Save Me iOS Application

WRS Document

Version 2.1

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SYSM 6309 Advanced Requirements Engineering – Spring 2015

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VERSION HISTORY

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MEETING HISTORY

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| 02/23/2015 | n/a | Via Email | Faizal Khader  Matt Reynolds  Kathy Kattamanchi |
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# Introduction

This project will develop a smartphone application (“the Application”) to assist members of the elderly community (“the Users”) who have poor mobility to contact a care giver in certain cases where immediate attention is needed.

In normal operation, the Application will execute as a background process. When the User of the Application is in an accident situation where mobility is suddenly and catastrophically impaired (i.e. when the User falls while holding their phone), the shock of the impact will be detected by the phone’s internal accelerometer. When a sufficient shock is detected by the Application, it will enter an elevated alert mode (“Alert Mode”), which will cue a telephone call workflow.

In Alert Mode, the Application will display icons with previously stored emergency phone numbers that are presented in an easily readable and accessible format. Further, the phone will emit an audible tone while displaying a timer countdown. If the User does not disable Alert Mode timely, the Application will begin calling the previously stored emergency phone numbers. For each call, the application will attempt to play a previously stored message asking for help.

# Issue registry

## Domain Issues

|  |  |
| --- | --- |
| **Domain Issue ID** | DR1 |
| **Statement** | *“In the application domain, the communication typically consists of the following people and events/situations: [...]”* |
| **Issues** | The “*application domain*” is a vague generalization of the complete elderly spectrum, referencing different types of ages |
| **Solutions** | *Define the domain and scope of the system.* |
| **Decision** | *The sole solution is selected.*  *Therefore*,  **This project’s domain of disability assistance shall be defined elderly above the age of 70.** |
| **Rationale** | *The goal of the system is to assist a user who is older than 70* |

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| --- | --- |
| Domain Issue ID | DR2 |
| Statement | *“Elderly are susceptible to falls”* |
| Issues | The terms “*susceptible to fall”* is general domain terms and not explicit to the scope of the system. |
| Solutions | Define the scope of system assistance with regard to DR1. |
| Decision | The sole solution is selected.  Therefore,  The system shall not provide functionality to solve problems originating from other disabilities in the world domain. |
| Rationale | The system will be for users of a specific domain disability scope, not the broad spectrum of the disability domain. An emergency situation will by no means impact the domain target of this system. |

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| --- | --- |
| Domain Issue ID | DR3 |
| Statement | *“[..] daily living activities like washing, taking a bath, going to the restroom, eating/drinking, walking, transferring to the bed, are the typical activities that are of concern to them [...] and they often prone to falls fulfilling these.”* |
| Issues | The phrase “*[users] often prone to falls fulfilling these [daily/typical activities]” is* unsound because, depending on the scope definition of baseline user capability, assistance with any kind of activity may not be necessary to begin with. |
| Solutions | Define the scope of system assistance with regard to DR1. |
| Decision | The sole solution is selected.  Therefore,  The system shall only assist users who fit the cognitive and physical capabilities as defined in DR1 and who are thus capable of operating a smart phone. |
| Rationale | The scope of the use capabilities reads, “*At this stage, patients are “usually able to do basic activities of daily living,”— which means they can perform their daily routines, such as getting up, going to the bathroom, getting dressed, and so on, without difficulty.*” Based on this, it can safely be assumed that the system does not need functionality to assist the user with the activities defined in the statement. |

|  |  |
| --- | --- |
| **Domain Issue ID** | DR4 |
| **Statement** | *“This system will be designed for a mobile smartphone platform running the Apple iOS.”* |
| **Issues** | None |
| **Solutions** | *Accept this statement.* |
| **Decision** | The sole solution is selected.  Therefore,  **This hardware/software domain of this system shall only exist on a mobile smartphone platform running the Apple OS.** |
| **Rationale** | The system is being designed with a mobile smartphone platform that is running the iOS operating system. |

## Stakeholder Issues

|  |  |
| --- | --- |
| **Stakeholder Issue ID** | SR1 |
| **Statement** | *“In the application domain, the communication typically consists of the following people and events/situations: [...]”* |
| **Issues** | The term “*people*” is vague and does not accurately represent the stakeholder group that may be using the system. |
| **Solutions** | Define the system stakeholders. |
| **Decision** | *The sole solution is selected.*  Therefore,  **The Stakeholder groups shall be defined as the following:**   * **User** * **System user** * **Non-User: Organization** * **Requirements Engineer** * **Software Developer** * **Test Engineer** |
| **Rationale** | The stakeholder groups are defined as the user who is suffering with accidental fall consistent with DR1, and the system’s software development organization. |

## Functional Objectives ISSUE IDENTIFICATION

|  |  |
| --- | --- |
| **Justification ID** | DR1, DR2, DR3, DR4 |
| **Objective ID** | FO1 |
| **Statement** | *“In the application domain, the* ***communication*** *typically consists of the following people and events/situations: [...]”* |
| **Issues** | “*Communication*” as used is vague. Is “*communication*” itself an “*event/situation*” or is “*communication*” the act of conveying information? |
| **Solutions** | 1. Define *“communication”* 2. Qualify the system’s level of assistance during *“communication”* against DR2, DR3, and DR4. |
| **Decision** | Solutions 1 and 2 were selected.  Therefore,   1. **“*Communication*” is forthwith defined as the act of conveying information about some object.** 2. **The system shall present a graphical user interface so that the user can communicate about it or to it.** |
| **Rationale** | If one cannot remember what that object is, communication is simply difficult. |

|  |  |
| --- | --- |
| **Justification ID** | DR4 |
| **Objective ID** | FO3 |
| **Statement** | *“In a typical scenario, where a person wants to communicate a message to the elderly he/she uses visual aids like pictures and icons and text and/or speech on top of it, to reinforce the meaning of an item”* |
| **Issues** | The statement combines two different scopes of domain impairment, and implies that the system must provide solutions for more than 1 domain disability type. |
| **Solutions** | Define the scope of system assistance with regard to DR1. |
| **Decision** | The sole solution was selected.  Therefore,  **It is resolved that the system’s understanding of user capability assumes that the user is fully capable of understanding the meaning of an object once remembered. While the system does not itself provide comprehension of an object, it allows user-defined and user-inputted meaning to objects.**  **The system shall allow system-approved user-defined meaning to objects.** |
| **Rationale** | The scope of the system does not deal with mental impairment past level three. As such, the system stakeholder user group is assumed to have the proper mental abilities to understand the meaning of an item once that item has been remembered. This system is not for individuals who have serious cognitive impairment past mild memory loss. |

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| --- | --- |
| **Justification ID** | DR4 |
| **Objective ID** | FO5 |
| **Statement** | *“The mobile platform must have the necessary environmental resources to run the system.”* |
| **Issues** | None. |
| **Solutions** | Accept the statement as is. |
| **Decision** | The sole solution was selected.  Therefore,  **The mobile platform must have the necessary environmental resources to run the system.** |
| **Rationale** | Because the system will be potentially using accelerometer and GPS capabilities of the device, the platform requirements must be sufficient so that the system can quickly process user requests involving these capabilities with the system. |

## Non-Functional Objectives Issues Identification

|  |  |
| --- | --- |
| **Objective ID** | NFO1 |
| **Statement** | “The system graphical user interface must be intuitive and easy to use.” |

|  |  |
| --- | --- |
| **Objective ID** | NFO2 |
| **Statement** | “The system shall be implemented limited on-platform hardware extensibility.” |

## Functional Requirements Issue Identification

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| --- | --- |
| **Justification ID** | NFO1, FO1 |
| **Requirement ID** | FR1 |
| **Statement** | *Providing a way for the users to select proper categories and navigate through various dimensions of vocabulary.* |
| **Issues** | *“Proving a way [...] to select [...] and navigate [...]”* as worded is vague. |
| **Solutions** | Define the way for the system to select and manipulate objects while navigating through the system. |
| **Decision** | The sole solution was selected.  Therefore,  **The system shall provide buttons for operating the system.** |
| **Rationale** | The user must be given an efficient and familiar navigational structure that ensures usability. |

|  |  |
| --- | --- |
| **Justification ID** | NFO5, FO3, NFR11, NFR16 |
| **Requirement ID** | FR2 |
| **Statement** | *Integrating already available technologies like stop watch in a meaningful manner.* |
| **Issues** | 1. The phrase “*integrating already available technologies*” is vague. 2. Are these technologies internal smartphone features, internal applications, or separate applications not native to the operating system? 3. Are these technologies meant to assist users with out of scope impairments? |
| **Solutions** | 1. Reject this requirement as redundant given FR4. 2. Allow this requirement, but restrict “available technologies” to only smartphone technologies, and only smartphone technologies that can be used to help the user remember an object. |
| **Decision** | Solution 1 was selected.  Therefore,  **This functional requirement shall be rejected.** |
| **Rationale** | Not required for the App’s working |

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| --- | --- |
| **Justification ID** | NFO2 |
| **Requirement ID** | FR3 |
| **Statement** | *The system shall check the platform of the smartphone to ensure compatibility with the system’s minimum platform requirements.* |
| **Issues** | *None.* |
| **Solutions** | *Accept statement as is.* |
| **Decision** | The sole solution was selected.  Therefore,  **The system shall check the smartphone platform’s resources to ensure system compatibility with minimum system requirements.** |

## Non-Functional Requirements Issue Identification

|  |  |
| --- | --- |
| **Justification ID** | NFO1, FO1 |
| **Requirement ID** | NFR1 |
| **Statement** | *The system should be usable.* |
| **Issues** | 1. Usability is ambiguous without a clear metric. Does this mean the system should not crash or crash rarely? 2. This statement does not define the scope to apply *usability*. For example does it apply to the system maintainers or to the users in terms of the user interface? |
| **Solutions** | Define the term *usability* in terms of the user interface. |
| **Decision** | The sole solution was selected.  Therefore,  **The system shall not display more than 3 layers over root level.** |
| **Rationale** | Given the application is geared towards a consumer market running on a user's smartphone we will define usability in terms of the user interface with defined metrics. |

|  |  |
| --- | --- |
| **Justification ID** | NFO1, FO1 |
| **Requirement ID** | NFR2 |
| **Statement** | *The system should be quick to understand (the learning time should be very low) and very easy to use.* |
| **Issues** | 1. No acceptable range or tolerances are defined for low and or high learning times. The range and or tolerances may be dependent on a variety of factors concerning the users. 2. No procedure is defined to accurately measure and determine if the learning time is valid. Further when and where should learning time be measured? What defines the starting point and ending point for measurements? |
| **Solutions** | The system shall require only two taps or clicks at most to access any functionality in the system. |
| **Decision** | The sole solution was selected.  Therefore,  **The system shall give button with at most two taps or clicks.** |
| **Rationale** | The system should not make the user perform counter-intuitive or burdensome input to access any portion or functionality of the system. |

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| --- | --- |
| **Justification ID** | N/A |
| **Requirement ID** | NFR3 |
| **Statement** | *The navigation of the system should be seamless and evident to all users.* |
| **Issues** | 1. This requirement is too broad and cannot be guaranteed in all cases as it is dependent on a variety of factors concerning the user. 2. No definition of seamless is given. The term seamless is used previously in other requirements to describe both the software system and the user interface. 3. Neither method of measurement nor acceptable ranges for that measurement were provided to ensure that the interface is seamless and evident to all users. |
| **Solutions** | 1. Provide a persisted object that is always on the top layer of the display that displays current location of user relative to root. 2. Reject this requirement as being unnecessary. |
| **Decision** | Solution 2 was selected.  Therefore,  **This non-requirement shall be rejected.** |
| **Rationale** | Given the scope assumptions of user capabilities, the user should have no issues operating the system and understanding what the implications are of navigation elements. |

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| --- | --- |
| **Justification ID** | N/A |
| **Requirement ID** | NFR4 |
| **Statement** | *The communication system to be built should reflect as closely as possible the way users communicate in the real world (see the domain theory above).* |
| **Issues** | 1. “*Reflecting as closely as possible the way users communicate in the real world*” is vague as there is no possible way to know all the potential ways people communicate with each other, and thus impossible to “*reflect as closely possible*” from a design standpoint what is unknowable. |
| **Solutions** | 1. *Define the scope of system assistance with regard to DR1.* |
| **Decision** | Solution 1 will be taken.  *Therefore*,  ***This non-functional requirement shall be rejected.*** |
| **Rationale** | *There is no possible way for this system to reflect as closely as possible communication in the real world. There are individual, cultural, and societal differences in the way that humans communicate with each other. Methods can consist of sign language, verbal, visual, or any other human movement that could carry meaning.* |

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| --- | --- |
| **Justification ID** | NFO1, FO1 |
| **Requirement ID** | NFR5 |
| **Statement** | *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).* |
| **Issues** | 1. This requirement does not define what it means to be minimal or what an appropriate level of performance is with an acceptable range and tolerance. 2. This requirement does not define meaningful metrics and measurement instructions to provide proof of the appropriate level of performance. |
| **Solutions** | Set a defined system response time to any type of user input. |
| **Decision** | The sole solution was selected.  Therefore,  **The system shall respond to user navigational input with no greater than a two second delay.** |
| **Rationale** | If the phone meets minimum hardware resource specifications, the system shall respond to navigational input in no longer than two seconds. |

# WRS

## World

### Problem Statement

The problem is how to get help to elderly in case of emergency who need immediate attention and may not be able to reach to their phone. Many times elderly live by themselves and may not have anyone around them. Accidental falls are common among the elderly. According to the Center for Disease Control and Prevention, millions of adults aged 65 and older fall. Falls can cause moderate to severe injuries, such as hip fractures and head traumas, and can increase the risk of early death. Fortunately, falls are a public health problem that is largely preventable.

### Scale and Scope of Problem

One out of three older adults (those aged 65 or older) is suddenly and catastrophically debilitated (falls) each year. Among older adults, falls are the leading cause of both fatal and nonfatal injuries. In 2013, 2.5 million nonfatal falls among older adults were treated in emergency departments and more than 734,000 of these patients were hospitalized.

### Goal

Apple iPhones™ are widely used. Many in the elderly community are familiar with the application ecosystem available on the iPhones™ and appreciate the intuitive, tactile interface of the applications. Leveraging this pre-existing familiarity in the marketplace, this project will create an iPhones™ application capable of making a call to emergency contact. The goal is to reduce the incidents.

### Improved Understanding of the Domain

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| --- | --- |
| Requirement ID | Statement |
| IDR1 | This project’s domain of disability assistance is comprised of elderly individuals aged 70 and above. (Appendix A) |

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| **Requirement ID** | **Statement** |
| IDR2 | The system’s scope of assistance shall only be only for those aged above 70. (Appendix A) |

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| --- | --- |
| **Requirement ID** | **Statement** |
| IDR3 | The system shall assume that the user is not physically and mentally handicapped, and thus capable without assistance of carrying out trivial activities such as operating a mobile device. |

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| **Requirement ID** | **Statement** |
| IDR4 | The system shall not assist the user with remembering an object, and any comprehension of the object shall be the burden of the user. |

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| --- | --- |
| **Requirement ID** | **Statement** |
| IDR5 | The system shall operate on Apple iOS running on the iPhones™ platform. |

### Improved Understanding of the Stakeholders

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| --- | --- |
| **Stakeholder ID** | **Statement** |
| ISR1 | The stakeholders are defined as:  User:   * System user * People responding to emergency contacts   Non-User:   * Project Sponsor * Requirements Engineer * Software Developer * Test Engineer * User Interface Engineer |

### Improved Understanding of the Functional Objectives

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| --- | --- |
| **Functional Objective ID** | **Statement** |
| IFO1 | The system shall present a user interface to the user so that the user may be helped when the iPhones™ device takes a severe fall. |

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| **Functional Objective ID** | **Statement** |
| IFO2 | The system shall allow the user to impart limited user-defined understanding on an object. |

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| **Functional Objective ID** | **Statement** |
| IFO3 | The mobile platform must have the necessary environmental resources to run the system. |

### Improved Understanding of the Non-Functional Objectives

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| --- | --- |
| **Requirement ID** | **Statement** |
| INFO1 | The system user interface shall be intuitive and easy to use. |

|  |  |
| --- | --- |
| Requirement ID | Statement |
| INFO3 | The system shall ensure quick response times while operating. |

|  |  |
| --- | --- |
| **Requirement ID** | **Statement** |
| INFO4 | The system shall maintain specific organization for handling emergency contacts. |

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| **Requirement ID** | **Statement** |
| INFO5 | The system shall support limited hardware and software extensibility. |

## Requirements specification

### Functional Requirements Specification

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| --- | --- |
| **Requirement ID** | **Statement** |
| FRS-001 | The application shall, as a matter of base functionality, remain dormant as a background process until such time as the accelerometer receives a sufficient shock. |
| FRS-002 | The application shall enter a countdown state for a specified time period. |
| FRS-003 | The application shall, upon uninterrupted completion of the countdown timer, call a previously stored list of emergency phone numbers. |
| FRS-004 | The application shall provide a button to easily click and call an emergency number regardless of state. |
| FRS-005 | The application shall provide a mechanism to enter Alert Mode with the least amount of user input. |
| FRS-006 | The App will deliver a functionality, where the contacts listed in the emergency call list are evaluated by their geographic location for distance from the user. The one nearest to the App user will be given higher priority while making the emergency call. |
| FRS-007 | The App will provide a list of emergency numbers and will loop through the list until one of them answers. This will happen in addition to leaving the message in the voicemail inbox if nobody answers the call. |

### 

### Non-Functional Requirements Specification

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| --- | --- |
| **Requirement ID** | INFR1 |
| NFRS-001 | The Application shall work on all models of iPhones™ from 4S to 6. |
| NFRS-002 | The Application shall have a simple and intuitive interface. |
| NFRS-003 | The Application shall have highly visible buttons that are easy to read for the old aged. |
| **Statement** | The system shall not display more than three layer of screens above root layer. |

|  |  |
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| **Requirement ID** | INFR2 |
| **Statement** | The system shall require that the platform possess the hardware commensurate with iPhones™ models 4S through 6, including specifically a GPS and accelerometer. |

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| --- | --- |
| **Requirement ID** | INFR3 |
| **Statement** | The system shall require no more than two taps or clicks to access any user interface element. |

|  |  |
| --- | --- |
| **Requirement ID** | INFR4 |
| **Statement** | The system shall require a form of organization upon all objects at all times. |

|  |  |
| --- | --- |
| **Requirement ID** | INFR5 |
| **Statement** | The on-platform technologies used to provide user-defined meaning shall not require third-party driver or plug-in support. |

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| --- | --- |
| **Requirement ID** | INFR6 |
| **Statement** | The system’s emergency objects must be accessible from anywhere in the user interface within five seconds. |

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| --- | --- |
| **Requirement ID** | INFR7 |
| **Statement** | Any on-platform technology used by the user to provide self-meaning to an object must provide output that be attached to an object. |

# Preliminary Prototype

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| --- | --- | --- |
| iPhones™ App 1Home App Icon | iPhones™ App 2Activated Background Page | iPhones™ App 3Main Functionality |

# Traceability

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | DR1 | DR2 | DR3 | DR4 | SR1 |
| FO1 | x | x | x | x |  |
| FO2? |  |  |  |  |  |
| FO3 |  |  |  | x |  |
| FO4? |  |  |  |  |  |
| FO5 |  |  |  | x |  |
| NFO1 |  |  |  |  |  |
| NFO2 |  |  |  |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | FO1 | FO2 | FO3 | FO4 | FO5 | NFO1 | NFO2 |
| FR1 | x |  |  |  |  | x |  |
| FR2? |  |  |  |  |  |  |  |
| FR3 |  |  |  |  |  |  | x |
| NFR1 | x |  |  |  |  | x |  |
| NFR2 | x |  |  |  |  | x |  |
| NFR3 |  |  |  |  |  |  |  |
| NFR4 |  |  |  |  |  |  |  |
| NFR5 | x |  |  |  |  | x |  |

# Requirements Creep Rate

“Save Me” team feels that due to the flexibility and compactness of the system design from a Non-functional objectives perspective, the team can handle a specific amount of creep rate that will be calculated below.

# 

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Element** | **Statement** | **Measure** | **Current Effort** | **Slack** | **Additional Effort per Change in Scope** | **Scope Creep Capacity** |
| IDR1 | This project’s domain of disability assistance is comprised of elderly individuals aged 70 and above. | Age Group | 20 | 3 | 2 | 150.00% |
| IDR2 | The system’s scope of assistance shall only be only for those aged above 70. | Age Group | 20 | 0.5 | 2 | 25.00% |
| IDR3 | The system shall assume that the user is not physically and mentally handicapped, and thus capable without assistance of carrying out trivial activities such as operating a mobile device. | User Capabilities | 30 | 1 | 4 | 25.00% |
| IDR4 | The system shall not assist the user with remembering an object, and any comprehension of the object shall be the burden of the user. | User Capabilities | 5 | 0.75 | 3 | 25.00% |
| IDR5 | The system shall operate on Apple iOS running on the iPhones™ platform. | Device Capabilities | 35 | 5.25 | 29 | 18.10% |
| ISR1 | The stakeholders are defined as… | N/A | N/A | N/A | N/A | N/A |
| IFO1 | The system shall present a user interface to the user so that the user may be helped when the iPhones™ device takes a severe fall. | UI Complexity | 30 | 4.5 | 44 | 10.23% |
| IFO2 | The system shall allow the user to impart limited user-defined understanding on an object. | App Complexity | 30 | 4.5 | 41 | 10.98% |
| IFO3 | The mobile platform must have the necessary environmental resources to run the system. | Device Capabilities | 20 | 3 | 27 | 11.11% |
| INFO1 | The system user interface shall be intuitive and easy to use. | UI Complexity | 20 | 3 | 18 | 16.67% |
| INFO3 | The system shall ensure quick response times while operating. | Response Time | 40 | 6 | 25 | 24.00% |
| INFO4 | The system shall maintain specific organization for handling emergency contacts. | App Capabilities | 20 | 3 | 4 | 75.00% |
| INFO5 | The system shall support limited hardware and software extensibility. | Device Capabilities | 20 | 3 | 28 | 10.71% |

# Justification

This application represents a critical lifeline for elderly patients who may suffer severe injuries or death if the application is not analyzed, designed and implemented to fit their community’s unique needs. In light of the foregoing requirements and problem domain, Team “Save Me” is ideally suited to the implementation of this project for three great reasons:

1. **Quality Assurance** – Given what is at stake, this application must operate in tight quality and operational bounds. A zealous quality leader, Kathy Kattamancha brings to the table many years of experience managing the quality processes in mission critical healthcare devices. Believing that a quality culture is the only way to implement a crash proof and rigorously tested product, Kathy has infused her unrelenting focus on quality control throughout the project management and systems engineering documents.
2. **Development –** Mobile application development requires the sharpest engineering mind. Anything less results in a confusing and misguided maelstrom of poorly documented, crash prone, and unusable code. Faizal Khader brings decades of development experience at Fortune 100 environments to the fore as the Senior Developer on this project. His leadership in the requirements engineering process have already uncovered numerous technical insights that will improve functionality and reliability beyond the original requirements specification.
3. **Documentation** – Known for his ‘Faulknerian’ prose, Matt Reynolds combines surgical precision with an engaging writing style to clearly and charmingly communicate all points in the project management process. Captivating stakeholders and future users alike will ensure that even the most soporific project meetings are standing room only.

# References

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