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Mobile Medical Information **System Application**

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A. Division of Labour

1 Introduction

1.1 Purpose

The purpose of this document is to provide information about the application's features, functionalities, and the application's audience. This documentation will clearly outline the project requirements and specifications. This document is intended for all stakeholders, staff and users of this application.

1.2 Scope

The software to be designed is a Medical Information Management System. The software will be designed to maximize collaboration between doctors, nurses and their patients using the Android mobile platform. The software shall be designed with security and efficiency in mind.

This software will specifically allow doctors and nurses to schedule patients into a time management system. Patient information, patient images and appointment notes will be stored in an encrypted data store. A prescription generator, accessible by the doctors will allow doctors to efficiently generate patient prescriptions for print. Allergies and specific needs identifications will ensure the safety of the patients within the Medical Center.

1.3 Definitions, Acronyms, and Abbreviations

SRS: Software Requirements and Specifications Document

CMA: Canadian Medical Association

QR: Quick Response

IEEE: Institute of Electrical and Electronics Engineers

OHIP: Ontario Health Insurance Plan

MMIS: Mobile Medical Information System

1.4 References

[1] IEEE. (2013, October 8). IEEE Standards [Online].
Available:<http://www.ieee.org/portal/innovate/products/standard/>

[2] CMA. (2013, October 8). Policy for Computers [Online].
Available:http://www.cma.ca/index.php?no-xform=true&ci_id=395&la_id=1&original_ci_id=50276

[3] Government of Ontario. (2010, January 1). Personal Health Information Protection [Online].
Available:http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_04p03_e.htm

[4] Android Developers. (2013, Oct 8) Device and Displays [Online]. Available:<http://developer.android.com/design/style/devices-displays.html>

1.5 Overview

This SRS provides information on the overall descriptions of this product including user characteristics, constraints, assumptions and dependencies. It also includes descriptions of both the functional and nonfunctional requirements for the product.

The SRS is organized so that it first gives an introduction to the project followed by an overview and then functional and nonfunctional requirements.

2 Overall Description

2.1 Product Perspective

This product relates to other products in the medical field of work because it is used to store patient information and allow patients to access their records and appointment information which is something that is required by all medical facilities. This product however is independant and self-contained because it does not rely on external sources within the medical facility. This product has to interface with a variety of related systems as it will need to make connections in order to grab data. This product will be run on multiple devices the datastore must be able to handle multiple device connections simultaneously.

2.2 Product Functions

- 2.2.1 Allow users to login and out of the system.
- 2.2.2 The system shall allow patients to access information about upcoming appointments and medical history.
- 2.2.3 The system shall access a data store to retrieve and store user data.
- 2.2.4 The system shall display visual plots or graphs to represent certain user data.
- 2.2.5 The system shall notify users of upcoming events such as appointments.
- 2.2.6 The system shall allow doctors to generate prescriptions for patients.
- 2.2.7 The system shall allow doctors to write, and edit (strikethrough, no deletion of data) patient information.
- 2.2.8 The system shall allow nurses to write in a different font in comparison to the font doctors use so as to be distinguishable.
- 2.2.9 The system shall allow users to access information on the go outside of the Medical Center.

2.3 User Characteristics

Receptionist: Books patient appointments, makes contact with patients to confirm appointments, cancel appointments and re-book appointments. Must have a high school diploma or equivalent with a basic understanding of computers and programs such as Microsoft Word, and Excel.

Nurses: Looks after patients and confirms medical history. Must have a degree in some form of nursing from a post secondary institution such as a degree in RPN(Registered Practical Nursing), RN(Registered Nurse) or a degree for a PSW(Personal Support Worker). Must be able to attend to patients and read and interpret data about their medical history.

Doctors: Assess patients, prescription manager and records data into medical history. Must have completed medical school, have an understanding of medicine and is able to read and understand patient medical information.

Patients: Do not have a medical background (in most cases), may be sick, may have an injury, may have an upcoming appointment to be treated on or to have a checkup. No experience for a patient is required aside from being able to operate a smartphone, understand the english language and posses mediocre time management skills.

In addition to the above characteristics all users are also assumed to have the knowledge and education to properly use the Android device.

2.4 Constraints

2.4.1 The system must be developed using the Java programming language and the Android SDK(Software Development Kit).

2.4.2 The system must be ready for deployment by Dec 3, 2013

2.5 Assumptions and Dependencies

This product is based on the fact that the users will have access to an internet connection as well as a phone running a version of android that will support this application.

2.6 Apportioning of Requirements

1. Availability to Print Patient Information
2. Script Generator
 - a. The product shall generates a print call with the information for the prescription
 - b. The product shall add information to the patient's file
 - c. The product shall store information about prescriptions that an individual patient receives most often and the prescriptions should be easily accessible.
3. Medical Diagnosis

4. Storage of Images for patients
 - a. Personal Profile Picture Accessed by, Doctors, Patients, and Nurses
5. Native Phone Calendar Integration
6. Allergy Warning Popup
7. Word Hinting
 - a. Medical terms highlighted and point to some medical database

3 Functional Requirements

3.1. Business Event: When the user wants to open the application, the product shall load a welcome screen.

ViewPoints:

3.1.1-Doctor: The doctor can see the general startup screen where they can choose to login into the system or to register a new account.

3.1.2-Nurse: The nurse can see the general startup screen where they can choose to login into the system or to register a new account.

3.1.3-Patient: The patient can see the general startup screen where they can choose to login into the system or to register a new account.

3.1.4-System: System must load the login/registration page for the user and it must set up the connection ensuring all information sent between the client and server application is encrypted.

3.1.5-System Security: Waits for user to attempt a login.

3.2. Business Event: When the user registers an account, the product shall show the user a screen with mutable fields for account details.

ViewPoints:

3.2.1-Doctor: The doctor can see a predefined registration page. After registration, the user is notified that in order to verify the account they must visit the medical centre in person as photo ID is required.

3.2.2-Nurse: The nurse can see a predefined registration page. After registration, the user is notified that in order to verify the account they must visit the medical centre in person as photo ID is required.

3.2.3-Patient: The patient can see a predefined registration page. After registration, the user is notified that in order to verify the account they must visit the medical centre in person as photo ID is required.

3.2.4-System: The system must notify the user that in order to validate the account they have to personally go into clinic with ID.

3.2.5-System Security: All data entered in the account registration fields must be encrypted and stored.

3.3. Business Event: When the user attempts to login to the system, the product shall show the user fields for credentials to be entered.

ViewPoints:

3.3.1-Doctor: System queries server to validate account. If validation is successful, load pages/functionality that a "Doctor" has access to. If validation failed, notify user that login was unsuccessful.

3.3.2-Nurse: System queries server to validate account. If validation is successful, load pages/functionality that a "Nurse" has access to. If validation failed, notify user that login was unsuccessful.

3.3.3-Patient: System queries server to validate account. If validation is successful, load pages/functionality that a "Patient" has access to. If validation failed, notify user that login was unsuccessful.

3.3.4-System: In the database, search for the user credentials that were provided. If the credentials are found in the database, grant appropriate access to the user; if the credentials are not found in the database, inform the user that they may have entered the wrong information.

3.3.5-System Security: Runs an encryption process on the user's information before storing the data in a secure location.

3.4. Business Event: User attempts to access patient information, the product shall display the given data

ViewPoints:

3.4.1-Doctor: The doctor is shown the patient information that the "Doctor" level of access is authorized to view. This information includes visual graphs of patients data, patient contact information, patient's picture and information about the patient's medical history.

3.4.2-Nurse: The nurse is shown patient information that the "Nurse" level of access is authorized to view. This information includes visual graphs of patients data, patient contact information, patient's picture and information about the patient's medical history.

3.4.3-Patient: The patient is shown information that the "Patient" level of access is authorized to view. This information includes patient contact information, patient's picture and information about the patient's medical history.

3.4.4-System: The system must retrieve patient information from the server through a secure connection. The system must then decrypt the data and display it to the user in a manner that is appropriate to the user's level of control (a doctor would have more control than a nurse or a patient, and therefore would be able to see and edit more information).

3.4.5-System Security: Retrieves the encrypted patient information from the data store and decrypts it for the system to display.

3.5. Business Event: When the user wants to view a patient's plot graphs, the product shall load the graphs in an orderly fashion.

ViewPoints:

3.5.1-Doctor: Requested patient information is shown in a graph.

3.5.2-Nurse: Requested patient information is shown in a graph.

3.5.3-Patient: Requested patient information is shown in a graph.

3.5.4-System: Relevant patient information must be fetched from the server and plotted to a graph. This graph must then be shown to the user.

3.5.5-System Security: Retrieves the encrypted data from the data store and decrypts it for the system to display.

3.6. Business Event: When the user chooses to edit patient information, the product shall present a formatted screen with appropriate fields which are editable to authorized users.

ViewPoints:

3.6.1-Doctor: Doctor is shown an 'edit information' page which has the fields eligible for editing by the "Doctor" level.

3.6.2-Nurse: Nurse is shown an 'edit information' page which has the fields eligible for editing by the "Nurse" level.

3.6.3-Patient: Patient is shown an 'edit information' page which has the fields eligible for editing by the "Patient" level.

NOTE: All information edited by patient must first be verified with medical centre before changes are final and information is updated.

3.6.4-System: System must query database and find out which information can be edited depending on the user that is currently attempting to edit. The system must then allow the user to make changes to the data to which they have access. All changes must be encrypted and added to the database.

3.6.5-System Security: Data entered in the editing fields shall be encrypted and then stored in a secure location where the old information is updated.

3.7. Business Event: When the date changes so that it is 5 days before a specific patient has an upcoming appointment, the product shall send notifications to some users.

ViewPoints:

3.7.1-Doctor: Nothing happens.

3.7.2-Nurse: Nothing happens.

3.7.3-Patient: Receives a notification reminding them that they have an upcoming appointment including the details of the appointment as well as date and time.

3.7.4-System: Must send out a notification to the patient's phone as a reminder.

3.7.5-System Security: Date, time, and any other information about the appointment should be encrypted when being transferred to the user and then decrypted before being displayed.

3.8. Business Event: When the date changes so that it is now 1 day before a specific patient has an upcoming appointment, the product shall remind users regarding the appointment.

ViewPoints:

3.8.1-Doctor: Nothing happens.

3.8.2-Nurse: Nothing happens.

3.8.3-Patient: Receives a notification reminding them that they have an upcoming appointment including the details of the appointment as well as date and time.

3.8.4-System: Sends out a notification to the patients phone reminding them of their

upcoming appoint.

3.8.5-System Security: Date, time, and any other information about the appointment should be encrypted when being transferred to the user and then decrypted before being displayed.

3.9. Business Event: User wants to access the Prescription Manager, and the product shall present them with a screen which allows the authorized user to manage all patient prescriptions.

ViewPoints:

3.9.1-Doctor: The doctor is shown an interface with editable fields that allows them to input script information for the required prescription with option to print.

3.9.2-Nurse: No visible access to Prescription Manager

3.9.3-Patient: No visible access to Prescription Manager

3.9.4-System: The system must register prescription information, and retrieve patient information from the server through a secure connection. The system ensures there are no allergy conflicts. Upon processing the prescription, the system sends a formatted printout to a local printer.

3.9.5-System Security: Must encrypt the data call that specifies which information to retrieve as well as decrypt retrieved information to be displayed to the user.

3.10. Business Event: If the user attempts to log out of the system, the product shall ask for confirmation, and then will lead the user back to the login page.

ViewPoints:

3.10.1-Doctor: The doctor is transferred back to the main login page.

3.10.2-Nurse: The nurse is transferred back to the main login page.

3.10.3-Patient: The patient is transferred back to the main login page.

3.10.4-System: The system must contact the data store and set the users status to logged out. It must also redirect the user to the main login page.

3.10.5-System Security: Must encrypt the data before the system sends it to the data store.

3.11. Business Event: When the user desires to close the application, the product shall finish all current processes and close the application.

ViewPoints:

3.11.1-Doctor: The application closes returning the doctor back to their phone's main screen.

3.11.2-Nurse: The application closes returning the nurse back to their phone's main screen.

3.11.3-Patient: The application closes returning the patient back to their phone's main screen.

3.11.4-System: The system must finish all data transfers to the data store, stop all remaining processes and close the application.

3.11.5-System Security: Must encrypt the data before the system sends it to the data store.

4 Non-Functional Requirements

4.1 Look and Feel Requirements

The application shall appear professional and simple to use. The application shall also appear authoritative and secured so that users can feel they can rely on it and trust it.

4.1.1 Appearance Requirements

The application shall have a clean, bright user interface with a minimalistic feel. Simplistic main menu to select which type of user is logging in with username and password fields. Also colour coding for the different type of users, for example the doctor's comments would be in blue and the nurse's would be in red.

4.1.2 Style Requirements

The application shall have a rounded, clean, professional appearance, with a focus on smooth transitions and responses to input. Intuitive swipe gestures will be implemented to decrease learning curve. A primarily blue palette will be used, following suit with common medical style.

4.2 Usability and Humanity Requirements

4.2.1 Ease of Use Requirements

The application shall be simple to use for all users above the age of 16, even if english is not their first language. A new patient should be able to register easily, and able to navigate through the application with ease and find what they want or need smoothly.

4.2.2 Personalization and Internationalization Requirements

The application shall not be overly complicated for users to understand/interpret, and should instead focus on language and font.

4.2.3 Learning Requirements

The application shall be intuitive for any user, and simple to navigate. The learning time in the application space should take no longer than 5 minutes.

4.2.4 Understandability and Politeness Requirements

The application shall be easily understood and refrain from slang or inappropriate terms.

4.2.5 Accessibility Requirements

The application shall allow usage of a device's native text-to-speech for the visually impaired if it exists.

4.3 Performance Requirements

4.3.1 Speed and Latency Requirements

- I. The application shall Push-Pull requests for patient data in under 2 seconds
- II. The application shall load patient images in less than 1 second.

4.3.2 Safety-Critical Requirements

- I. The system must not display incorrect allergy information or specific health concerns for patients.
- II. The application shall not release personal information to unauthorized users.

4.3.3 Precision or Accuracy Requirements

The system shall store data accurate to at least 4 decimal places for dosage and prescription amounts.

4.3.4 Reliability and Availability Requirements

- I. The application shall be accessible to all patients, doctors, and nurses registered with the facility. The application should be fully functional at all times and in all rooms of the facility. The user should be able to alternate between WiFi and cell data without having to login again. The data store is also assumed to be running at all times in order for this product to continue functioning.
- II. If the device becomes disconnected from the Local Internet Connection the application will automatically use the devices cellular data to transmit information.

4.3.5 Robustness or Fault-Tolerance Requirements

The system shall be designed to handle all type-errors from user input including division by zero.

4.3.6 Capacity Requirements

Assuming the medical center has a quantity of n paper charts before the digital conversion, the application shall be able to store $2n$ digital charts upon deployment.

4.3.7 Scalability or Extensibility Requirements

The application shall be prepared to possibly integrate other medical facilities in the future

including chiropractors, dentists and naturopathic medicine.

4.3.8 Longevity Requirements

The application shall be current for a minimum of 5 years following its release, and should be maintained to a functioning capacity until such a time as a new system is released.

4.4 Operational and Environmental Requirements

4.4.1 Expected Physical Environment

N/A

4.4.2 Requirements for Interfacing with Adjacent Systems

The application shall not be difficult for users to transition from the paper system.

4.4.3 Productization Requirements

The application shall use database and patient information backend handling which can be easily transferrable for reuse in other similar software models.

4.4.4 Release Requirements

The application shall be released by December 3rd, 2013 without compromising reliability and usability.

4.5 Maintainability and Support Requirements

4.5.1 Maintenance Requirements

Maintenance shall not be done during regular operating hours of the facility.

4.5.2 Supportability Requirements

N/A

4.5.3 Adaptability Requirements

N/A

4.6 Security Requirements

4.6.1 Access Requirements

The application shall allow no outside organization or person to access the application except the doctors, patients, nurses and receptionists of the medical center.

4.6.2 Integrity Requirements

The application shall ensure patient information will be input by the doctors and nurses only.

4.6.3 Privacy Requirements

The application shall encrypt data in accordance to CMA legal standards. Any information about the patient is confidential. [2]

4.6.4 Audit Requirements

The application shall run diagnostics and send pertinent information to the company about any system failures or user crashes to allow for debugging.

4.6.5 Immunity Requirements

The application shall be immune to trojan horse, malicious script, worm and virus attacks.

4.7 Cultural and Political Requirements

4.7.1 Cultural Requirements

The application shall display information in British English and remain religiously sensitive.

4.7.2 Political Requirements

The application shall comply with CMA encryption standards and OHIP billing services. [2]

4.8 Legal Requirements

4.8.1 Compliance Requirements

The application shall comply with CMA standards. [2]

4.8.2 Standards Requirements

The application shall comply to Android standards including resolution, screen size, and speed limitations. [4]

Appendix

A. Division of Labour

All worked throughout on sections 1 and 2 during meetings. Section 3 was split equally between Matt, Brendan, and Simon. Section 4 was split between Jason, Connor, and Khalil.

Connor Jakes
(Team Leader) _____

Jason Paolasini _____

Brendan Sim _____

Matthew Schweitzer _____

Simon Vergara _____

Khalilullah Rahin _____

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