

DBSG3 USER GUIDE

Rel. 1.1

Web-based access to DBSG3 data sets

September 2nd 2006

Table of Contents

1	INTRODUCTION.....	3
2	FUNCTIONAL OVERVIEW OF THE SOFTWARE	3
3	DATA MAINTENANCE PROCEDURE	4
3.1	Microsoft Excel.....	4
3.2	Solution Based on CSV editor	4
4	IV. USE CASES	5
4.1	Common user and table keeper use cases	5
4.2	System administrator use cases	6
5	USER INTERFACE DESIGN	7
5.1	Login page	7
5.2	Common user main menu	8
5.3	Table keeper main menu	8
5.4	System manager main menu	9
5.5	data set categories	9
5.6	Data set sub-categories.....	10
5.7	Download data set.....	10
	Select data set to search.....	11
5.8	Search in data set.....	12
5.9	Download search results	13
5.10	Upload data set.....	13
5.11	Upload data set (missing input fields).....	14
5.12	Publish data set (step 1)	15
5.13	Publish data set (step 2)	16
5.14	Reject data set	16
5.15	View event log	17
5.16	Manage users (step 1)	17
5.17	Manage users (step 2)	18
6	TABLE KEEPER ACTIVITY DESCRIPTION.....	18
7	DATA MIGRATION PLAN.....	19
7.1	Step 1 – Schema conversion	20
7.2	Step 2 – Data conversion	21
7.3	Step 3 – Data publishing	21

1 Introduction

This document is the user guide for the the Web-DBSG3 software application. The DBSG3 main task is to provide access/management/distribution of the radiowave propagation measurements database, maintained by the ITU-R SG3.

The document is organized as follows:

- Section II is a functional overview of the capabilities of the software.
- Section III describes Procedures for Maintenance of the data sets.
- Use cases diagrams for the various categories of users are provided in Section IV.
- Section V describes the Web-based user interface of the system.
- Section VI is made of an activity diagram for the table keeper role.
- The data migration plan is presented in Section VII.

The server can be accessed through the WEB at the address:

<http://saruman.estec.esa.nl/dbsg3/login.jsp>

Please note that INTERNET cookies must be enabled on the browser to access the system.

Username and password to access the system can be requested to:

Antonio Martellucci

European Space Agency, ESTEC, TEC-EEP

E-mail: Antonio.Martellucci@esa.int e-m: amartel@ties.itu.ch

2 Functional overview of the software

Web-DBSG3 enables users to browse, search, download, update and publish DBSG3 data sets from a browser-based interface. Three groups of users are supported. Common users have access to the browse, search and download capabilities only. Table keepers may also upload new versions of the data sets they are managing. Finally, the system administrator has the ability to approve or reject new data set versions for publication, to manage users and to keep track of system events. These features are listed below and describe in more details through activity diagrams, and user interface pages in the following sections.

Common users

- Login / logout
- Browse data sets by categories (e.g. Terrestrial line-of-sight) and sub-categories (e.g. Rain attenuation data).
- Select a data set.
- Download a full data set.
- Fill in search criteria on the searchable fields of a data set such as date, frequency, elevation angle, location, and download the matching records of this data set only.

Table keepers

- Common user features.
- Upload a new version of a data set and submit it for publication.

System administrator

- Common user features
- View data sets submitted for publication by table keepers
- Approve or reject each submitted data set
- Create/Modify/Delete a user

- View a log of system events

3 Data maintenance Procedure

The main criteria for tools used for the maintenance of the data sets by the table keepers are:

- integrity of the data
- reliability
- ease of use for the table keepers and the system administrator

Solutions are described hereunder.

3.1 MICROSOFT EXCEL

The use of Microsoft Excel has also been investigated. Excel proved able to import and export CSV files reliably. Upon importing a CSV file, Excel makes guesses about the data types of the fields. However, these data types will not be enforced by Excel, in the sense that a user may redefine the contents of a cell as he wishes. Therefore, although Excel can be used as a convenient data set editing tool, additional data validation also has to be performed in the DBSG3 Web application whenever a new data set version has been uploaded by a table keeper. A key is with Access is that Excel does not enforce properly the data types.

The format of data fields is also dependent on the user locale and version of Excel itself (US-English, French, Dutch, etc). Therefore, Excel can be used with some caveats but is not the most practical solution.

3.2 SOLUTION BASED ON CSV EDITOR

Based on this discussion, the following pragmatic solution has been chosen:

- Users download data sets as CSV files (not XML).
- Table keepers edit these CSV files with a dedicated CSV editor, downloadable from the DBSG3 site, and then upload the modified CSV files.
- A data validation tool is custom-developed as part of the DBSG3 application. This tool will parse the CSV file, extract one row at a time, set each missing field to NULL and use the JDBC API for inserting the row into the corresponding database table. If data type errors or non-nullable field errors are returned by Oracle, the diagnostic will be captured by the tool. The following line will be written in the diagnostic file, with substitution by the actual values:

<STATION_NO> <EXP_NO> <DIAGNOSTIC>

so that the table keeper will receive a diagnostic file with one such entry per offending record. As the (STATION_NO, EXP_NO) uniquely identify a record, the table keeper will be able to trace the source of the error based on this information.

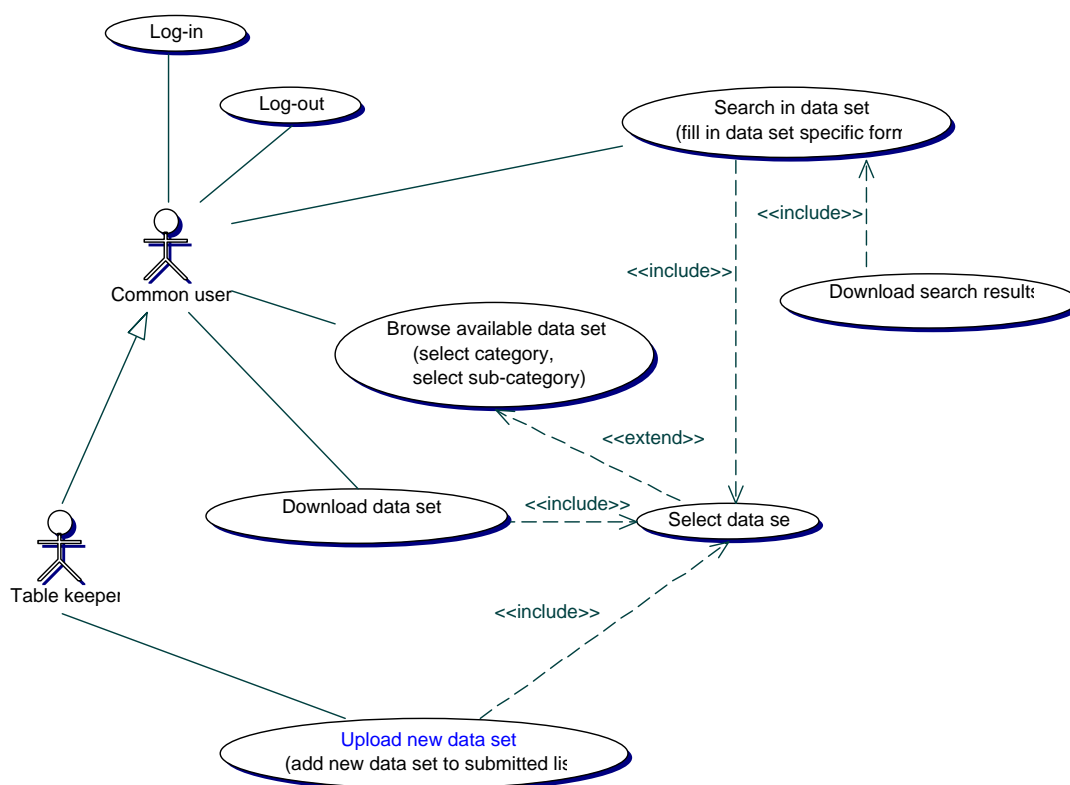
- The data validation will have the following transactional behavior with the database:
 - Start transaction
 - Create temporary table 'LIKE' published data set table (same structure)
 - For each row in CSV file:
 - Insert row
 - If error, log into diagnostics file
 - Rollback transaction
- If the whole data set is valid, the table keeper may then change its status to "submitted for publication".

- The system administrator may then download the CSV file for inspection, and eventually decide to accept or reject it.

4 IV. Use cases

This section contains two use case diagrams illustrating the use cases available to each category of user, in UML notation. For convenience, common user and table keepers use cases are grouped on a single diagram. System administrator-specific use cases are specified in a separate diagram.

4.1 COMMON USER AND TABLE KEEPER USE CASES



This use case diagram depicts usage of the DBSG3 system by common users and table keepers (TKs). Since TK inherits from common user, all use cases performed by the common user can be performed by the TK.

First of all, users must log into the system in order to be given access to functionalities depending on their credentials. To avoid confusion, the system will filter out inaccessible functionalities from the interface. All users are authenticated; there is no guest or anonymous access. Logging out cancels the user’s session and resets the interface to the main menu page.

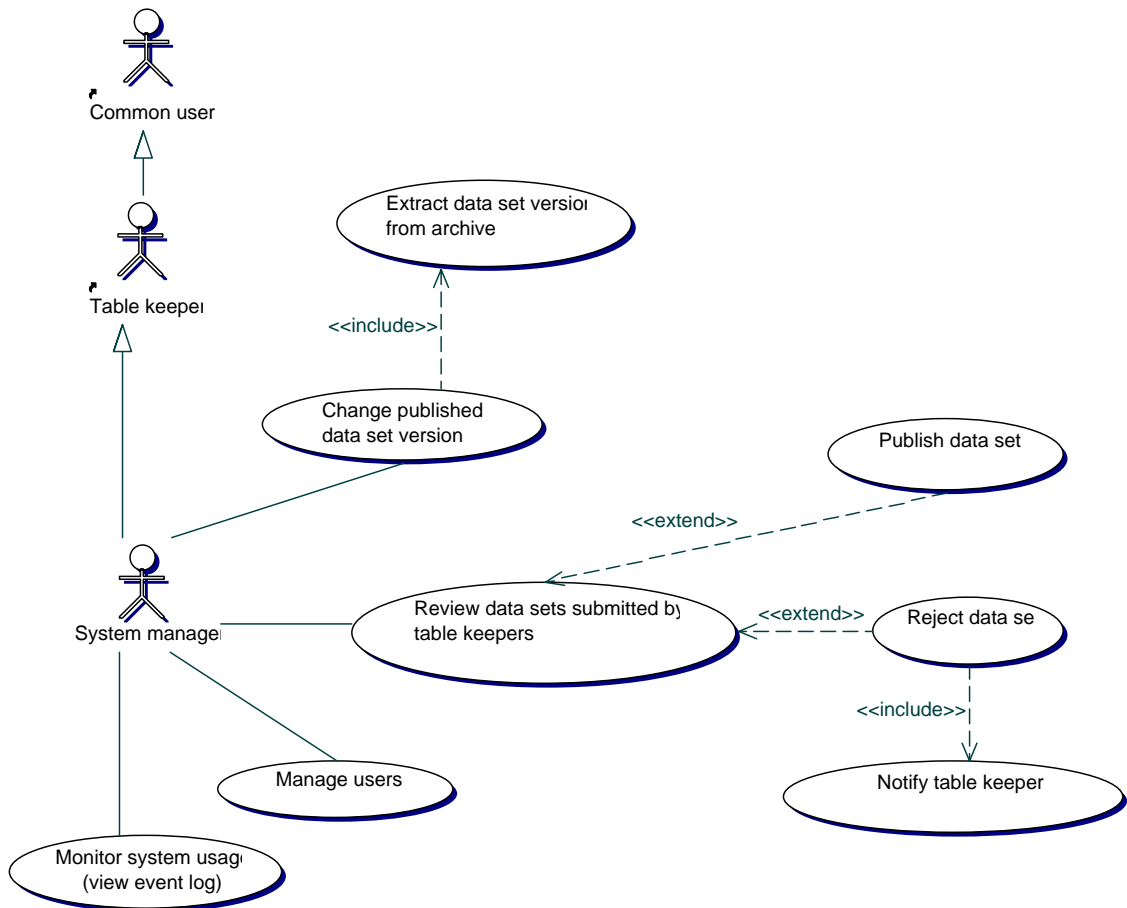
All DBSG3 users share a set of basic functionalities:

- browsing through categories and published data sets
- downloading a published data set
- searching in a published data set and downloading search results

Selecting a data set involves browsing through categories and sub-categories down to the data set level. Only one data set is published at a given time for a leaf category (see system manager UC).

In addition to this common set of functionalities, TKs can upload a new data set in a leaf category. Upon validation success, this new data set can then be inserted in the workflow with the state “submitted” (see data set state diagram in section VII). A comment can be associated with a data set submission.

4.2 SYSTEM ADMINISTRATOR USE CASES



System manager is a role derived from TK, itself derived from common user. This means System Managers (SM) can access all functionalities available to these two other roles. In addition to that, SMs have access to functionalities that can be split in two categories: workflow management and application maintenance.

The SM role can update the state of a data set in the workflow by performing scenarios from the “publish data set”, “reject data set” and “change published data set version” use cases. The data set states are described in more details in section VII.

Before either publishing or rejecting data sets, the SM reviews the list of data sets submitted by table keepers for all categories. When publishing or rejecting, a comment can be associated with the action. Whenever a data set is rejected, the table keeper who submitted it is notified by email.

A System Manager can also manage users of the system and their credentials (i.e. access to common user or TK features), and monitor system usage by viewing the event log.

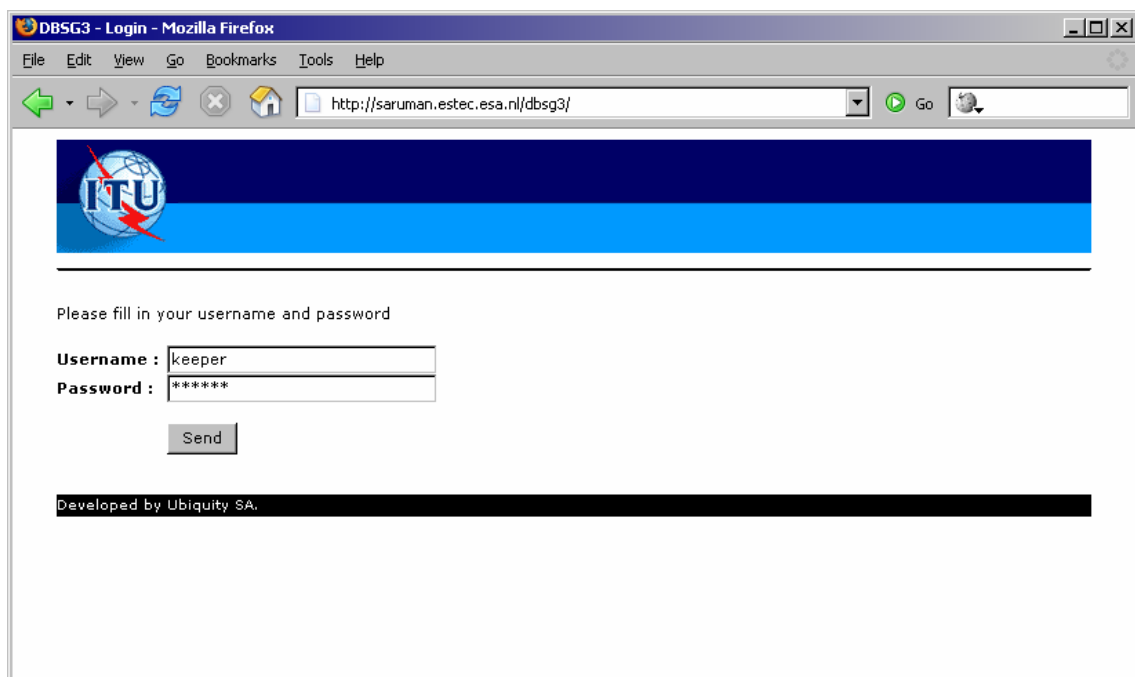
5 User interface design

This section illustrates the functionalities of the application through screenshots of the user interface.

References to the use case diagrams are included and the use case descriptions should therefore be used as a reference.

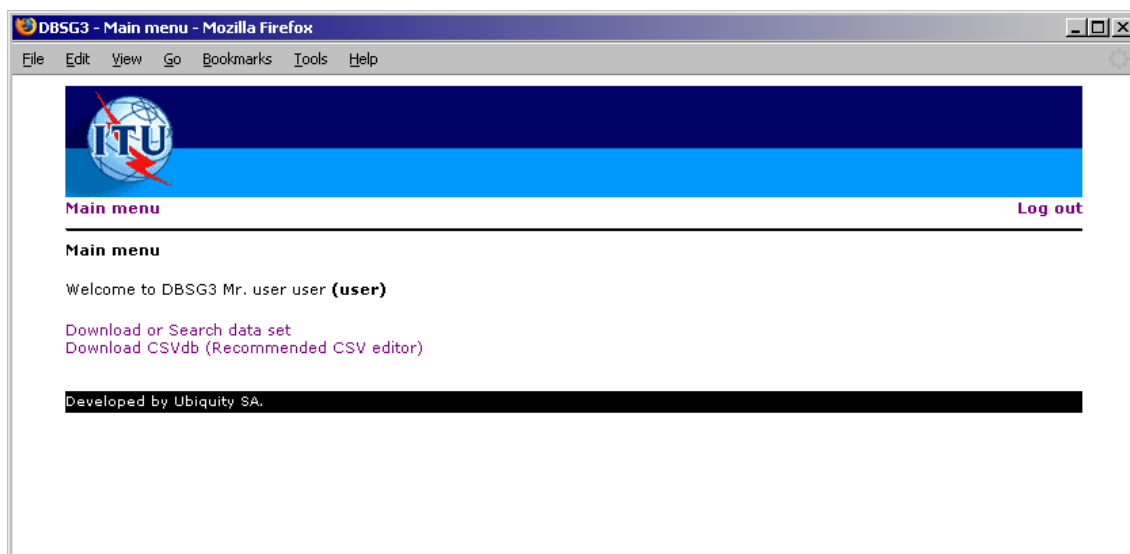
5.1 LOGIN PAGE

→ Log in use case



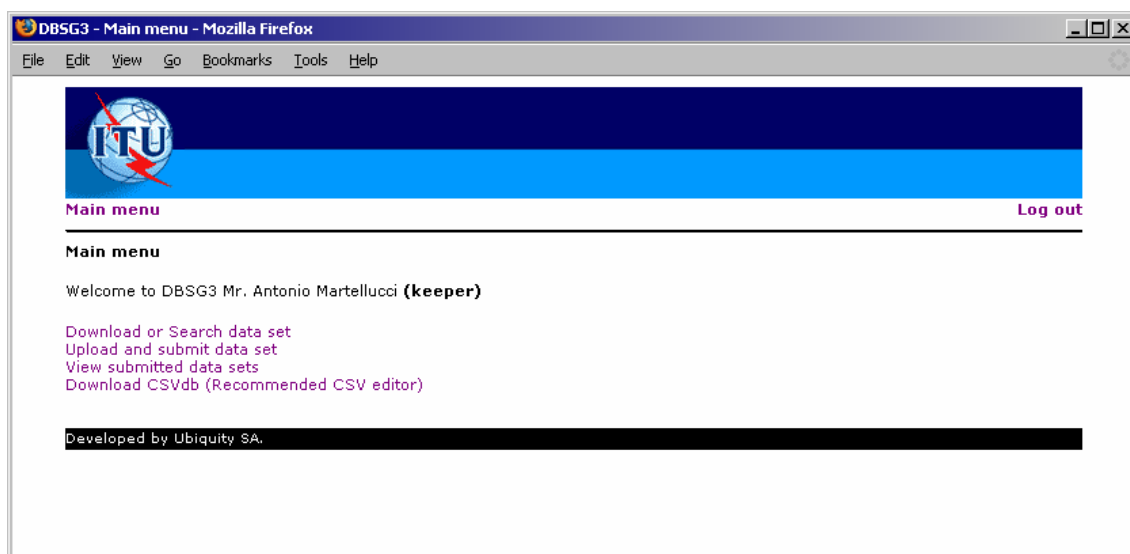
This page allows the user to log into the system. Login is a prerequisite to access all other functionalities.

5.2 COMMON USER MAIN MENU



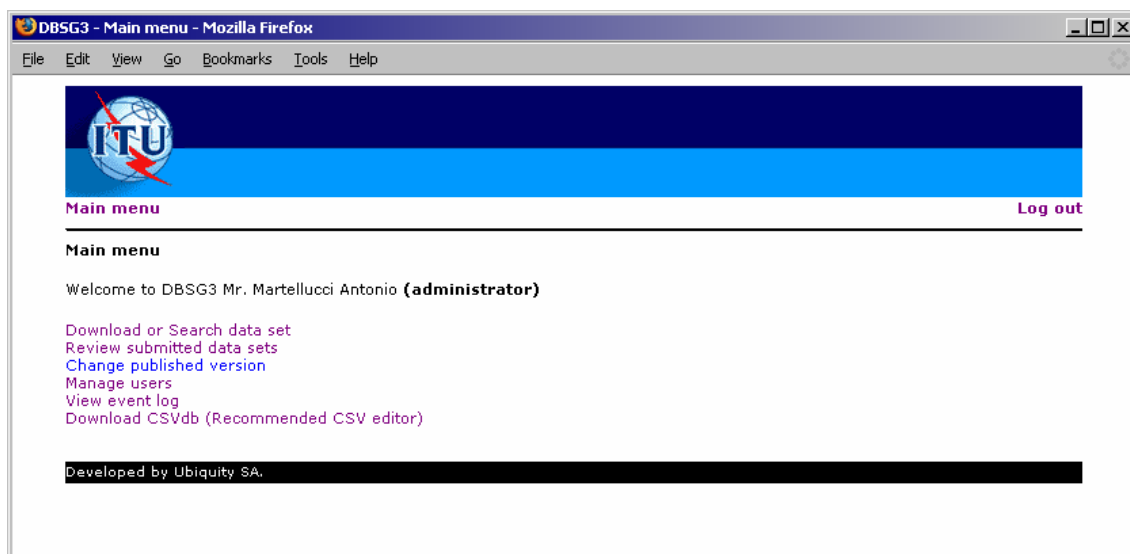
After logging in, the user is redirected to the main menu page. Depending on his credentials, he will have access to a different set of functionalities. This is the menu for the lowest credential level, the common user.

5.3 TABLE KEEPER MAIN MENU



This page is the main menu that table keepers will see after logging in. Note that at any point, the user is able to return to the main menu. He does not have to log in again if his session is still valid. The maximum idle time is configured in the web server. The session expires if the browser is closed.

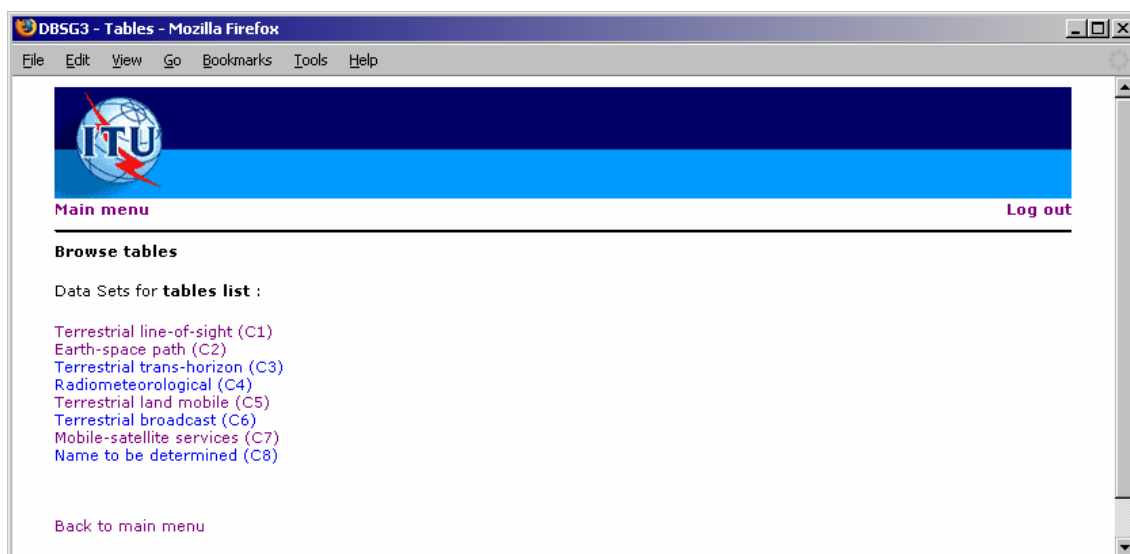
5.4 SYSTEM MANAGER MAIN MENU



This is the most complete main menu, accessible to users with system manager credentials. It gives access to all functionalities.

5.5 DATA SET CATEGORIES

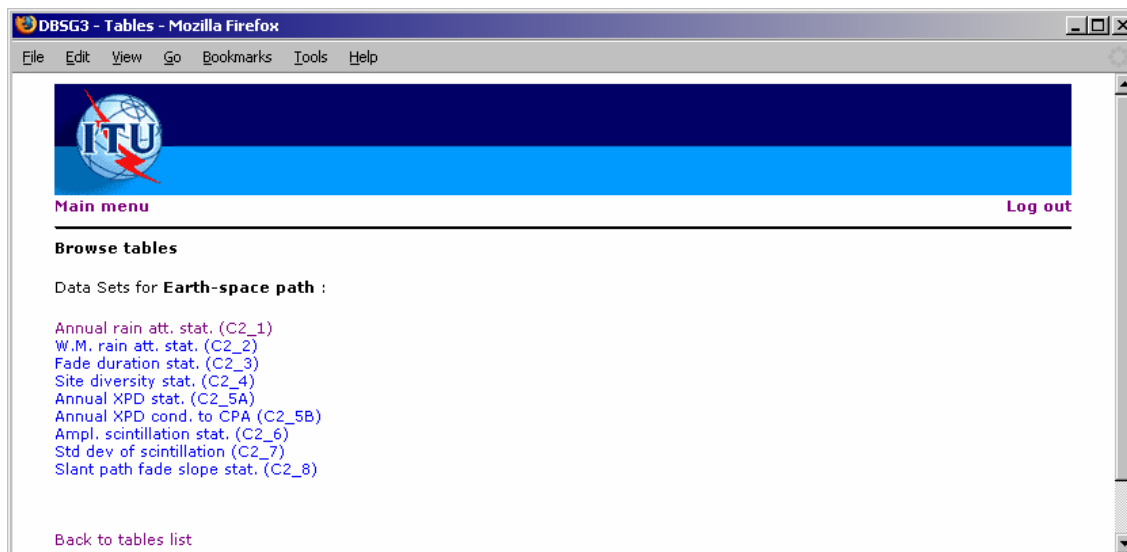
→ Browse available data sets use case



Browsing categories is one of the most common functionalities. It is required for the “download data set”, “search data set”, “upload data set” and “change published version” use cases. After selecting either of these use cases, the user is redirected to the corresponding screen.

5.6 DATA SET SUB-CATEGORIES

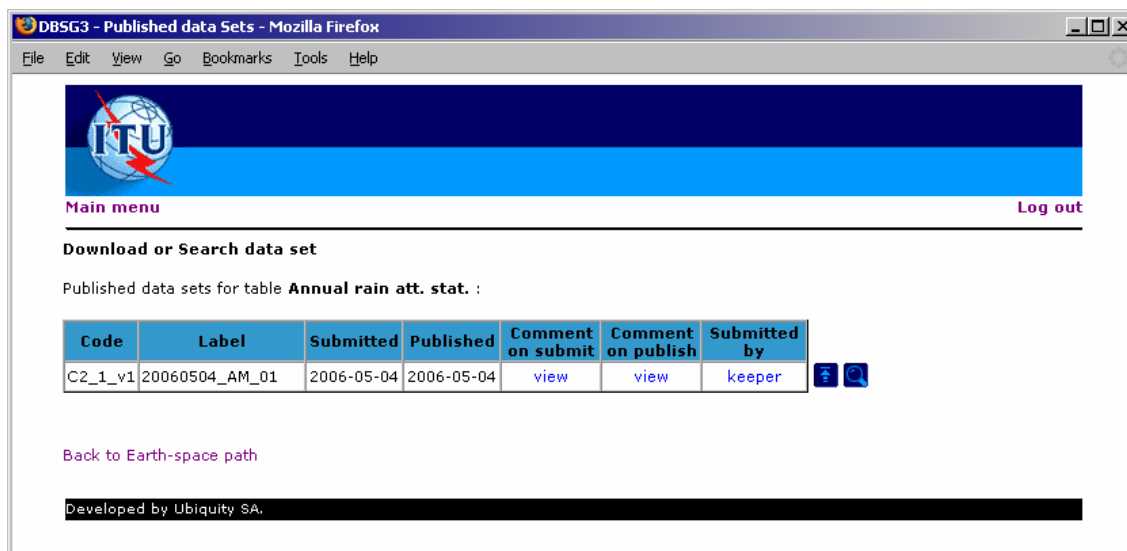
Browse available data sets use case



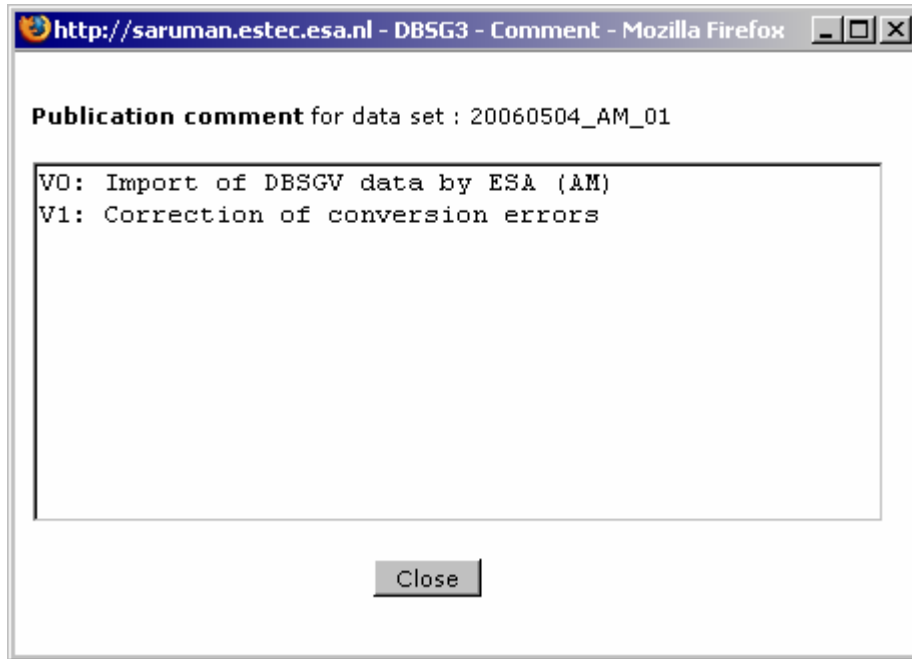
By selecting a root category, the user is presented with the list of sub-categories for that category, as shown in this screen (sub categories for the root Mobile-satellite services category). After selecting a leaf category, the user will view data sets in that category and take action depending on the functionality he initially chose. This is demonstrated on the screenshots below.

5.7 DOWNLOAD DATA SET

→ Download data set use case

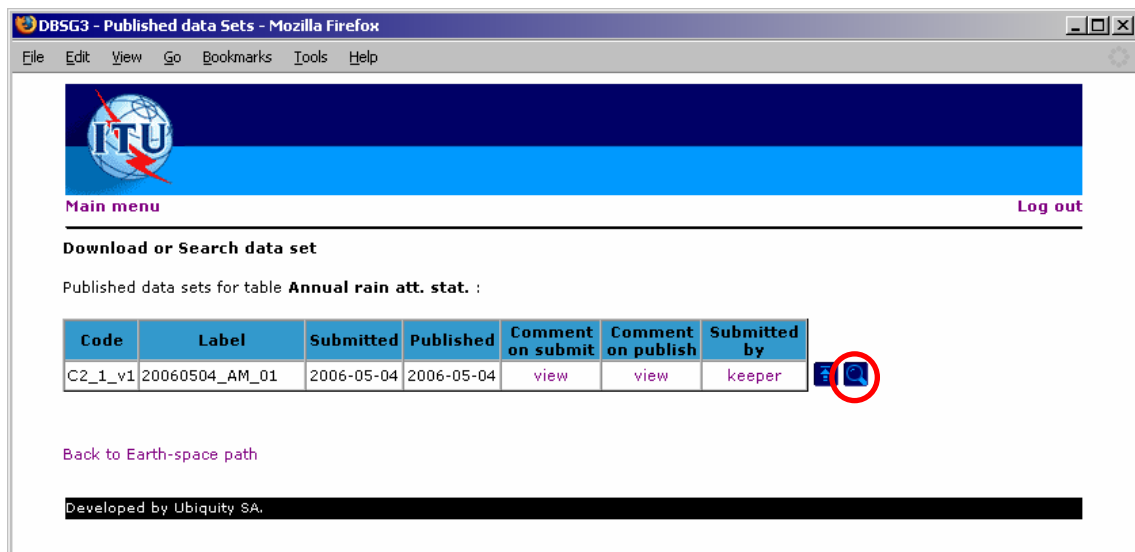


This screenshot demonstrates the download data set use case. In this example, after choosing the “Clear air basic trans loss” category, the user can download the published data set. He has access to the submission date, the published date, and can view comments for both of these events in a pop-up window (see below).



SELECT DATA SET TO SEARCH

→ Select data set use case



This screen allows the user to select the data set he wants to search through.

5.8 SEARCH IN DATA SET

→ Search in data set use case

DBSG3 - Search data set - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

ITU

Main menu Log out

Search in data set C2_1

Please select your search criteria.

Date Format is : **yyyy/MM/dd**
 Decimal separator is : .

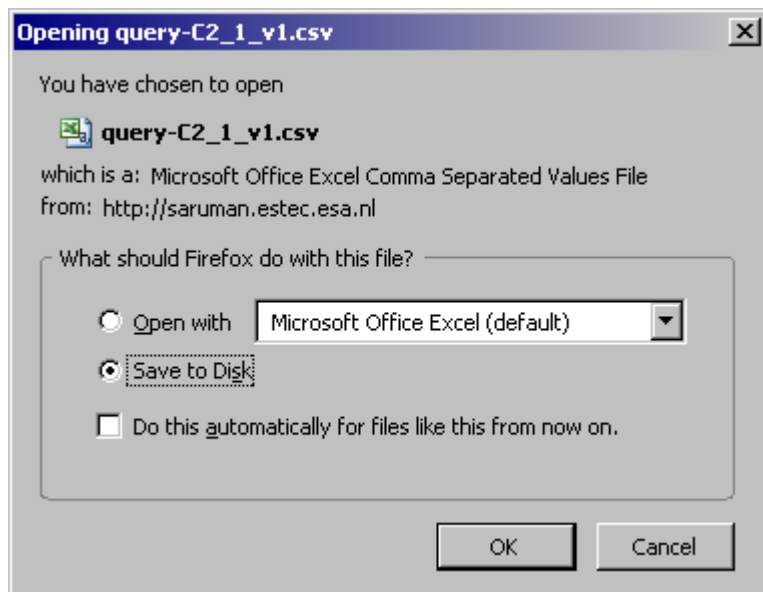
R_CTRY equal
 R_LATITUDE = deg Range from -90.0 to 90.0
 R_LONGITUD = deg Range from 0.0 to 360.0
 R_ALTITUDE equal m
 SATEL_POS = deg Range from 0.0 to 360.0
 TYPE equal
 START_DATE equal and
 END_DATE equal and
 DURATION = days
 FREQUENCY = GHz
 POL_L_C equal
 POLAR = deg
 ELEVATION = deg Range from 0.0 to 90.0
 RAIN_CONC equal
 ATT_E_T equal

Search >>

After selecting the data set to search in (see previous screen), the user can specify search criteria. Each search criterion can be activated or deactivated with a check-box. The available search criteria are listed, and for each of them the user can choose the operator (=, <, >= etc.) and specify the value. The list of available search criteria depends on the data set and has been specified in the Excel spreadsheet. When available in the meta-data for the data set, the unit is displayed.

5.9 DOWNLOAD SEARCH RESULTS

→ Download search results use case



Once the search has been initiated, the user is presented with this screen and can download the results of his search. These results are a subset of the data set's records.

5.10 UPLOAD DATA SET

→ Upload new data set use case

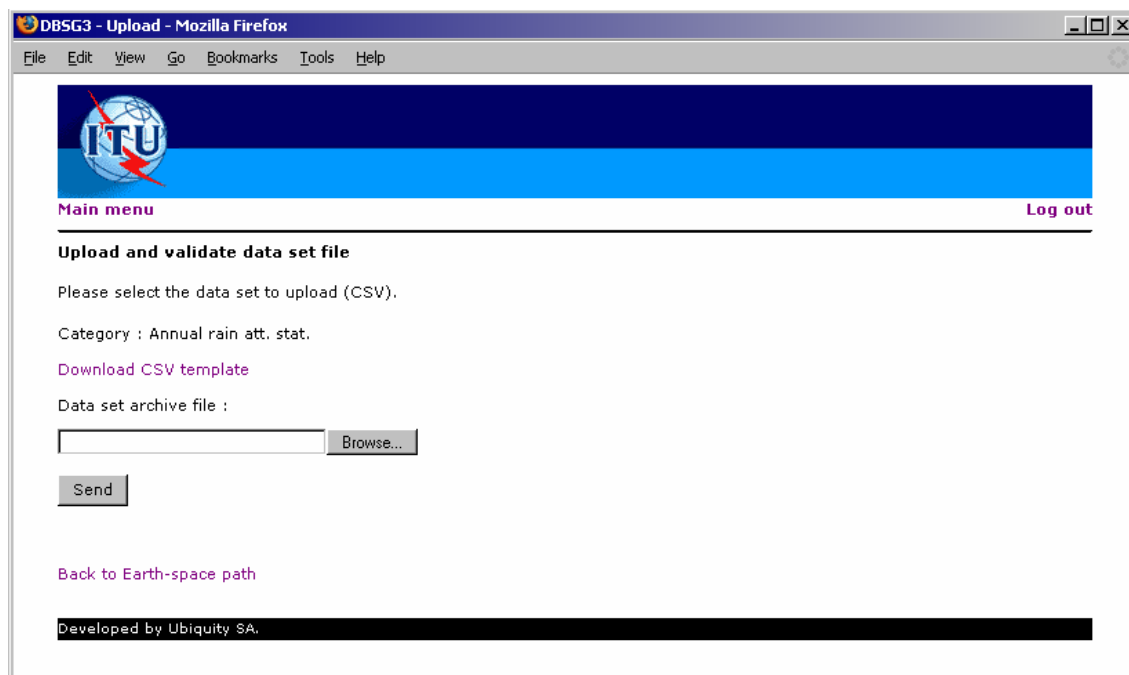
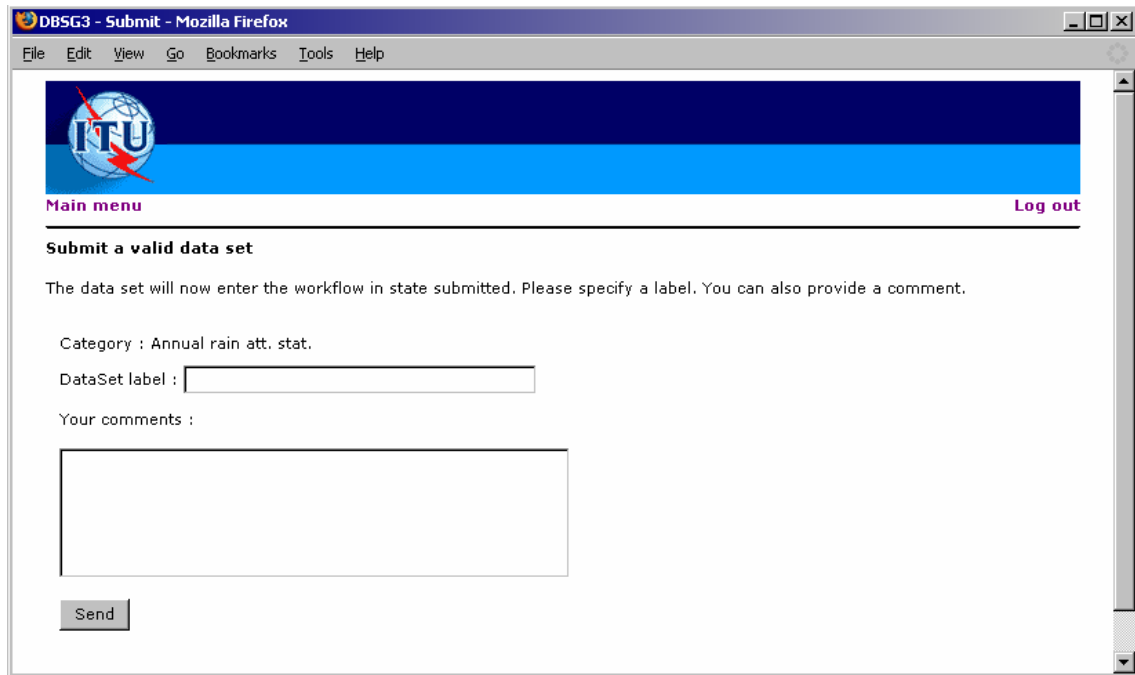


Table keepers can not only download but also upload data sets. This form allows them to do so by specifying a file on their file system, a label, and an optional comment. The browse button opens an OS/browser specific file system select window.

5.11 UPLOAD DATA SET (MISSING INPUT FIELDS)

→ Upload new data set use case

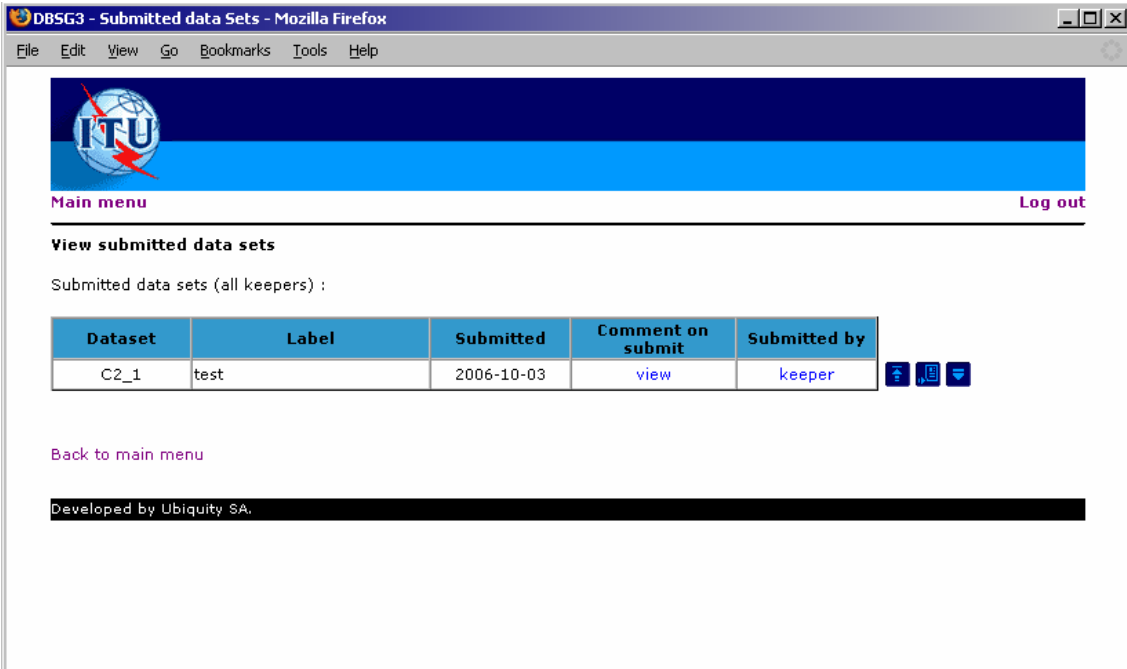


The screenshot shows a web browser window titled "DBSG3 - Submit - Mozilla Firefox". The browser's menu bar includes "File", "Edit", "View", "Go", "Bookmarks", "Tools", and "Help". The page header features the ITU logo on the left and a "Log out" link on the right. The main content area is titled "Submit a valid data set" and contains the following text: "The data set will now enter the workflow in state submitted. Please specify a label. You can also provide a comment." Below this text, there is a "Category" field with the value "Annual rain att. stat.", a "DataSet label" field, and a "Your comments" text area. A "Send" button is located at the bottom of the form.

The upload form, as any form in the system, is subject to validation. This process ensures that every mandatory field is filled in and notifies the user otherwise. Here is, as an example, the result of submitting an incomplete upload form.

5.12 PUBLISH DATA SET (STEP 1)

→ Publish data set use case



The screenshot shows a web browser window titled "DBSG3 - Submitted data Sets - Mozilla Firefox". The page content includes a header with the FTU logo and navigation links for "Main menu" and "Log out". Below the header, the section "View submitted data sets" is displayed, followed by the text "Submitted data sets (all keepers) :". A table with the following data is shown:

Dataset	Label	Submitted	Comment on submit	Submitted by
C2_1	test	2006-10-03	view	keeper

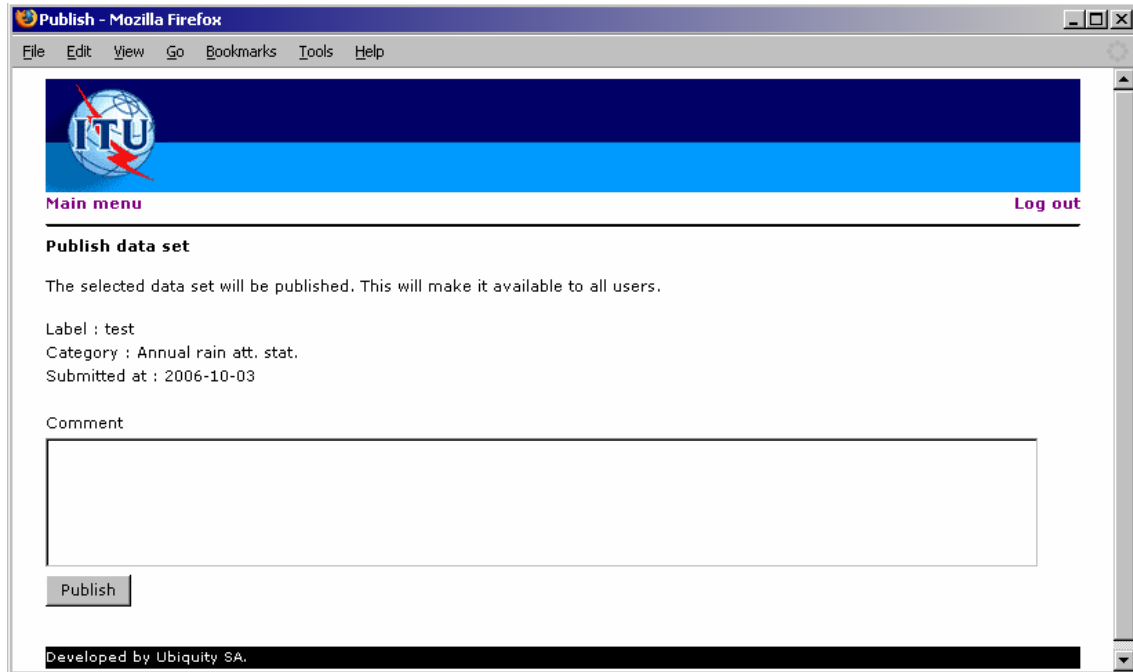
Below the table, there are three small icons (a plus sign, a document icon, and a minus sign). At the bottom of the page, there is a link "Back to main menu" and a footer that reads "Developed by Ubiquity SA."

This screen demonstrates the system manager's Review submitted data sets use case. After selecting this functionality from the main menu, the SM has access to a list of all data sets in the submitted state. This view provides information on the category, label, submission date, submission optional comment (pop-up) and the table keeper.

The SM can publish any of these data sets, which puts it in the "published" state (available to all users), automatically archiving the previous published data set in that category. He can also reject the data set (the TK will be notified by email). By clicking the submitter name, a profile window is opened (see edit profile).

5.13 PUBLISH DATA SET (STEP 2)

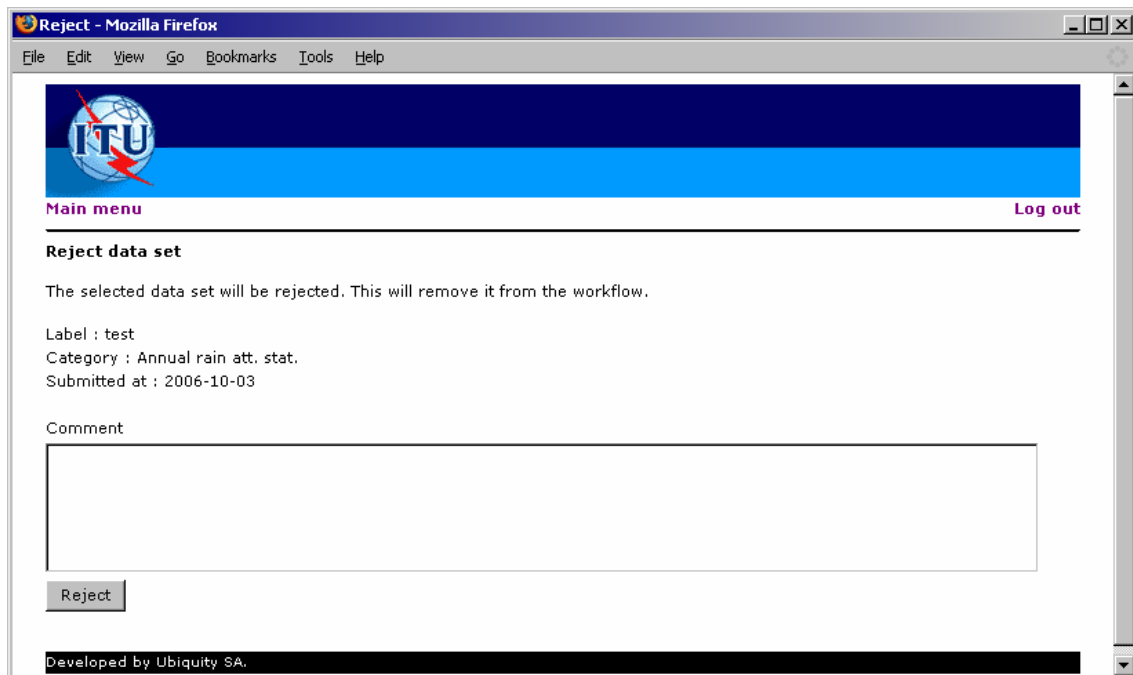
→ Publish data set use case



When the SM chooses to publish a data set, he is redirected to that page, where he can specify an associated comment.

5.14 REJECT DATA SET

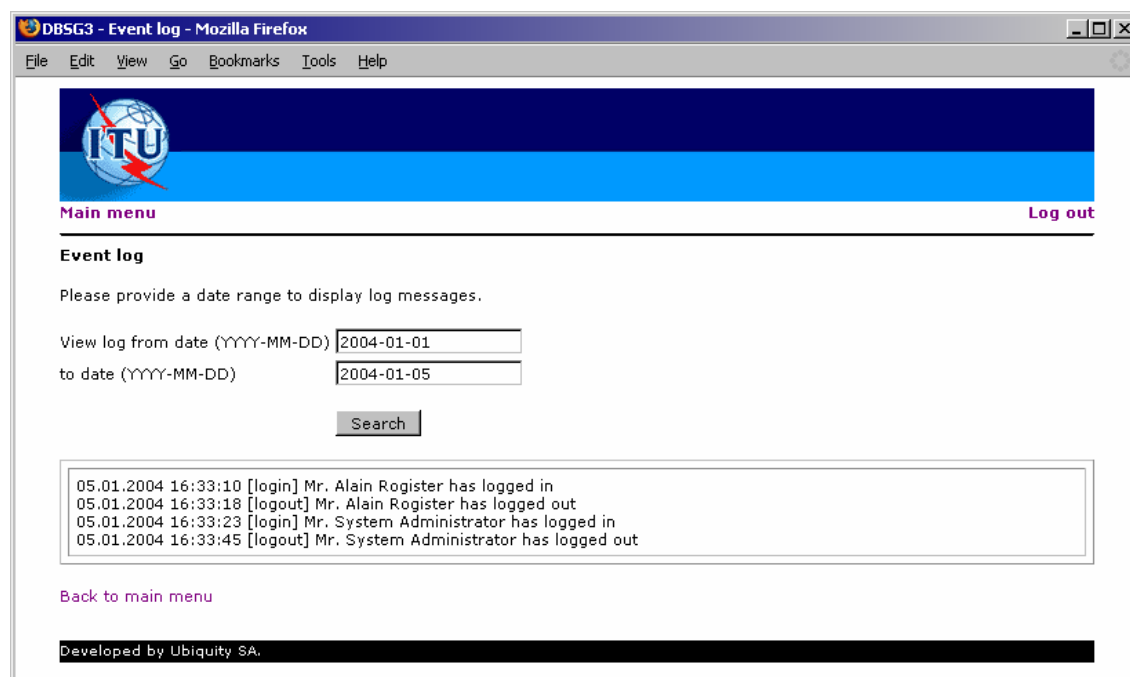
→ Reject data set use case



When the SM chooses to reject a data set, he is redirected to that page, where he can explain his decision.

5.15 VIEW EVENT LOG

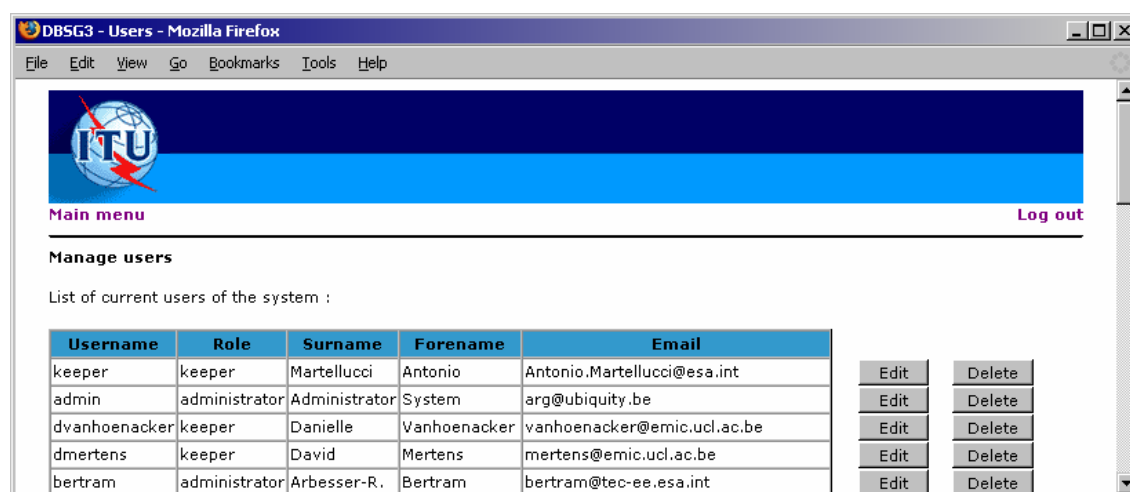
→ Monitor system usage use case



The monitor system usage is demonstrated by this screen. The SM can view an event log and trace the significant actions of all users of the system. The log is searchable for a given date range. The time of the event is provided, as well as the unique ID of the user who triggered it and a description of the event.

5.16 MANAGE USERS (STEP 1)

→ Manage users use case



This screen displays an overview of the system's registered users. For each user, the SM can take two actions: he may either delete the user, banning him/her from the system, or edit his/her profile (see following screen).

The SM can also add a new user, granting him access to functionalities of the system that will depend on the chosen credentials level. He is then presented with a blank profile form.

5.17 MANAGE USERS (STEP 2)

→ Manage users use case

The screenshot shows a web browser window titled "DBSG3 - User profile - Mozilla Firefox". The browser's address bar and menu bar are visible. The page content includes a header with the ITU logo and a "Log out" link. Below the header is the "User profile" section, which contains a form with the following fields and values:

- ID (read only):** 5
- Username (unique):** keeper
- Password:** *****
- Confirm password:** *****
- Role:** Table keeper
- Title:** Mr
- Surname:** Martellucci
- Forename:** Antonio
- E-mail:** Antonio.Martellucci@esa.int
- Phone:** (empty)
- Street:** (empty)
- Street number:** (empty)
- Postal code:** (empty)
- Locality:** (empty)
- Country:** Netherlands
- Authorized Tables:** C1_1, C1_2, C1_3, C1_4, C1_5

At the bottom of the form are "Send" and "Cancel" buttons.

This form allows the SM to edit the profile of a user. The SM is redirected to that screen if he chooses either to edit an existing profile or to create a new one.

The role field defines the level of credentials, and thus the possible use of the system for that user.

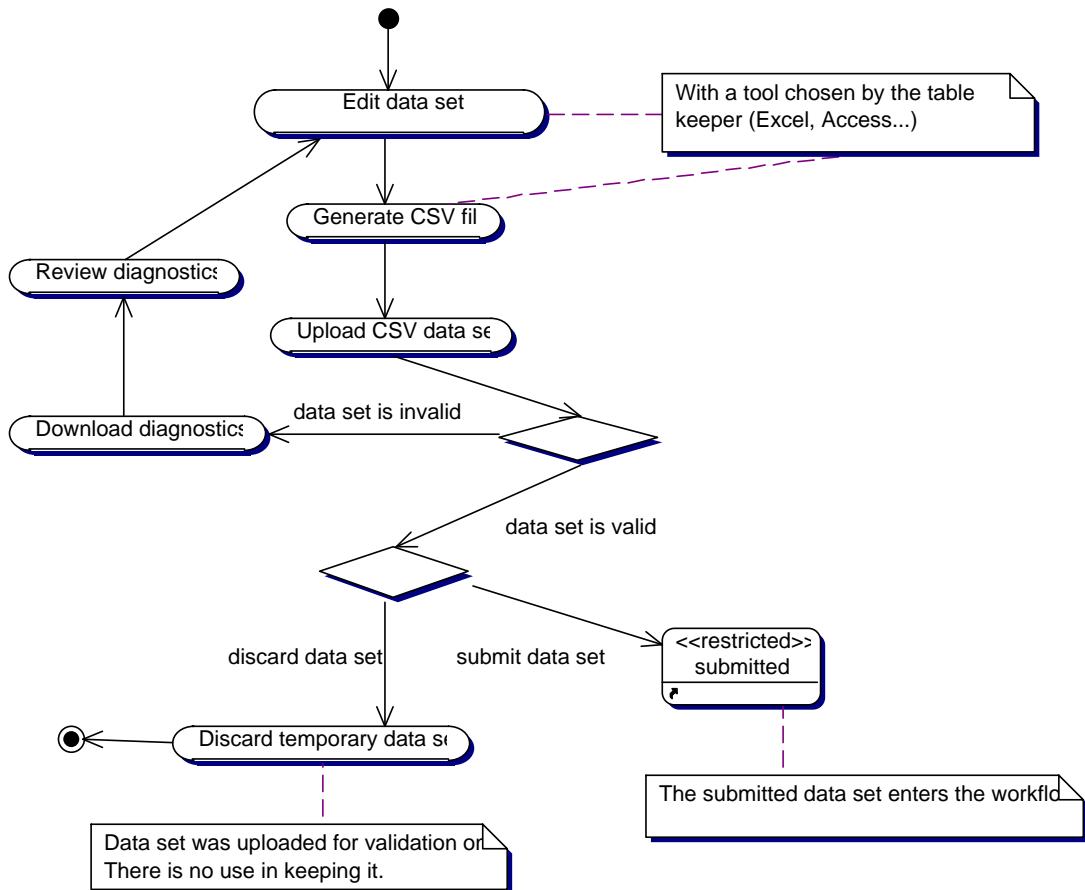
If the password is changed, it must be confirmed in the Confirm password field. If the cancel button is pressed, the SM is redirected to the list of users.

6 Table keeper activity description

This diagram describes the sequence of activities performed by the TK when updating a data set. First, the TK edits his data set with his tool of choice. Data sets are downloaded in CSV (comma separated value) format and thus easily imported in a tool like Excel or Access. Once the TK has finished editing his data set, he uses his tool of choice to convert it back to CSV.

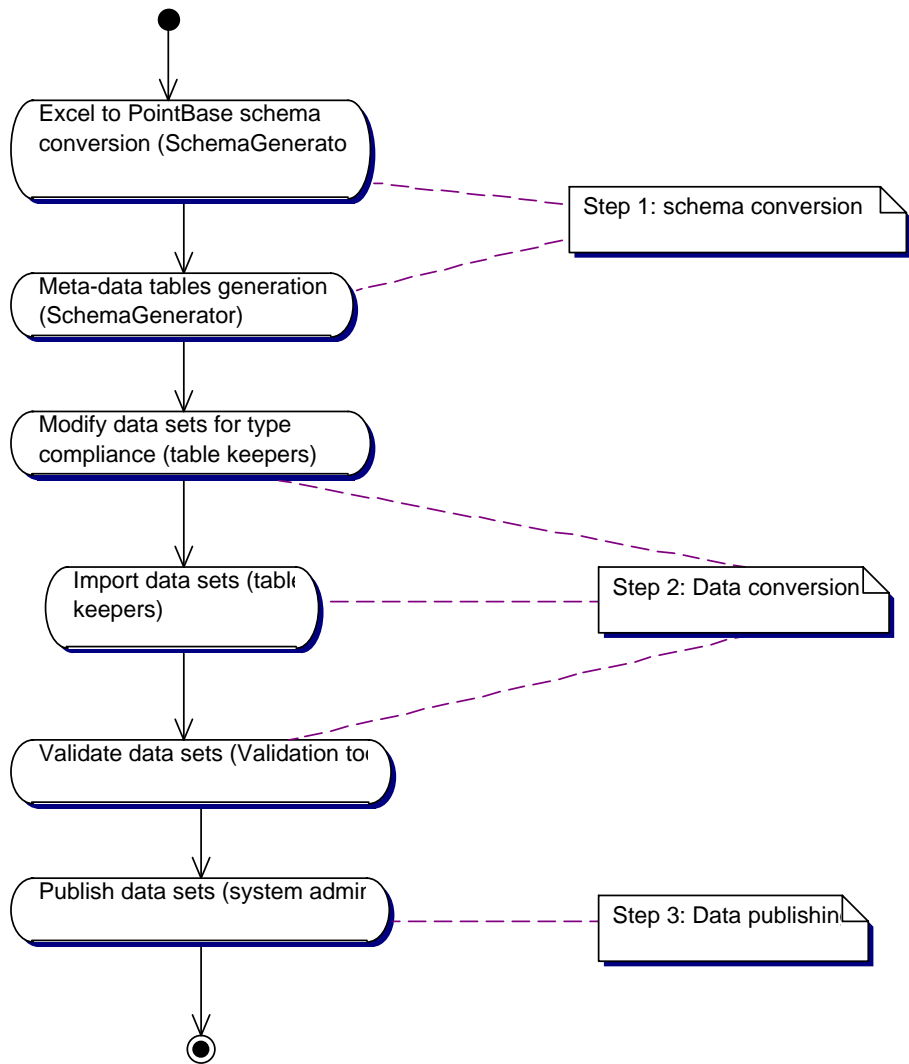
The modified CSV is then uploaded into the system, where it is verified for compliance with the database schema for this particular data set. If the data set is not valid, a diagnostics file is generated. This file can then be downloaded by the TK in order to identify the inconsistencies of the uploaded data set. After correcting the data set, the TK can upload it again. After the uploaded data set has been validated, the TK can either discard it or submit it. This gives the TK the ability to validate a working version of a data set without sending it in the approval workflow.

When submitted, the data set enters the workflow and will be reviewed by the system manager and either published or rejected.



7 Data migration plan

This task involves three steps: the migration of the database schema first, then the manual conversion of the existing data sets to the new format (with stricter data types), and finally the import of the converted data sets into the new database. These steps are described below.



7.1 STEP 1 – SCHEMA CONVERSION

As the reference definition of the data sets has been provided by ESTEC in Excel format, a SchemaGenerator tool was designed for reading the contents of the spreadsheet through an ODBC driver and creating the PointBase schema through JDBC. The SchemaGenerator uses the data type, length and precision declarations in the spreadsheet for assigning the proper SQL data type to each column in the target PointBase database. The type mapping is:

“N”, length, precision	→	NUMBER(length, precision)
“C”, length	→	VARCHAR2(length)
“D”	→	DATE

The (STATION_NO, EXP_NO) fields are used jointly as the primary key for each data set table.

The START, END and REFERENCES fields are renamed as START_DATE, END_DATE and REFERENCES_EXP in the target database, as they are reserved keywords in SQL.

The algorithm of the SchemaGenerator is described with a sequence diagram below.

7.2 STEP 2 – DATA CONVERSION

This step is performed by the table keepers. The expected output is one CSV file per data set, containing the full contents of the data set in compliance with the list of fields, their ordering and their type as defined in the Excel spreadsheet and the PointBase database schema. After converting a data set and saving it as a CSV file, a table keeper uploads it to the DBSG3 Web site where it is validated. If the data is valid, the table keeper can submit it for publication; otherwise data must be corrected and re-submitted.

7.3 STEP 3 – DATA PUBLISHING

This step is performed by the system administrator. Publishing has the following database semantics:

- Start transaction
- Read validated data set
- Delete all rows of the database table currently published
- Insert all rows of the validated data set
- Update meta-data table : set publication timestamp of the data set
- Commit transaction