will involve workshops, survey and interview a variety of stakeholders with the aim of gathering requirements from them in relation to how the end result should be. Table below shows the technical requirements elicited from the techniques mentioned:

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Table 3 :Technical Requirements

A description of these requirements can be found on MoSCoW section

Must	Should	Could	Won't
TR25			TR45
TR31			
TR37			
TR47			
TR48			

2) Prototyping

The prototype will be developed based on the requirements gathered. This wireframe will be used to get feedback from stakeholders during requirements workshop in order to finalised the second version of the prototype. The second version of the prototype will take into account suggestions made on the first version to add or remove some features in order to satisfy the stakeholders.

3) Web development

The purpose of the website is to display content and results of the various techniques used to elicit requirements. This website will be used at the final presentation and also the project showcase.

4) Client Evaluation

This is where an evaluation of the project performance will be given.

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6. Appendix

i) Projection of People with dementia in Ireland

Estimated number and projected growth in the number of people with dementia in Ireland by age group, 2011-2046

Age group	2011	2016	2021	2026	2031	2036	2041	2046
30-59	2,866	2,935	2,934	2,869	2,854	2,864	2,889	2,991
60-64	1,200	1,301	1,449	1,615	1,738	1,906	2,044	1,896
65-69	2,776	3,287	3,827	4,020	4,485	4,876	5,315	5,645
70-74	4,604	5,532	7,013	7,442	8,367	9,378	10,211	11,188
75-79	7,475	8,213	11,298	12,560	14,055	15,928	17,968	19,692
80-84	10,958	12,265	16,099	17,868	22,348	25,364	29,102	33,196
85+	17,970	21,260	25,595	31,085	40,195	52,512	64,654	77,549
Total	47,849	54,793	68,216	77,460	94,042	112,828	132,182	152,157

Note: Estimates for 2011 based on Census of Population 2011. Projections for 2016 to 2041 based on CSO (2013) Population and Labour Force Projections, 2016-2014, Stationery Office, Dublin, Table 3, page 40 and EuroCoDe (2009) Age and gender specific dementia prevalence rates. (Source: Pierce, M. et al. (forthcoming). Prevalence and Projections of Dementia in Ireland, 2011. Genio Ltd., Mullingar).

ii) Project Ethics Approval

4th year Project - **Ethics** form resubmission

CM

Cristina Hava Muntean
Wed 28/11/2018 16:46
Steven Kawala; Eugene O'Loughlin ✕

Dear Steven Kawala,

The status of your **ethics proposal** resubmission is: **Approved**.

Comments:
Your supervisor has assured me that you will not be interviewing individuals who are suffering with dementia just those who know them as such I do not see any ethical issue with the questions proposed but you should discuss with your supervisor as to whether they are useful for requirements elicitation.

You may proceed now with your project following the procedure specified in the **ethics** form.

Regards,
School of Computing **Ethics** Filter Committee

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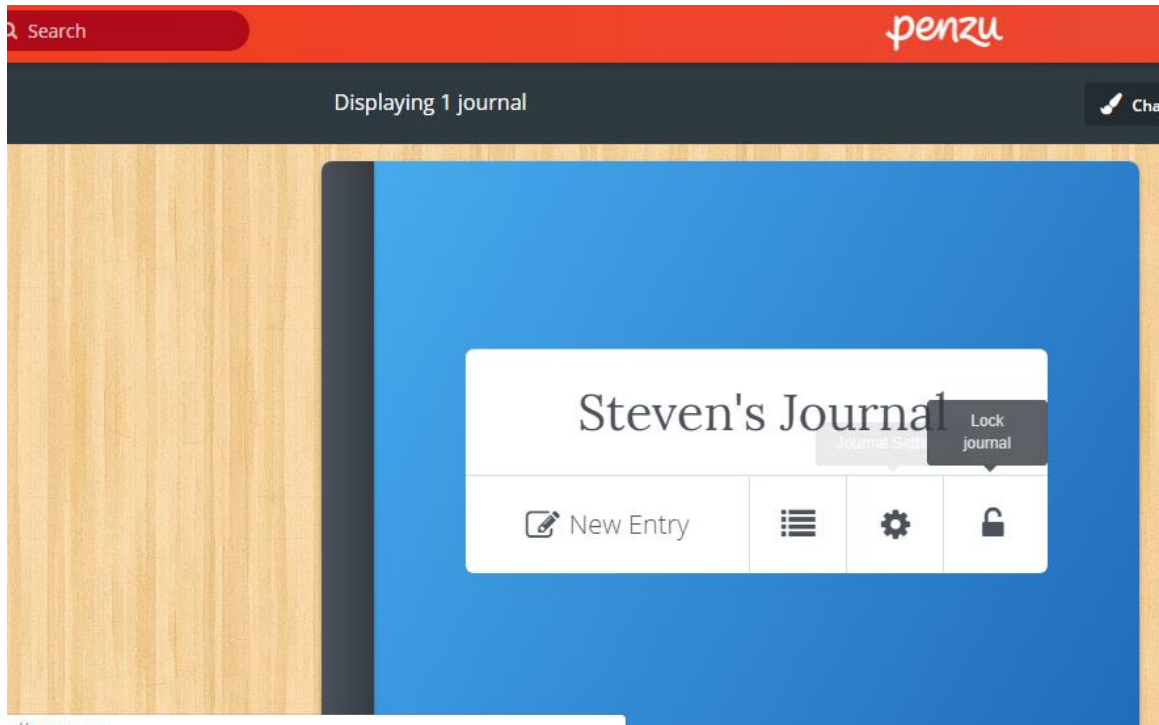
iii) Project Scrum Board - Trello

The screenshot shows a Trello board titled "Elicitation Requirements" with a green background. The board is organized into five columns representing a Kanban workflow: "Backlog", "Prioritise", "Working On", "Stuck-On", and "Done". Each column has a "+ Add a card" button. The "Prioritise" column contains ten cards: "Brainstorming", "Prototype 1", "Survey", "Interviews", "Workshop Requirements", "Prototype 2", "Requirements Verification", "Requirements Analysis", "Solution Validation", "User Story", "Use Case", and "Web Presentation". The other columns are currently empty.

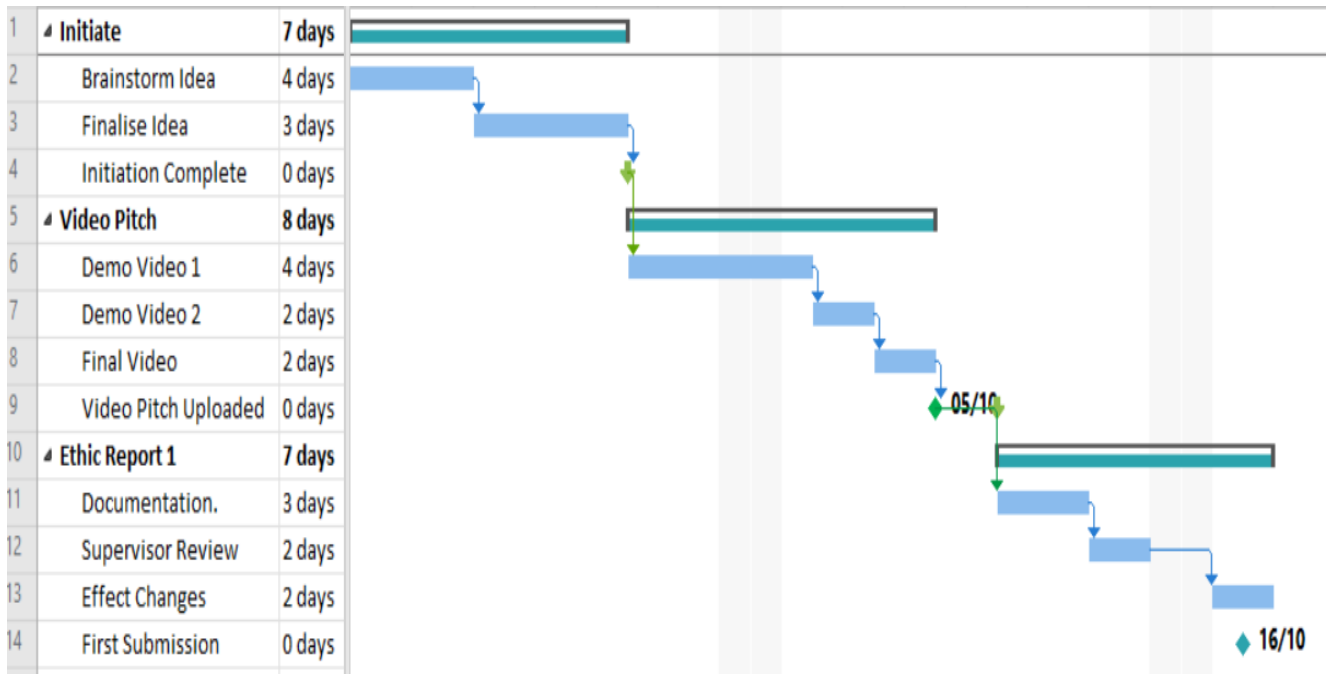
This screenshot shows the same Trello board, but the workflow has progressed. All the cards that were previously in the "Prioritise" column are now in the "Done" column. The "Prioritise" column is now empty, and the "Done" column contains the same ten cards as in the previous screenshot: "Brainstorming", "Prototype 1", "Survey", "Interviews", "Workshop Requirements", "Prototype 2", "Requirements Verification", "Requirements Analysis", "User Story", "Use Case", "Solution Validation", and "Web Presentation".

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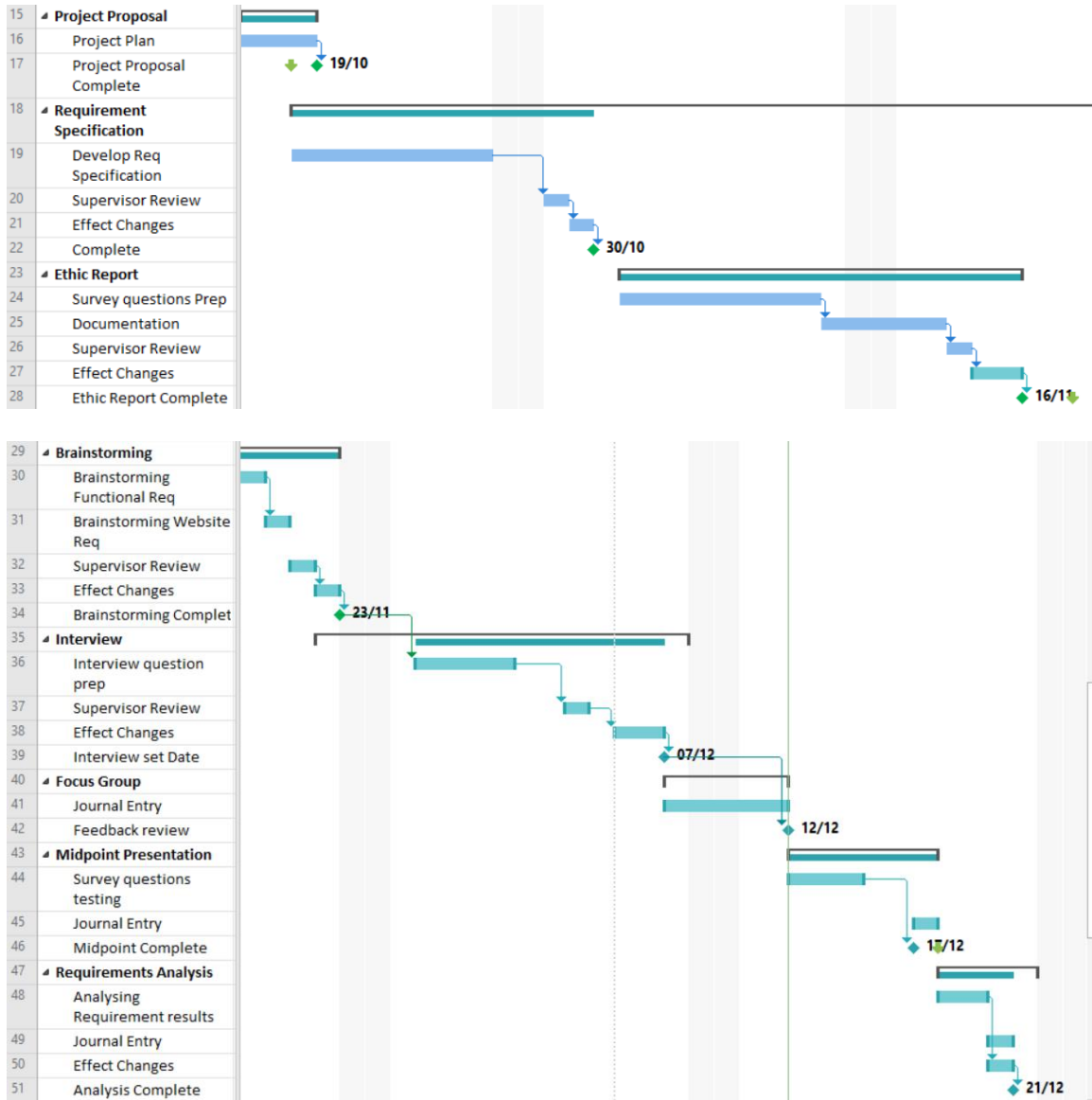
iv) Monthly Journal writing Reminder - Penzu



v) Project Plan -Gantt Chart



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vi) Show case Poster

National College of Ireland

STEVEN KAWALA
TECHNOLOGY MANAGEMENT BA STREAM

DAMMA

Meet
DAMMA

DETECT AND ALERT MOBILE MESSAGING APP

Develop an IEEE requirement specification document to elicit requirements for the development of DAMMA. Authorised users will receive alert messages on their mobile phones when a person living with dementia moves outside the set parameters. This includes a person's inactivity and instances like failing or missing medication. Caregivers and relatives will be able to monitor scheduled daily activities.

TECHNOLOGIES USED

WordPress, Excel, Doodle, Google Forms, Microsoft Project 2019, Trello, HTML5, CSS3, IEEE

REFERENCE:
Carva.com. (2019). Amazingly Simple Graphic Design Software - Canva. [online] Available at: <https://www.canva.com/> [Accessed 6 May 2019].

Sign up by
x15018121@student.ncirl.ie

6.1 Project Proposal

Aims of the project is to carry out a detailed requirement and produce a form of report towards the development of building a Detect and Alert monitoring mobile based application.

- Provide a friendly user mobile application
- Provide a real time information for all detected safety concerns
- Provide alert messages to contacts in sequential format
- Provide path tracking of wandering clients
- Provide activity reminders e.g. medication time, appointments

Technology Used

- Excel
- Samsung Laptop
- Violet UM
- Google Form
- Microsoft Project Management
- WordPress
- IEEE Papers

6.1.1 Project Objectives

The first objective is the initiation of the project which involves the reading of the project briefing, brain storming the idea and researching on the domain of the idea.

The milestone of this objective is a Video Pitch of presenting the proposed project.

The second objective is to generate a detailed requirements specification document that will allow developers to use and develop mobile based application that will not only monitor but also detect safety issues for people with dementia in Ireland. The deliverables for this objective include; project plan, mock-ups and mid-point presentation.

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The last objective is to develop a presentation website to showcase the project achievements.

The success of this project depends on the amount of work and time allocated for each deliverable. The project guidance plan has been drawn for the full academic year to allow proper time apportionment for many other assignments, exam preparation and mini projects to be attended efficiently. This project plan will be followed to keep track on the date lines of the deliverables.

6.1.2 Background

The Idea came from my work experience as a Community worker for vulnerable people. I saw a gap in the market for the application that deals with safety issues of people with dementia. I did the required research to know and understand my domain. I video pitched my Idea and the comments and remarks were encouraging from my lectures which gave me a go ahead of the project. Because of the closeness of the due dates of other assignments, I started working on my project proposal in the study week. I met my supervisor Dr Eugene a week after I pitched my idea for feedback. The second meeting was before reading week, where he suggested to me to have a brainstorming session in class as soon as my ethic report approval, to give me a head start for the project before going for the reading week.

6.1.3 Technical Approach

In the first year, the project will use iterative life cycle model approach until it is fit for the purpose. During interactive model approach, some features will be added and some will be removed until the final mobile based application meets the expectations of the customer.

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Systems Analysis

Many elderly people suffer from dementia in their life time. The symptoms of dementia include impairments in thinking, communicating and recalling things of the past. (alz.org.2018) This system proposal identifies and examines the solution to safe guard the memory recalling, wandering and falling risks of the people with dementia in Ireland.

This project is feasible because the focus will be on Ireland population only in order to be delivered within one year, otherwise if the audience scale is extended to be global, the project may take more than five years to be completed.

Programming

The platforms considered for building this application are open source platforms; Android studio, Word-press and Joomla.

If the application is built on joomla platform, it will then be converted into a mobile android application. Joomla allows converting a web base app into a mobile base app.

One of the remarkable advantages of Joomla is that:

- It centers on categorizing the extensions according to functions.
- Joomla has a built-in search engine optimization tools that are ready for use. These tools include metadata creation and modification, keyword planning and monitoring, support for SEO-friendly URLs, sitemap generations, robot exclusions, and menu creation. Some extensions can provide native analytics, URL redirection functions, link management, and browser standardizations.
- Joomla supports language extensions. It also has built-in performance-enhancing functions such as caching and GZIP compression, image optimization, and plugin and HTTP requests restriction.(joomla.org.2018).

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Testing

Testing will be done to ensure system produces right results. The test series to be conducted include:

- Unit testing which will test each program in system separately.
- System testing which will test functioning of system as a whole.
- Acceptance testing: Makes sure system is ready to be used in production setting.

At the end of each test, the system development life cycle will use iterative modelling technique.

Conversion

Finalization of the detailed documentation will show how system works from technical and end-user standpoint

6.1.3 Special Resources Required

In order to enhance my skills in the following areas; using balsamiq, WordPress and use case diagram using Violet MU, I will use the following resources:

- Seminar with Sam on WordPress
- YouTube tutorials on how to create a prototype using Balsamiq
- YouTube tutorials on how to construct a use case diagram using Violet MU.

Some required resources for this project:

- 1) A laptop
- 2) Google Drive in order to backup and save all files for my project
- 3) "A guide to the business analysis body of knowledge (BABOK guide)"
- 4) IEEE guide for effective requirements gathering
- 5) Google Forms for survey questions
- 6) Microsoft Excel for analysing survey results and create charts.
- 7) Balsamiq for the prototypes
- 8) Microsoft office to create the document
- 9) Microsoft PowerPoint to make the midpoint and final presentation
- 10) Microsoft Project to make the project plan
- 11) IEEE Xplore Digital Library and EBSCO for research.

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6.1.5 Project Plan

	Task Mode ▾	Task Name ▾	Duration ▾	Start ▾	Finish ▾
1		Initiate	7 days	Mon 17/09/18	Tue 25/09/18
2		Brainstorm Idea	4 days	Mon 17/09/18	Thu 20/09/18
3		Finalise Idea	3 days	Fri 21/09/18	Tue 25/09/18
4		Initiation Complete	0 days	Tue 25/09/18	Tue 25/09/18
5		Video Pitch	8 days	Wed 26/09/18	Fri 05/10/18
6		Demo Video 1	4 days	Wed 26/09/18	Mon 01/10/18
7		Demo Video 2	2 days	Tue 02/10/18	Wed 03/10/18
8		Final Video	2 days	Thu 04/10/18	Fri 05/10/18
9		Video Pitch Uploaded	0 days	Fri 05/10/18	Fri 05/10/18
10		Ethic Report 1	7 days	Mon 08/10/18	Tue 16/10/18
11		Documentation.	3 days	Mon 08/10/18	Wed 10/10/18
12		Supervisor Review	2 days	Thu 11/10/18	Fri 12/10/18
13		Effect Changes	2 days	Mon 15/10/18	Tue 16/10/18
14		First Submission	0 days	Tue 16/10/18	Tue 16/10/18
15		Project Proposal	3 days	Wed 17/10/18	Fri 19/10/18
16		Project Plan	3 days	Wed 17/10/18	Fri 19/10/18
17		Project Proposal Complete	0 days	Fri 19/10/18	Fri 19/10/18
18		Requirement Specification	31 days	Fri 19/10/18	Fri 30/11/18
19		Develop Req Specification	6 days	Fri 19/10/18	Fri 26/10/18
20		Supervisor Review	1 day	Mon 29/10/18	Mon 29/10/18
21		Effect Changes	1 day	Tue 30/10/18	Tue 30/10/18
22		Complete	0 days	Tue 30/10/18	Tue 30/10/18

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23	★	▸ Ethic Report	12 days	Thu 01/11/18	Fri 16/11/18
24	☞	Survey questions Prep	6 days	Thu 01/11/18	Thu 08/11/18
25	☞	Documentation	3 days	Fri 09/11/18	Tue 13/11/18
26	☞	Supervisor Review	1 day	Wed 14/11/18	Wed 14/11/18
27	★	Effect Changes	2 days	Thu 15/11/18	Fri 16/11/18
28	☞	Ethic Report Complete	0 days	Fri 16/11/18	Fri 16/11/18
29	★	▸ Brainstorming	5 days	Mon 19/11/18	Fri 23/11/18
30	★	Brainstorming Functional Req	2 days	Mon 19/11/18	Tue 20/11/18
31	★	Brainstorming Website Req	1 day	Wed 21/11/18	Wed 21/11/18
32	★	Supervisor Review	1 day	Thu 22/11/18	Thu 22/11/18
33	★	Effect Changes	1 day	Fri 23/11/18	Fri 23/11/18
34	☞	Brainstorming Complet	0 days	Fri 23/11/18	Fri 23/11/18
35	★	▸ Interview	11 days	Fri 23/11/18	Fri 07/12/18
36	★	Interview question prep	4 days	Tue 27/11/18	Fri 30/11/18
37	★	Supervisor Review	1 day	Mon 03/12/18	Mon 03/12/18
38	★	Effect Changes	2 days	Wed 05/12/18	Thu 06/12/18
39	★	Interview set Date	0 days	Fri 07/12/18	Fri 07/12/18
40	☞	▸ Focus Group	3 days	Fri 07/12/18	Wed 12/12/18
41	★	Journal Entry	3 days	Fri 07/12/18	Tue 11/12/18
42	★	Feedback review	0 days	Wed 12/12/18	Wed 12/12/18
43	★	▸ Midpoint Presentation	4 days	Wed 12/12/18	Mon 17/12/18
44	★	Survey questions testing	3 days	Wed 12/12/18	Fri 14/12/18
45	★	Journal Entry	1 day	Mon 17/12/18	Mon 17/12/18
46	★	Midpoint Complete	0 days	Mon 17/12/18	Mon 17/12/18

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47	★	▸ Requirements Analysis	4 days	Tue 18/12/18	Fri 21/12/18
48	★	Analysing Requirement results	2 days	Tue 18/12/18	Wed 19/12/18
49	★	Journal Entry	1 day	Thu 20/12/18	Thu 20/12/18
50	★	Effect Changes	1 day	Thu 20/12/18	Thu 20/12/18
51	★	Analysis Complete	0 days	Fri 21/12/18	Fri 21/12/18
52	★	▸ Exam Preparation	7 days	Wed 02/01/19	Thu 10/01/19
53	★	Exam finish	0 days	Thu 10/01/19	Thu 10/01/19
54	★	▸ Mockup	5 days	Mon 21/01/19	Fri 25/01/19
55	★	Perpare Mockup	2 days	Mon 21/01/19	Tue 22/01/19
56	★	Use case	1 day	Wed 23/01/19	Wed 23/01/19
57	★	journal Entry	1 day	Thu 24/01/19	Thu 24/01/19
58	★	Prototype Presentation	0 days	Fri 25/01/19	Fri 25/01/19
59	★	▸ Website	79 days	Mon 04/02/19	Thu 23/05/19
60	★	Prep Showcase web	15 days	Mon 04/02/19	Fri 22/02/19
61	★	Supervisor Review	1 day	Fri 22/02/19	Fri 22/02/19
62	★	Make request changes	1 day	Mon 25/02/19	Mon 25/02/19
63	★	Website Testing	2 days	Tue 26/02/19	Wed 27/02/19
64	★	Presentation Poster	5 days	Thu 28/02/19	Wed 06/03/19
65	★	Create final presentation	7 days	Thu 07/03/19	Fri 15/03/19
66	★	Showcase preparation	5 days	Mon 18/03/19	Fri 22/03/19
67	★	Complete showcase	0 days	Fri 22/03/19	Fri 22/03/19

6.1.7 Constraints

There is risk of scope creep that will result from continually growing of requirement listing. Stakeholders may not be able to differentiate the need and the wants on the requirements list. To combat this MoSCow analysis will be used to manage stakeholder's expectations.

The scope for the application is difficult to measure. The application will be developed with the intension of adding features to it as it matures. (Iterative model life cycle approach.)

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6.1.8 Problem Statement

The people with dementia faces a lot of challenges in their day to day life that worry the caregivers and relatives like (getting lost or falling without being noticed etc) To solve these problems, the authors aim to generate a requirement specification document that will allow developers to develop a detect and alert monitoring mobile application. This application will have basic functionality like “GPS Navigator”, “Fall Detection System”, “Alert messaging system” and “Emergency contacts”. The GPS will have a microcontroller for real-time tracking of a person with dementia in order to monitor their safety when they go outside their homes.

6.1.9 Evaluation

The project Scope may slightly change over the course of time of creating this proposal but the goal of delivering the idea will remain the same. The first thing to be done in this project is the documentation of the requirements and Website illustrating the development of the app.

At present the Application satisfies the basic functionality of Detect and alert monitoring system. The scope can be enhanced in the future by giving complete control to the user. A registered user will login into system; rouse the client profile, set activities for the client, path tracking of wandering clients, detecting falls and memory reminder on day to day activities of the client.

6.2 Monthly Reflective Journals

Penzu was the online tool used to remind me writing my monthly journal.
(Appendix iv)

6.2.1 November

I will begin with a retrospective summary of the past two months. Month of September, I had one deliverable which was the video pitch of the project Idea. It went well than what I expected. I had two Ideas but when Eamon said, I quote ‘If you have more than one idea,

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then that's a sign of failure. You should have only one idea no backup.' The moment I heard this I became nervous and picked the only idea which was the first to find in my note book. I did not debate about it and that's the same idea I intend to finish with. Thanks Eamon, choosing an idea is not easy but your trick helped me though it is scary.

There were a number of activities in October but the notable ones were: Ethic report and Proposal document. The ethics report was another night mare. I had to twist my idea to meet the requirements of the ethic report. Mind you, we chose an idea without any briefing that there will be some regulations to follow, that's crap.

Lesson learnt: Choose your idea early and stick to it.

6.2.2 December

Deliverables for this month are: Conduct first interview with stakeholders of my project, conduct a focus group and mid-point presentation.

12/12/18 Midpoint presentation feedback.

My midpoint presentation was a disaster. I spent a week without speaking to anyone even my partner feeling bitter for myself because of the trauma of the presentation. Here is what happened. I prepared very well both my slides and memorising my piece.

First was my desktop. The previous presenter before me had logged off completely the computer so I had to restart it again. The computer took almost a good five minutes to completely switch on and for the projector to warm up. This time I started panicking of the time. I tried to switch on my laptop as a backup which was quick enough but it was not compatible with the projector. The judges started charting and my time was ticking.

I just pulled out the first version of my presentation slides and started preaching the wrong gospel. I had no time to look for the final version of my power point. This time my heart was pounding heavily knowing that I had now little time to say what I prepared to say. As if it was not enough, Ron my second marker noticed that I was now all over the place and started punching me with a lot of questions left and right. This time I knew I had blown it and all I wanted was just to get out. Now you can see why it took me a week to start talking to my friends and partner. It was a long week of fasting, locked myself in the room and just listening Mozart music. *Lesson: Don't dwell much on the past. Look up to the future and you can still turn things around.*

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6.2.3 January

Oh! Let me introduce myself officially. I forgot to introduce myself. I am a mature student with strong background in Finance as a Certified Accounting Technician. I have a family of four kids and my wife does not work, she looks after the kids. She is a journalist by professional. I work 40hours a week as a community worker. I am an International student, that means I pay international college fees myself without state fund.

You may wonder why I am introducing myself now. The reason is that this month marks the sixth month since I have been homeless with my family. It is difficult to plan where I will sleep at the end of the day and what I will eat or feed my family. Thanks to my study partner Adelaide who tirelessly buys me soup every day in college canteen to keep me strong.

It has been a difficult month for me to concentrate on my studies and even do my project, that's one of my project constraint. I want you to be in my shoe to see how life can be in a foreign land when you have no support structure. I do not want you to feel sorry for me but I just want to encourage whoever goner read this journal that no matter what life throws at you, whether sickness or other challenges, never stop believing in God and keep on pressing on. One day it shall be a lesson well taught to you, others and your generation. Every problem has its expiry date and hard work and persistence pays.

I became homeless because I had to reduce my hours of working to concentrate on my final year of college. That's what I call success with a sacrifice. *Lesson: Life is all about sacrifice and" striking a perfect balance.Since nothing in life is perfect ,we can only do the best with what we got".Anquanette Gaspard.*

6.2.4 February

This month is my partner's birthday month. This is the first birthday I have to do for her nothing because am under pressure with my project.

I am not happy with my exam results. Thank God am not repeating anything. At this stage your first thing on your wish list is not to repeat any module.

Penzu my online diary has been a great tool to remind me to write my journal at the same time to work on my project. If I had time I would have been using this tool to write every day in my journal but unfortunately time is not on my side.

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This month I have also learnt a new technology, *Trello*. There are a lot of tools out there, all you have to do is research not just rely on the Lecture to give it to you. *Lesson: Keep on researching and learning new things.*

6.2.5 March

Thanks Sam for such a wonderful seminar of WordPress. That's another technology I have learnt this month. Honestly the support is there for your success, what matters is time management. I wish I had time to utilise all the support resources available in this college.

Don't suffer in silent my friends, come out in your comfort zone and ask for help. There are some good people in this college who can help like Eamon, Dr Eugene, Hellen and Sam. Reach out to them, you will be surprised what you were missing. *Lesson: Ask for help!*

6.2.6 April

Before I forgot, let me say Eamon you are my guy. I like your simplicity approach and constant communication (engagement) with students. Thank you.

This month has been all about exams and preparation for job interview. I haven't done much on the project. I have four job interviews to prepare, two exams and two assignments. Time really flies fast still I have to use most of my nights doing my project. That's another sleep sacrifice.

I have scheduled two interviews with my project supervisor to review my progress and go through the marking rubric.

I have one class representative meeting with Student Union as I am class rep for BSHTM4.

Two meetings with career office to meet Hellen. This one is another actor in my adventure whom I haven't fully introduced. Meet Hellen a wonderful lady from careers office who sacrifices a lot of her time to help you in career development and job hunt. She is patient and kind. I wish she could have a chance to read this but all I can say is keep up the good work and thank you for your support. *Lesson: Strategise, take the responsibility don't waste time in blaming that!*

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6.2.7 May

The pressure is mounting. The sleepless nights will be over this month. One thing I have learnt is never give up or be stuck in one thing. Go over it and come back again to look at it if you still have time. Passing exams does not mean you know everything but be smart and aware of what is needed because the marking scheme will only look at what is expected not your story.

It has been a journey and without the help of you guys (Dr Eugene, Eamon, James O’connor and Catherine Mulwa I would have not made it. Thanks to the whole college staff and student union for making my adventure interesting and memorable.

Lesson: See the good side of everything you do or face and learn to appreciate in life.

6.3 Requirements Validation

6.3.1 Workshop Session

The screenshot shows a Doodle poll interface. At the top, the Doodle logo is on the left, and 'Steven Kawala' with a dropdown arrow and a 'Create a Doodle' button are on the right. Below the header is a dark grey bar with a red button that says '* Choose final option', and 'Invite' and 'More' options. The main content area has a blue header with the title 'Requirement Workshop' and 'by Steven Kawala • 20 days ago'. Below this, there are three items: a location 'NCIRL', a description 'To discuss on prototype 1 for the final year project.', and a privacy setting 'Only you can see all votes and comments.'. At the bottom, there are two tabs: 'Table' (selected) and 'Calendar'. The 'Table' view shows a table with columns for date, participants, and votes.

Date	Participants	Votes
Mar 8 FRI	7 participants +	✓7
	Sean Brady seanbrady059@gmail...	✓
	Peter Kashanga wakashanga@gmail.co	✓

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6.3.2 Interview 1

Thank you Dean for being my Sponsor and also allowing me to interview you on some of the aspects of the app. Below is the summary of the requirements from our meeting. Please confirm if these were the only issues you highlighted.

Requirements from Interview One:

- User friendly
- Logout button
- User registration
- Compatibility with other software

Regards

Steven

Hi Steven

I think you are on track. The list of the requirements is brilliant and precise. Let me know if there is anything we have overlooked when we meet on our second meeting.

Regards

Dean Hart BA (Hons.) in Social Care

Healthcare & Medical | Driver | Warehouse & Forklift | Construction & Engineering Recruitment

Jamestown Business Park

Finglas, Dublin 11

Company Reg: 476529

Dublin: 01 891 2330 | Cork: 021 422 6688 | Mobile: 087 0654190

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6.3.3 Interview 2

steven Kawala <kawalasteven7@gmail.com>

Feb 7, 2019, 12:40 AM



to James ▾

Thank you again James for taking time out of your busy schedule to facilitate my interview on Tuesday. The interview was a success and it has given me an opportunity to fully understand from the developer's point of view the requirements to consider for the app.

You confirmed that it should take no less than 6 months to develop the app and the app would not be complex to make on both Android and iOS platform using Xamarin.

Requirements Elicited

- Google's RECAPTCHA
- User registration
- Password Requirements
- Data encryption in the database
- Customization
- Support page link
- Forward Alert message option
- Logout button.
- Message update required
- Alert message when login /Registration fails.
- Encryption of password/pin number

Could you please confirm the requirements listed above is what exactly discussed during our interview meeting and let me know if you feel I have missed any requirements. I will appreciate also if you would put a provision for the cost of this app which I forgot to ask.

Once again, I want to assure you that this interview will be anonymous.

Regards,
Steven Kawala

Hi Steven

I am glad you found the interview of use. I can confirm all the requirements listed were well interpreted. If you need any further assistance, let me know.

Regards
James

ej.ngondo@sap.com

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6.3.4 Interview 3

7/11/2021

Thank you once again for your contribution on the requirements needed to be considered for the development of the application. Based on the questions and answer interview session we had, below is copy of the list of the requirements you confirmed.

Requirements from Interview

- Health analytics
- Messaging Functionality
- Project timeline
- Technologies
- Webhost provider

Regards,
Steven Kawala

Hie Steven

The requirements listing are exactly what I suggested for users to get the best out of this app. Feel free to contact me when you need further overview.

Regards

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6.3.5 Interview 4

I would like to thank you for taking time out of your busy schedule to facilitate my interview yesterday. These are the requirements elicited:

- To consider stimulating colour like yellow which can trigger cognitive functioning.
- Familiar voice activation to give reassurance and safety advice.
- Pre-recorded instructions functionality for everyday tasks that can be voice requested.
- Voice activated prompt or reminder of how to carry out daily tasks on request like 'Alexa'.
- Cognitive functioning apps available :Dementia Digital,Dementia Clock,My Therapy,Memory Box,Dementia Emergency,Mind mate and Family locator GPs Available
- Should have automatic call access to emergency services.
- Even when there is no activity happening for 20 minutes max ,the app should automatically send message in case the client is dead.
- Should be able to access even without internet service.

Could you please confirm the requirements listed above and let me know if you feel the requirements are misinterpreted from what you suggested during our interview. Once again ,I want to assure you that this interview will be anonymous.

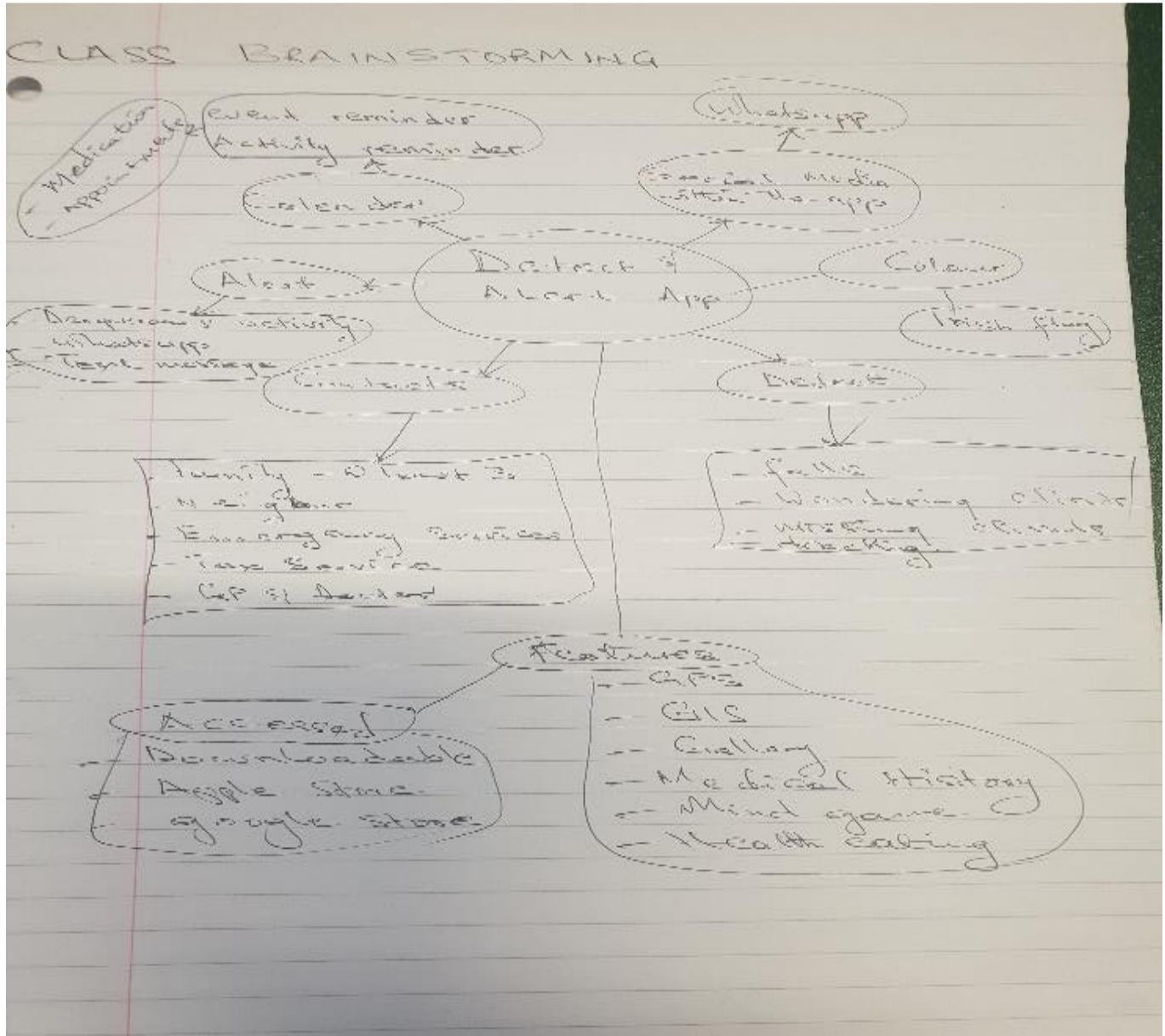
...

Steven

The requirements outcome list is perfect. I am happy to confirm that this is what we discussed. Tell me how it goes when you finish your project.

Thanks

6.3.6 Brainstorming Session



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6.3 Website Screenshots

Website link: <https://stv2019.000webhostapp.com/>

This website was built using WordPress for the purpose of the project showcase and presentation.



6.5 Project Evaluation

Reflection

It has been a challenge to complete this project mainly because of time constraint. That is time management between project, exams and other modules. The project plan and the breakdown of the deliverables helped me to put into practice scrum agile project approach. I was able to deal with each and every deliverable at a time, giving me an opportunity to concentrate at a specific deliverable. It was until on this project that I realise how I could use the knowledge gained in other modules to enhance my skills on this project. For instance, modules like; Requirement management, Information Systems management, Business Data Analysis, Agile management and Managing your learning. These modules were assets for the success project.

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I am happy with the quality of my project work. I believe that developers will find informative to develop DAMMA using this IEEE requirements specification document.

Things I have learnt from the Project?

The lifecycle of this project has been educational in the sense that, I have learnt how to manage a project, do a research, new software and new technologies. Before this project, all I knew was theory and this project was a practical assignment of all knowledge gained during my study as a business analyst.

Through seminars with Sam, I have learnt how to build a website using WordPress. From research resources, EBSCO and IEEE Xplore Digital Library, I have read so many interesting and educational articles which I can also use in the industry. The most fascinating thing I enjoyed in this project was the elicitation of requirements through interview and brain storming techniques because of the engagement and feedback sessions I had with stakeholders and the amount of requirements generated were enormous compared to survey. Survey technique was time consuming but less requirements were gathered.

As a business analyst am now equipped for the role now that I have a better understanding of what is involved in the role.

What I found most difficult?

The most difficult part was not to be able to visualise what requirements the elicitation techniques will bring and to stand aside to let the user generate the requirements without me bringing my own requirements.

What do I wish I had done differently?

Now I understand why my supervisor kept on insisting that I should polish up my survey and interview questions. He knew that those were the key elements of generating large quality of requirements. If I was to re work again on this project, I would have done my questions differently in order to have large number of quality of requirements.

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If I had more time and a chance to do this project again, I would have gone back to the stakeholders and call them for a second workshop to clarify and breakdown some of the requirements further, generate more prototype for the client side (Person with dementia) and create a more detailed user story.