

INMACOM IMS Project
Software Requirements Specification
Version 1.0

Revision History

Date	Version	Description	Author
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Software Requirements Specification

1. Introduction

The introduction of the Software Requirements Specification (SRS) provides an overview of the entire SRS with purpose, scope, definitions, acronyms, abbreviations, references and overview of the SRS. The aim of this document is to gather and analyze and give an in-depth insight of the complete **INMACOM Information Management System** by defining the problem statement in detail. Nevertheless, it also concentrates on the capabilities required by stakeholders and their needs while defining high-level product features. The detailed requirements of **INMACOM** are provided in this document.

1.1 Purpose

The purpose of the document is to collect and analyze all ideas that have come up to define the system, its requirements with respect to stakeholders. Also, we shall predict and sort out how we hope this product will be used in order to gain a better understanding of the project, outline concepts that may be developed later, and document ideas that are being considered, but may be discarded as the product develops.

In short, the purpose of this SRS document is to provide a detailed overview of the software product, its parameters and goals. This document describes the project's target audience and its user interface, hardware and software requirements. It defines how our client, team and audience see the product and its functionality. The document will also outline the key information to be shared by the three member states and also highlight the key strategic points to be monitored in each of the basins in the member states as per the IncoMaptuo Resolution document. It will also help any designer and developer to assist in software delivery lifecycle (SDLC) processes.

1.2 Scope

Primarily, the scope pertains to the IMS product features for making the INMACOM project live. It focuses on INMACOM, the stakeholders and applications, which allow data collection, access to and sharing of information between the Basin Riparian States and with the INMACOM and basin stakeholders.

This SRS is also aimed at specifying requirements of software to be developed but it can also be applied to assist in the selection of in-house and commercial software products. The standard can be used to create software requirements specifications directly or can be used as a model for defining an organization or project specific standard. It does not identify any specific method, nomenclature or tool for preparing an SRS.

1.3 Definitions, Acronyms, and Abbreviations

FAQ	Frequently Asked Questions
RAID 5	Redundant Array of Inexpensive Disk/Drives
IMS	Information Management System
GUI	Graphic User Interface
API	Application Programming Interface

1.1 References

The references are:

1. IncoMaputo Agreement
2. IncoMaputo Final Resolution

1.2 Overview

The remaining sections of this document provide a general description, including characteristics of the users of this project, the product's hardware, and the functional and data requirements of the product. General description of the project is discussed in section 2 of this document. Section 3 gives the functional requirements, data requirements and constraints and assumptions made while designing the IMS. It also gives the user viewpoint of the system. Section 3 also gives the specific requirements of the product. Section 3 also discusses the external interface requirements and gives detailed description of functional requirements. Section 4 is for supporting information.

2. Overall Description

This document contains the overall aim of developing the IMS, which is to ensure appropriate, efficient, effective and sustainable technical systems and human resources for collection, storage, management and dissemination of the IncoMaputo water resources related information and data. It further contains a list of the stakeholders and users of the proposed solution. It also illustrates the needs and wants of the stakeholders that were identified in the brainstorming exercise as part of the requirements workshop. It further lists and briefly describes the major features and a brief description of each of the proposed systems.

The following SRS contains the detailed perspective from different stakeholders. It provides the detailed functions of the IMS with user characteristics permitted constraints, assumptions and dependencies and requirements subsets.

○

2.1 Product Perspective

The system will be web-based and will be accessible to users via the Internet. The system will have two interfaces, one for the common internet end users and one for the Data Managers and

Administrators. The public facing system will require no login details or credentials to view the system. The objective of the system is to present information on Water quality, Hydrology, Water Use and Other relevant data and information to end users at the click of a button. The site is targeted to have a very neat and clean user interface with zero to minimal learning curve.

Rather than having different versions to target each specific device; it will have a very responsive interface to accommodate personal computers as well as common handheld devices such as Tablets and Mobile devices. The interface will shrink on Mobile devices and expand on laptop computers to fill up screen space.



2.2 Product Functions

The functions have been divided into categories according to the user types:

2.2.1 Administrator/Data Manager

- ✓ Allow administrator to manage user/data manager accounts
 - A user has a username (unique across all users), password (no restrictions), email address (no restrictions) and company
 - All accounts has to be created by admin
- ✓ Allow administrator to manage roles and permissions for users
- ✓ Allow administrator and data manager to Login and Logout
- ✓ Allow administrators and data managers to upload data. (Excel files and GeoJson for stations)
 - Flow Gauges data must be in excel file format with Date column and Flow (m³/s) column
 - Dam Levels data must be in excel file format with Date column and Percentage Full (%) column
 - Rainfall data must be in excel file format with Date column and Value (mm) column
 - Water Quality data must be in excel file format with Date column, unit column, minimum value column and maximum value column
 - Groundwater data must be in excel file format with Date column and value (m) column

- ✓ Allow administrator to view analytics to analyze and measure web activity, including the use of the system
- ✓ Reset/Change passwords
- ✓ Manage key monitoring stations

2.2.2 Users / Viewers

- ✓ Explore System
 1. Multiple Languages
 - a. PT - Portugues
 - b. EN - English
 2. View Top Navigation to access different modules of the system
 3. Subscribe for notifications/alerts
 - a. When new information is uploaded, an alert is sent to subscribers via their subscription email address on record.
- ✓ Explore Home Page
 - a. View Key Gauging Stations on map with color codes
 - b. View Key Rainfall Monitoring stations on both table and map with color codes
 - c. View Dam Levels on a map and on a table
 - d. View Water quality on both map and table
- ✓ Explore Contact Us
- ✓ Explore Water Quality
 - a. Download and View documents/graphs if any
 - b. View Resource quality monitoring data and information.
 - c. View Information on the existing activities that individually or cumulatively are likely to cause or have caused agreed identifiable significant harmful transboundary impacts. This includes the identification of the discharges of any of the pollutant substances referred to in Appendix E, List E1 of the IncoMaputo resolution document.
 - d. View Information on pollution of watercourses following an emergency incident such as an accident involving the spilling of a harmful substance that found its way into a watercourse, and the remediation thereof.
 - e.
- ✓ Explore Water Use
 - a. View Records of daily measured inflows and releases,
 - b. Dam storage levels
 - c. Operating rules for reservoirs
 - d. Download Documents if any
- ✓ Explore Hydrology
 - a. View Hydrometric real-time data (daily flows) and rainfall data measured at all agreed monitoring stations in the Incomati and Maputo river basins on map and on a table.
 - b. View historical data.
 - c. Download and View documents/graphs if any
- ✓ Explore Other Relevant data and Information
 - a. Study reports. The information shall refer to data and reports prepared by the Parties on the portions of the Incomati and Maputo watercourses that fall inside the territories of the respective Parties.
 - b. Programs of measures for the implementation of SADC water quality regulations and norms agreed by TPTC.
 - c. Aquatic weeds infestation and translocation control.
 - d. Legislation developed and implemented on water resource management.

- e. Guidelines and methodologies used for assessing the water quality, the character and condition of the in-stream and riparian habitat, and the characteristics, condition and distribution of the aquatic biota.
- f. Guidelines used in determining the water quality required for different water uses.
- g. Guidelines developed for involving the public in water resource management.
- h. Strategies developed for water conservation and demand management by different water use sectors.
- i. Strategies for water resources management developed on national and catchment level.
- j. Guidelines, procedures, strategies and best practices developed on managing and controlling water users and potential sources of pollution.
- k. All new strategies and policies related to integrated water resources management.
- l. Relevant reports prepared by the Parties on portions of the Incomati and Maputo watercourses that fall inside the territories of the respective Parties as they become available.
- m. Policies, guidelines, procedures, strategies and best practices as developed.
- n. Biological approaches to water quality assessment (criteria)
- o. Download and View Documents if any

2.3 User Classes and Characteristics

The typical system user is simply anyone that has access to the Internet and a web browser. It is assumed that the user is familiar enough with a computer to operate the browser, keyboard and mouse and is capable of browsing to, from and within simple systems.

There are three types of users of the system.

1. Administrator
2. Data Managers
3. Users / Viewers

Administrators will be able to manage permissions for the system using out of the box features. Data Managers will have permission to add/update content in the system that is visible to the normal users / viewers. Information added by data managers will be approved by Administrators/Approvers to approve/reject the content Viewers of the system will only use the system to obtain information. The whole site will be read-only to users.

2.4 Design and Implementation Constraints

There are no special constraints for the end user except to have a modern browser that supports HTML5 and an Active Internet Connection on the device.

2.5 Assumptions and Dependencies

- ✓ Datamatics will be responsible for the hosting.
- ✓ Content should be fully edited and adjusted outside the system before uploading.
- ✓ There will be no sign in option via social sites on the system.
- ✓ Anything not mentioned in detail in this document is only content.
- ✓ Emails sent to public users will have both English and Portuguese text in the same email body.
- ✓ All members of states have or will be able to share data in excel files and GIS format.

2.6 Proportioning of Requirements

Data collection is not a concern of this project. As such, it is beyond the scope of this system to collect, analyze and validate data from data loggers, or any other concern of this nature. Additionally, the system is not responsible for the following:

- ✓ Allowing users to manipulate data on the system
- ✓ Verifying data integrity

Additionally, the system may need to later be extended to provide additional functions. One such example is added support for visually impaired users. In many cases a screen reading program is used and ensuring that page-layout reads from top-left to bottom-right in a logical manner would be required.

3. Functional Requirements

Following are the identified components of the system.

3.1 Bilingual Website

A language switch link will be provided on the system header, which will allow visitors to switch from the English language of the system to Portuguese, and vice versa.

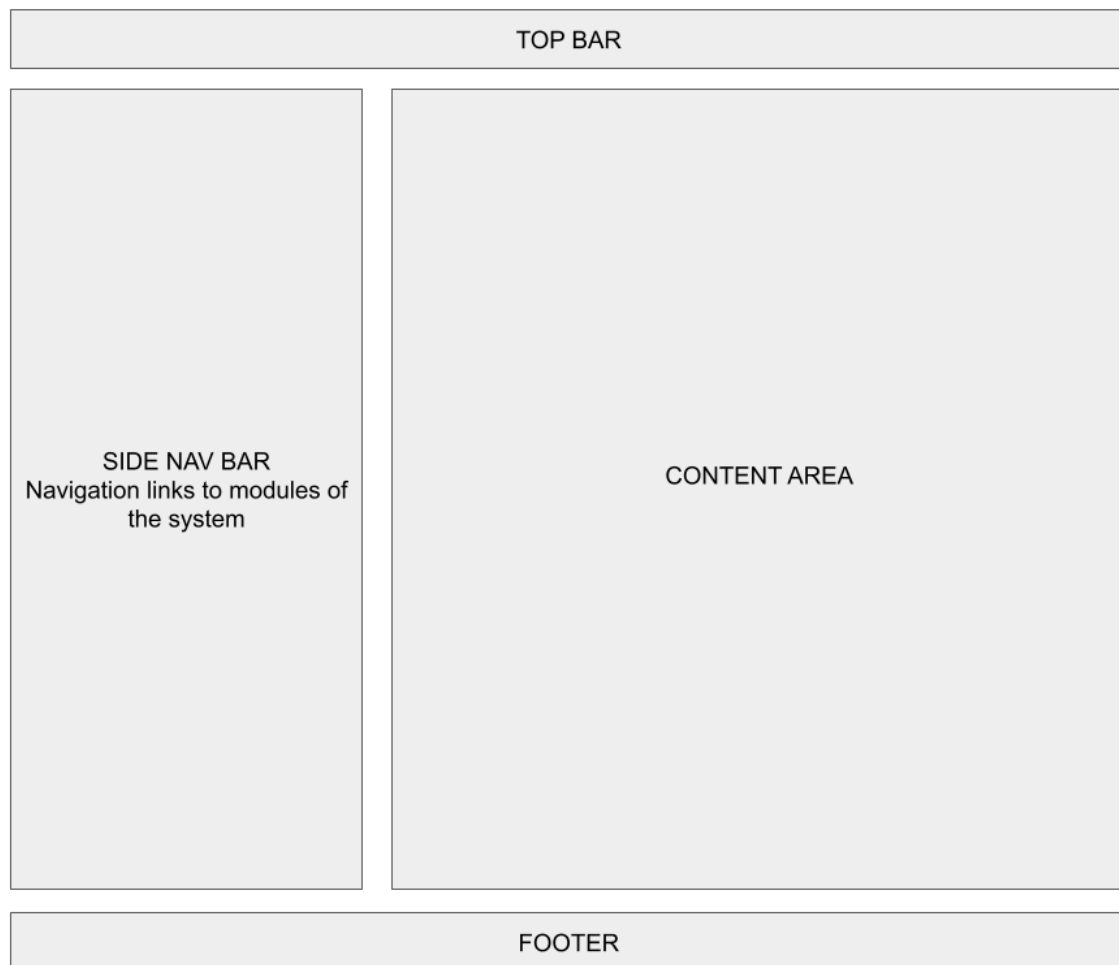
3.2 Page Layouts

A Page Layout is a template for a page that users/admins apply to their content for a consistent layout of information. The zones in the page layouts are used to add web parts. Page Layouts are based on a Master Page and inherit certain controls defined in it. For the MIS, header and footer will be part of the Master Page, this will ensure that the same look and feel is maintained throughout the site and same header and footer are available in each page. Following are the Page Layouts which will be available in the website:

- ✓ Admin Panel Page Layout
 - Applies to administrator panel/portal
- ✓ Home Page Layout
 - Applies to Home Page only
- ✓ Other Page Layout
 - Applies to every other page on the system

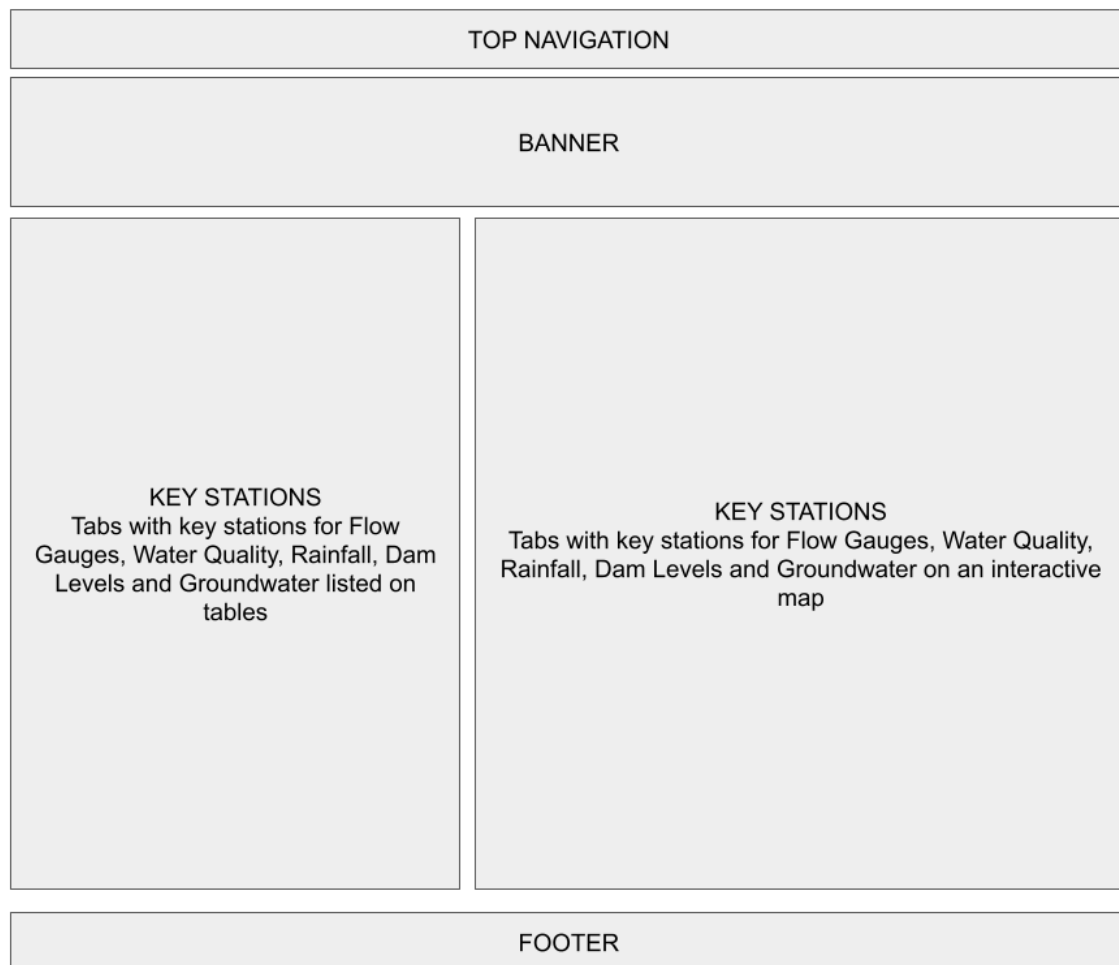
3.2.1 Admin Panel Page Layout

The homepage layout is as follows:



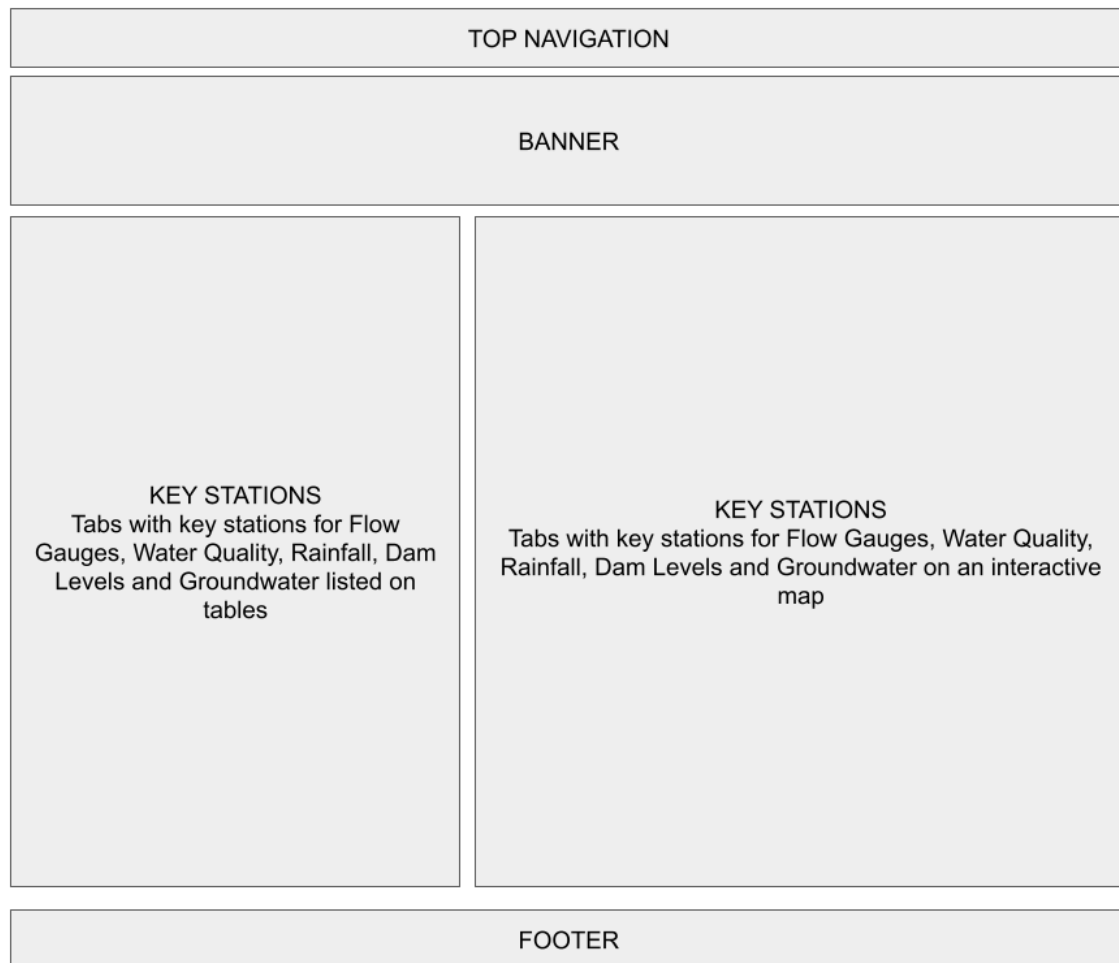
3.2.2 Home Page Layout

The homepage layout is as follows:



3.2.3 Other Page Layout

Other pages layout will be created to achieve the same look and feel for every other page on the system. Following predefined zones will be included in this page layout which will have multiple web parts to render the content.




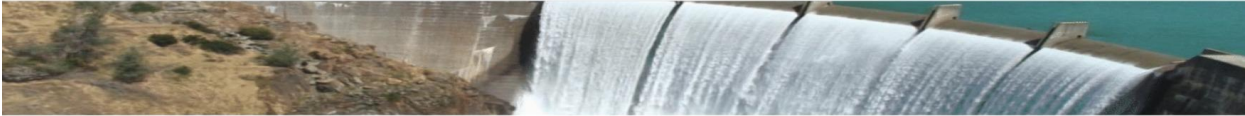
The other page layout will be used in the following sections of the system:

- ✓ Water Quality
- ✓ Flow Gauges
- ✓ Dam Levels
- ✓ Rainfall
- ✓ Groundwater
- ✓ General Information

4. Prototype

Screenshots from the prototype are included below to demonstrate core features discussed above. Each is accompanied with a description.

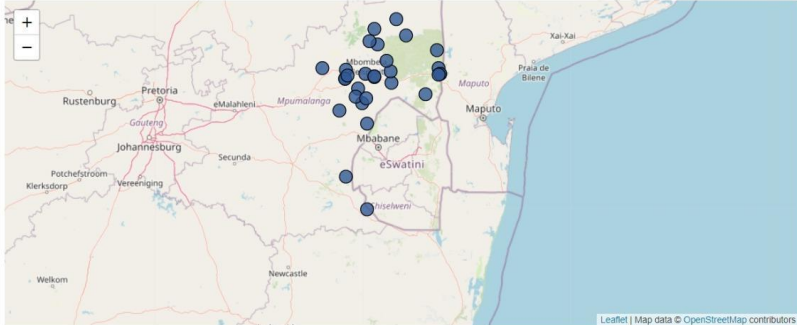

[Home](#)
[Water Quality](#)
[Flow Gauges](#)
[Dam Levels](#)
[Rainfall](#)
[Groundwater](#)
[General Information](#)
[Login](#)
[Register](#)



Stations


STATION	DATE	VALUE
Komati at Hooggenoeg	2022-12-05	8.52 m ³ /s ↓
Komati at Tonga	2022-12-05	8.52 m ³ /s ↓
Outflow from Vygeboom Dam	2022-12-05	8.52 m ³ /s ↓
Komati at Mwetl	2022-12-05	8.52 m ³ /s ↓
Nels at Boschrand	2022-12-05	8.52 m ³ /s ↓
Krokodil at Karino	2022-12-05	8.52 m ³ /s ↓
Queens at Sassenheim	2022-12-05	8.52 m ³ /s ↓
Noordkaap at Bellevue	2022-12-05	8.52 m ³ /s ↓
Krokodil at Montrose	2022-12-05	8.52 m ³ /s ↓
Houtbosloop at Sudwalaskral	2022-12-05	8.52 m ³ /s ↓


[FLOW GAUGES](#)
[DAM LEVELS](#)
[WATER QUALITY](#)
[DROUGHT](#)
[RAINFALL](#)



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This the homepage that every viewer/user will land on when visiting the system. No login is required to view this page.


[Home](#)
[Water Quality](#)
[Flow Gauges](#)
[Dam Levels](#)
[Rainfall](#)
[Groundwater](#)
[General Information](#)
[Login](#)
[Register](#)



Workspace design vector is created by pikisuperstar (freepi)

Sign In

Welcome back! Please signin to continue.

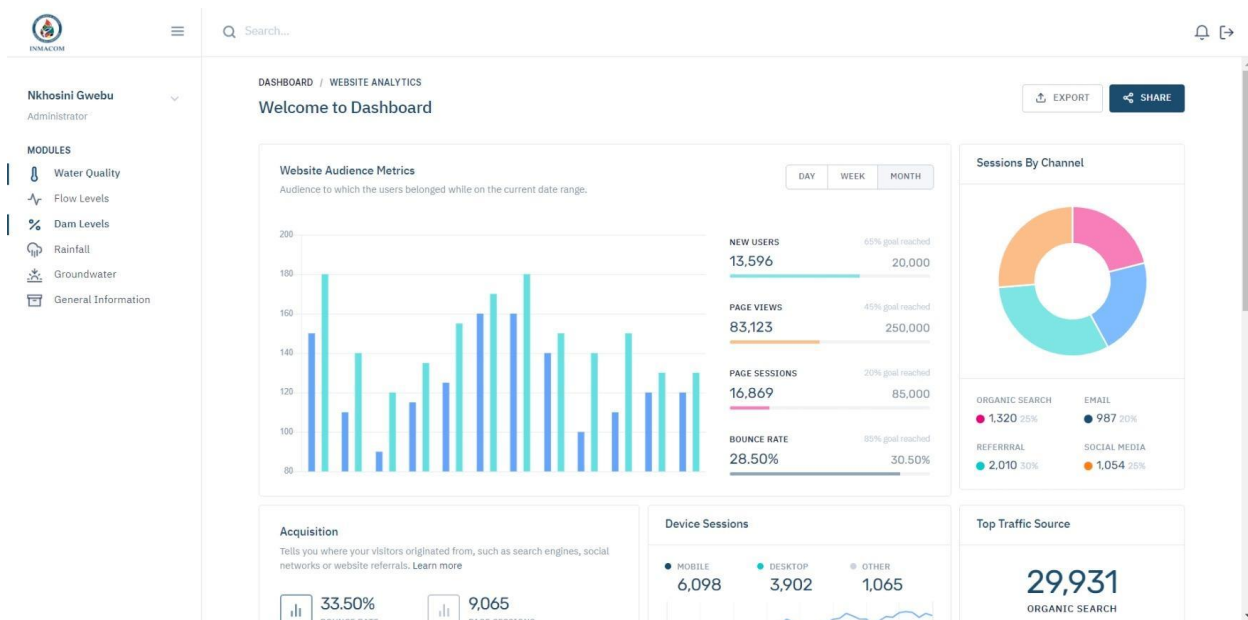
Email address

Password [Forgot password?](#)

[Sign In](#)

[Don't have an account? Create an Account](#)

This is the login page for administrator/data manager. An email address and a password is required for logging in.



After successfully logging in, the administrator will be redirected to their dashboard/admin panel where they will access the modules of the system using the sidebar navigation links.

5. Other Requirements

5.1 Reliability & Availability

5.1.1 Back-end Internal Computers

- ✓ The system shall provide storage of all databases on redundant computers with automatic switchover.
- ✓ The system shall provide for replication of databases to off-site storage locations.

5.1.2 Internet Service Provider

- ✓ The system shall provide a contractual agreement with an internet service provider for T3 access with 99.9999% availability.
- ✓ The system shall provide a contractual agreement with an internet service provider who can provide 99.999% availability through their network facilities onto the internet.

5.2 Performance

- ✓ The system shall be based on the web and has to be run from a web server.
- ✓ The system shall take initial load time depending on internet connection strength which also depends on the media from which the product is run.
- ✓ The performance shall depend upon hardware components of the client/user.

5.3 Security

The system is a public website; therefore all the content will be available for the users. From the administrator's perspective, security management is role-based at all levels, providing coherent security management across the system with a consistent role-based user interface and object model for assigning permissions on objects. As a result, list-level, folder-level, or item-level security implements the same user model as system-level security, making it easier to manage user rights and group rights throughout a system. Administrators will be able to add new groups and define roles at a later time as well.

5.3.1 Data Transfer

- ✓ The system shall use secure sockets in all transactions that include any confidential user information.
- ✓ The system shall automatically log out all users after a period of inactivity.
- ✓ The system shall not leave any cookies on the user's computer containing the user's password.
- ✓ The system shall not leave any cookies on the user's computer containing any of the user's confidential information.

5.3.2 Data Storage

- ✓ The user's web browser shall never display a user's password. It shall always be echoed with special characters representing typed characters.
- ✓ The system's back-end servers shall never display a user's password. The user's password may be reset but never shown.
- ✓ The system's back-end servers shall only be accessible to authenticated administrators.
- ✓ The system's back-end databases shall be encrypted.

5.4 Interfaces

There are many types of interfaces as such supported by the IMS software system namely; User Interface, Software Interface and Hardware Interface.

- ✓ The protocol used shall be HTTPS.
- ✓ The Port number used will be 80.
- ✓ There shall be a logical address of the system in IPv4 format.

5.4.1 User Interfaces

- ✓ The user interface for the software shall be compatible with any browser such as Internet Explorer, Mozilla or Netscape Navigator by which user can access to the system.

5.4.2 Hardware Interfaces

- ✓ Since the application must run over the internet, all the hardware required to connect to the internet will be hardware interface for the system. As for e.g., Modem, WAN – LAN, Ethernet Cross-Cable.

5.4.3 Software Interfaces

- ✓ The IMS system shall communicate with Hydstra to collect data

5.4.4 Communications Interfaces

- ✓ The IMS system shall use the HTTP protocol for communication over the internet and for the intranet communication will be through TCP/IP protocol suite.

5.5 Licensing Requirements

- ✓ Not Applicable

5.6 Legal, Copyright, and Other Notices

- ✓ The IMS should display the disclaimers, copyright, word mark, trademark and product warranties of the INMACOM.

5.7 Applicable Standards

- ✓ It shall be as per the industry standard.

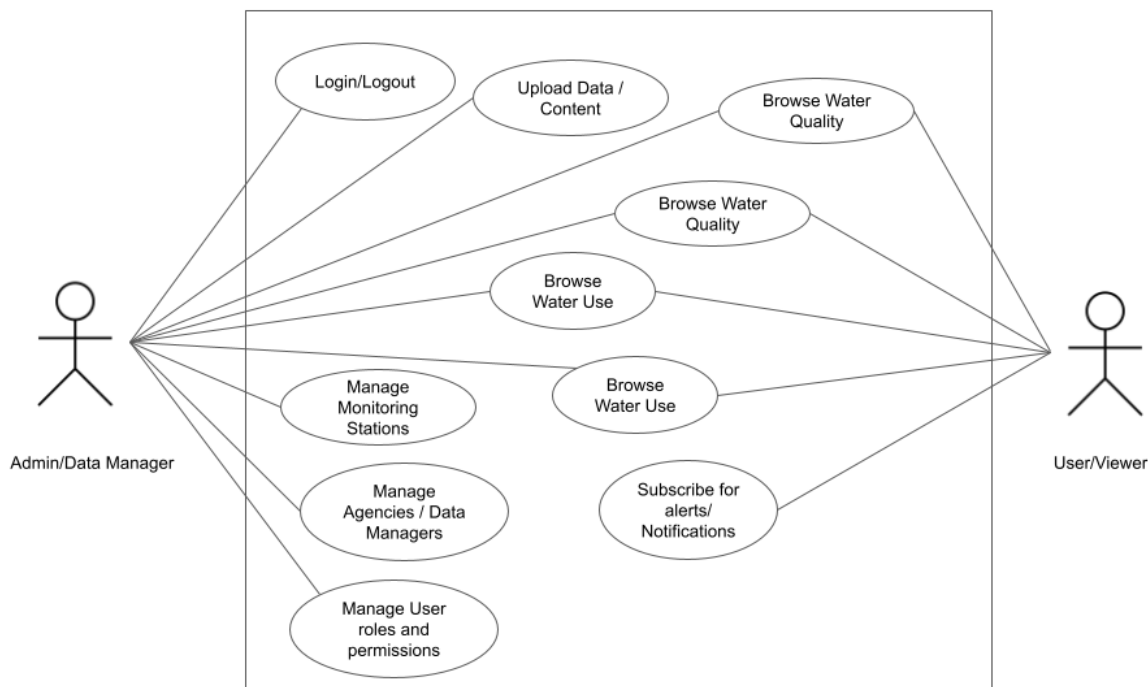
6. Modeling Requirements

6.1 Use Case Diagram

The purpose of this diagram is to demonstrate how objects will interact with the system and map out the basic functionality of the system. Below is a list of the elements that you will see in the diagram on the next page as well as what is included in the use case templates that follow.

Actors	Shown in the diagram as stick figures with a name underneath. They represent elements that will be directly interacting with the system.
Use Cases	Oval shapes that have their names in the center. These represent direct functionality within the system that must be implemented.
Interactions	Lines that connect the actors with the different Use Cases. These show that there is some form of direct interaction between the actor and that specific functionality.
Includes	Dotted lines labeled “<◇” that connect two use cases and have an arrow pointing towards one. This means that the use case without the arrow calls on the functionality of the use case with the arrow.
Extends	Dotted lines labeled “<◇” that connect two use cases and have an arrow pointing towards one. This means that the use case without the arrow takes all of the functionality of the use case with the arrow and adds extra functionality.

The System Boundary	The large rectangle that contains the Use Cases. Everything within the rectangle is what the system is responsible for implementing
Use Case Template	Describes the basic functionality and features of each use case and this can be found in the pages following the use case diagram.
Type	A field in the use case template that states whether or not the use case is directly interacted with by an actor (Primary) or not (Secondary) as well as whether or not it is essential to having a functioning system.
Cross Ref	A field in the use case templates that states which one of the original requirements that particular use case satisfies.
Use-Cases	A field in the use case templates that state which other use cases must be executed prior to that particular use case.



Use Case: Login

Actors: Administrator / Data Manager

Type: Primary and essential

Description: Initiated when a user attempts an action that is restricted. The user is then prompted to enter in their username and password in order to proceed.

Includes: None

Extends: None

Cross Ref: Required for 2

Use-Cases: None

Use Case: Logout

Actors: Manager, Customer, System

Type: Primary and essential

Description: The customer or manager will have the option to logout and if that user is inactive for a given amount of time then that user should be logged out by the system automatically.

Includes: None

Extends: None

Cross Ref: None

Use-Cases: User must have completed the Login use case.

Use Case: Browse Water Quality

Actors: Administrator/Data Manager, Users/Viewers

Type: Primary and Essential

Description: All stations with information on water quality are listed on a single page with each station including its code, name, value date, value, unit of measure, minimum value and maximum value. List should be sorted by code.

Includes: None

Extends: None

Cross Ref: None

Use-Cases: None

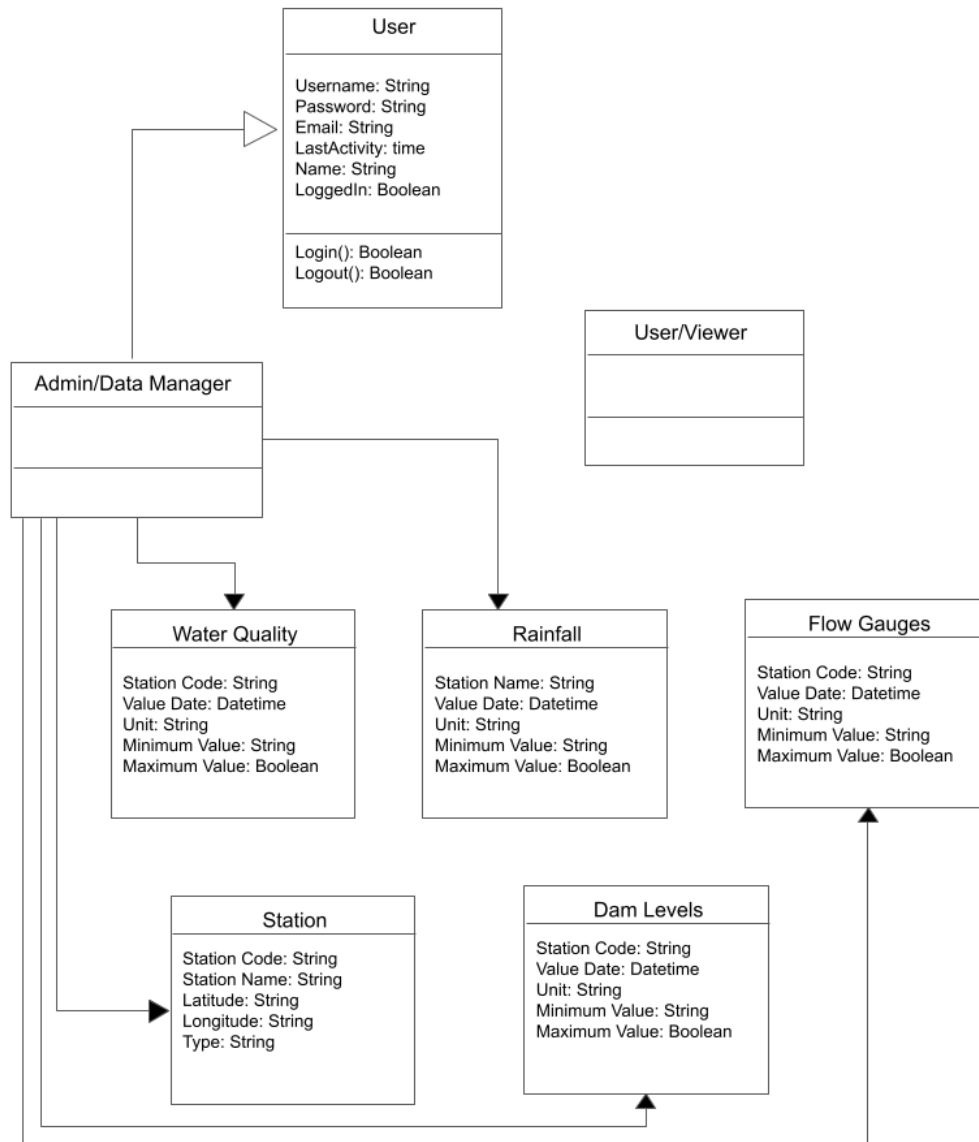
6.2 Class Diagram

The purpose of this diagram is to show how objects within the BECS system will interact with each other in order to achieve the functionality required by the Use Case diagram.

Below is a list of what you will see in the diagram itself as well as the class descriptions that follows.

Classes	Rectangles in the diagram that are split into three parts. The top section is the name of the class, the middle section is the list of variables that are stored in the class and the bottom section is the list of functions in the class. These rectangles represent objects within the system
Variables	These have a name followed by a semicolon and then a type. The type denotes what kind of data can be stored in the variable.
Functions	These have a name followed by a list of any variable that the function receives in-between the parenthesis "()". After that there is a semicolon and any variables that the function may return, if none it will be void.
Generalizations	Shown using a line from one object to the other with an unfilled triangle on one end. The object without the triangle inherits the functionality and variables from the object that has the triangle pointing towards it
Aggregations	Lines that have an unfilled diamond on one end. This means the object with the diamond contains the object(s) without the diamond. This may have numbers on the ends (multiplicities).
Associations	Lines connecting two classes that can have a name beside it, may point in one direction, and may have numbers at the ends (multiplicities). These designate some relationship between the objects. Arrows are simply there to assist you in recognizing which direction the name of the association is read.
Multiplicities	Numbers that may be on the ends of Aggregations and Associations. They state how many

of the one object can be related to the other. The first number is the minimum and the second number is the maximum. An asterisk ‘*’ means many, so “1..*” can be read as 1 to many. If no number exists it is assumed to be 1.



7. Software Requirement Specifications Document Approval

I have reviewed the information contained in this document and approved it through by sign off below:

Name	Signature	Date

The signatures of the people above relay an understanding in the purpose and content of this document by those signing it. By signing this document you agree to this as the formal Software Requirement Specifications Document.