Software Requirements Specification

For

UgaDemos System

Version 1.0 approved

Prepared by

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1. Introduction

This section of the Software Requirements Specifications (SRS) gives an overview of everything included in SRS document with purpose, document convention, reading suggestions, scope, references, abbreviations, acronyms and definitions used throughout the document.

1.1 Purpose

The purpose of this SRS document is to provide a detailed description of the functionalities of **UgaDemos** System version 1.0.
This document will look at the intended features of the system and also provide a preliminary look of the system's user interface and how the system will respond to external stimuli.
The document among other things will talk about the hardware, software and various technical dependencies under which the application will operate.

1.2 Document Conventions

Section 2, the Overall Description of this document gives an overview of the functionality of UgaDemos system. It describes the informal requirements and is used to establish a context for the technical requirements specification in the subsequent chapter.

Sections three, four and five specify the requirements sections of this document, written to describe in technical terms the details of the functionality of the system.

1.3 Intended Audience and Reading Suggestions

This document is intended for all individuals participating in the development of this project *as* the specification from which to implement the working program code, and other respective stakeholders.

1.4 Product Scope

UgaDemos system is a web based system that provides a flexible and thorough analysis of Uganda's population for the past twenty years (1996 to 2016) to the intended users, basing on the following characteristics; Births, Deaths, Total population, Number of migrants per 1000 population, rate of natural increase, Births per 1000 population, Deaths per 1000 population, Growth rate, Net number of migrants, Natural increase and population change.
The system is limited to English language and because of the nature of the dataset provided to us by the instructors, it will not be able to estimate the life expectancy, child dependency ratio, aged dependency ratio, population composition and structure.

1.4.1 Benefits:

i. Provide Statisticians with concise information about the population in the country.
ii. Provide mechanisms for book keeping and storing relevant information about the citizens in different areas in the country.
iii. Provide a platform for government to plan for the people in the country according to the population available.

1.4.2 Goals:

iv. To analyze data about the statistics in the country.
v. To provide a platform that visualize population data graphics such as scatter plots matrix, box and whisker plots, bar plot, and pie charts depending on selected parameters.
vi. To predict the population of future.

1.4.3 Objectives.

- Provide information about the current population in Uganda.
- Provide a brief description about the location, geography, and current administration of Uganda.
- Analyze Uganda's population data for the past 20 years.

- Visualize the population information using graphics such as Box and Whisker plots, Bar plots, pie charts, and scatter plot matrices.
- Draw conclusions based on the observations of the analysis of the population basing on parameters such as deaths, births, birth rate, and others.
- Predict future population over a specific period of time in the future.

2. Overall Description

This section of the document gives the perspective of the system, and entail deeply what functionalities it will provide. It further contains the user documentation and specific user classes of the proposed solution. It also briefly illustrates the operating environment for the system and enlightens on the assumptions and dependencies for effectiveness.

2.1 Product Perspective

UgaDemos system will allow the measure for the dynamics of Uganda's population for the past 20 years based on the datasets provided by the course instructors. This measure is to be in terms of population growth, population distribution, population density, and population change. On the other hand, the software is going to be able to provide valid conclusions depending on the observations from the analysis.

2.2 Product Functions

- calculate population change which is analyzed by measuring the change between population size to another and be able to give supportive information as to why there is such a change (either an increase or decrease). This is calculated by taking one population size of a given year minus the population size of the previous year.
- provide information about the current population in Uganda
- draw conclusions based on the observations of the analysis of the population basing on parameters such as deaths, births, birth rate, and others
- users will download population data and graphics then use them for their own needs.

- Users will also search for specific population data for Uganda for a particular year by entering any year between 1996 and 2016.
- visualize the population information using graphics such as Box and Whisker plots, Bar plots, pie charts, and scatter plot matrices
- predict future population over a specific period of time in the future.

2.3 User Classes and Characteristics

The UgaDemos system users include, population statisticians, and since it will be a web based, they will use their computers and internet to access it in order to know the information about population.

Also, government bodies interested in carrying out population studies (demographics), for example Uganda Bureau of Statistics so that they are able to make informed decisions about economic planning for the future depending on analysis from past experiences.

2.4 Operating Environment

On the Operating system requirement, UgaDemos software is supported on computers having Windows OS, Linux and Mac OS.

The system is developed in R programming language and basically run on the web based platforms, therefore, it is supported by a computer running R environment. For hardware support, a minimum of 64 MB of physical memory, 0.4 GHz of CPU and a storage space of 16MB at max.

2.5 User Documentation

The system will be designed to as simple as possible to use. Therefore, Users may not require some supplementary information about the functionalities of our system.

2.6 Assumptions and Dependencies

For effectiveness, the system will operate on web based platforms specifically on devices such as desktops and laptops.

Assumptions include the following:

- We assume that the system will be accessed via the internet.
- We assume that the system will not affect the user's computer applications in anyway.
- We also assume that user's computer will be at least 64mb of physical memory.
- We assume that user's computer will be at least 0.4 GHz of CPU.

3. External Interface Requirements

3.1 User Interfaces

The UgaDemos' user interface is a web interface, allowing its users to navigate it via menus, text inputs where text is to be entered, drop down select options will also be used by the users to choose amongst many alternatives and other GIU related features. Therefore, its user interface is specifically designed to give convenience to users.

The home interface offers a menu with a list of functions that the system performs. The user can select one of the option on the menu, and is taken to the respective screen. Hence prompting the user to choose what he wants to see or do with the system.

3.1.1 Template of the Home page interface

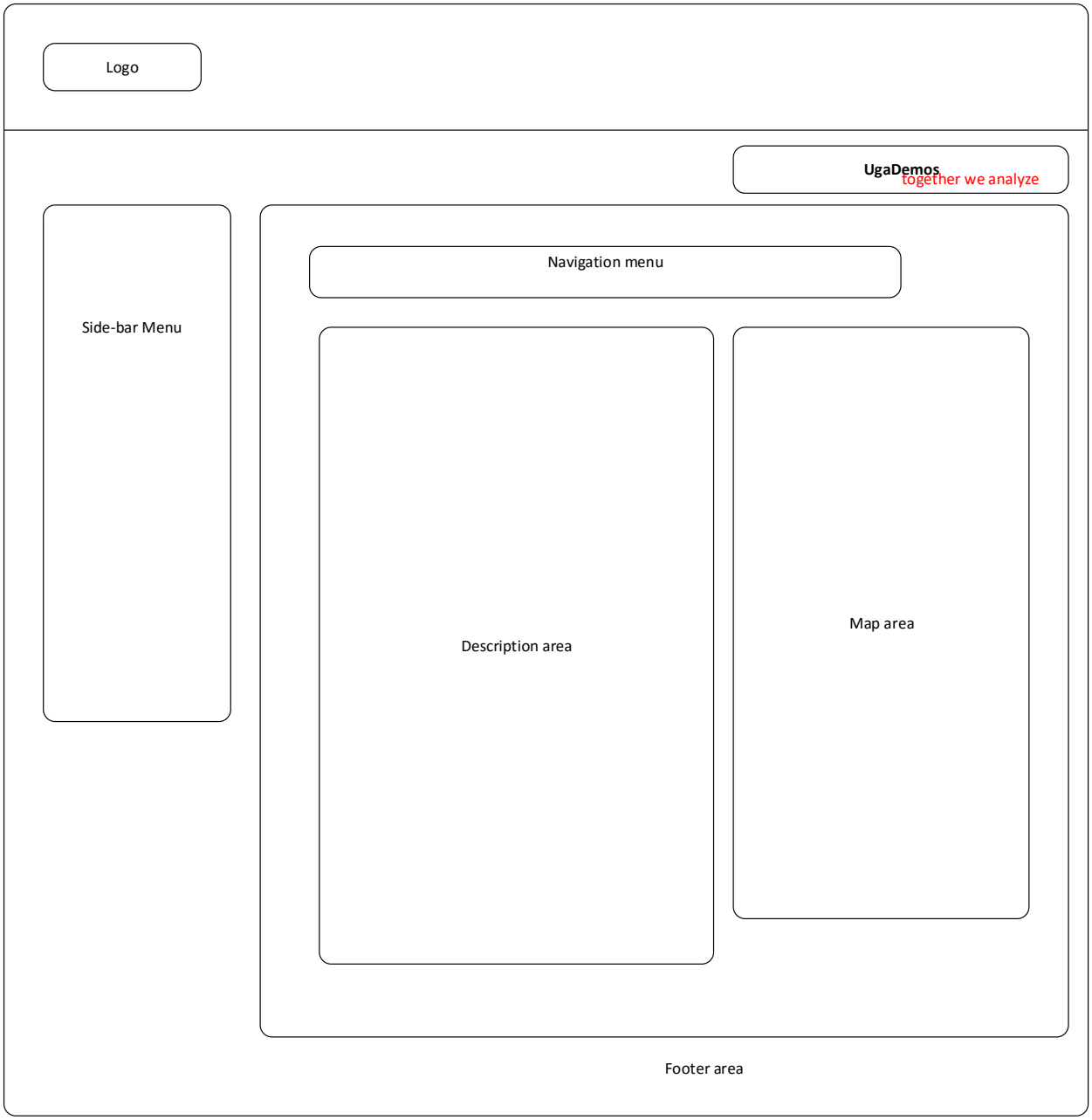

Figure 1.0 Home interface for UgaDemos

3.1.2 Template for the Get Involved interface

On this interface, the user of UgaDemos system will be required to get his or her hands dirty by taking part in the analysis of his or her uploaded data.

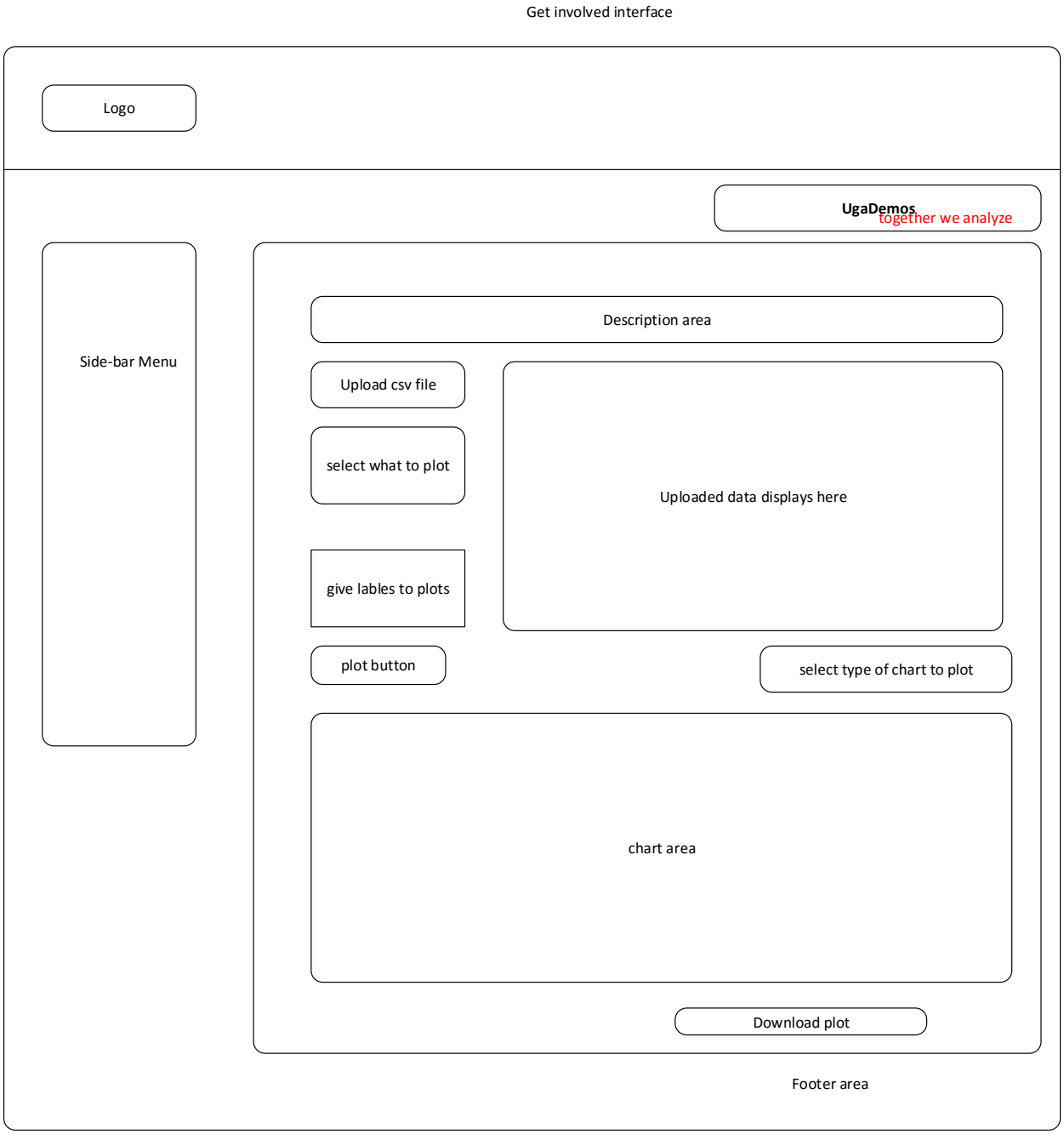

Figure 2.0 Get Involved interface for UgaDemos

3.1.3 Template for the Predictions interface.

On this interface, predictions of Uganda's population data will be made and displayed to the user with supportive information for the observations.

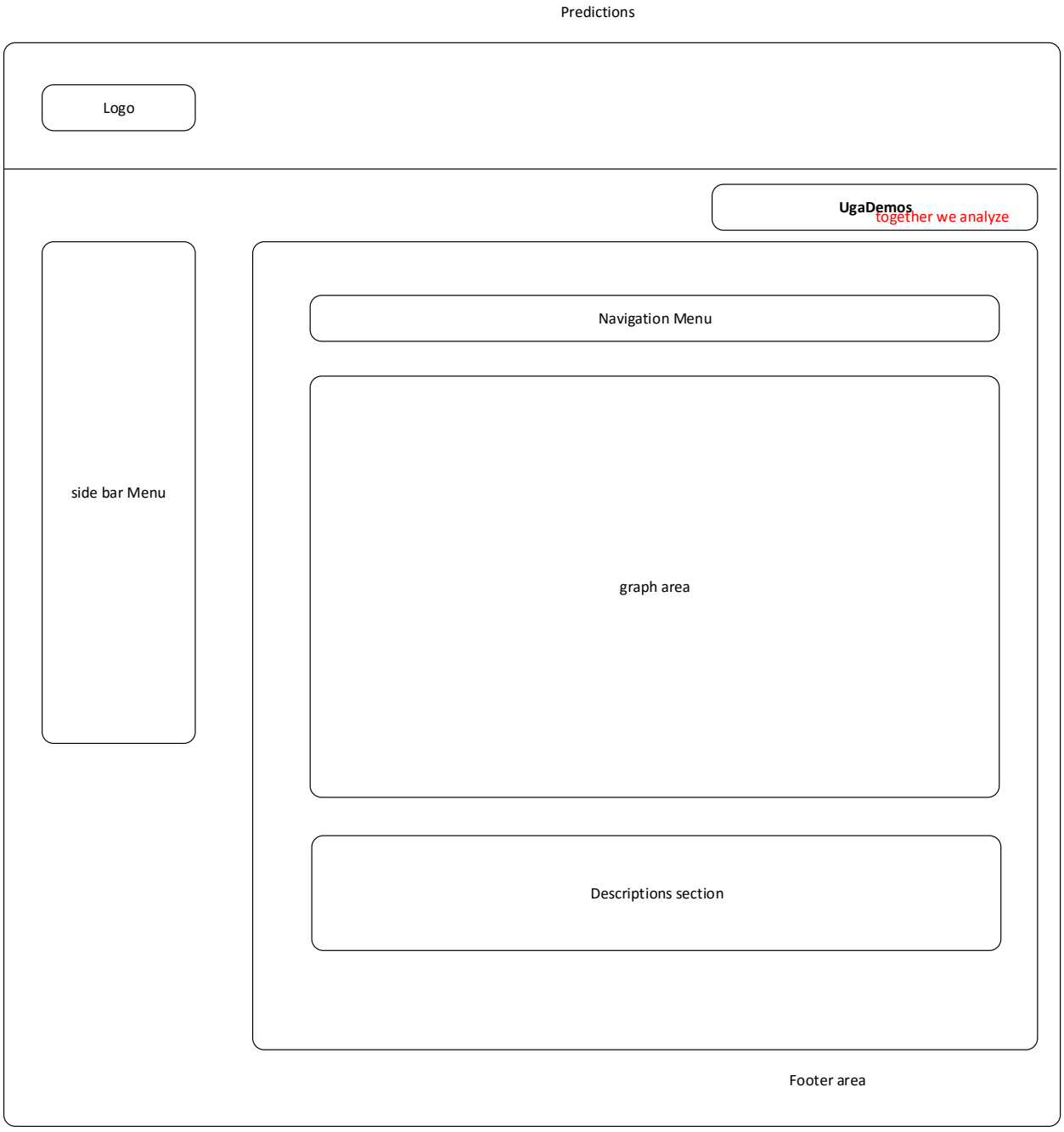

Figure 3.0 Predictions interface for UgaDemos

3.1.4 Template for the FAQs interface.

On this interface, frequently asked questions will be displayed and the user will also be able to leave a question concerning the UgaDemos system.

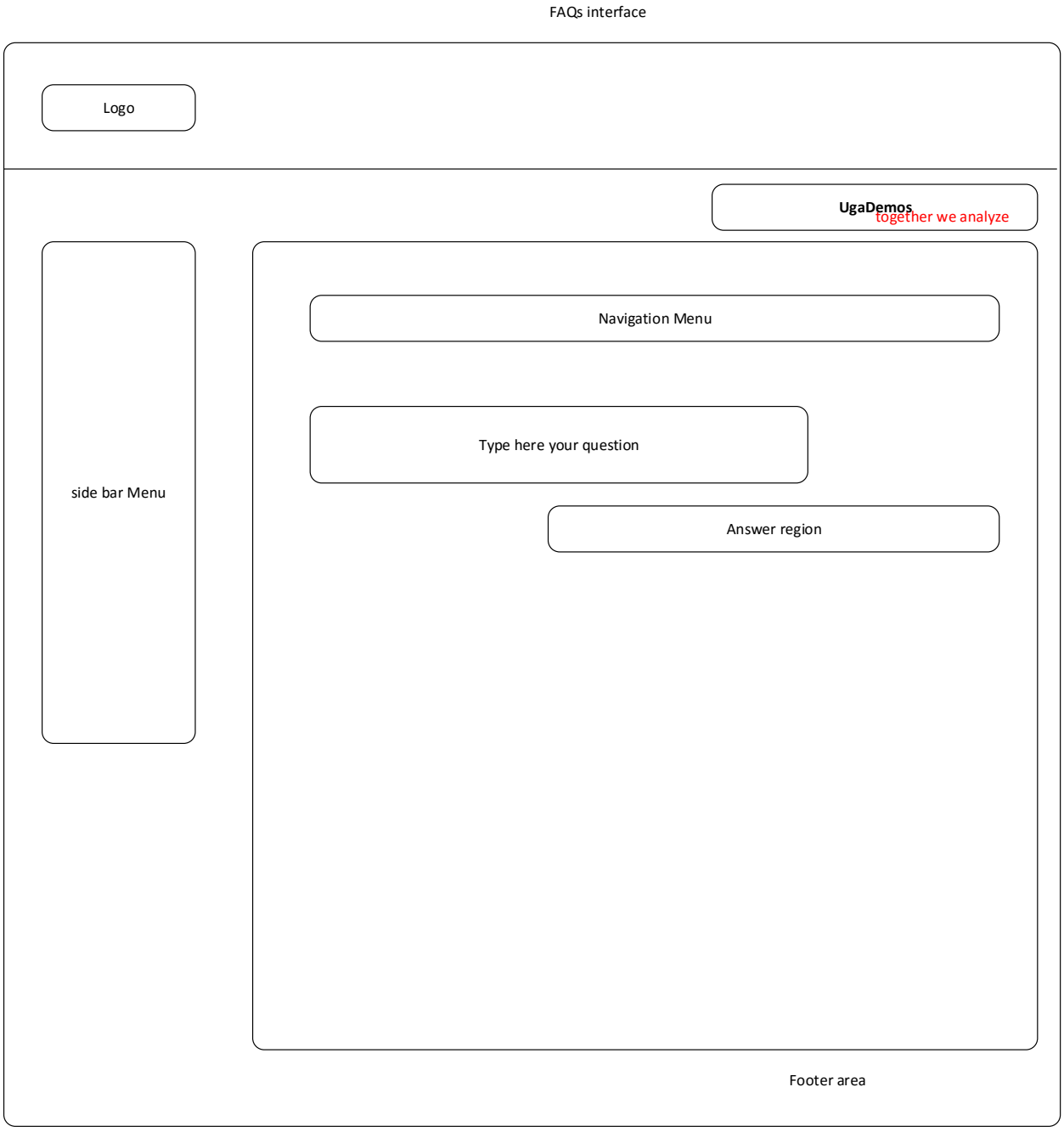

Figure 4.0 FAQs interface for UgaDemos

3.2 Communications Interfaces

The communication between the different parts of the system is important since they depend on each other. Communication interfaces are the means through which system is able to share data and exchange information with users.

UgaDemos shall make use of HTTPs protocols as needed for message transfer at the application layer.
UgaDemos shall make use of various networking protocols such as TCP/IP at the transport layer.

4. System Features (User Cases)

This section outlines the use case, functional and quality requirements of UgaDemos system. It gives a detailed description of the system and its features.

4.1 Description

The system uses CSV files for data input, CSV files having Uganda's population statistics for the past 20 years are imported into the system, their data are cleaned, and sorted then categorized and stored into a data frames.
Current population data for Uganda will be also imported from an external CSV file and will be used for comparison with the previous population data and used to make predictions.
The user can search for population data for a particular year by entering the year between 1996 and 2016 in the search box, he can also select a range of years between 1996 and 2016 and plot graphics for that range of input years.
The system will use the sorted data to calculate the population densities, growth and change for the entire period of the 20 years.
UgaDemos system shall provide the population data in a table form under the Populations section for the users to have a clear picture of how the population data has been changing for the past 20 years.
The system shall also plot graphs for the data, then provide supportive information for the observations, this will be under the section of Statistics.
The cleaned data is also used with the current population data to make predictions about the future population trends.
Below is the use case diagram which summarizes the features of UgaDemos system.

[1] Use case diagram

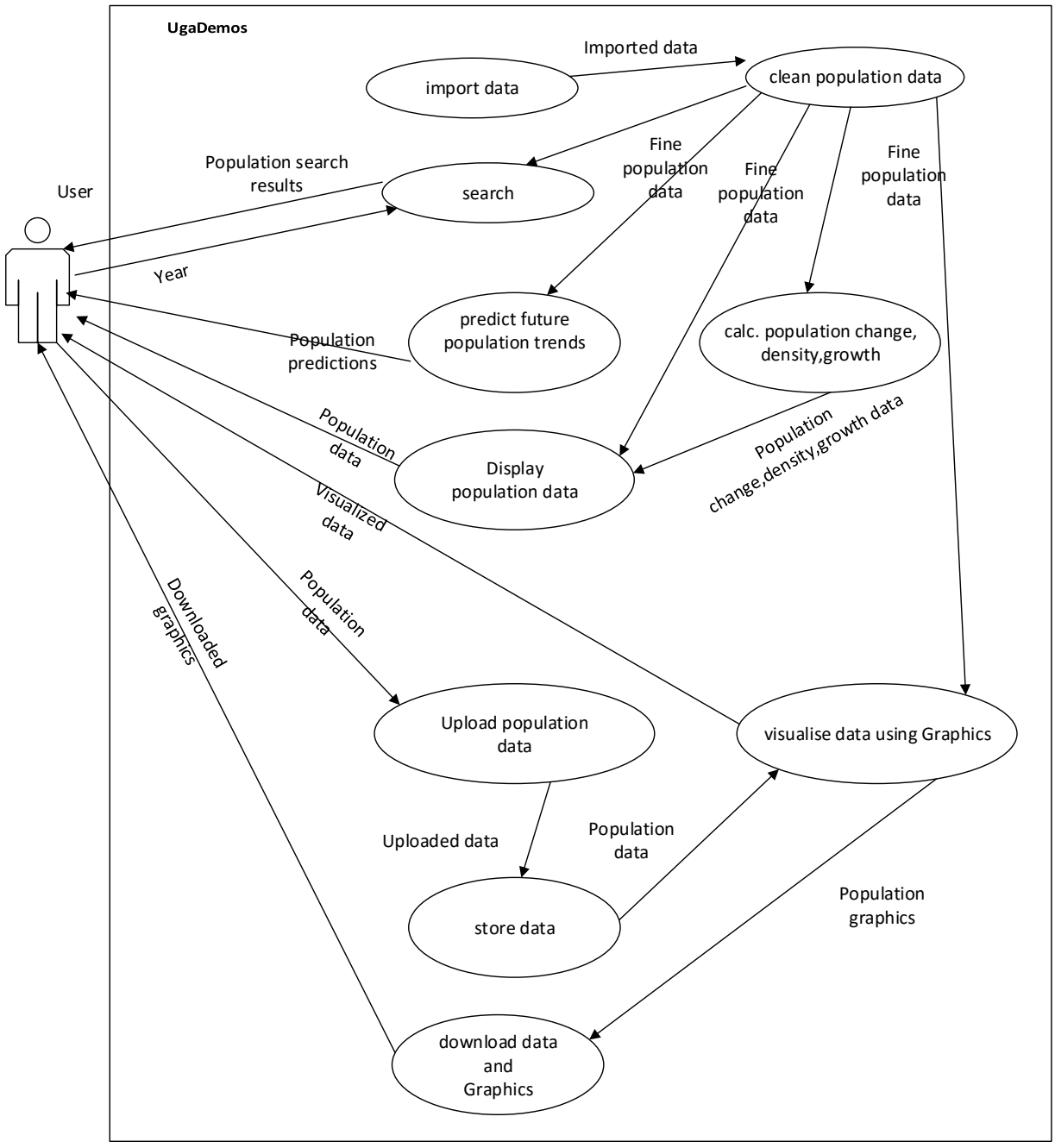

Figure2.0 Use case diagram for UgaDemos system

The tables below show the use cases for the UgaDemos system in details;

4.1.1 Cleaning and organizing data

Name of Use Case	Clean population data
Actor	System
Description	Describes the data organization process
Input	Raw CSV file (population.csv)
Output	Three data frames of organized data
Precondition	The csv file must be available
Steps	i. Import csv file which is stored in same directory as the system files. ii. Imported csv file in (i) is stored into a data frame in the system and then broken down into small sized vectors. iii. Small sized vectors are categorized and then stored into three data frames.
Postcondition	Imported data has been categorized and stored into three data frames.
Assumption	The csv file is in same location as the system file.

4.1.2 Search population data

Name of Use Case	Search.
Actor	User.
Description	Describes the searching process for population data.

Input	Year.
Output	A table of the searched data
Precondition	User has navigated up to the search box.
Steps	i. User clicks in search box and enters the desired year. ii. User clicks search button. iii. System searches in the population data. iv. System returns the searched population data.
Alternative	i. User clicks in search box and enters the desired year. ii. System rejects the year. iii. System sends rejection information.
Postcondition	Searched data has been returned to the user.
Assumption	The entered year is between 1996 and 2016.

4.1.3 Uploading data

Name of Use Case	Upload data.
Actor	User.
Description	Describes uploading population data.
Input	Csv file containing population data.
Output	Table of the uploaded data.
Precondition	User has navigated up to the interface that requires him to upload the data.(Get Involved)
Steps	i. User clicks Upload population data button ii. A file choose window appears, then user

	navigates his computer and choses the file and uploads it. iii. System stores and then displays the Uploaded data in table form. iv. User selects the desired variables to plot graphs. v. User clicks plot button. vi. System plots graphs.
Alternative	i. User clicks Upload population data button. ii. A file choose window appears then user navigates his computer, chooses the file. iii. System fails to pick the file. iv. System gives an error message because of wrong file format.
Postcondition	Data is uploaded and displayed. User is able to plot graphs from her/his uploaded data.
Assumption	The file to upload should only be csv files. The file to be uploaded does not exceed 10Mb

4.1.4 Compute population density, growth and change.

Name of Use Case	Calculate population density, change and growth.
Actor	System.

Description	Describes how to calculate the population density, population growth, population change.
Input	Vectors having population data e.g. natural increase, net migration, etc. and Uganda's total area.
Output	Tables showing population density, growth, change for the past 20 years.
Precondition	Data was already organized and is available from use case 4.1.1
Steps	i. Calculate population density by dividing the total population by Uganda's total area in square kilometer, and store the results into a data frame. ii. Calculate population growth by adding the natural increase to total migrations, store the results into a data frame. iii. Display the results in (i) and (ii) in form of a table to the user.
Postcondition	Population density, growth and change has been calculated and stored by the system.
Assumption	None.

4.1.5 Display population data

Name of Use Case	Display population data.
Actor	System.
Description	Describes the Display population data process
Input	The three data frames from the Clean population data process.
Output	Tables and description of the data.
Precondition	Data was already categorized.
Steps	i. Divide each data frame into two halves and display each half side by side. ii. Provide a brief description of the data being displayed.
Postcondition	Data has been displayed
Assumption	None.

4.1.6 Download data and graphics

Name of Use Case	Download data and graphics
Actor	User
Description	Describes the download data process.
Input	None.
Output	Downloaded data or graphics
Precondition	User has already visited the interface having the download options.
Steps	i. User clicks the download button ii. System downloads the data iii. Downloaded data is saved on the user's computer.
Postcondition	Data and graphics have been downloaded and saved on the user's computer.

Assumption	User knows how to click a button.

4.1.7 Predict future population

Name of Use Case	Predict future population
Actor	System
Description	Describes prediction of
Input	Total population vector,
Output	Population projections in form of data and graphics.
Precondition	Population data is available from use case 4.1.1.
Steps	i. Data frames having population data for past 20 years is regressed. ii. Data frame having current data is also regressed. iii. A comparison of the results in (i) and (ii) is made. iv. Systems makes projections and concludes basing on the observations.
Postcondition	Predictions have been made to the highest degree of accuracy possible.
Assumption	The projections are highly accurate.

5. Other Nonfunctional Requirements

5.1 Performance Requirements

Performance requirement describe what must clearly be specified in order to assess the performance of the system. The UgaDemos system will be readily available at all times, therefore the user will be required to login so as to access the home page.

5.2 Safety Requirements

For safety of data entered into the system, the user will be required to logout in order to keep his information safe. The system will not affect any other systems or applications installed on user's device and its internal components.

5.3 Security Requirements

UgaDemos will be able to work either online or offline depending on the functionality the user may want to access which implies that the system will be protected by the device's security system and the user' login credentials.

5.4 Software Quality Attributes

The graphical user interface of UgaDemos is to be designed with usability as a priority. The system will be presented and organized in a manner that is both visually appealing and easy for the users to navigate.

To ensure reliability and correctness, there will be zero tolerance for errors in the algorithm that computes and splits different sets of data. Data as entered will be correctly calculated and stored.

To ensure availability, the system will be reused whenever it is needed during the critical months of updating the directory.

With UgaDemos being ported solely for web based platforms, this system has an advantage of being portable and convenient to use everywhere at any time.
The user interface of the system will be simple enough that users will take no time to learn its features and navigate through it with little difficulty.

Appendix A: Glossary

Acronym	**Description**
CSS	Cascading Style Sheets
HTML	Hyper Text Markup Language
R	Statistical programing language
Demographic	Study and analysis of human population
UgaDemos	UgaDemos is made up of two major words **Uga** standing for Uganda the country and **Demos** a Greek word which means people.
GUI	Graphical User Interface

6. References

- [1] [Gary_B._Shelly,_Harry_J._Rosenblatt]_Systems_Analysis And Design 9th Edition.