IMMUNOTRAK

Proposal Document

by:

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ABSTRACT / EXECUTIVE SUMMARY

This document outlines the features of ImmunoTrak, which is a web-platform that seeks to accomplish full immunization access for the African children between 0-5 years old by tracking vaccination defaulters, sending vaccination reminder alerts to registered parents mobile phones in addition to analyzing vaccination data in real time from a supported database.

Successful implementation of this platform in conjunction with the Government and some related Non-Governmental Organizations, for example, UNICEF and the World Health Organization's (WHO) affiliations in Africa will generally increase the number of vaccinated children annually. As a result, child mortality as a result of otherwise preventable childhood killer diseases will significantly decrease.

CHAPTER 1: INTRODUCTION

1.1 Introduction

Every year, vaccines prevent more than 2 million child deaths in the world. An additional 2 million could be prevented if a proper approach is taken to improve the efficiency of the immunization process, especially in Africa, where most of the deaths due to lack of vaccinations occur.

1.2 Problem Statement

ImmunoTrak will help achieve the child mortality reduction goal by increasing accessibility to vaccination routines and follow up procedures which are an essential part of the full immunization programmes. This way, the children will get fully vaccinated in a process that will also actively engage their parents or guardians as a part of a vaccination awareness and education programme conducted by the involved governments and organizations.

While keeping this in mind, I intend to build a platform to be used by the immunization health workers to achieve the following:

- Keep track of locations/regions where immunizations have not been done, are ongoing or have been completed for better convenience.
- Capture the information of the children during the immunization process to avoid omissions.
- Capture the parents' information to easily keep track of the children whose information has been submitted.
- Store a database of the children's photos for easier identification in case reference is needed.
- Allow for the health workers to contact the parents on matters related to their children's future immunization needs i.e. dates and the types of immunizations needed.

- Allow real-time analysis of the vaccination data and display it on a relevant platform.

1.3 Justification.

This will be suitable because the users (vaccination health workers, doctors and medical analysts) will not have to pull the paper records to get the information they need. Moreover, the implementation will be done on a web platform, therefore, the users will work at their convenience since it will be easily accessible (with the correct credentials of course).

1.4 Objectives

- Acquire the vaccination process from relevant sources, in this the government and other
- organizations that have done immunization before.
- Design an implementable information flow diagram from the information provided.
- Create a web app for the same using Python (Django), HTML, CSS and an SQL database.
- Roll out the application to the client for the testing for approval.
- Deployment on approval.

1.5 Methodology

The techniques used to acquire information and data required for this whole project included:

- Phone call interviews with some of the on-site vaccination health workers
- Manual records and analyses of previous vaccination campaigns as documented by the government and the NGOs involved in the exercises.
- Online research on immunization methodology and procedural observations.
- Statistical documentation of the data collected from the previous exercises.

The type of data that was mainly considered revolved around the number of children immunized successfully, the number of children that died as a result of not being immunized and the geographical regions covered during a particular vaccination exercise.
Moreover, the number of days within which the processes took place were included as part of the study to provide a much more detailed and informative analysis of the general efficiency of the whole process in terms on time consumption and resource allocation per day.

1.6 Conclusion

We can, therefore, conclude that the whole exercise was a resounding success given the amount of co-operation we received from all the involved parties and the amount of constructive information we received.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Vaccines can generally be delivered in two ways, either as part of a vaccinating schedule in routine immunization, or on an ad hoc basis limited by time and location in so-called vaccination campaigns. Vaccination campaigns have been used successfully in many instances on a global, regional, national or sub-national basis to administer vaccines to those in highest need. Campaigns may be carried out for reasons including:

- Part of disease elimination or eradication efforts.
- To supplement routine immunization and increase routine immunization coverage within the target regions.

In this section, the current vaccination process will be analyzed, scrutinized and used to determine the scope within which a digital implementation would work in the most efficient manner. The literature review will focus on some of the most devastating childhood killer diseases whose effects were largely felt all over the continent. Some of these diseases are:

- Measles
- Polio
- Meningitis

2.2 Literature Review

In Africa, childhood-killer disease epidemics have previously led to mass deaths of children and/or lifetime paralysis due to lack of immunization. This led to a massively promoted immunization campaign by the WHO and UNICEF to curb the epidemic.

Measles, for example, is highly infectious and one child getting sick means many other children around them will most likely be infected too. In order to fully contain a measles epidemic like that, follow up immunizations are a must. Periodic follow-up immunizations within 2 to 4 years of the first dosage administration should be done for full protection against the diseases.

In developing countries, however, this proves hard to achieve, mainly due to accessibility constraints and unsystematic or centralized vaccination schedule record-keeping methods for each child involved in the exercise. Moreover, the parents may not able to be reached hence the follow-up procedures may end up not being done at all.

Also, there's a largely misguided notion in some regions in Africa that vaccines are not safe. This sometimes leads to people avoiding vaccines entirely. As a result, many of the vaccination campaigns in such regions are ignored by the residents. This hinders the whole process and provides a major setback in terms of maximum immunization impact in the continent.

2.3 Conclusion

Vaccination campaigns have been carried out in Africa for a long time for various reasons. For injectable vaccines; measles, meningitis and IPV vaccines, the results have been inconsistent. The factors which have determined success includes the partners involved, the degree of planning and the population vaccinated. With respect to the uptake of the vaccine, important factors include risk perception of the disease against which the population is being vaccinated, the fears regarding the safety of the vaccine and previous experience with the vaccine are the ones which may drive vaccine avoidance behaviour.

CHAPTER 3: PROJECT OVERVIEW

3.1 Introduction

The ImmunoTrak project, if implemented as planned, will minimize the setbacks that are currently being encountered during the vaccination process in African regions. The project will enhance connectivity between immunization health service providers and the children, parents and the government. Moreover, the project will aim to educate people about the benefits of immunization thus removing the backward notion that vaccines are harmful to the children.

3.2 Proposed solution

I'm proposing a web application to be used to synchronize all the information gathered during the vaccination exercises. This application will be primarily used by the health workers to collect data which will be synchronized across all devices authorized to access the database. This way, tracing the immunization schedules will be much easier and much more centralized. Moreover, the project will provide a section that provides all the information required by the general public about the immunization processes.

The app works by sending and retrieving data from a real-time database and displaying it on the application. The retrieved data can also be used for statistical analysis after the vaccination campaigns to come up with better strategies to reach a bigger audience and hence save more lives.

The application will be developed using Django, a modern framework that uses a combination of Python and web development technologies (HTML and CSS) to create web applications. As for the backend of the application, an SLQ database will be used to store the information and maximize its synchronized cloud capabilities and flexible storage configurations.

The application will store a snapshot of the data entered temporarily whenever there is a limited network connection before uploading the updated data to the database once the device is back online. This approach will cater to the possibility of loss of data in areas with poor network connections and hence maintain the integrity of the information synced to the database.

3.3 Project Scope

Product description

The product will be used on web browsers on the client's side, i.e. the health workers collecting and updating the data whilst the server end will be maintained using an online console to keep track of the database transactions in real time.

Goals

To create an application that will successfully keep track of immunization campaigns.

Conveniently store the children's information.

Deploy the application once it has been acceptably tested.

Deliverables

Centralized storage of immunization information.

Real-time updating and retrieval of immunization information.

Simple User Interface for ease of use of the application. This will ensure that a manageable learning curve is achieved for the application's users.

Deadlines

The whole platform should be effective, up and running, ready for testing within 6 months. This does not include the period to be undertaken while doing testing on the field during practical immunization campaigns to evaluate the general usability and effectiveness of the application.

3.4 Resources

Some resources are necessary for the project to be satisfactorily delivered. The project will make use of the following resources to be fully and effectively completed:

- Constant and reliable internet connection.
- A database server.
- Test client computers with suitable web browsers.
- Test Mobile devices (Android and iOS) during development and deployment. These devices and emulators should be of a variety of the Android or iOS platforms and distributions to enable me easily identify bugs and cross-version discrepancies when developing the application.
- Development computers with IDEs supporting hybrid app development plugins.

- Collaboratory effort from concerned parties. This includes access to their previous databases and manual records available. This is an important part of the project if full digitization of the platform is to be achieved.

3.5 Preliminary Results and Evaluations

I expect a fully functional application at the end of the stipulated deadline. Moreover, the application will be deployed at the end of the testing phase.

3.6 Conclusion

In conclusion, the project, if implemented, is estimated to make a good impact on the childhood health sector in the region and eventually the whole of the continent.

CHAPTER 4: PLAN

4.1 Introduction

In this chapter, the planning involved towards the implementation of the project is discussed. This generally includes the following modules or topics:

- Project schedule
- Work plan
- Budgeting and cost evaluation
- Conclusion

At the end of this topic, the plan that will be used to actualize the project will be articulately drawn and analyzed.

4.2 Project Schedule/Work plan

After evaluation of the requirements and available timeline for the project completion, I drafted a viable outline based on the ideas, evaluation, implementation and presentation. The chart below shows the schedule:

Timeline / Work Plan	December 2018	Jan - Feb 2019	Feb - March 2019	March - April 2019	April - June 2019
Coming up with ideas					
Drafting the project problem statement					
Project proposal / Requirements specification					
Design, documentation, data collection & analysis					
Coding & software testing					
Project Presentation					

4.3 Budget

This project is estimated to incur minimal costs as most of the resources required are readily available for free or for a negligible price. The only costs to be incurred will be in form of transport cost to meet the client, to data collection sites which are all around Nakuru and Nairobi and Internet usage costs for research purposes, software testing and deployment in addition to development resources available online.

4.4 Conclusion

The ImmunoTrak project should be completed without major hiccups if the plan stated above is implemented fully and effectively.

FINAL CONCLUSION

I can therefore conclude that, the ImmunoTrak project, if implemented well, can be sourced to organizations to help streamline positive change in the childhood health sector in Africa. The project is aimed at helping children in need in the continent and eventually reduce child mortality and/or permanent dependency due to childhood killer diseases.

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