AGRICULTURAL ROUTINE DATA SYSTEM WEB APPLICATION DEVELOPMENT PROJECT

Operations and Maintenance Technical Manual (Zero Draft)

PREPARED AND SUBMITTED BY:
PROJECT TEAM
DEPARTMENMT OF COMPUTER SCIENCE AND ENGINEERING
UNIVERSITY OF DAR ES SALAAM
FOR
JICA TECHNICAL COOPERATION PROJECT
FOR CAPACITY DEVELOPMENT FOR THE ASDP MONITORING AND EVALUATION SYSTEM, PHASE II
MINSTRY OF AGRICULTURE, FOOD SECURITY, AND COOPERATIVES

June 11, 2014

Revision History

Date	Version	Author	Section	Amendment
June 11, 2014	Zero Draft	UDSM	All	n/a

Table of Contents

1 General Information

1.1 System Overview

The Agricultural Routine Data System (ARDS) Web Portal is intended to provide functions where ARDS data from the LGMD2/2i database can be uploaded at the portal, viewed, analyzed, and downloaded for further processing. The ARDS Web Portal aims to enable sharing of the ARDS data broadly among all relevant Local Government Authorities (LGAs) and Monitoring & Evaluation Units of Agriculture Sector Leading Ministries (ASLMs). Such that, officers of authorities can easily access and download the data for their specific demands regardless their computer has LGMD2/2i installed.

The ARDS Portal is a web-based application thus accessible through the Internet by a web browser. Users access all functions provided by the portal through friendly and intuitive interactive controls of the graphical user interface.

ARDS Web Portal can be perceived as a platform on several levels. First, the portal's key source of data is the existing LGMD2/2i which serves as a primary database for ARDS. Second, the ARDS Web Portal database is designed ground-up with flexibility in mind. Data structures such as data elements, forms and user roles can be defined completely freely through the application user interface. These make it possible for the portal to adopt the existing LGMD2/2i of ARDS while offering flexibility to accommodate future changes at the portal user interface.

Third, The ARDS Web Portal architecture and functions is broken up into separate modules. Due to the modular design of portal, it can be extended with additional modules. These modules can live side by side with the core modules of ARDS Web Portal. This is a powerful feature as it makes it possible to extend the portal with extra functionality when needed.

The application delivered in this phase is functional prototype in that it includes the web application graphical user interface, report, pivot table, dashboard and maintenance tools. Functions provided by these tools will be discussed later in this document.

1.2 Authorized Use Permission

This section will provide a warning regarding unauthorized usage of the ARDS Web Portal and making unauthorized copies of data, software, reports, and documents, if applicable.

1.3 Points of Contact

1.3.1 Information

For additional information, UDSM team of ARDS Web Application Development Project can be contacted through Project coordinator: Dr. Honest Kimaro (honest_c@yahoo.com).

1.4 Organization of the Manual

The remaining sections of this manual provide system summary and explanation on how to set up, operate and maintain the ARDS Web Portal. General overview of the system is outlined in section 2 of this document. Section 3 provides an administrator guide on how to install and set up the ARDS Web Portal Server. Section 4 provides a guideline for administrative operation of the portal. System maintenance and troubleshooting guide is discussed in section 5 and 6 respectively.

1.5 Acronyms and Abbreviations

ARDS	Agricultural Routine Data System
ASLMs	Agricultural Sector Lead Ministries
GIS	Geographical Information System
HTTPS	Hypertext Transfer Protocol Secure
JICA	Japan International Cooperation Agency
LAN	Local Area Network
LGA	Local Government Authority
LGMD	Local Government Monitoring Database
MAFC	Ministry of Agriculture, Food Security and Cooperatives
M&E	Monitoring and Evaluation
MSSQL	Microsoft SQL Server
SDS	Software Design Specification
SRS	Software Requirement Specification
TOR	Terms of Reference
TWG	Thematic Working Group
UDSM	University of Dar es Salaam
URL	Universal Resource Locator
VAEO	Village Agricultural Extension Officer(s)
WAEO	Ward Agricultural Extension Officer(s)

2 System Summary

This section provides a general overview of the system. It outlines the uses of the system in supporting the activities of the user.

2.1 System Configuration

The Diagram below illustrate configuration of the ARDS Web Portal. A user can use a desktop, laptop, tablet, Personal Data Assistant (PDA), smart phone or any other device which is running any web browser except Internet Explorer version 7 and below. The device shall be connected to the ARDS Web Portal Server either through the LAN or the Internet. A user will be required to run a web browser and provide URL of the ARDS Web Portal Server. Currently, the web browser communicate with the server using HTTP but later HTTPS will be used to encrypt data transmitted between user's web browser and the server so as to ensure confidentiality of data ,in particular when a user access the server through the Internet.

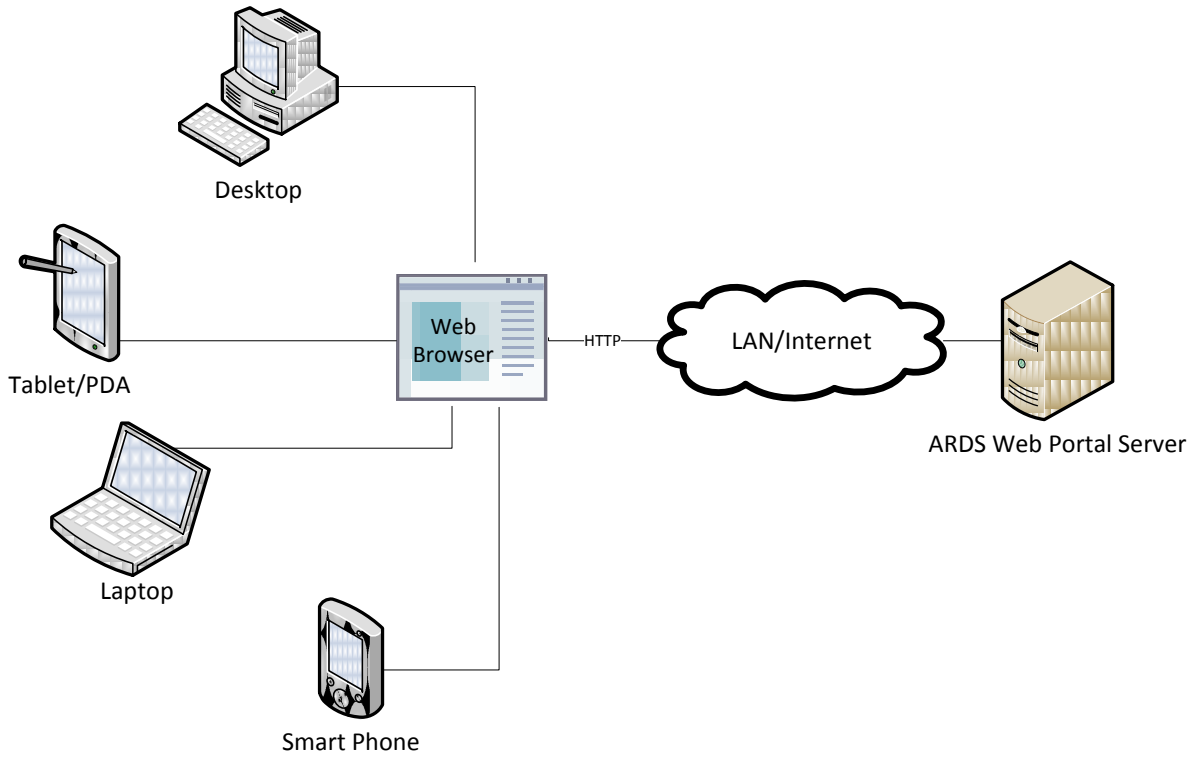

Figure 1: ARDS Web Portal Configuration

2.2 Data Flows

Major data flow in the ARDS Web Portal is transformation of the LGMD2/2i data into the database of the portal so that the data is accessible and can be manipulated by the ARDS Web Portal modules. The Modules, which includes Metadata Search & Browse, Pivot Table, Data Visualize & Charting, GIS Framework, Report, and Dashboard, enable a user to perform the following on the data:

- Metadata search and browse using different properties of content available in the

database and in predefined categories.

- Represent and manipulate the data in pivot table based on existing dimensions such as what data, form which locality and of which period.
- Represent the data in various types of charts.
- View the data on top of a map along with thermal indicators of presented data for association of captured geographical locality.
- Generate ARDS standard reports and various custom reports.
- Create and manage a dashboard that help users to get an overview of important trends or performance of particular variables in charts, graphs, summary tables, maps and headlines.
- Download data from the portal to PDF, Excel, CSV, and-or XML.
- And print out information created by the portal.

2.3 User Access Levels

Information in the ARDS is confidential. Therefore, when a user opens the portal is required to use name and password to get access to the rest of the features. The portal restricts access privilege based on user roles including administrative and normal users.

The administrative user is a super user and can carry out all activities that are supported by the portal including system maintenance and configuration activities.

The portal restricts normal users based on their information access level. In the next phase a list of defined roles and their information access level will be included here.

3 Setting Up ARDS Web Portal Server

The following section details how to set up ARDS Web Portal Server in Windows Operating Systems.

3.1 Prerequisites

3.1.1 Hardware

Below are the recommended hardware standards. Refer the ARDS Software Design Specification for further details.

Figure 2: Hardware Prerequisites

Hardware	Recommended Standard
Memory	• At least 1 GB memory per 1 million captured data records per month or per 1000 concurrent users is necessary. • Recommended **8 GB**
Processor	Quad Core 2 GHz
Hard disk	500 GB
System Type	32 or 64 bit
Operating System(OS)	ARDS Web Portal supports any OS. However, this guideline focuses on Windows Operating Systems.
Network Adapter	Ethernet card or other network specifications.

3.1.2 Software

For the ARDS Web Portal server to work, the following technologies must be installed and properly configured. Refer to the ARDS Software Design Specification for further details of software standards.

JDK 7 (or JRE 7) or higher

Tomcat version 7.0.35 or higher

PostgreSQL 9.2 or higher

Also, the server requires the following Environment Variables to be set

$path	folder is set to ***"C:\Program Files\Java\jdk1.6.0_10\bin"***
$JAVA_HOME	folder is set to ***"C:\Program Files\Java\jdk1.6.0_10"***

Essentially **JDK** must be installed because **Tomcat** requires Java Platform. Thus Java Platform shall be installed first.

A computer system has to be able to locate where the Java Platform is found. Therefore, its **path** must be defined in the Environment Variable as will be shown below along with setting up **JAVA_HOME** folder.

Tomcat is independent from **postgreSQL**, thus either of the two may be installed first followed by the other. However, the **ards.war** file requires **Tomcat** so Tomcat has to start. The ARDS requires the database, thus **PostgreSQL** must be installed and data base connection parameters including username and password must be set so that ARDS can access the database. These directives are provided through a file called **Hibernate.properties.** The system will read this file from its location which, of course, has to also be defined in the Environmental Variables of your computer.

3.2 Install procedure

In order to successful set up ARDS Web Portal server you just need to follow the following steps.

3.2.1 Step 1: JDK installation

- The latest version of JDK is preferred. You may download the latest version of java platform (JDK) from www.oracle.com. In particular, through the following link http://www.oracle.com/technetwork/java/javase/downloads/index.html.
- When the download is complete, run the .exe file of the JDK and follows the instruction until the installation is complete.

3.2.2 Step 2: Set Up Environment Variable

- After the installation of JDK is complete, browse your computer to locate Java bin folder. In Windows operating system, this is often located in the program files within a folder called Java where Java is installed. For example, **C:\Program Files\Java\ jdk1.7.0_45 \bin**. Where **jdk1.7.0_45** depends on the JDK version, for instance JDK version 7 was used in this example.
- Copy the bin folder path located above
- Right-click **My Computer** and click **Properties**
- Go to **Advanced Settings** and then select **Environmental variables.**
- On the new window as shown figure 4, Select the variable **Path** and then go to the **Edit** button.
- In the Variable string append a semi colon at the end and paste the path you copied. In this case **C:\Program Files\Java\ jdk1.7.0_45 \bin** will be added in the variable string.
- Then click the OK button to finish setting up the path.
- Go to the folder that java is installed as explained above, this time don't go to the bin folder, just one step before it. Copy the path. For the above example, the path is **C:\Program Files\Java\ jdk1.7.0_45.**
- Go to the **Environment Variable** as explained above.

- This time select **new** to create new variable instead of **edit**. Remember, there are **System Variables** (lower section) and **User Variables** (upper section). You shall opt for System Variables for your changes to apply to all users.
- The new window will appear as shown in figure 5.
- On the variable name type **JAVA_HOME**
- On the variable value past the copied path. For instance **C:\Program Files\Java\ jdk1.7.0_45** in this example.
- Then click Ok for the New System Variable window and then Ok for the Environment Variable window. And you are done with setting up Environment Variable for Java platform.

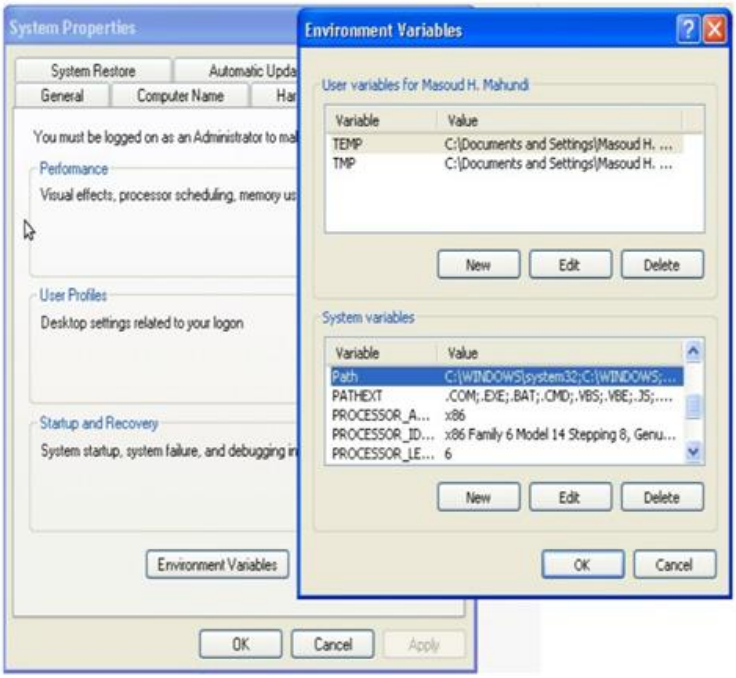

Figure 3: Setting up path for Java

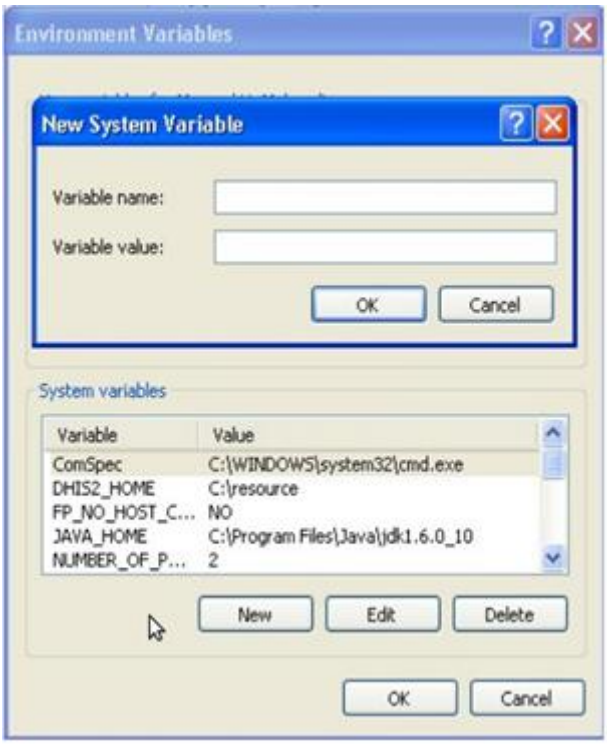

Figure 4: Setting Up New System Variable

3.2.3 Step 3: Install Tomcat

Binary downloads of the **Tomcat** server are available from http://tomcat.apache.org/. This manual assumes you are using the most recent release of Tomcat 7.0.35 or later.

Installing Tomcat on Windows can be done easily using the Windows installer. Its interface and functionality is similar to other wizard based installers with only a few items of interest.

- **Installation as a service**: Tomcat is installed as a Windows service. Using the checkbox on the component page sets the service as "auto" startup, so that Tomcat is automatically started when Windows starts. For optimal security, the service should be run as a separate user, with reduced permissions (see the Windows Services administration tool and its documentation).
- **Port Number**: In the course of installing Tomcat, you will be required to choose the port to be used by Tomcat. Provide the port number which is not commonly used by other applications, for instance 8180 is used in this guide. Also you will be prompted to provide username and password for the administrator user.
- **Java location**: The installer will provide a default JRE to use to run the service. The installer uses the registry to determine the base path of a Java 6 or later JRE, including the JRE installed as part of the full JDK. When running on a 64-bit operating system, the installer will first look for a 64-bit JRE and only look for a 32-bit JRE if a 64-bit JRE is not found. It is not mandatory to use the default JRE detected by the installer.

Any installed Java platform may be used. You may select to use the one you set up above.

- The installer will create shortcuts allowing starting and configuring Tomcat. It is important to note that the Tomcat administration web application can only be used when Tomcat is running.
- After installing you can see if tomcat is running through the browser with the URL **localhost:8180** or using the **port number** you selected. Otherwise go to **services management** by right clicking **MyComputer** select **manage**, Under **Services and Applications** click **services** and see if Apache service is running.
- Refer to the Windows Service HOW-TO for information on how to manage Tomcat as a Windows service.

3.2.4 Step 4: Install PostgreSQL

- Download Windows graphical installer for PostgreSQL which includes the PostgreSQL server and pgAdmin III from http://www.postgresql.org/download/windows/. pgAdmin III is a graphical tool for managing and developing your databases.
- To installing PostgreSQL on Windows just follows steps of the Windows installer. You will be prompted to enter the password for PostgreSQL user. Provide the password and finish the installation.

3.2.5 Step 5: Create the database and populate it with data restoring function

- After installation of the Windows graphical installer of PostgreSQL explained above you will have the pgAdmin in your programs list.
- Click Start > All Programmes > pgAdmin III.
- Double-click the server appearing in the list. If it is the first time add a new server by clicking File > Add Server.
- Connect to Server Window will appear as shown in the figure below.

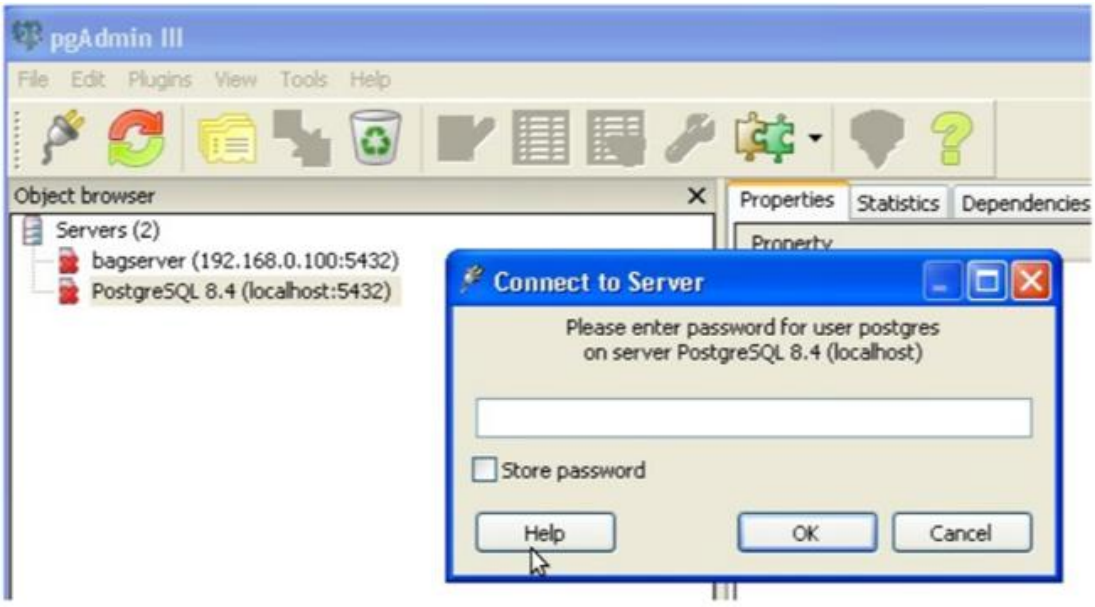

Figure 5: Connect to PostgreSQL Database Server

- Enter the password you entered during the installation and select OK. The window will appear giving you the chance to define a new database. However, you need to create the login role first, kind of a user account that will access the database.
- Right-click the **Login roles** and click **New Login Role.** In the following window, fill in three fields **Role name** and **Passwords fields** (In this guide a role name is **DHIS).**

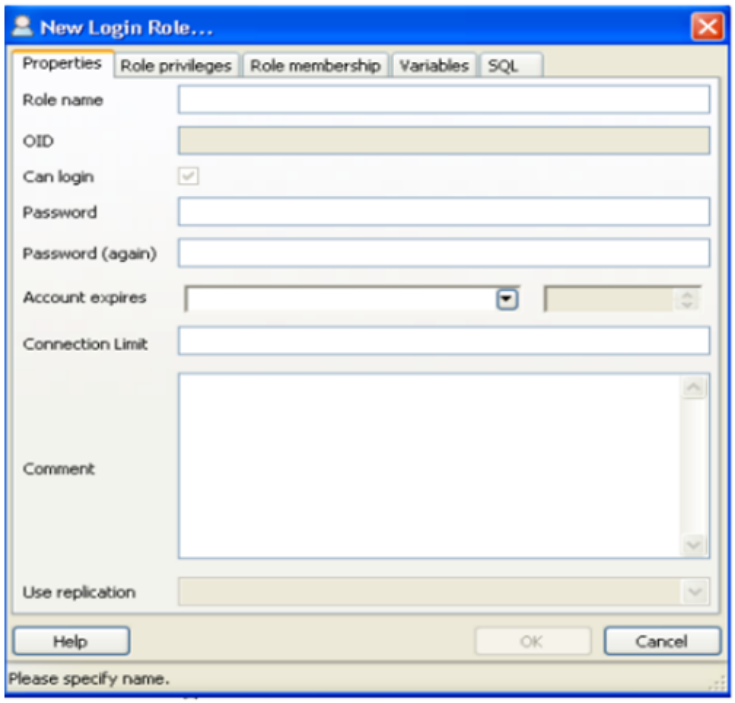

Figure 6: Create New Login Role

- Select **All** in the **Role Privileges** tab to grant all **privileges** to the created role.
- Select OK to finish creating the role
- Then right-click the **Database** and click **New Database** and a window will appear prompting you to enter the name of the database and the owner.
- Provide **Name** for your Database and select form the **Owner list**, the login role you created. Leave other options as they are.
- If you have a back-up database (file with an extension **.backup**) you will need to restore it in the created database. Right-click the database you have created and click **restore**, and then browse for the back-up file in the filename section.

Figure 7: Restore Database

- Leave the verbose option checked so that you see the process of importing data to your database.
- Then Click OK to finish restoring the database.

3.2.6 Step 6: ARDS Connection to the Database

Hibernate.properties file shown below is used to point the database which the **ARDS** should use. The file contains the configuration details including the database name, username and password for accessing the database. You will need to edit values of some parameters to have the configuration you have set up.

*hibernate.properties

```
# PostgreSQL
hibernate.dialect = org.hibernate.dialect.PostgreSQLDialect
hibernate.connection.driver_class = org.postgresql.Driver
hibernate.connection.url = jdbc:postgresql:dhis_2
hibernate.connection.username = dhis
hibernate.connection.password = district
hibernate.hbm2ddl.auto = update

# MySQL
#hibernate.dialect = org.hibernate.dialect.MySQLDialect
#hibernate.connection.driver_class = com.mysql.jdbc.Driver
#hibernate.connection.url = jdbc:mysql://localhost/dhis2tes
#hibernate.connection.username = root
#hibernate.connection.password = root
#hibernate.show_sql = true
#hibernate.format_sql = true
```

Figure 8: hibernate.properties configuration file

For PostgreSQL users

- Edit from the **third line,** after the phrase **postgresql:,** append the name of the database you created earlier, for the above file dhis_2 is the name of the database.
- In the fourth line, write the **username** for accessing your database, for the above file is dhis.
- In the fifth line write password for the username above, for the above file is district.

For MySQL users

- The Second part is used for users who uses MySQL database. Use harsh sign (#) as shown above to comment the lines and will not be used for configurations.
- Save the **hibernate.properties** file to a folder.

3.2.7 Step 7: Set Up DHIS2_HOME Variable.

- Set this environment variable in your computer to point to where your hibernate.properties file is located.
- Use the normal procedures of defining the new Environment Variables as explained in step 2 when defining JAVA_HOME. But in this case, add the following values

  Variable Name: DHIS2_HOME

  Variable Value: Add the path where your hibernate.properties is found, Eg. C:\resource

3.2.8 Step 8: Set up ards.war file in the webapps folder

- Stop Tomcat application through the services management by right clicking MyComputer > manage.
- Under Services and Applications click services and put the latest ards.war file in the webapps folder.
- If defaults setting were used during installation The path to the webapps folder is C:\Program Files\Apache Sofware Foundation\Tomcat\6.0\webapps
- Then Start Tomcat from the list of services through the services management by right clicking MyComputer > manage.
- Try to access the ARDS through your browser with the following address **localhost:8180** (If you used same port described in step 3).
- You should be able to view the login page of the ARDS Web Portal. If not, make sure that you have correctly followed the steps explained above.

3.3 Rollback or Un-install procedure

To Rollback follow the steps below.

NOTE: You should un-install/remove/delete a program, Environment Variable and-or file only if it was explicitly installed for ARDS Web Portal server setup. This is to avoid affecting other programs that might have been using some of the programs or configurations that were also used in the ARDS Web Portal.

- Remove (delete) the ards.war file from the webapps folder
- Delete the DHIS2_HOME Environment Variable
- Delete hibernate.properties file from its location.
- Un-install PostgreSQL from the programs using normal Windows program un-installation procedures.
- Un-install Tomcat from the programs using normal Windows program un-installation procedures.
- Delete the JAVA_HOME Environment Variable and remove the java path which was added in step 2.
- Un-install JDK from the programs using normal Windows program un-installation procedures.

4 Administrative ARDS Web Portal Operations

This section provides a guide on how to perform administrative ARDS Web Portal operations. A guide on how to perform other basic operations is provided in the ARDS User Manual.

4.1 Starting ARDS Web Portal

To know that the ARDS Web Portal server set up is complete and the server is up and accessible you must use another computer which is connected to the server through LAN/ Internet and follow the following steps

- Start →All Programs →Google Chrome (Or any other browser except Internet Explorer 7 and below)
- Enter URL for the ARDS Web Portal Server. For instance http://176.58.114.36:9000, a URL to the demo server.

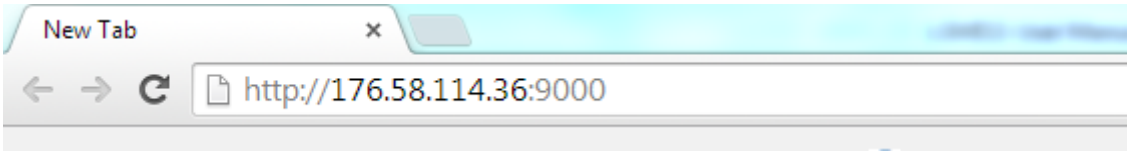

Figure 9: Entering URL to the Web Browser

- Then Press ENTER. The following login screen shall open

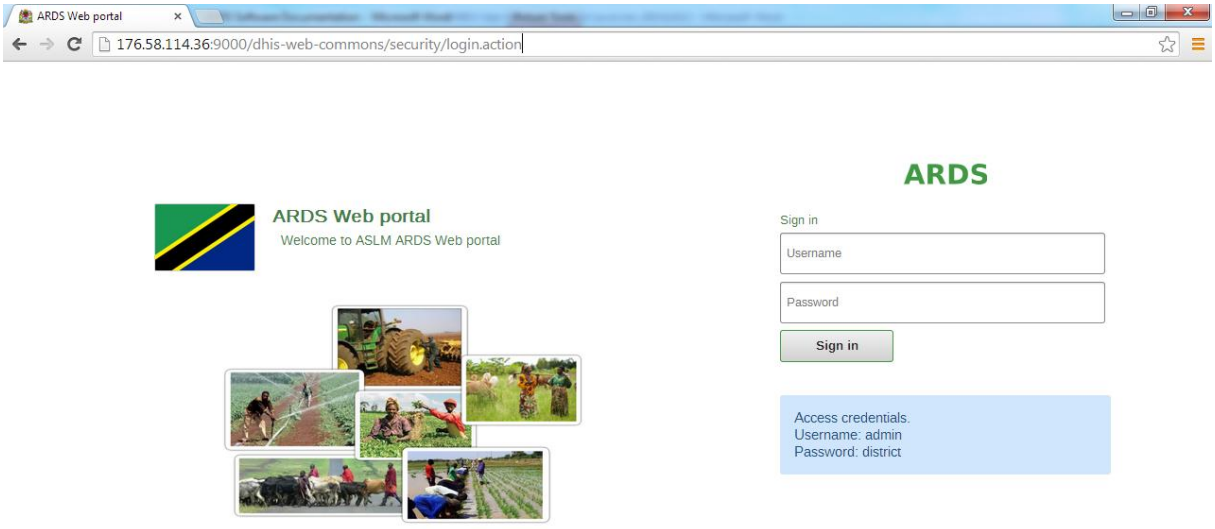

Figure 10: Login Screen

- Type the default administrator account "**admin**" and password "**district**" correctly and click "Sign in". The default page (Home page) shall open.

- On your first login as an administrator you must update your account information and change the password by following similar steps discussed in the ARDS user manual. Also, must disable any other existing accounts for security purposes. How to view and disable existing account is discussed in the next section of this technical manual.

4.2 Managing Users

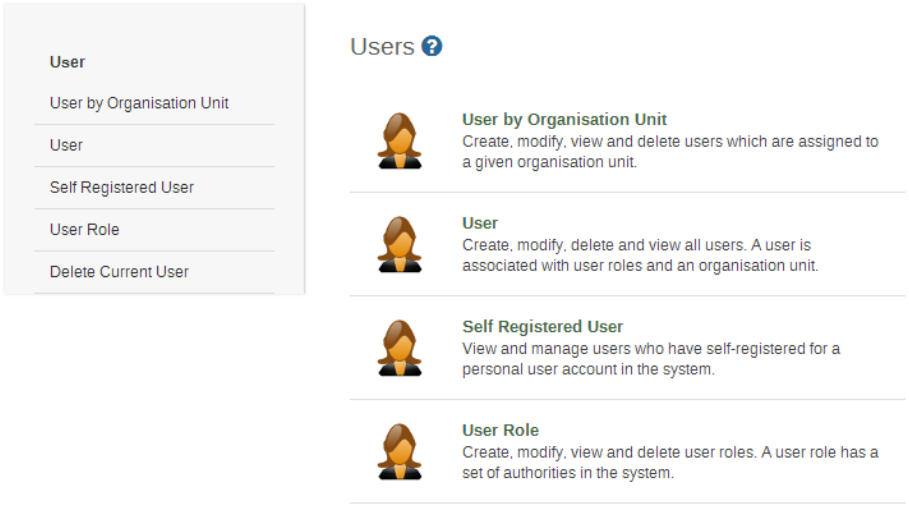

Figure 11: GUI for Managing Users

4.2.1 View Users

- To create or find a user begin with clicking on the 'user' module displayed in the drop down menu of the Maintenance module located on the main menu bar on the top part of the displayed screen after login.
- Select User
- User names already registered will appear as a list as seen in the screen shot below.

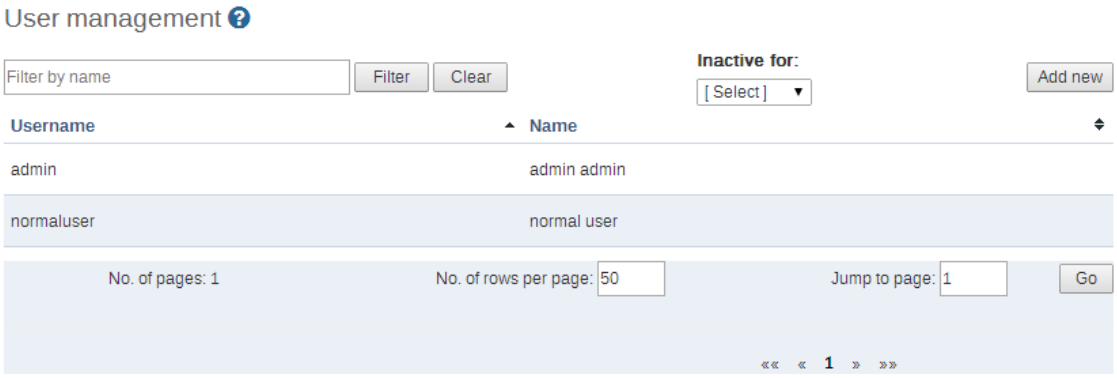

Figure 12: Displaying List of Users

- You can search for specific user names in the user list by entering the name in the 'filter by user name' field as shown above.

- You can disable, remove, edit or view details of the existing user by left click on the user in the list.

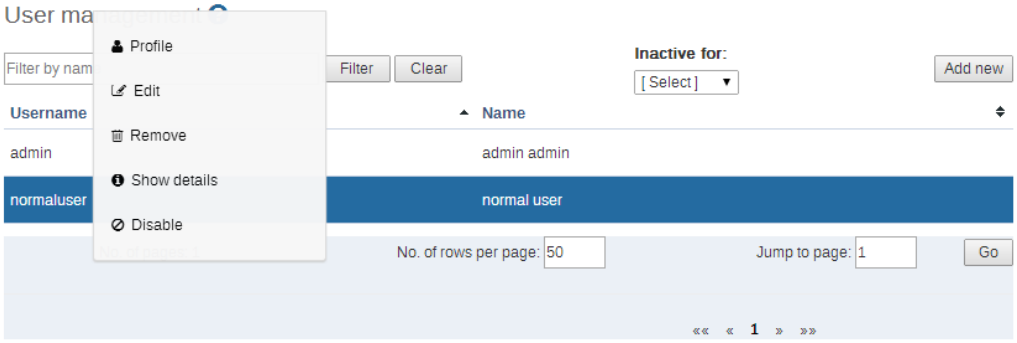

Figure 13: Popup Menu for Managing Existing User

4.2.2 Define a new role

- As part of creating a user name you are required to define the user role. Do so by clicking on the 'user role' appearing on the left side of the displayed screen. This will lead you to the Role Management page where you will have to click on Add new to *create a new role.*
- The following screen will open and here in the first text box you need to give Name of the Role such as Super User, Admin User, etc. The second text box called 'Description' gives more information about the type of User Role that is being created for e.g. State Admin User.

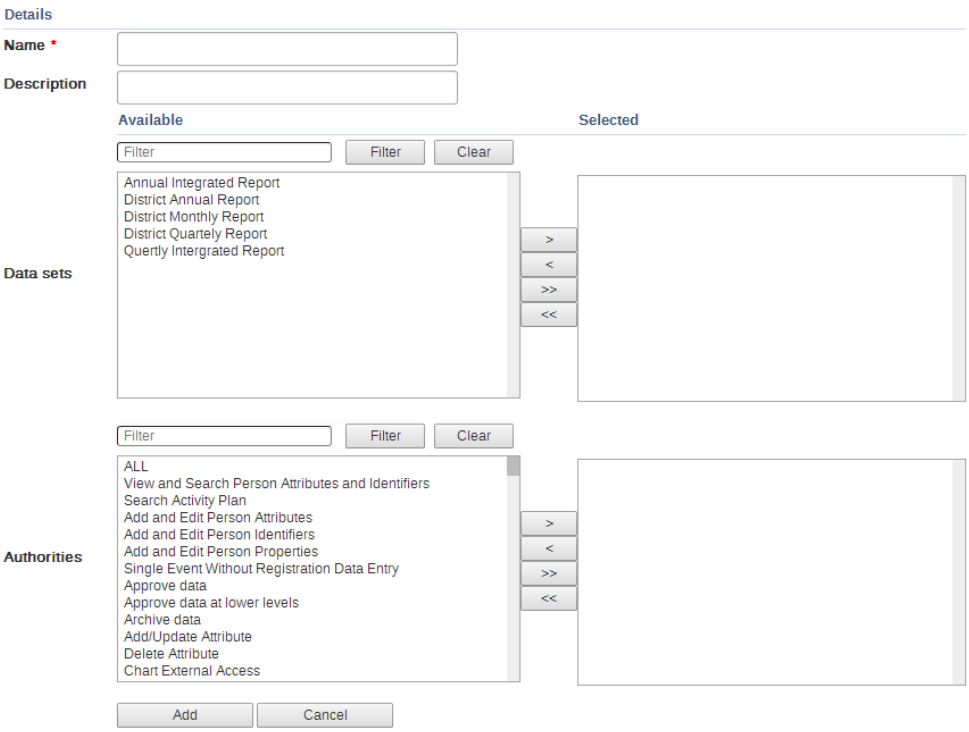

Figure 14: Create a New User Role

- Next you will specify the particular data set(s) that are to be made available to the particular role. You will also need to specify the type of 'authority' to be given to the particular user. For each of the three options namely Datasets, Reports and Authorities user can select multiple options from the scroll down menu provided against each field. A user can choose multiple options either by moving them one-by-one.
- In order for particular users to be able to enter data, you must add them to both a dataset as well as an administrative unit level. You can also select multiple datasets individually by pressing the Ctrl key on the keyboard and clicking on individual datasets.
- Finally when you have entered the required fields click on Save which is located on the lower part of the displayed screen. The desired user role and related authorisation will be saved to the database, and can then be assigned to a particular user.

4.2.3 Add New User

Under particular user role there can be more than one user. To add new users go to the User options under the Maintenance module.

To add a new user, just follow these steps:

- Click on the Add New button.
- Enter New User details like User name, Password, Confirm password, Surname, First name and Email in new user's option tabs.
- Assign user to available role(s) and Administrative Unit(s).
- Click on Add button for confirmation of new user details.
- The recently created new user can be seen in main' User management Screen
- You can edit (like password, surname….etc) and delete the details of new/old users by selecting corresponding User's Edit and Delete Buttons.
- Click on Save tab after editing all details of a particular selected user.

4.3 Managing Data Elements and Indicators

4.3.1 Data Elements

Data elements define what is actually recorded in system, e.g. number Animals moved to other areas from the district. The actual creation and definition of the data elements themselves will be based on the data in the LGMD2/2i.

To access the data element maintenance module, choose Maintenance -> Data elements and Indicators -> Data element.

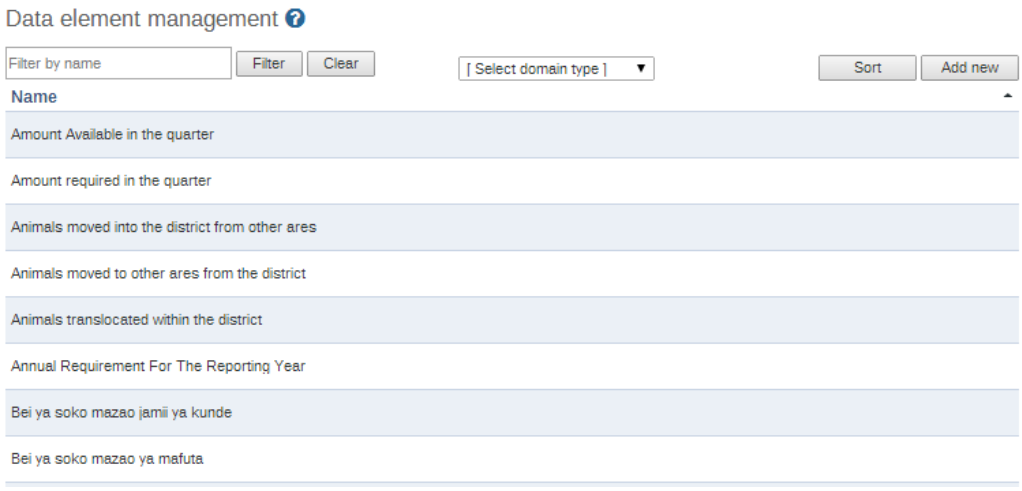

Figure 15: Data Element Management Screen

The ‘Filter by name’ will allow you to filter a range of data elements if you know either the full name of the data element, or just a part of it. Type the name into the search field and any matching data elements are displayed below. You can also choose ‘Filter by group/view all’ to narrow down a data element search within a particular data element group. In default mode, this field will display all the data elements in the application. The 'Sort' button can be used to sort the data elements into alphabetical order.

To add a new data element, click the 'Add new' button. You can modify or delete data element already present in the database by left click on the selected data element in the list and select Edit or Remove respectively.

There are various options available to allow the user to modify data elements already present in the database or add new data element. Each of the options is as shown and described below:

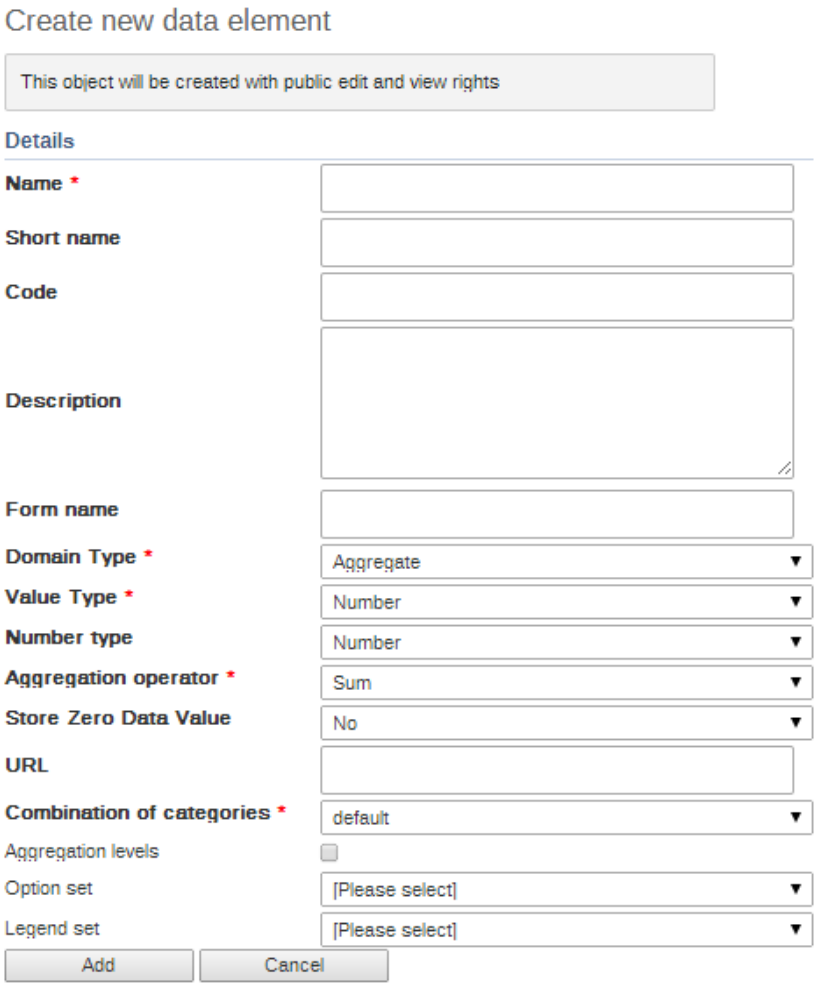

Figure 16: Create New Data Element

- Name: Define the precise name of the data element in this field. Each data element must have a unique name.
- Short name: Typically, an abbreviation of the full data element name. This attribute is often used in reports to display the name of the data element, where there is limited space available.
- Alternative name: Allows the definition of an alternative name of the data element.
- Code: If data elements are assigned a code. The code can be entered in this field.
- Description: Allows a full textual description of the data element to be entered. The user should be as precise as possible, and include full information on how the data element is measured and what its meaning is.
- Active: Defines whether a given data element is active or not. Data elements marked as inactive will not be displayed in the data entry screens.
- Domain type: Defines whether a data element is an aggregate or patient type of data element.
- Value type: Defines the type of data this data element will be used to record. Currently there are four options: number, text, yes/no (boolean), and date.

- Number type: In order to increase the robustness of data entry, ARDS Web Portal supports several different number types. During data entry, users will be restricted to enter the defined number types only. Each of the available options is described below.
    - Number: This number type supports any real value with a single decimal point, an optional negative sign, and no thousands separators.
    - Integer: Any whole number (positive and negative), including zero.
    - Positive integer: Any whole number greater than (but not including) zero.
    - Negative integer: Any whole number less than (but not including) zero.
- Aggregation operator: Defines the default aggregation operation that will be used on this data element. Most data elements should have the "SUM" option set. This includes all data elements which should be added together. Other data elements, such as staffing levels, should be set to use the "AVERAGE" operator, when values along the time dimension should not be added together, but rather averaged.
- URL: A URL having an in-depth description of the data element can be entered in the 'URL' field. This could be for instance, a link to a metadata repository or registry that contains detailed technical information about the definition and measurement of the data element.
- Combination of categories: Defines which category combination the data element should have.
- Data element group sets: Click the check box to activate this option then choose which data element group sets this data element should belong to. Available data element group sets are displayed in the upper window. Click the desired data element group set, then the "Add selected" button to add the data element to the group set. To remove a data element from a group set, click the data element group set in the lower list, and then click "Remove selected".
- Calculated: This option is available only when a data element is created.
- Select the data elements that will be used to define the calculated data element, and then click "Add selected" to add them calculated data element composition list. Fill in the correct factor for the data element calculation component (defaults to 1). Component elements of the calculated data element can be removed from the definition by pressing the "Remove" button.
- Aggregation levels: The Aggregation Levels option allows the data element to be aggregated at one or more levels. When the user clicks on the Aggregation levels option, a drop down menu appears which displays available aggregation levels. The desired aggregation level is then selected by clicking the 'Add Selected' button. By default, the aggregation will start at the lowest assigned administrative unit.
- After making the required changes, click 'Save' to institute them. The 'Cancel' button aborts all changes made.

4.3.2 Data Element Group

Data element groups provide a mechanism for classifying related data elements into a common theme. For instance, three data elements "Eneo la malisho ya mifugo", "Eneo la

mashamba yaliyotumika kwa malisho", and “Eneo la linalotumika” might be grouped together into a data element group "Eneo la malisho (Grazing land)".

To access the data element group maintenance page, click Maintenance -> Data elements and Indicators -> Data Element Group.

Similar to the "Data element" maintenance page, data elements groups can be searched with by entering a search string in the "Filter by name" field.

To add a new data element group, click the "Add new" button and the following screen will be displayed.

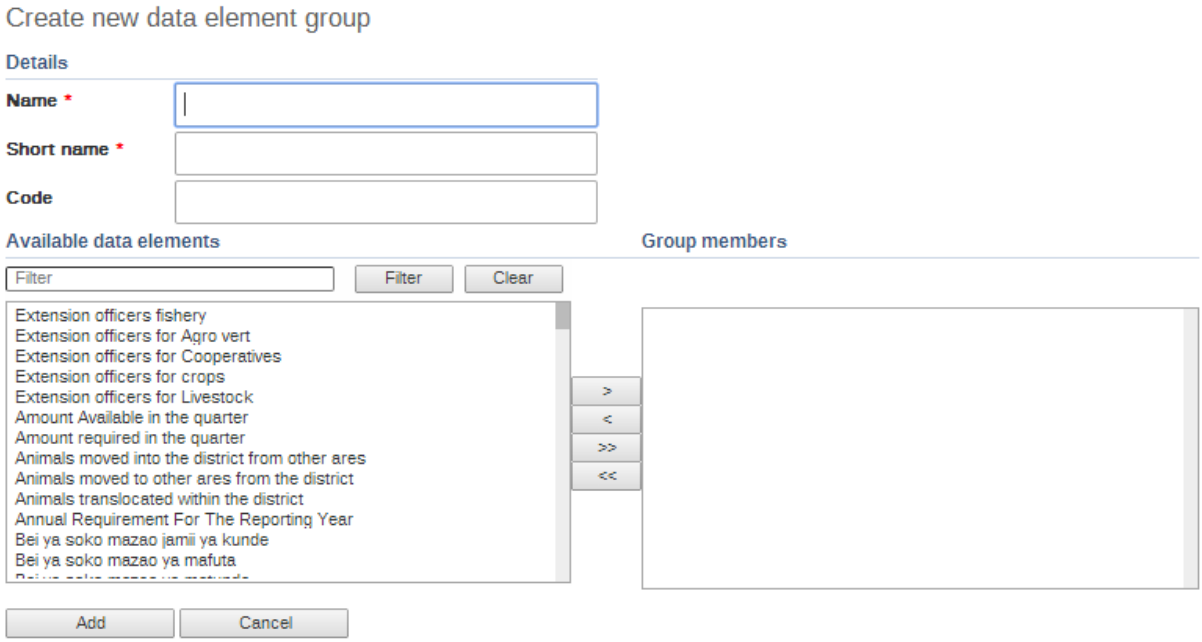

Figure 17: Create New Data Element Group

Fill in the "Name" field and then select all data elements that should belong to the group from the left panel. Click the "Move selected" button to add the selected data elements to the data element group. Click the "Remove selected" button to remove all data elements from the group that have been selected in the right panel. Finally, click the "Add" button to save changes, or the "Cancel" button to discard any changes.

4.3.3 Data Element Category

Data element categories can be used to disaggregate data elements into individual atomic components. Data element categories are typically a concept, such as Aina za mazao (crop type). Data elements such as "Eneo lililolimwa (Cultivated Ares)" can be broken into smaller component parts to determine, for instance, “Eneo lililolimwa mpunga”, “Eneo lililolimwa mahindi”, and etc.

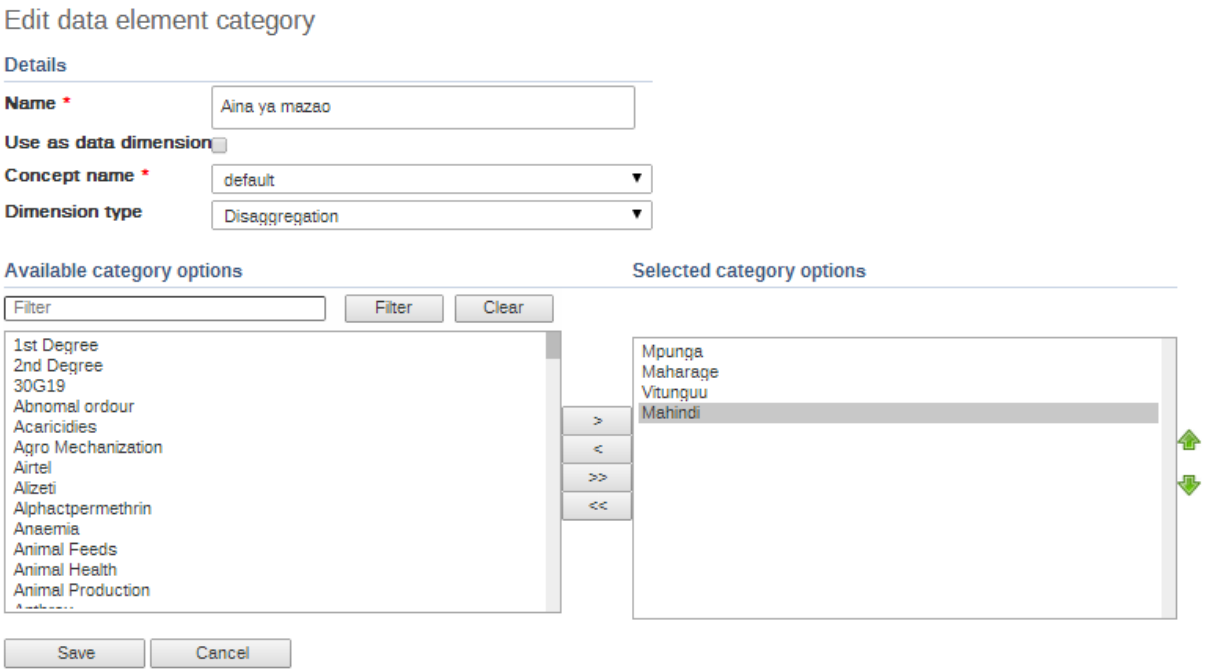

Figure 18: Example of Edit Data Element Category

Effective use of data element categories greatly simplifies the process of setting up the ARDS Web Portal, as the data element categories can be reused to disaggregate many different data elements. Otherwise, each of the data elements would need to be created separately. Judicious use of data element categories allows for subsequent advanced analysis.

Data element categories are composed of category options. Category options must be defined when a data element category is created for the first time. Subsequent changes to the data element category, i.e. adding or deleting new category options, are not allowed once the data element category has been created.

It is critical that the proper categories and category options are defined in the initial definition step, as further changes to the category and its options will not be possible.

To access the data element category option maintenance module, press "Maintenance -> Data Elements and Indicators->Data Element Category Option". The following screen will be displayed:

Figure 19: Data Element Category Option Management

To access the data element category maintenance module, press "Maintenance -> Data Elements and Indicators->Data Element Category". The following screen will be displayed.

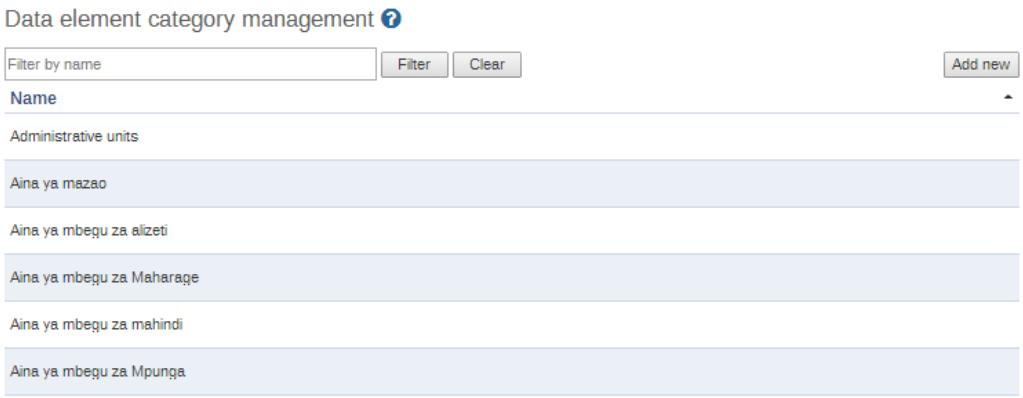

Figure 20: Data Element Category Management

Similar to the other data element maintains modules, data element categories options and data element categories can be filtered by typing the name of the data element category option or the category respectively (or a portion of it) into the "Filter by name" field.

To add a new data element category option, press the "Add new" button of the data element category option management which will then display the following screen.

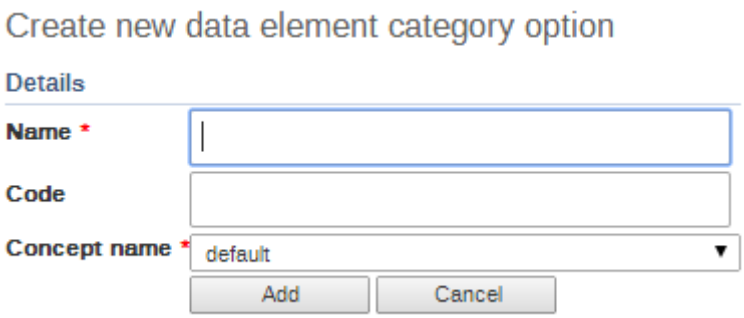

Figure 21: Create New Data Element Category Option

Type the details accordingly, for example Maize for the types of crops and click add.

To add a new data element category, press the "Add new" button which will then display the following screen.

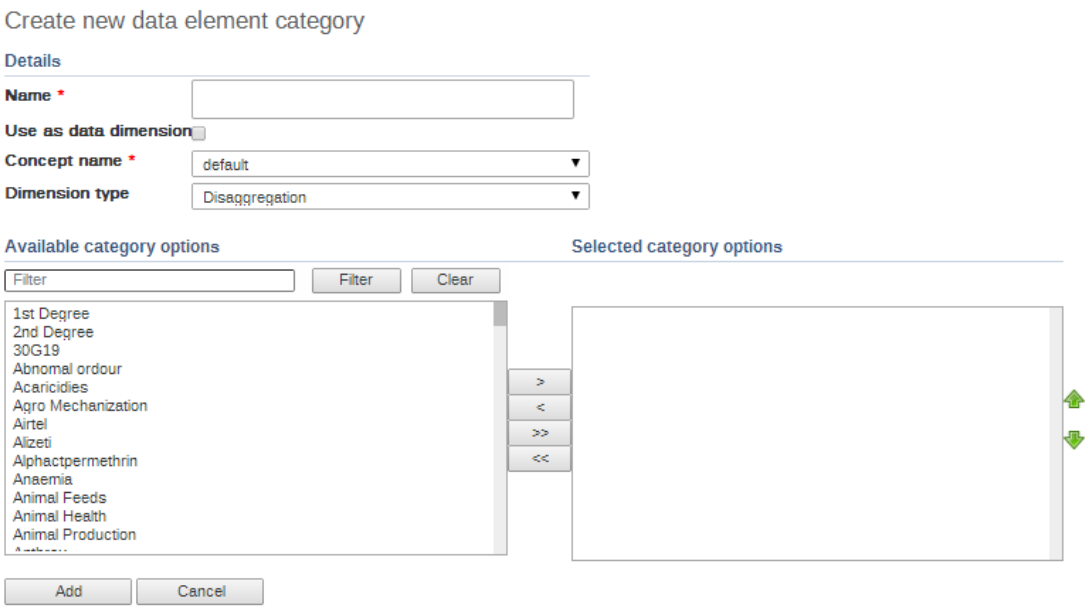

Figure 22: Create New Data Element Category

Type the name of the new data element category in the "Name" field in the "Details" region. Category options can be added by typing the name of the category option in the "Category option" region and pressing the "Add category option" button. Category options can be reordered using the "Move Up" and "Move Down" buttons. Categories options can be deleted by selecting the data element category option and pressing the "Delete" button. Once all data element categories options have been added to the data element category, press the "Add" button to save all changes or the "Cancel" button to discard any changes.

All data element category options must be added and defined properly in this step. Subsequent alterations to the data element category (other than reordering of the category options themselves) are not possible.

4.3.4 Data Element Category Combination

Data element category combinations allow multiple data element categories to be combined into a related set. By combining different categories into a data element category combination and assigning the combinations to data elements, the appropriate disaggregation levels can be applied efficiently and quickly to a large number of data elements.

To access the data element category combination maintenance module, select "Maintenance->Data element and indicators->Data element category combinations". As with the other maintains modules, you can filter the listed category combinations by entering the name (or portion thereof) of the category combination. Also you can Edit, Delete the data category combination.

To add a new category combination, click the "Add new" button. The following dialogue will be displayed.

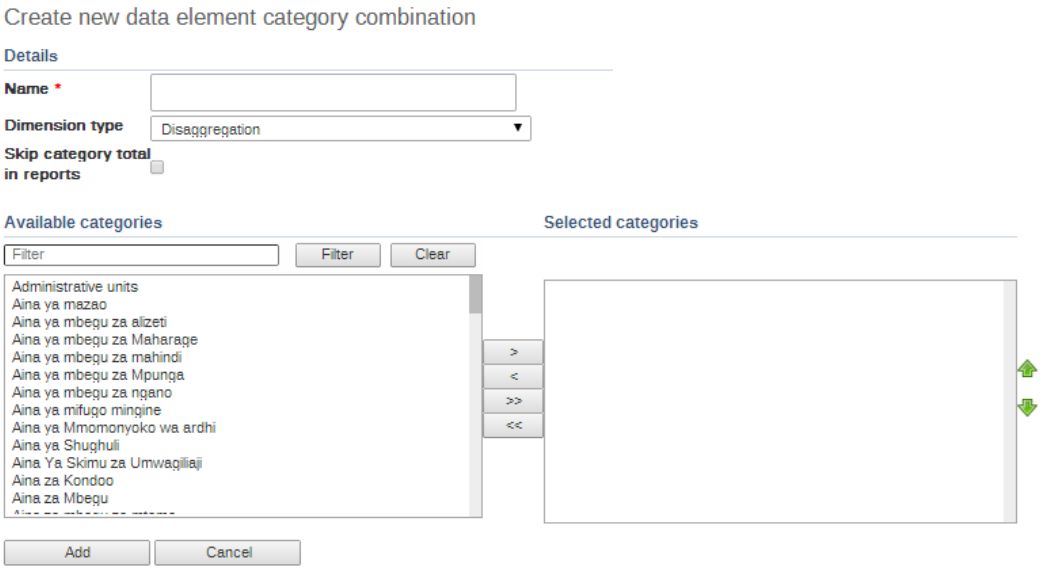

Figure 23: Create new data element category combination

Type the name of the category combination in the "Name" field, and then select the desired categories from the left panel. Press the "Move right" button to add the selected categories to the category combination. Press "Move left" to remove any categories that should not be part of the category combination.

Categories can only be added to a category combination at this step. Categories can be removed from category combinations later by editing the category combination, however, it is not allowed to add additional categories once the combination has been created. Ensure that the category combination and its respective categories are final before you create the category combination and assign it to a data element.

4.3.5 Indicators

Guideline on how to manage indicators will be included in the next phase.

4.4 Managing Data Sets

The dataset management function allows you to create new datasets (form) and manage existing ones. The dialog can be reached by choosing Maintenance->Datasets->Dataset. A sample dialog is displayed below. Each of the functions is described below.

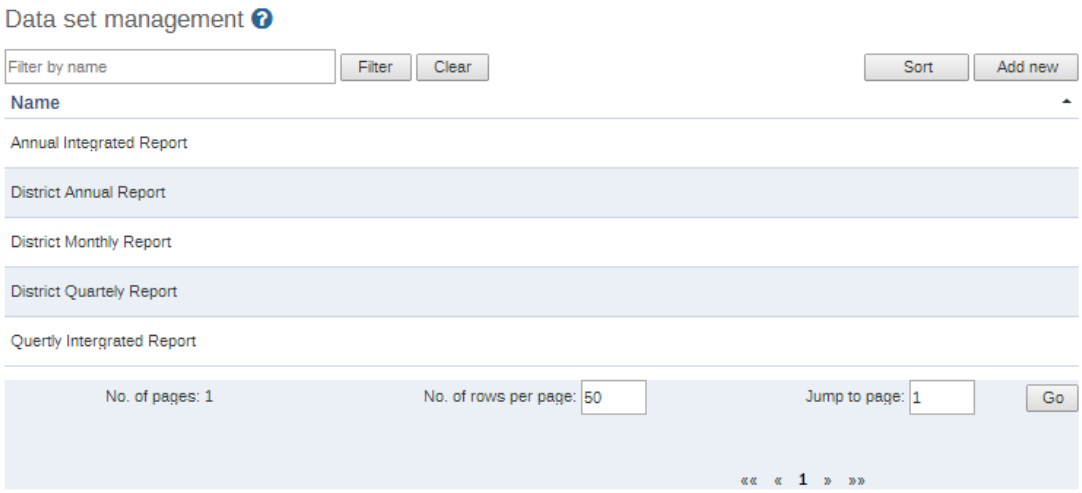

Figure 24: A dialog to View and Change and Add Data Sets

- Sort: This controls the custom sort order. Depending on the systems settings, users will see the datasets ordered in the specific order which you provide.
- You can perform the following functions as shown in the figure below by left click on the selected data set in the list.

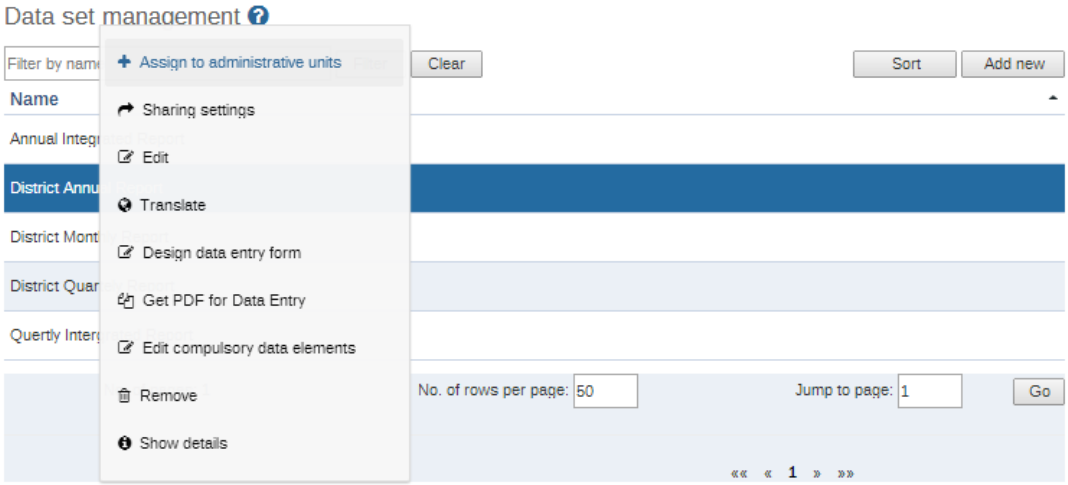

Figure 25: View and Edit Existing Data Sets

- Add new: Adds a new dataset. When pressing this button, you can create a new dataset. You need to provide a name, shortname and frequency. The "Code" attribute is optional. Data elements can be added to the "Selected data element" list by selecting them individually. And pressing the button. Indicators can also be added to data sets and will be available to be placed in custom data entry forms when they need to be shown along with data elements on the same data entry form. Press "Save" to add the new dataset.
- Assign administrative units to datasets: This function will allow you to assign individual administrative units to a dataset. Only administrative units which have been assigned to a dataset will be allowed to enter data into the dataset.

- Edit dataset: This will allow you to edit existing datasets, for instance when you need to add or remove data elements and indicators to a given dataset.
- Translate: Allows you to translate the name of a dataset to a different language.
- Create or edit a custom data entry form. Refer to for detailed information of how to use this function.
- Edit compulsory data elements: This dialog will allow you to add or remove data elements which are compulsory.
- Delete: Completely removes a dataset from the system.
- Information: Display some informative information about the dataset, including the number of data elements, the frequency, and which data entry form has been assigned to the dataset.

4.5 Managing Administrative Units

Guideline on how to manage administrative units in the Maintenance option will be included here in the next

4.6 Analytics and Data Mart

The data mart is a set of tables in the ARDS database which is used by all reporting and analysis tools to retrieve data from. The data mart is populated based on the collected data. This management user interface shown below allows an administrator to control that process of converting collected data into aggregated data and write to the data mart.

- The data mart management screen allows you to select period types, start date and end date which will control which periods are included in the data mart process. By default all data elements, indicators and administrative units will be included.
- The data mart process might take a long time and heavily utilize the resources of your server so make sure you start such processes at a feasible time in production environments.
- Data mart processes can be scheduled as regular tasks in the data administration module.

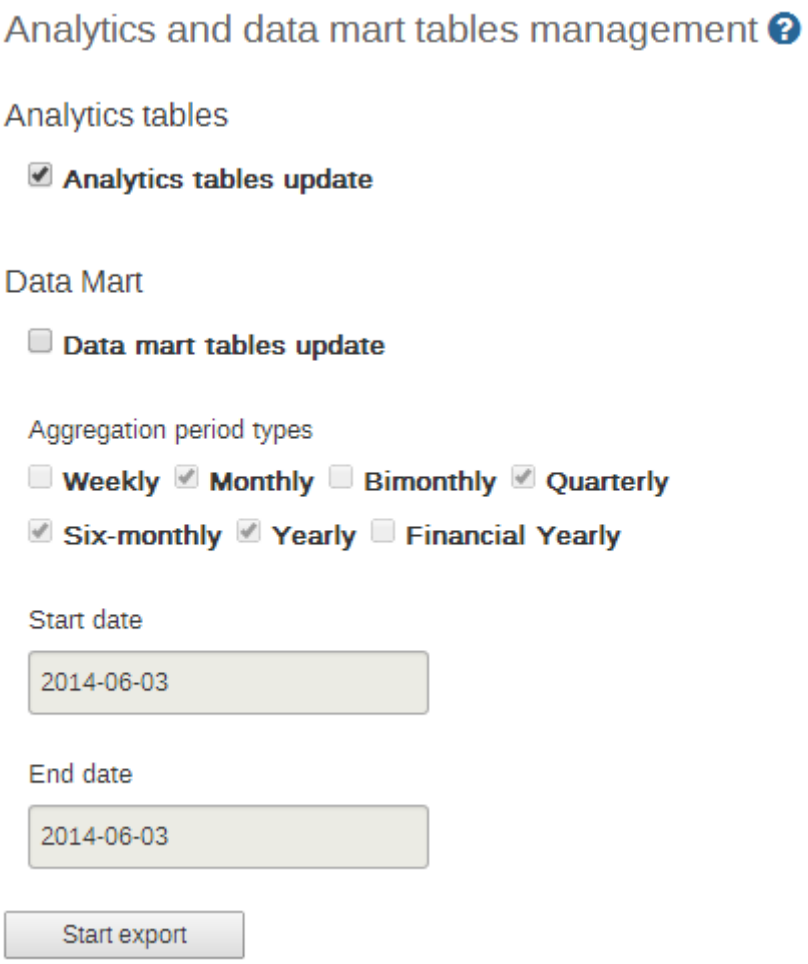

Figure 26: Analysis and Data Mart Table Management Menu

5 Maintenance

5.1 Change System Settings

5.1.1 Changing General Setting of the Portal

To change general settings of the ARDS Web Portal go to Maintenance drop down menu and select settings then select System General Settings and the following screen will appear.

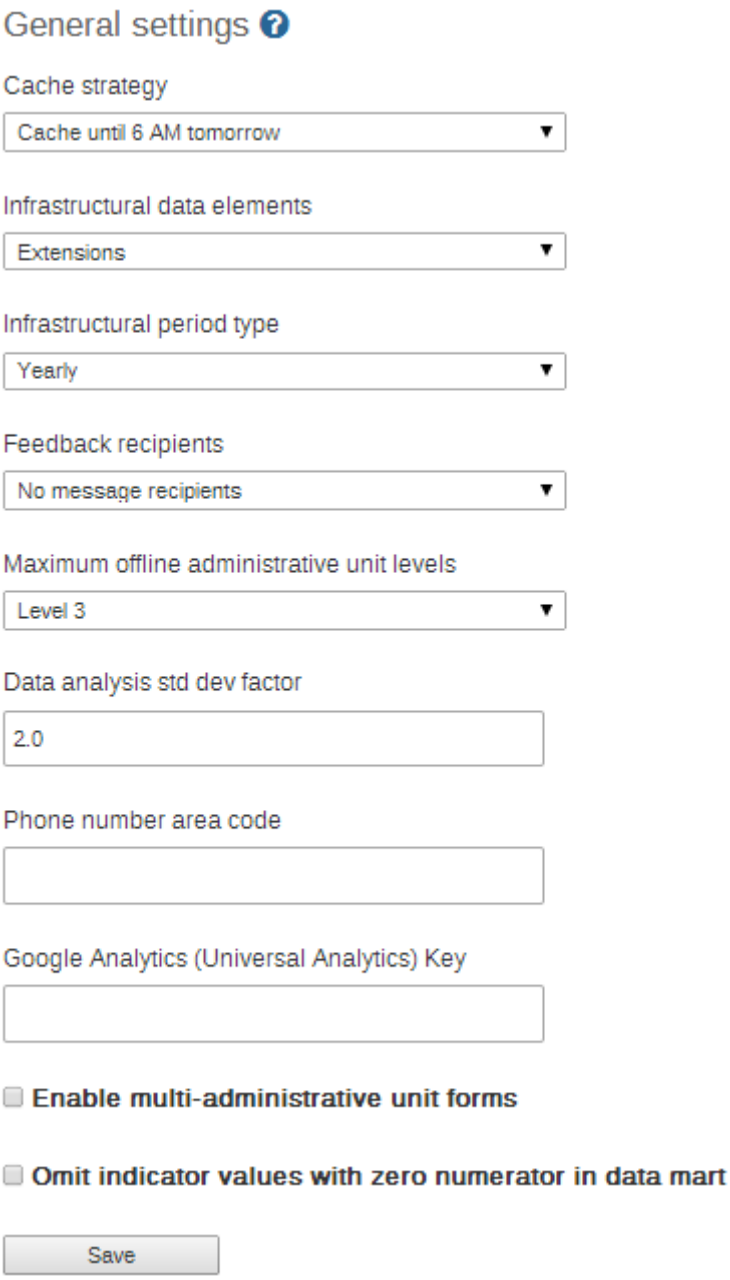

Figure 27: Change General System Settings

- Aggregation strategy: This setting defines how the system generates and provides aggregated data to the output tools. There are two options available: Batch means that all output tools like reports, charts and maps will read aggregate data from pre-built

data mart tables in the database. This strategy provides the best performance and inflicts less load on the application since data retrieval only implies reading from one or a few database tables using a simple query.

- This strategy requires that those data mart tables are populated with the relevant data before the reports are requested. This can preferably be done using nightly scheduled jobs or manually through the data mart user interface. A potential downside is that users will have to wait to the next day to view their reports after uploading the data to the portal database. This approach is the recommended for large online deployments where there are medium to high user concurrency.
- Real-time means that aggregated data is generated and retrieved on-the-fly every time a report is requested. This implies that there is no delay after doing data entry before the data is accessible in reports. Performance will not scale adequately and hence this strategy is suitable for small, typically offline, deployments.
- Infrastructural data elements: This setting defines a data element group where the member data elements should describe data about the infrastructure of administrative units. Examples of such infrastructural data elements could be population, doctors, beds, internet connectivity and climate. This infrastructural data can currently be viewed in the GIS module in the facility information sheet.
- Infrastructural period type: Sets the frequency for which the data elements in the infrastructural data elements group are captured. This will typically be yearly. When viewing the infrastructural data you will be able to select the time period of the data source.
- Feedback recipients: This setting defines a user group where the members will receive all messages being sent through the function for writing feedback in the dashboard module. This will typically be members of the super user team who are able to support and answer questions coming from end-users.
- Completeness notification recipients: This setting defines a user group where the members will receive messages as notifications when a form has been marked as complete. A typical use of this is when the forms are considered to be an order of some commodity and a group of users want to be notified when such orders are placed.
- Omit indicator values with zero numerator value in data mart: Defines whether aggregated indicator values with zero as the numerator value should be written to the indicator data mart table. Having such values written is required for instance when connecting Excel pivot tables to the data mart as Excel will need the numerator data to correctly aggregate up in the administrative unit hierarchy. If third-party tools like Excel are not used with the application this will reduce the total number of values written to the data mart (which again will improve performance) and could safely be set to omit.
- Disable data entry when data set completed: This setting defines whether the data entry forms should be disabled and prevent from further entry after they have been marked as complete.

- Data analysis std dev factor: Sets the number of standard deviations for use in the outlier analysis performed on the captured data in the data entry module. The default value is 2; a high value will catch less outlier values than a low value.

5.1.2 Changing Appearance

To change appearance settings of the ARDS Web Portal go to Maintenance drop down menu and select settings then select System Appearance Settings and the following screen will appear.

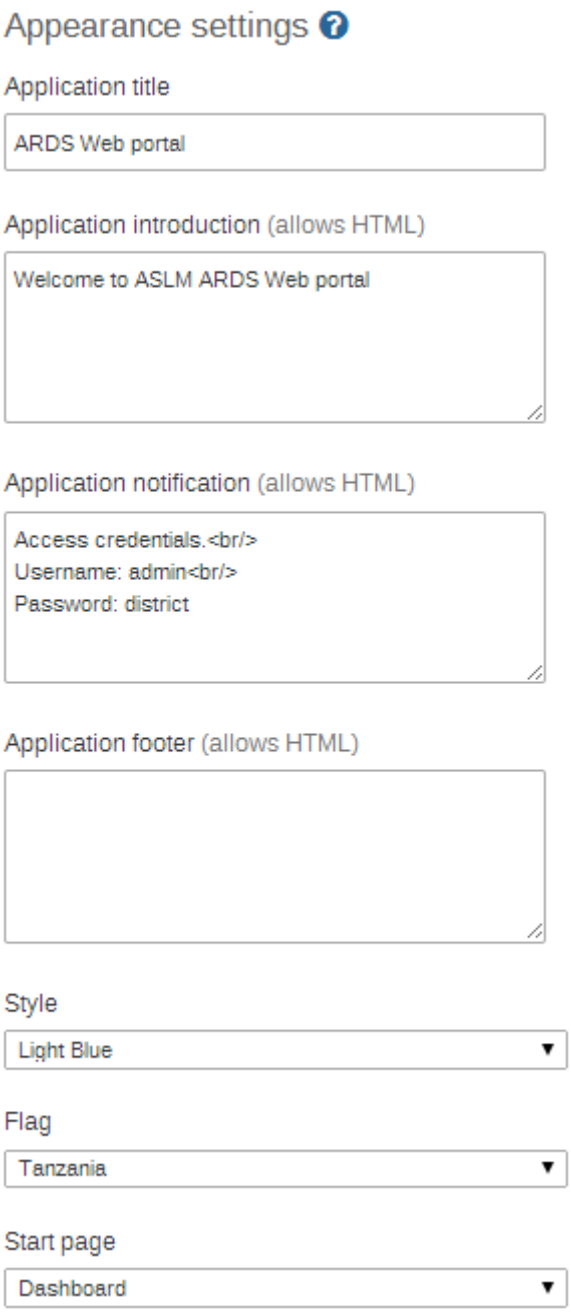

Figure 28: Changing System Appearance Settings

- Application title: Sets the application title to the left on the top menu.

- Style: Sets the style / look-and-feel of the system. The corresponding user style setting overrides this.
- Flag: Sets the flag which is displayed in the left menu of the dashboard module.
- Start page: Sets page / module which the user will be redirected to after logging in. The dashboard module is the recommended start module.

5.2 Data Administration

Guideline on data administration option of Maintenance option will be included here in the next phase

6 Troubleshooting

Trouble shooting guide will be included here in the next phase.