McMaster University

Requirements Document

Capstone Team 14

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Project Drivers

This document was written using the Volere template.

1 The Purpose of the Project

1.1 The User Business or Background of the Project Effort

17 HIV Antiretroviral (ARV) medications have been approved for use in children. This results in various regimens available for use, as usually most children need to be on 3 medications at once. There are many factors to consider when initiating ARVs in children as many medications have different toxicities and side effects (including affecting growth, hormones, kidneys etc). Also, certain viruses may be resistant to some medications and not others. Some medications will interact with other HIV or non HIV medications. Some medications come in liquids, dissolvable tablets, or pills which can affect what age children can take them or not. Also, FDA approval for certain medications depends on: age, weight etc. Drug insurance will only cover some medications. Therefore, it is very challenging to decide on a regimen given the multiple permutations.

1.2 Goals of the Project

By creating a solution for this regimen issue, we can: improve efficiency, reduce human error, and provide an optimal and detailed regimen when medical teams need to decide on prescriptions for HIV patients. Creating this app will also help lessen the time that a doctor needs to use in order to come up with a medication regimen for a child. The doctor will be able to use the saved time for other important tasks and the patient will also receive their prescription at a sooner time.

2 The Client, the Customer, and Other Stakeholders

2.1 The Client

The client for this project is Dr. Sarah Khan. She is an assistant professor currently teaching at McMaster University. She is the individual who proposed the project to the team. She will be the one to test the product and give advice on improvements.

2.2   The Customer

The software application is being designed for doctors treating patients with HIV. The software will be used by users with all skill levels and deliver crucial information to them. Therefore, the application should be simple and fast.

2.3   Other Stakeholders

The other stakeholders involved with the development of this project are: Dr. Sarah Khan and Dr. Wenbo He. Dr. Khan will be our external supervisor and will be aiding the team with the design of the UI along with the crucial information that is to be implemented in the software. Dr. He will be our internal supervisor and will be aiding the team with the semantics and syntax of the code.

3   Users of the Product

3.1   The Hands-On Users of the Product

The only users are doctors taking care of HIV patients. The roles of the doctors are:

1. Giving medication on time

2. Giving the right medication

3. Giving the right dosage

4. Not mixing the wrong medication

3.2   Priorities Assigned to Users

Key Users: Android OS users **Secondary Users:** Programmers

3.3   User Participation

- Users allow username and password to be saved for later use

- Users allow operation of software with account information from device

3.4 Maintenance Users and Service Technicians

- Programmers

Project Constraints

4 Mandated Constraints

4.1 Solution Constraints

Description: The application will provide a page where information about the patient can be inputted in a simple and intuitive way.
Rationale: Inputting patient information should be easy and fairly quick.
Fit Criterion: The app will use the default android keyboard that all android users know how to use.

Description: The application will operate on Android OS.
Rationale: Android is an easy os to develop apps for and there are several tools that can help us create the product.
Fit Criterion: The app will be designed using standards set by android studio.

4.2 Implementation Environment of the Current System

- The source code will be written in **Java**

- **Android Studio** developments environment will be used to develop and test the application

- **SQLite** database will be used to store information about HIV medications

4.3 Partner of Collaborative Applications

N/A

4.4 Off-the-Shelf Software

N/A

4.5 Anticipated Workplace Environment

- Hospitals

- Doctor's Office

4.6 Schedule Constraints

- Requirements Document Revision 0: October 26th

- Requirements Document Revision 1: April 5th

- Final Demonstration: April 2017

4.7 Budget Constraints

N/A

5 Naming Conventions and Definitions

5.1 Definition of all Terms

- **Android:** Mobile operating system based on the Linux kernel. It is mainly designed for smartphones and tablets.

5.2 Data Dictionary of Any Include Models

N/A

6 Relevant Facts and Assumptions

6.1 Facts

- The Android's basic coding language is Java.

- The user interface of Android is using touch gestures to operate the on-screen objects, and text input with a virtual keyboard on screen of device.

6.2 Assumptions

- Assume that the user can use a mobile phone and mobile applications

- The user will be a doctor or a member of the medical field

- The doctor will be given the choice of selecting a medication timetable from the ones given in our app

- The user will need to own a mobile device running Android

Functional Requirements

7 The Scope of the Work

7.1 The Current Situation

There are many factors for medical teams to consider when they are initiating ARVs in children. Every kind of medication has different side effects and toxicities. Some medications may not be efficient to certain viruses because those viruses are resistant. The state of medications (gas,liquid, or solid) is one of the factors that medical teams need to consider, which can affect the age that children can take them. The medical teams need to compose different groups of medications depending on each patients conditions. Therefore, it is very challenging to decide on a regimen given the multiple permutations. There are the other important tasks for medical teams, so they cannot be on service all the time. In some emergency cases, the patient needs to receive their prescription at a sooner time.

We intend to build one application that can be functional by smartphone. The medical teams can receive the patients personal information and enter the medications as they need in other place, to help lessen the time that medical teams need to use in order to come up with a medication regimen for a child. Also, the medical teams can see the type and the amount of medications in hospital from database, so they can be able to compose the feasible medications, to provide an optimal and detailed regimen when medical teams need to decide on prescriptions for HIV patients.

7.2 The Context of the Work
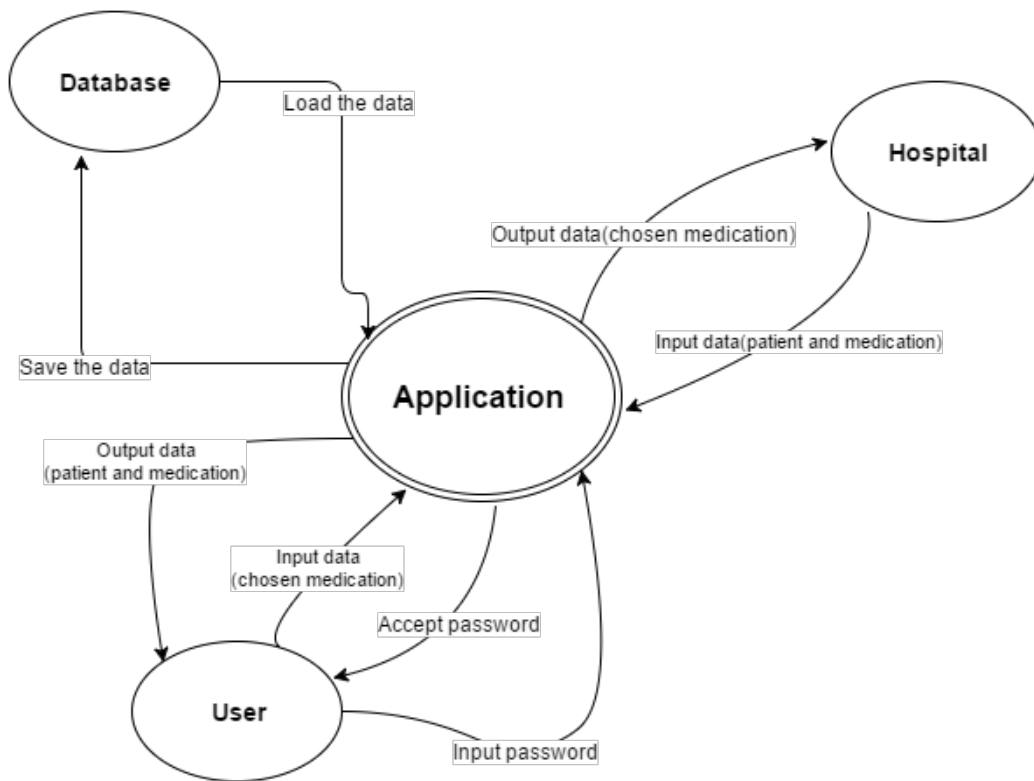
Figure 1: Work Context Diagram

7.3   Work Partitioning

Event Name	Input/Output	Summary
Hospital enter patients information	Patients information(In)	Store the patients information in database
Hospital enter the type and amount of medications	Medication information(In)	Store the medication information in database
User enter user password	User Password(In)	Verify users password and user log in
User enter the request	Requests(In)	Accept the users request
Send information to user	Patients information(out)	Display the patient's information to user
Send information to user	Medication information (out)	Display the medication information to user
User enter medications	Chosen medications(In)	Store the chosen medications in database
Send information to hospital	Chosen medications(out)	Display the chosen medications to hospital

Table 1: Work Partitioning

8   The Scope of the Product

8.1   Product Boundary

- The application will be functional only on Android devices.

8.2   Product Use Case

9   Functional and Data Requirements

9.1   Functional Requirements

Requirement # 1
Description: The product shall store the patients description given by the hospital into the database.
Rationale: The input data is required for medical teams. The patients condition needs to be considered when prescribing medication.
Fit Criterion: The database can save the patients data from the device in

Figure 2: User Case Diagram

the hospital.

Requirement # 2
Description: The product shall store the medication information given by
hospital into database.
Rationale: The input data is required for medical teams. Since they need
to consider the available medication in the hospital.
Fit Criterion: The database can save the medication data from the device
in hospital.

Requirement # 3
Description: The product shall be able to add, delete and modify the data
in database.
Rationale: If the user data in the database needs to be updated to the most
current version.
Fit Criterion: The hospital and user can be add, delete and modify the

data in database.

Requirement # 4
Description: The product shall be able to display the required information to a user if the user sent the request.
Rationale: The medical teams need to consider that the medications depend on the patient's condition and the availability of the medication in the hospital.
Fit Criterion: The device can display the data from the database anytime after sending the request.

Requirement # 5
Description: The product shall be able to display the chosen medications selected by the user.
Rationale: The hospital needs the medical teams order to give the patient the correct medications.
Fit Criterion: The device in the hospital can display the chosen medications from the database

Requirement # 6
Description: The product shall be able to allow the user to enter a password.
Rationale: To prevent any unauthorized and viewing of personal information of patient.
Fit Criterion: The device of will allow a user to enter a password.

Requirement # 7
Description: The product shall be able to verify the users password. Restrict a users access if the password is incorrect.
Rationale: To prevent any unauthorized and viewing of personal information of patient.
Fit Criterion: The database cannot allow the person any access without the correct password.

Requirement # 8
Description: The product shall store the chosen medication given by a user into database.
Rationale: The doctor can select the medication anytime.

Fit Criterion: The database can save the input with the chosen medication from the device of the user.

9.2   Data Requirements

- Only the users can be allow to access and view the data(patient and medication) in database

- Only the users and hospital can be allow to view the chosen medication

- Data in database should always be able to save and load securely and without any error

Nonfunctional Requirements

10   Look and Feel Requirements

10.1   Appearance Requirements

- A group of English speakers in the age range of 25-70 shall be able to understand the UI within 10 minutes of using the software.

- The UI shall fit in all resolutions of the Android OS.

10.2   Style Requirements

- After the first use of software, 80 percent of customers shall feel secure enough to trust the system with their personal information.

11   Usability and Humanity Requirements

11.1   Ease of Use Requirement

- After a year of using the product, the error rate shall be close to 0 percent

- The software account registration shall be detailed enough so that a user will always be able to obtain their password in case they forgot it

11.2 Personalization and Internalization Requirements

- The first design of the UI shall only be available in English.

- The first design of the software shall only be compatible on the Android OS.

- The first design of the software shall not allow users to make changes to the UI.

11.3 Learning Requirements

- Anyone in the age range of 25-70 shall be able to use the UI with little to no help.

11.4 Understandability and Politeness Requirements

- The software shall use words and symbols that are understandable by the any user in the intended age range.

11.5 Accessibility Requirements

N/A

12 Performance Requirements

12.1 Speed and Latency Requirements

- The application speed will vary depending on the Android operating system, but will generally respond within a second. Latency is not relevant as our application does not use any network.

12.2 Safety-Critical Requirements

- Private information about patients on accounts will only be viewed by the users.

- Only the users may access and modify the medical information of a user.

12.3 Precision or Accuracy Requirements

- The app will manage medication schedule for patients down to the time of day.

- It will take into account the patient's physical condition as well as compatibility with other medications when constructing this schedule.

12.4 Reliability and Availability Requirements

- The app is tied to the users mobile device and should be available at any time.

12.5 Robustness or Fault-Tolerance Requirements

- A patients medication schedule should respond and/or change appropriately when a new medication is added based on its compatibility with existing medications.

12.6 Capacity Requirements

- As this app is independent to each user, there is no capacity to the number of users.

12.7 Scalability or Extensibility Requirements

- Users will be able to add additional medication to their account, and the schedule be changed accordingly.

12.8 Longevity Requirements

- The application will be able to function indefinitely until there are new major medical discoveries that drastically change the way current medication should be taken.

13 Operational and Environmental Requirements

13.1 Expected Physical Environment

- As long as the user is in possession of their mobile device, the app can be used anywhere.

13.2 Requirements for Interfacing with Adjacent Systems

N/A

13.3 Productization Requirements

- The app will be available for download from the Google Play store.

13.4 Release Requirements

- New releases of the app will be based on new medications compatibility with the old.

14 Maintainability and Support Requirements

14.1 Maintenance Requirements

N/A

14.2 Supportability Requirements

- The software shall be hardcoded and not supported. The code will still be accessible for the team in case any changes need to be made.

14.3 Adaptability Requirements

- The software shall operate on the Android OS.

15 Security Requirements

15.1 Access Requirements

- A username and password will be required to access the data of every individual using the software.

15.2 Integrity Requirements

- The software shall be guarded from any misuse.

- The software shall be protected from any local or remote attack.

15.3 Privacy Requirements

- The software shall not send any data remotely.

15.4 Audit Requirements

N/A

15.5 Immunity Requirements

N/A

16 Cultural and Political Requirements

16.1 Cultural Requirements

N/A

16.2 Political Requirements

N/A

17 Legal Requirements

17.1 Compliance Requirements

N/A

17.2 Standards Requirements

N/A

Project Issues

18 Open Issues

- Creating the android application will be difficult as everyone is unfamiliar with the language and environment of Android Studio.

- The government constantly updates the list of approved medication for child use. Currently, we do not have a solution for updating our application to correspond with that list on a regular basis. Our implementation will include the most updated list at the time of release.

19 Off-the-Shelf Solutions

Currently, our medication regimen application seems to be the only off-the-shelf solution for our client. There does not exist any solution outside of manual sorting/organizing to help filter out medication constraints for the HIV patients and provide them with the ideal dosage and schedule.

20 New Problems

We aim to have our application completely stand-alone while referencing medical information provided publicly by the government. The application should not interfere with any operations in hospitals.

21 Tasks

- Revise requirements document.

- Create a test plan.

- Demonstrate a proof of concept.

- Draw up design documents.

- Revision 0 project demonstration.

- Create a user guide for the project.

- Write up a test report.

- Final revision project demonstration.

- Write final revisions to documentation.

22 Migration to the New Product

N/A

23   Risks

- If the algorithm is not carefully implemented, it might generate faulty regimens that doctors may overlook and suggest to patients. This could lead to serious consequences.

- User passwords might be cracked even under reinforced encryption methods. The affected victims may blame the development team for not creating a secure system.

- There will be no way to access the database with existing application credentials if the user forgets the application password.

24   Costs

There are no direct monetary costs associated with this project, but about half a year of development time will be required.

25   User Documentation and Training

Users will be provided with information on the program use via a Help option which, when selected, will open a dialog box detailing general functionality of the program along with an FAQ section. Beyond the help document, a users familiarity with casual computer use should require no further training.

26   Waiting Room

- Currently, there are no plans on making a web-based version of the android application. However, this is something to consider upon future releases of our product.

- Medical information is planned to be implemented statically. Dynamic implementation can be considered for keeping the information up-to-date and automated by our clients.

27   Ideas for Solutions

- Main programming language should be Java and coded inside Android Studio