HOPE (Helping Old People Easily) Phone Application System

**Project 2**

**SE 4351**  
**Section 001**

**Team Name: HelpSoft9**

<table>
<thead>
<tr>
<th>Member’s Name</th>
<th>Email Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aaron Jacobs</td>
<td><a href="mailto:Npcomplete29@gmail.com">Npcomplete29@gmail.com</a></td>
</tr>
<tr>
<td>Allen Helton</td>
<td><a href="mailto:allen@student.utdallas.edu">allen@student.utdallas.edu</a></td>
</tr>
<tr>
<td>Chris Mudd</td>
<td><a href="mailto:thechrisman@gmail.com">thechrisman@gmail.com</a></td>
</tr>
<tr>
<td>Jeff Allain</td>
<td><a href="mailto:jiffyall@yahoo.com">jiffyall@yahoo.com</a></td>
</tr>
<tr>
<td>Jessi Cardosa</td>
<td><a href="mailto:Jxc1288@student.utdallas.edu">Jxc1288@student.utdallas.edu</a></td>
</tr>
<tr>
<td>Matthew Jacobs</td>
<td><a href="mailto:Maj076000@student.utdallas.edu">Maj076000@student.utdallas.edu</a></td>
</tr>
<tr>
<td>Prerak Patel</td>
<td><a href="mailto:Prerak.patel@student.utdallas.edu">Prerak.patel@student.utdallas.edu</a></td>
</tr>
<tr>
<td>Richard Vanderdys</td>
<td><a href="mailto:Richardv3@student.utdallas.edu">Richardv3@student.utdallas.edu</a></td>
</tr>
<tr>
<td>Saurav Shrestha</td>
<td><a href="mailto:saurav2220@gmail.com">saurav2220@gmail.com</a></td>
</tr>
</tbody>
</table>

**Team Website:** [www.utdallas.edu/~maj076000](http://www.utdallas.edu/~maj076000)
# Table of Contents

- Table of Contents ......................................................................................... 2
- Revision History .......................................................................................... 3
- Team Members and Roles ........................................................................... 3
- Meetings ....................................................................................................... 3
- Problem ......................................................................................................... 4
- Goal ............................................................................................................... 4
- Process .......................................................................................................... 4
  1. Introduction ............................................................................................... 5
  2. Issues with Preliminary Definitions ............................................................ 5-12
  3. Improving Understanding ......................................................................... 13-15
  4. Requirements added in Phase II ............................................................... 15
  5. Preliminary Prototypes ............................................................................. 16-19
  6. Traceability ............................................................................................... 20-24
  8. HOPE Use Case Diagram ......................................................................... 28-29
  9. HOPE Business Use Case Diagram ........................................................... 30-31
  10. SIG Diagram ............................................................................................ 32
  11. Conclusion ............................................................................................... 33
**Revision History:**

<table>
<thead>
<tr>
<th>Reviser(s)</th>
<th>Date</th>
<th>Addition/Changes/ETC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saurav</td>
<td>9/1/10</td>
<td>Filled in Introduction, Project Organization, and Managerial Process.</td>
</tr>
<tr>
<td>Matthew Jacobs</td>
<td>9/1/10</td>
<td>Added Cover Page, Table of Contents, Technical Process, and Schedule.</td>
</tr>
<tr>
<td>Saurav</td>
<td>9/29/10</td>
<td>Worked on functional requirements and PowerPoint.</td>
</tr>
<tr>
<td>Aaron</td>
<td>9/30/10</td>
<td>Worked on non functional requirements.</td>
</tr>
<tr>
<td>Saurav, Jacob, Prerak</td>
<td>10/19/10</td>
<td>Worked on Project 1 and prototypes.</td>
</tr>
<tr>
<td>Saurav</td>
<td>11/28/10</td>
<td>Added use case, business use case, new requirements.</td>
</tr>
</tbody>
</table>

**Team Members and Roles:**
- Requirement Elicitation: Saurav, Chris
- Architecture/Design: Jeff
- Development: Richard, Jessi, Patel
- Testing: Jessi, Allen, Patel
- Customer: Matthew

Team Leader: Aaron Jacobs

**Meetings:**

<table>
<thead>
<tr>
<th>Date</th>
<th>Input, Activities, Output, Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 21, 2010</td>
<td>The group met and discussed what types of features to implement in our software system. Together, we brainstormed a list of issues that the elderly have to face daily and tried to find a solution to them using a Smartphone application. We generated a list of feasible functional requirements that our software would provide to its users.</td>
</tr>
<tr>
<td>September 26, 2010</td>
<td>Further discussed the functional and non functional requirements of our system and some issues we might have on implementation.</td>
</tr>
<tr>
<td>September 30, 2010</td>
<td>Completed the Phase 1 report.</td>
</tr>
<tr>
<td>October 18, 2010</td>
<td>Meet in a group discussion</td>
</tr>
<tr>
<td>October 20, 2010</td>
<td>Finished the documents and prototypes.</td>
</tr>
</tbody>
</table>
Problem

The purpose of this project is to help elderly people that have difficulties with hearing, low vision, speech impairment, unclear speech, and memory loss. In the past, devices such as hearing aids, hearing boards etc have been designed and implemented by Augmentative and Alternative Communications (AAC) however; these equipments prove to be costly as many difference equipments are needed such as communication boards, hearing aids, etc that are not only expensive but are also very bulky and take up a lot of space and move around.

Goal

Our goal is to provide our customers with an “all in one solution” thus integrating all these devices features into one single device. The key to our success lies in the recent advent of mobile devices with their sophisticated computer like software and hardware capabilities. Our project will be focused on using the Android platform for smart phones. This system will be implemented on a mobile device which consists of a helpful user interface containing icons, pictures, sounds, speech and text easily understood by the elderly.

Process

The solution was developed upon collaboration of all the group members. We studied the Requirements Elicitation: Initial Understanding documents intensively and realized that a unique and robust solution to the various disabilities experienced by the elderly people can be solved by carefully studying the requirements and filtering out what’s necessary and implementing an Android application that will be very easy to use for the elderly who are not technically experienced with smart phones.
Introduction

The document covers the requirements elicitation for the HOPE android application that we are going to be implementing very shortly. It will mention the issues that exist with the Preliminary Definition and discusses possible solutions and traceability and a prototype.

2. Issues with Preliminary Definition Given (ambiguities, incompleteness, inconsistency, conflicts)

2.1 Issues with II.1 The Domain, Stakeholders, Functional and Non-Functional Objectives

2.1.1 Issue Description

(U1) - The users of the application are the elderly people that stay at home or in a nursing environment/hospital. They may have problems with speech, hearing, vision and/or memory loss. Their daily activities are bathing, washing, restroom, eating/drinking, walking, and transferring to the bed.

Decision and Reasoning
These elderly people may not be able to communicate properly their needs because of problems such as poor speech. Our application shall make it easy for the elderly to communicate with others and live a comfortable life.

2.1.2 Issue Description

(U2) – An assistive person is one that is either a disabled person or a non-disabled person with whom the user wants/needs to communicate. This person responds to the elderly requests and sometimes also initiates conversations.

What if the user is a stay at home individual that lives alone?

Decision and Reasoning
The system shall be designed so that the elderly can operate our software regardless of an assistive person being present.

2.1.3 Issue Description

(U3) - The elderly use common greetings like “What is your name”, “Where am I?”, and “Sorry”, and “Thank you” etc…” In a typical scenario, where a person needs to communicate a message, he/she uses visual aids like pictures and icons and text...”
Will the person that needs to communicate have these visuals?

**Option I:**
The person that needs to communicate with the elderly can have visuals with them that they can use.

**Options II:**
These visuals will need to be with the elderly at all times so that any one that wants to communicate with them can do so without needing any visuals.

**Decision and Reasoning**
Option II is more feasible in a real life scenario because it is not convenient for people that want to communicate with the elderly to have the visuals with them. The current system has not solved this problem.

### 2.1.4 Issue Description

(U4)- *Apart from the basic communication messages, the elderly also want to perform other activities or express an opinion about something like – ‘I want to watch Television’, ‘I want to drink Cola’. The elderly should initiate communication by navigating among various categories.*

What happens if an activity or opinion is not in the categories provided?

**Decision and Reasoning**
The system will be such that the elderly can browse over of list of activities organized into disjoint categories. If they want to communicate a message not available in the categories however they will also have the option of typing in new activities or opinion.

### 2.1.5 Issue Description

(U5) – *The system must be capable of providing an easy interface for emergency calls like 911, to any emergency contacts, as well as send fast messages to a nearby response department like a hospital.*

Is it not sufficient to call 911 or any emergency contacts? I do not think it is necessary to send fast messages to a nearby response department like hospital.

**Decision and Reasoning**
The system will have an emergency option that contacts 911 or any emergency contacts. The system can also text message people on the
emergency contact list however I do not think sending fast messages to a hospital via text or something else exists.

2.1.6 Issue Description

(U6) - *Just like the elderly user, the system should be easily usable by the assistive person, e.g. by providing a good search interface through which that person need not know the entire system and can bring up any part by just visiting the search page.*

Decision and Reasoning
The system shall be very easy to use with a simple interface with only 4 categories buttons, each choice will lead to more option menus however it will be very simple as we expect the elderly to not want to or have the ability to learn a complex system and use it especially in an event of an emergency.

2.2 Issues with II.2 Software System Requirements: Functional Requirements

2.2.1 Issue Description

(U7) – *Providing a way for the users to select proper categories and navigate through various dimensions of vocabulary,*

Decision and Reasoning
The user interface shall be simple with only four buttons in the main user interface thus making it easy to learn and use. Furthermore, our application can be setup as a widget on the android screen thus making it simple to access.

2.2.2 Issue Description

(U8)- *Generating desired sentences and represent them pictorially.*

We cannot associate sentences and represent them pictorially efficiently because there are thousands of words in the English language, it would be infeasible to have a picture for all these words.

Option I
Have commonly used everyday symbols that are organized in categories. Symbols can be added by the user if necessary.

Option II
Have the web browser search the key phrases in the sentences and find images.
Decision and Reasoning
Option I shall be feasible although it is limited to a certain number of symbols however, pictures can be taken or downloaded and saved to the application.

2.2.3 Issue Description
(U9) – Generating desired sentences as well associate with a sound/voice.

Decision and Reasoning
The text-to-speech feature will convert any generated sentences/words to a voice announcement.

2.2.4 Issue Description
(U10) – Placing emergency calls and messages

Decision and Reasoning
The system shall have an emergency button that will give the option to alert services such as 911, hospital, fire and text message contacts listed under emergency contacts.

2.2.5 Issue Description
(U11) – Giving a specific meaning to each picture to reduce the ambiguity, as a picture can be worth a thousand words and a thousand interpretations.

Decision and Reasoning
The pictures in the phone can have a description tags so that it will assist the elderly to remember the subject in the picture.

2.2.6 Issue Description
(U12) – Making each vocabulary item available through a search interface.

Decision and Reasoning
The search feature shall present each vocabulary item when text is typed in the search box.

2.2.7 Issue Description
(U13) – Allowing to change the orientation/display of the vocabulary in terms of color and icon size.

Decision and Reasoning
The system shall have an option to change the font size and color of icons so it is most comfortable for the elderly, especially those with vision problems.
2.2.8 **Issue Description**  
(U14)- Integrating already available technologies like alarm clock in a meaningful manner.

**Decision and Reasoning**  
The system will provide various reminders such as medicine reminder along with some already available technologies such as the alarm clock.

2.2.9 **Issue Description**  
(U15)- Displaying relevant or most frequently used items before other vocabulary items.

**Decision and Reasoning**  
Our system shall sort the option menu based on the frequency of use.

2.2.10 **Issue Description**  
(U16)- Make a previously generated sentence repeatable without regeneration.

**Decision and Reasoning**  
Our system shall store the generated sentence for future use.

2.2.11 **Issue Description**  
(U17)- The GPS receiver shall remain inactive when not in use.

**Decision and Reasoning**  
This will increase battery life.

2.2.12 **Issue Description**  
(U18) - The system should track medical records and have reminders.

**Decision and Reasoning**  
It will help the elderly that forget to take medicine or other events.

2.2.13 **Issue Description**  
(U19) - Vocabulary should include sign language icons for people who may not have speech capability at all and may well be versed in American Sign Language symbols.

**Decision and Reasoning**  
This feature seems to not make sense because those who do not have speech capabilities can enter text in the screen or may look at the list of symbolic images to convey their message. Having sign language symbols is not feasible because most people they interact with on a daily basis are not able to recognize sign language.
2.2.14 Issue Description
(U20) - System should save and present at least the last 5 phrases/words constructed by the user through the system, conveniently from the main screen.

Decision and Reasoning
There shall be a recently used phrases/words tab that will list the phrases/words entered by the user.

2.1.15 Issue Description
(U21) - User/assistive persons should be able to associate their own text/name to an icon/image in the system and also be able to set the size of the icons on the screen.

Decision and Reasoning
The user will be able to create a profile and have a button to access it (e.g. a button that gets created with their name) and once they open it, it will show their profile. Also, the user shall be able to customize the size of the icons in the system.

2.3 Issues with Non Functional Requirements

2.3.1 Issue Description
(U19)- The system should be usable.

Decision and Reasoning
The system shall be usable and guarantee error free performance because the elderly do not have the technical skills and patience to deal with a faulty system.

2.3.2 Issue Description
(U20)- The system should be quick to understand (the learning time should be very low) and very easy to use.

Decision and Reasoning
Most elderly people do not have as much technical skills as the younger generations in using technology hence the system shall be easy to learn and use.

2.3.3 Issue Description
(U21)- The navigation of the system should be seamless and evident to all users.

Decision and Reasoning
This again further suggests that the system should be easy to use.

2.3.4 Issue Description
(U22)- New sentence generation should be done as dynamically and with as much flexibility as possible.

Decision and Reasoning
Our system shall implement this with the speech-to-text feature. It will be similar to the one in the Android OS which listens to the sentence and converts it after its done listening. It cannot be dynamic in the sense that it cannot converts word after word because it takes time to convert speech to text. The system would not be able to do it dynamically without falling behind on the conversion.

2.3.5 Issue Description
(U23)- The number of clicks that a user has to press to generate a sentence shall be kept minimal.

Decision and Reasoning
Our system will be designed with the motive to minimize the number of clicks because we understand that the elderly prefer an easy to use system that does not have complicated menu selections.

2.3.6 Issue Description
(U24)- The communication system to be built should reflect as closely as possible the ways users communicate in the real world.

The system will not make communication as easy as it is in a real world because the application performs with a degree of reliability and accuracy.

Decision and Reasoning
When the elderly individual is using the text-to-speech feature it will obviously take time for him or her to type the message to communicate. Also, the voice-to-text is not always accurate; our system will increase accuracy by using a limited dictionary of words and phrases.

2.3.7 Issue Description
(U25)- The system should provide an appropriate level of performance: the elapsed time between the click of an icon and the sound generation should be minimal, (emergency calls and messages should be fast and accurate).

Decision and Reasoning
Our system shall be developed with efficient algorithms that execute fast
and are error free. We understand that emergency situations require a very reliable system.

2.3.8 Issue Description
(U26)- The system should be easily extensible to accommodate the following typical variations: variations in interface, language, definitive needs of the user, new features, new hardware etc.

Decision and Reasoning
The system shall be designed to be highly customizable and upgradable.

2.3.9 Issue Description
(U27)- Speech recognition will work with a limited dictionary.

Decision and Reasoning
Speech recognition seems to work most accurately when a limited number of words are in system. Our accurate system will reduce communication errors.

2.3.10 Issue Description
(U28)- The system will be compatible with Android Platform 2.1 or above.

Decision and Reasoning
This will insure that the phone has the latest API’s installed.
3.0 Improved Understanding

3.1 W – Improved Understanding

3.1.1 (W1) – The system shall make it easy for the elderly to communicate with others and live a comfortable life.

3.1.2 (W2) – The system shall be designed so that the elderly can operate our software regardless of an assistive person being present.

3.1.3 (W3) – The system shall be such that the elderly can browse over a list of activities organized into disjoint categories.

3.1.4 (W4) – The system will have an emergency option that contact 911 or any other emergencies.

3.1.5 (W5) - The system shall be very easy to use with a simple interface with only four categories buttons, each choice will lead to more option menus however it will be very simple as we expect the elderly to not want to or have the ability to learn a complex system and use it especially in an event of an emergency.

3.2 Improved Understanding of Function Requirements and Non Functional Requirements

3.2.1(FR) Improved Functional Requirements

3.2.1.1(FR1) The user interface shall be simple to access, the application can be will be a widget on the android screen for fast access. The widget will startup as soon as it is added to the screen and is active and ready to be used.

3.2.1.2(FR2) The commonly used everyday symbols shall be provided in categories so that it can be viewed pictorially. Users can use the existing symbols or add new symbols.

3.2.1.3(FR3) Text-to-speech feature will convert any generated sentences/words to a voice announcement. The user will hold the talk-to-text button and the system will record the speech and convert it using its speech dictionary.

3.2.1.4(FR4) The speech-to-text when activated by the user, will record the speech and convert it into text using the limited dictionary.
3.2.1.5(FR5) When the user presses on the Emergency button, options to dial 911 or hospital or fire are presented. If none is selected, the system dials 911 and sends the user location.

3.2.1.6(FR6) When a text is entered into the Search bar, the system will search for that content in the phone for easy access. This is handy for somebody such as an assistive person that doesn’t know where what is on the phone.

3.2.1.7(FR7) The system shall have an option to change the font size and color of the icons. When the user opens the font size tab, they can adjust the size of the text according to their preferences.

3.2.1.8(FR8) The system should track medical records and have reminders.

3.2.2(NFR) Improved Non Functional Requirements

3.2.2.1(NFR1) The system shall be usable and guarantee error free performance because the elderly do not have the technical skills and patience to deal with a faulty system.

3.2.2.2(NFR2) Most elderly people do not have as much technical skills as the younger generations in using technology hence the system shall be easy to learn and use.

3.2.2.3(NFR3) The navigation of the system should be seamless and evident to all users.

3.2.2.4(NFR4) New sentence generation should be done as dynamically and with as much flexibility as possible.

3.2.2.5(NFR5) The number of clicks that a user has to press to generate a sentence shall be kept minimal.

3.2.2.6(NFR6) New sentence generation should be done as dynamically and with as much flexibility as possible.

3.2.2.7(NFR7) The system should provide an appropriate level of performance: the elapsed time between the click of an icon and the sound generation should be minimal, (emergency
calls and messages should be fast and accurate).

3.2.2.8(NFR8) The system will be compatible with Android 2.1 or above.

3.3 Requirements added in Phase II:

**Issue Description**
(U29) - *Vocabulary should include sign language icons for people who may not have speech capability at all and may well be versed in American Sign Language symbols.*

**Decision and Reasoning**
This feature seems to not make sense because those who do not have speech capabilities can enter text in the screen or may look at the list of symbolic images to convey their message. Having sign language symbols is not feasible because most people they interact with on a daily basis are not able to recognize sign language.

**Issue Description**
(U30) - *System should save and present at least the last 5 phrases/words constructed by the user through the system, conveniently from the main screen.*

**Decision and Reasoning**
It does not seem likely that the elderly will use this feature because they will seldom have to repeat the same 5 activities they had just recently used. Our features are so easily accessed because of our easy to use interface that navigating to any recently used functions will not be a hassle and may even be quicker than navigating through the recently used list.

**Issue Description**
(U31) - *User/assistive persons should be able to associate their own text/name to an icon/image in the system and also be able to set the size of the icons on the screen.*

The Android system comes with profile feature that allows the user to enter their information and create a link for it so this does not need to be implemented in the HOPE system. As for the icon sizing, our system is built with big icons that are larger than the average text that people interact with. Hence we believe that our icon size does not need to be modified by the user.
4. Preliminary Prototype.

The user can access the application from three ways:

1) A persistent icon that goes in the status bar and is accessible through the launcher. This allows for quick and immediate access to the application without scrolling through app drawer.
2) A widget placed on the Android desktop that has quick access to functions within the application, as well as being able to open the application.
3) The user can open the application drawer and find the application and click the icon. This is slightly more difficult and may be harder to execute by the elderly but this is the default behavior of an Android application. The other two access methods are favored due to ease of use.

Figure 1.0 HOPE systems screenshot
Pressing the open key will open the application which looks exactly like the widget with the open key being replaced by the organization/search key.

Pressing the emergency button on either the widget or in the application will result in a popup that allows the user to choose which number to dial. If no response is received after 5-7 seconds, the application will automatically dial the default number which is 911, transmitting location information as well.

Pressing the medicine button on the widget or application will result in a popup allowing the user to choose what information they would like to see. Menu options include:
a) Viewing the prescription schedule which will show the weekly dosage information as well as upcoming doses.

b) The medical reminder submenu will allow the user to see upcoming appointments and prescription refill dates.

c) The current medications submenu will allow the user to see all current prescriptions being taken and any conflicting prescriptions/conditions.

Pressing the communication button on the widget or application brings up the communication menu. The submenus include:

a) The speech-to-text menu brings up the microphone input panel to allow the speech-to-text function to accept speech.

b) The text-to-speech button brings up Android TTS feature allowing the input of text from the keyboard into speech.

c) The pictorial symbol menu will bring up an array of pictures which the user can click to make the picture full screen.

Pressing the organization/search button in the application brings up a submenu which includes:

a) Search will allow the user to search through the application for communication/contacts/prescriptions/medicine/appointment dates and display the information as it is input. The data can be accessed once it is found.

b) Reminders will allow the user to view any upcoming reminders as well as input reminder of their own.

c) History/Recent will allow the user to view recently accessed data in a manner similar to the search field based on last access versus search string.

d) Alarm –

e) Change Color will allow the user to change the various colors of the interface with a color picker to allow for their best visibility

f) Change Icon Size will allow the user to increase or decrease icon size to allow a user to make an icon more visible or less obtrusive.
Figure 1.2 Screenshot of the services
## 5. Traceability

<table>
<thead>
<tr>
<th>ID</th>
<th>USER REQUIREMENT</th>
<th>FORWARD TRACEABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1</td>
<td>The users of the application are the elderly people that stay at home or in a nursing environment/hospital. They may have problems with speech, hearing, vision and/or memory loss. Their daily activities are bathing, washing, restroom, eating/drinking, walking, and transferring to the bed. They need the help of others.</td>
<td>W1,W5, FR1</td>
</tr>
<tr>
<td>U2</td>
<td>An assistive person is one that is either a disabled person or a non-disabled person with whom the user wants/needs to communicate. This person responds to the elderly requests and sometimes also initiates conversations.</td>
<td>W5</td>
</tr>
<tr>
<td>U3</td>
<td>The elderly use common greetings like “What is your name”, “Where am I?”, and “Sorry”, and “Thank you” etc... 'In a typical scenario, where a person needs to communicate a message, he/she uses visual aids like pictures and icons and text...”</td>
<td>W1, W3, FR1, FR2, FR4</td>
</tr>
<tr>
<td>U4</td>
<td>Apart from the basic communication messages, the elderly also want to perform other activities or express an opinion about something like – ‘I want to watch Television’, ‘I want to drink Cola’. The elderly should initiate communication by navigating among various categories.</td>
<td>W3,FR1, FR2</td>
</tr>
<tr>
<td>U5</td>
<td>The system must be capable of providing an easy interface for emergency calls like 911, to any emergency contacts, as well as send fast messages to a nearby response department like a hospital.</td>
<td>W1, W4</td>
</tr>
<tr>
<td>U6</td>
<td>Just like the elderly user, the system should be easily usable by the assistive person, e.g. by providing a good search interface through which that person need not know the entire system and can bring up any part by just visiting the search page.</td>
<td>W5, FR1, FR6, NFR1</td>
</tr>
<tr>
<td>U7</td>
<td>Providing a way for the users to select proper categories and navigate through various dimensions of vocabulary.</td>
<td>W3, FR1, NFR1</td>
</tr>
<tr>
<td>U8</td>
<td>Generating desired sentences and represent them pictorially.</td>
<td>W1</td>
</tr>
<tr>
<td>U9</td>
<td>Generating desired sentences as well associate with a sound/voice.</td>
<td>W1</td>
</tr>
<tr>
<td>U10</td>
<td>Placing emergency calls and messages.</td>
<td>W4</td>
</tr>
<tr>
<td>U11</td>
<td>Giving a specific meaning to each picture to reduce the ambiguity, as a picture can be worth a thousand words and a thousand interpretations.</td>
<td>FR2, NFR1</td>
</tr>
<tr>
<td>U12</td>
<td>Making each vocabulary item available through a search interface.</td>
<td>FR2, FR6, NFR1</td>
</tr>
<tr>
<td>ID</td>
<td>USER REQUIREMENTS</td>
<td>BACKWARDS</td>
</tr>
<tr>
<td>----</td>
<td>-------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>U13</td>
<td>Allowing to change the orientation/display of the vocabulary in terms of color and icon size.</td>
<td>FR7</td>
</tr>
<tr>
<td>U14</td>
<td>Integrating already available technologies like alarm clock in a meaningful manner.</td>
<td>FR1, NFR1</td>
</tr>
<tr>
<td>U15</td>
<td>Displaying relevant or most frequently used items before other vocabulary items.</td>
<td>NFR5</td>
</tr>
<tr>
<td>U16</td>
<td>Make a previously generated sentence repeatable without regeneration.</td>
<td>NFR6</td>
</tr>
<tr>
<td>U18</td>
<td>The system should track medical records and have reminders.</td>
<td>FR8</td>
</tr>
<tr>
<td>U19</td>
<td>The system should be usable.</td>
<td>W1, FR1</td>
</tr>
<tr>
<td>U20</td>
<td>The system should be quick to understand (the learning time should be very low) and very easy to use.</td>
<td>W1</td>
</tr>
<tr>
<td>U21</td>
<td>The navigation of the system should be seamless and evident to all users.</td>
<td>W1, W2</td>
</tr>
<tr>
<td>U23</td>
<td>The number of clicks that a user has to press to generate a sentence shall be kept minimal.</td>
<td>W1, FR1</td>
</tr>
<tr>
<td></td>
<td>TRACEABILITY</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>W1</td>
<td>The system shall make it easy for the elderly to communicate with others and live a comfortable life. Such as voice to text.</td>
<td>U1, U4, U8, U9, U20, U21, U23</td>
</tr>
<tr>
<td>W2</td>
<td>The system shall be designed so that the elderly can operate our software regardless of an assistive person being present.</td>
<td>U21</td>
</tr>
<tr>
<td>W3</td>
<td>The system shall be such that the elderly can browse over a list of activities organized into disjoint categories.</td>
<td>U3, U4, U7</td>
</tr>
<tr>
<td>W4</td>
<td>The system will have an emergency option that contact 911 or any other emergencies.</td>
<td>U5</td>
</tr>
<tr>
<td>W5</td>
<td>The system shall be very easy to use with a simple interface with only four categories buttons, each choice will lead to more option menus however it will be very simple as we expect the elderly or assistive person to not want to or have the ability to learn a complex system and use it especially in an event of an emergency.</td>
<td>U1, U2, U6</td>
</tr>
<tr>
<td>FR1</td>
<td>The user interface shall be simple to access; the application can be will be a widget on the android screen for fast access. The widget will startup as soon as it is added to the screen and is active and ready to be used.</td>
<td>U1, U3, U4, U6, U7, U14, U19, U23</td>
</tr>
<tr>
<td>FR2</td>
<td>The commonly used everyday symbols shall be provided in categories so that it can be viewed pictorially. Users can use the existing symbols or add new symbols.</td>
<td>U3, U4, U11, U12</td>
</tr>
<tr>
<td>FR3</td>
<td>Text-to-speech feature will convert any generated sentences/words to a voice announcement. The user will hold the talk-to-text button and the system will record the speech and convert it using its speech dictionary.</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>FR4</td>
<td>The speech-to-text when activated by the user will record the speech and convert it into text using the limited dictionary.</td>
<td></td>
</tr>
<tr>
<td>FR5</td>
<td>When the user presses on the Emergency button, options to dial 911 or hospital or fire are presented. If none is selected, the system dials 911 and sends the user location.</td>
<td></td>
</tr>
<tr>
<td>FR6</td>
<td>When a text is entered into the Search bar, the system will search for that content in the phone for easy access. This is handy for somebody such as an assistive person that doesn’t know where what is on the phone.</td>
<td></td>
</tr>
<tr>
<td>FR7</td>
<td>The system shall have an option to change the font size and color of the icons. When the user opens the font size tab, they can adjust the size of the text accordingly to their preferences.</td>
<td></td>
</tr>
<tr>
<td>FR8</td>
<td>The system should track medical records and have reminders.</td>
<td></td>
</tr>
<tr>
<td>NFR1</td>
<td>The system shall be usable and guarantee error free performance because the elderly do not have the technical skills and patience to deal with a faulty system.</td>
<td></td>
</tr>
<tr>
<td>NFR2</td>
<td>Most elderly people do not have as much technical skills.</td>
<td></td>
</tr>
</tbody>
</table>
as the younger generations in using technology hence the system shall be easy to learn and use.

| NFR3   | The navigation of the system should be seamless and evident to all users. |
| NFR4   | New sentences generation should be done as dynamically and with as much flexibility as possible. |
| NFR5   | The number of clicks that a user has to press to generate a sentence shall be kept minimal. |
| NFR6   | New sentence generations should be done as dynamically and with as much flexibility as possible. |
| NFR7   | The system should provide an appropriate level of performance: the elapsed time between the click of an icon and the sound generation should be minimal, (emergency calls and messages should be fast and accurate). |
| NFR8   | The system will be compatible with Android 2.1 or over. |

**Process Specification:**
During the HOPE project HelpSoft9 has gone through the various different phases of the software development lifecycle and carried out various activities. In phase I, we initially studied the requirements presented in the phase one interim and verified that they were correct and consistent with the other requirements. Upon understanding the requirements, we were able to categories them as functional or nonfunctional requirements and find solutions as to meeting the requirements and presented them in the SRS document. The forwards and backwards traceability were also established by the end of the first interim. We also created the screenshots for the user interface that we were going to use in our system.

Phase I Contributions:

- Saurav and Matthew worked on the preliminary project plan.
- Saurav worked on the final project 1 deliverable and Aaron helped with the traceability.
- Prerak and Jessi worked on the screenshots.

In phase two, we analyzed the new requirements provided to us and decided that the first requirement provided out of the three (U27) was not feasible. We agreed that the other two requirements (U28, U29) were feasible and accepted them in our design. In interim II, we created the vision document along with the process specifications and also created various use case and business use case diagrams. Further details have been added to the Vision and process specification documents in the project II final and a functional prototype has been created.

Phase II contributions:

- Saurav worked on process specification.
- Matthew worked on the Vision document.
- Aaron worked on Non-functional requirements
- Prerak, Richards and Chris worked on the android application.

The relationship between phase I and phase II in terms of input and outputs:

The phase I and phase II only differ by the additional requirements provided by the instructor. Phase II will implement these requirements and also has many different diagrams and more functionalities working in our HOPE application.
Figure 1.3 IDEF0 Diagram for HelpSoft9
Figure 1.4 Development process used by HelpSoft9
## Summary

<table>
<thead>
<tr>
<th>Name</th>
<th>Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmacy</td>
<td>Used in get the elderly medication</td>
</tr>
<tr>
<td>Notify for refill</td>
<td>Notifies the pharmacy that the individual is low on medication and will need a refill soon</td>
</tr>
<tr>
<td>Emergency Services</td>
<td>The police department, Medical service etc.</td>
</tr>
<tr>
<td>Call Emergency Services</td>
<td>Notifies emergency services by making a call</td>
</tr>
<tr>
<td>Create Text</td>
<td>Sends a text notification to the family members and care giver that a call to emergency services has been initiated</td>
</tr>
<tr>
<td>Feature</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Voice Command Listener</td>
<td>Is always listening for key commands to initiate</td>
</tr>
<tr>
<td>Check Medication</td>
<td>Allows elderly to check what medication to take</td>
</tr>
<tr>
<td>Update Medication List</td>
<td>Allows family members/ care giver to update the medication list for the elderly</td>
</tr>
<tr>
<td>HOPE Application</td>
<td>The System interface</td>
</tr>
<tr>
<td>Check to do List</td>
<td>Lists activities and reminders for the elderly</td>
</tr>
<tr>
<td>Update to do List</td>
<td>Allows family members/ care giver to update the medication list for the elderly</td>
</tr>
<tr>
<td>Elderly</td>
<td>Primary user of system</td>
</tr>
<tr>
<td>Family Members</td>
<td>Secondary users that can help update information in the system.</td>
</tr>
<tr>
<td>Care Giver</td>
<td>Secondary users that can help update information in the system.</td>
</tr>
</tbody>
</table>
Use Case Diagram

HOPE Business Model

Figure 1.6 Business use case diagram
**Summary**

<table>
<thead>
<tr>
<th>Name</th>
<th>Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family</td>
<td>Elderly relatives</td>
</tr>
<tr>
<td>Requirements Gathering</td>
<td>Requirements are gathered</td>
</tr>
<tr>
<td>Marketing</td>
<td>Marketing demographics are looked at to gain insight for requirements</td>
</tr>
<tr>
<td>System Specifications</td>
<td>Include the systems specs that were developed from requirements</td>
</tr>
<tr>
<td>Development</td>
<td>Product development</td>
</tr>
<tr>
<td>Testing</td>
<td>Product testing</td>
</tr>
<tr>
<td>User Testing</td>
<td>Users test product</td>
</tr>
<tr>
<td>Product Refinement</td>
<td>After testing product is refinement</td>
</tr>
<tr>
<td>Product Distribution</td>
<td>Product is distributed</td>
</tr>
<tr>
<td>Elderly</td>
<td>People that will be using the application</td>
</tr>
<tr>
<td>Care Giver</td>
<td>Will be helping recommend product and help elderly with product</td>
</tr>
<tr>
<td>HOPE Development Team</td>
<td>Group that develops tests, and creates the application</td>
</tr>
<tr>
<td>Cell Phone Vendors</td>
<td>Sale hardware and service from which the product will be used</td>
</tr>
<tr>
<td>Google</td>
<td>Help distribute product on marketplace and provide documentation for product</td>
</tr>
</tbody>
</table>
Figure 1.7 SIG Diagram for HopeSoft9

sources: Boehm and McCall
5. Conclusion

In conclusion, to respond to the various issues that the elderly face on a daily basis such as hearing loss, eye sight, memory loss, we have proposed a viable solution that is being implemented on an Android phone. Unlike the previous solutions that resulted in bulky devices that can only serve a single purpose such as a hearing aid, our solution is an all in one product. The Android Hope application has many features such as voice-to-text, text-to-voice, magnifying glass, reminders. It also has a simple user interface so that it will not be difficult to learn and use even for the elderly who are not as technically advanced as the younger generations. We believe that our solution will solve most of the problems related to aging mentioned in this document if not every one of them. Our group is excited to work on this project specially because unlike any other software applications written in the past, HOPE application is something that impacts our society and it revolutionizes the lives of elderly and how they communicate with the world.