

NILE BASIN DECISION SUPPORT SYSTEM

FINAL INCEPTION REPORT

ANNEX D: Concept for Web-based Water Information System and Prototype demonstration

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NEEDS ASSESSMENT AND CONCEPTUAL DESIGN OF THE NILE BASIN DECISION SUPPORT SYSTEM CONSULTANCY

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1. Introduction / project description

1.1. Goals and Objectives

The Goals of the Nile-IS

Nile-IS targets the development of a framework of the KB with essential features and sufficient flexibility for scaling up to the full-fledged Nile Basin Knowledge Base. The following will specifically be supported.

- Making all information obtained and generated in the “Needs Assessment and Conceptual Design Exercise” available to NBI, the identified stakeholders, and the interested public (world) in a transparent and well structured manner on a central platform. This implies that information obtained will be available for subsequent tasks and projects both within and outside NBI. This will assure effective utilization of accumulated information and increase efficiency.
- Clarification to any user of the IS the implications of the usage of the information contained in the IS especially with respect to applicability and quality.
- Data exchange with other systems (like the website www.nilebasin.org)
- Different Access levels
- Workflows that guarantee a high level of information quality

Non Goals of Nile-IS

- A fully fledged Document Management System (with Lock-Mechanisms on any documents to be edited; containing all the documents generated throughout the whole communication processes of the NBI)
- Communication-Tools like Groupware systems usually provide

1.2. Statement of Scope

Nile-IS will provide an easy-to-use platform which enables all participants of NBI to store, retrieve and exchange information in a structured way.

High quality of data will be achieved by feedback mechanisms and reliability by implementing a sophisticated concept which supports information flow from inner circles of the community out to the public (see section 3.1).

Through the implementation of state of the art technologies like Lucene (see section 5.4) a scalable and future-proof system will be developed.

1.3. Key functions (general functional user requirements)

The general layout / key functions of Nile-IS will be as follows:

- Content archiving (structured document repository with search functionalities) and versioning
- A metadata database
- A tool for the storage and exchange of information between NBI units and stakeholders
- A web portal for general public (linked from NBI website)
- The web based back-end offers an easy-to-learn and user-friendly (Microsoft Windows like user interface!) administration environment (IE 5.0+ is recommended) where

- Metadata and assets can be administrated
 - Documents can be uploaded
 - Users and user groups and their access rights can be administrated and
 - Log Files of the system can be seen
- In addition to the web based back-end an MS-Excel based offline client can provide a simple way to collect data (due to the well defined asset types) when users are offline (e.g. during some periods of the inception phase). Data collected in this way can be imported to the database with a special parsing routine
 - All content of Nile-IS is organised as assets which are always of one of a well defined asset types. To any asset, one or more assets of the type "Document" can be linked. Documents can contain either unstructured (e.g. Text formatted as Adobe PDF, MS Word etc.; Images formatted as JPEG, GIF etc.) or semi-structured data (e.g. Datasets formatted as MS Excel etc.) and will always be described by a special asset type called "Document" (therefore extensive use of Dublin Core Metadata will made).
 - All metadata collected with respect to any asset will be stored in the conX DB-System and will be indexed together with the documents (except certain document types like pictures) in the conX Index-System (which is based on Lucene).
 - At the web based front-end (which will be optimised for IE 5.0+ and Firefox 2.0+) any asset for which the user has access rights can be browsed and searched by using a high performance and scalable search engine, useable in two ways
 - Simple Google-like Search (by typing in a search phrase)
 - Moderated Search based on basic metadata like selecting countries, sub basins, themes or types of information (asset types)¹

1.4. Assumptions and dependencies

Nile-IS will be developed by re-using well and regularly deployed software components. All components are open source but will be customized especially for this project.

No factors that could affect the requirements stated in this document have so far been identified.

1.5. Criteria for success

The client attaches great importance to the scalability of the system. Future extension of the system, both in the scope of functionalities and in the data volume, will not be restricted by design constraints but will be possible in a modular manner.

- Conceptual design of an (intelligent) web-based information system
- Screen design (style guide) for efficiency information systems (including usability & accessibility)
- Technical implementation of the web-based information system
- High level Web-hosting/-housing
- Know-how on conception and implementation of intelligent search engines
- Know-how on conception and implementation of semantic web components

¹See also categorised search at <http://www.reegle.info>

Further criteria

- Consulting along the whole project schedule
- Conceptual design of the system (structure of content and information, system architecture → performance, robustness, scalability, security, screen design → usability, accessibility)
- Precise search mechanism to achieve high quality output of information
- Development of a target-oriented (screen) design according to community and the audience

Self-evident – but important criteria

- User friendly interfaces – consistent guidance for the user
- Media-compatible preparation of content
- High performance of the web-based system
- Definition of window-headers and meta-tags to be indexed by other search engines
- Testing (e.g. operating systems, different browser)
- Tight project management and frequently & transparent communication and co-ordination of the project
- WAI conformity (as needed) by using XHTML technology.

2. Interface structure requirements

2.1. Interface structure Front-End

The 4 basic elements of the Nile-IS front end are:

1. Portal View
2. Community / User Groups
3. Search
4. Additional menu containing basic information about the Nile-IS

The main menu elements 1 – 3 might be organised as tabs as implemented at <http://www.pwm.at>.

Figure 2.1 Portal View

Logo and Header			
Create new account or Login Forgot password? Click here!		Home ! Sitemap ! About Us ! <div style="float: right; border: 1px solid black; padding: 2px;">RSS</div>	
Portal	Community	Search	Title <div style="float: right; border: 1px solid black; padding: 2px;">Print this</div>
Topic 1* Topic 1.1 Topic 1.2 Topic 1.3 Topic 2 Topic 3 Knowledge Base . . .		Short description - Content package 1 - Content package 2 - Content package 3 Subtitle of Content package 1** Weit hinten, hinter den Wortbergen, fern der Länder Vokalien und Konsonantien leben die Blindtexte. Abgeschlossen wohnen Sie in Buchstabenhäusern an der Küste des Semantik, eines großen Sprachozeans. Ein kleines Bächlein namens Duden fließt durch ihren Ort und versorgt sie mit den nötigen Regelialien. Es ist ein paradiesmatisches Land, in dem einem gebratene Satzteile in den Mund fliegen. Nicht einmal von der allmächtigen Interpunktion werden die Blindtexte beherrscht - ein geradezu unorthographisches Leben. Eines Tages aber beschloß eine kleine Zeile Blindtext, ihr Name war Lorem Ipsum, hinaus zu gehen in die weite Grammatik. : : **** Title of attached document No. 1 **** Title of attached document No. 2 Feedback:	

* Topics are organised as folders in the backend, into any such folder an asset of the type "basic information" can be asserted which will appear on the front-end. Topics should not have more than 2 levels to keep the frontend in a readable manner; the folder "Knowledge Base" is organised differently and is described in this document under xx.xx
 ** if picture (and it's caption) is attached to a content package then text will be flowing around it

Menu structure of the Portal view can be organised comfortably in the backend: Folders (and their names) define the structure in the public view (front-end). Only a two level hierarchy under the portal node is planned. In any "Topic Folder" there must be one asset of the type "basic information", which will be displayed in the public view (front-end) when chosen. To publish documents in these folders a symbolic link called "hard-links" can be created which points to the original asset (which is a part of the community), so any changes on the original information will be seen also in the public portal view.

Any asset which can be displayed for a user can also be printed out.

The output at the front end will be programmed with a strong orientation towards the WAI guidelines of the W3C, thus a text only version will be offered for the most important features of the system.

Additional menu containing basic information about Nile-IS

At any stage of the front end the additional menu can be accessed:

- Home -> brings the user to the entry page (home page) of the website "basic information"
- About Us -> "basic information"
- Sitemap -> shows all available navigation links in the portal and search view – navigation links in the community space will not be shown in the sitemap (e.g. profile, community, groups, ...)
- RSS -> RSS-Feed (using RSS 1.0) of the last 100 assets which were published for the public view can be accessed

Additional menu elements can be added as long the elements fit the designated area. By default additional elements will use the asset type "basic information".

Community View

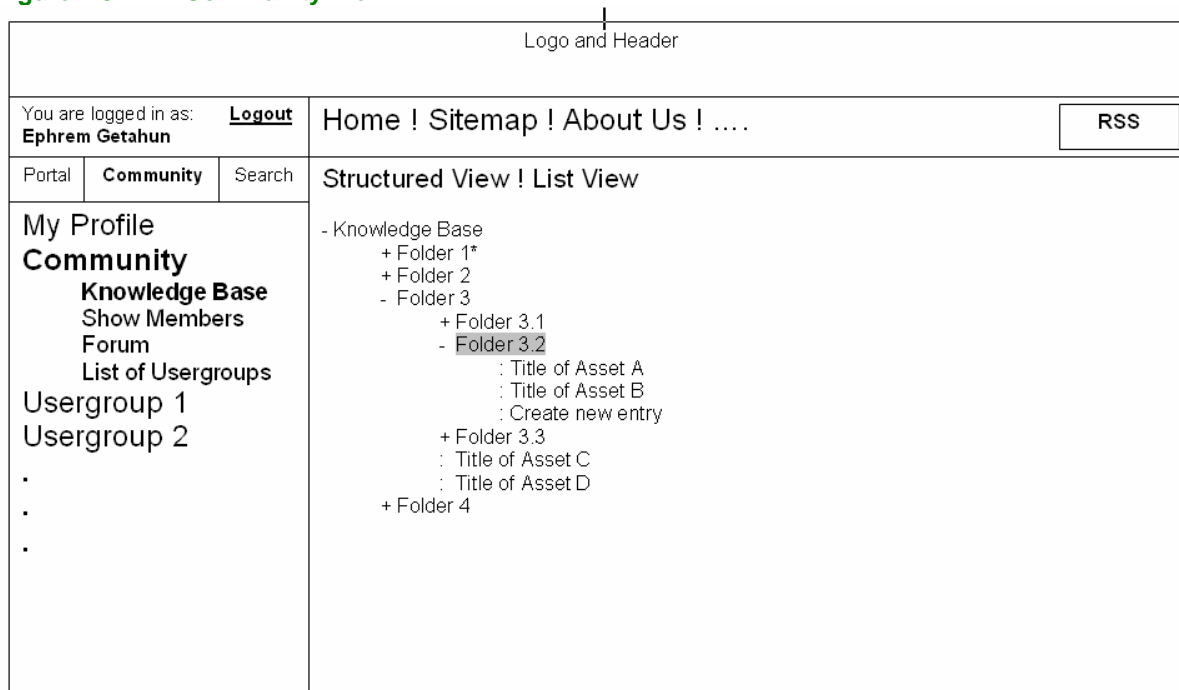
Once logged into, the Community area will offer new features (when anonymous users click on “Community” a text should be displayed which explains the advantages of an account and how to apply for an account; this text has to be defined):

- My Profile: The user can change any information he or she has inserted when the account was created, especially the password.
- Community:
- Knowledge Base: to browse the knowledge base a Windows explorer like interface will be offered. The user can create new assets, therefore an empty template will be displayed which conforms to the structure of the chosen asset type. Clicking on existing assets shows well structured metadata and any linked documents (see: “Frontend_Community_Asset.doc”) can be explored and downloaded as well (with the exception that, if the user doesn’t have the right to read the linked documents but the rights for the “parent-asset”, in which case the title of the document will be displayed but when clicked it will produce a message which informs about the restriction).
- Show Members: A list of all members of the community will be shown. The members list contains first name and surname and can be filtered on initials of the members surname (eg ALL A B C D E F ...). A click on the members name will lead to the detailed description of the members profile (Asset Type User).
- Forum: A overview of topics will be shown and a new topic can be added (“add new topic”). Users can add postings on topics as shown in the figure below. User may enter a subject and a message for each topic or posting.

Figure 2.2 Structure of the forum



- User Groups: a list of all user groups with their short descriptions and a button to apply for the membership of certain user group (see section “Workflows”).

Figure 2.3 Community View

* The folder structure can only be changed by the administrator

Adding Assets

A) Add new asset by a user group member to a user group's knowledge base

Basic principle: any member of a user group is allowed to add assets to this user group.

1. User selects his user group
2. User selects the menu tab "knowledge base" inside of this user group
3. User selects the needed folder where the new asset should be added
4. User select option: "create new entry"
5. User selects an asset type the user wants to add out of existing available asset types (e.g. institution, spatial data, document etc)
6. User fills out the given form which is defined for the asset type (title, lead, summary, country etc) and uploads a document (if needed)
7. User saves the new asset
8. User is the owner of this new asset (means that the user has all rights on this asset)
9. New asset is available for the whole user group (read only)

The workflow of adding a new asset to the Community is exactly the same as the above described to a user group.

B) Publish an asset from user group's knowledge base to a higher level: community view knowledge base

Basic principle: administrators of user groups have all rights within this user group. Several administrators can be assigned to a user group (by back end super users).

1. User group administrator selects asset to publish (out of the user groups knowledge base – out of the relevant folder)
2. User group administrator selects function "publish asset" (only available for user group administrators)
3. User group administrator fills out a form "publish request" and sends this request to the community administration (e.g. why this asset needs to be published for the community)
4. Community administration receives an internal message about the new asset publishing request.
5. Community administration has 2 choices:

- a. Accept publishing request → Community administration selects “accept request”
 - An internal message is sent by the system automatically to the requesting user group administrator containing a publish confirmation
 - Community administration has to set a hard link inside of the back-end (CMS) onto the relevant asset to publish it inside of the Community.
 - The asset is now available in the Community’s knowledge base (for all members of the Community – read only)
- b. Deny publishing request → Community administration selects “deny request”
 - An internal message is sent by the system automatically to the requesting user group administrator containing a publishing denial (this message is editable by the Community management – to e. g. give a reason of the publishing denial)

The workflow of publishing an asset from the Community to the public view is exactly the same as the above described from the user group to the Community.

Join User groups

To become a new member of a user group it is necessary to be logged in. The next step is then to apply for membership (part of the submenu “List of user groups”) for a selected user group. All of the administrators of this user group receive an email with a short message (needs to be defined!) which contains the name and email of the user who applied for membership. The administrator can now log in to the system and add the user to the user group which generates an email with a short notification (text needs to be defined!) of the new membership. This mail will be sent to all administrators of the user group and to the new member

Search

Users (no matter if logged in or anonymous) can search those assets (and therefore also over those documents) they have the access rights for. There are two ways to search the knowledge base:

- Simple search: Like Google a text field will be offered. The user can type in one or more words (separated by blanks). When the search button is clicked the search engine will look for assets (entries) where the search phrase can be found. If more than one word is typed in all the words must be found in an entry to be displayed. Quotation marks around two or more words mean that exactly that phrase must be in the asset to be shown in the search results. The search results will be displayed as a list (Title and text passages containing the search phrases will be shown and optionally some metadata of the asset – see also: <http://www.reegle.info> or <http://www.ecoi.net>).
- Moderated search: In addition to the free search phrase the user can set filters: By selecting countries, sub basins, themes and asset types the search results can be shortened and the time to find suitable results can be shortened quickly.

It has still to be defined how many hierarchies sub basins or themes will have to be implemented.

Figure 2.4 Search View

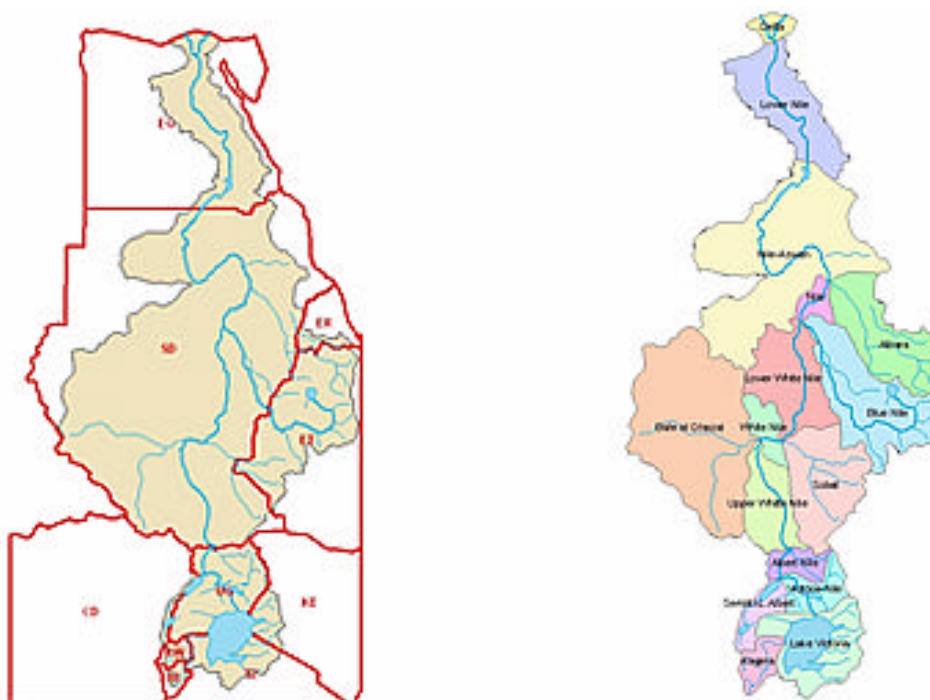
Logo and Header				
You are logged in as: Ephrem Getahun		Logout	Home ! Sitemap ! About Us ! ...	
Portal	Community	Search	<input type="button" value="RSS"/>	
Simple Search Moderated Search			Select Countries	
			Select Sub Basins	
			Select Themes	
			Select Asset Types	
			Search Phrase or additional keywords	

The query interface makes also multiple selections of attributes possible: eg. A query can be based on more than one country, sub basin or theme or a combination of all of them.

Moderated search: selecting a country or a sub basin

A country and/or a sub basin can be selected by clicking on the country / sub basin map. The selected country / sub basin will be highlight. Only one country / sub basin can be chosen.

Figure 2.5 Nile Countries / Sub-basins map



2.2. Interface structure Back-End

Folders (and their names) define the structure in the public view (front-end). In any folder there must be an asset type “Basic information” which will be shown if chosen in the front-end. E.g. the content of “Home” must be entered in the asset type “basic information” in the folder “Home”, Information about the Sitemap must be entered in the asset type “basic information” in the folder “Sitemap” and so on ...

Figure 2.6 Overview of the backend folder tree



Allowed asset types in the folders and subfolders in the knowledge base are: Institutions, Infrastructure, Project, Treaty, Time Series Data, Database, Spatial Data and Model.

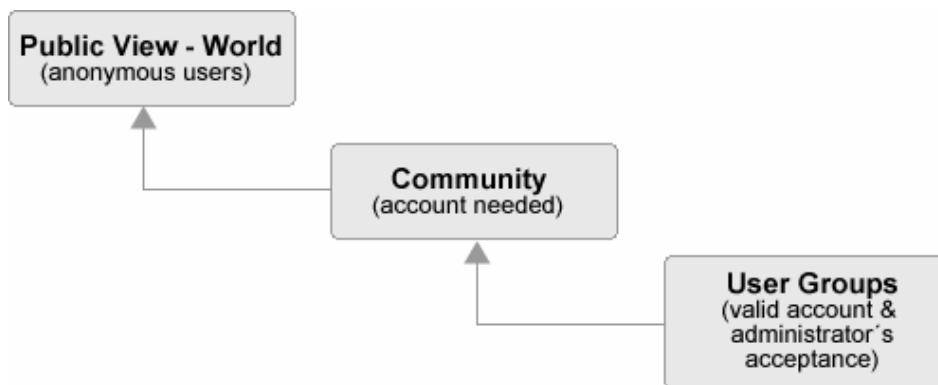
3. Information Access requirements

The system will serve as a communication platform but no specific communication features such as newsgroups or email are currently planned. It will not replace NBI intranet features. The front end will be integrated as a link into <http://www.nilebasin.org>

3.1. System Users, User groups and Access Rights

At the front end there are 3 levels of access:

Chart 3.1 Levels of access of the Nile-IS



For the back-end super users can be defined who have unrestricted access to all information. They also can grant any access rights to any other user if they want.

For any user group which only can be defined by super users, administrators (at least one or more) can be defined. Besides unrestricted rights on all assets inside "his or her" user group the administrator can decide if several assets should be readable also for the community level (the same principle is also foreseen for the community level). The creator of an asset has any right on his or her asset except lifting it up to the next level.

Within the Content Management System (back-end) the following access rights can be applied to any folder (assets inside the folder inherit the defined rights) and/or asset to any user group (and therefore to their members) or single users by the back end super users:

- See existence of asset (but no right to read or open)
- Read
- Write / Edit
- Delete
- Rename
- Move (and therefore put assets to a higher level and publish them)
- Grant access rights

The administration of the above mentioned access levels are handled via the content management system by the back-end super users.

Figure 3.1 User groups of the system

	Front-end			Back-end
	Public	Community		Administration
			Usergroup(s)	
Public User	ACCESS	NO ACCESS	NO ACCESS	NO ACCESS
	read			
Community User	ACCESS	ACCESS	NO ACCESS	NO ACCESS
	read	read		
Group User	ACCESS	ACCESS	ACCESS TO ALLOCATED GROUPS	NO ACCESS
	read	read	Assets in the Knowledge base: read, write / edit ,delete OWN assets	
Group Admin	ACCESS	ACCESS	ACCESS TO ALLOCATED GROUPS	NO ACCESS
	read	read	Assets in the Knowledge base: read, write / edit ,delete ALL assets, create folders in the knowledge base	
Community Admin	ACCESS	ACCESS	ACCESS TO ALLOCATED GROUPS	NO ACCESS
	read	Assets in the Knowledge base: read, write / edit ,delete ALL assets	Assets in the Knowledge base: read, write / edit ,delete ALL assets, create folders in the knowledge base	
Super-Admin	ACCESS	ACCESS	ACCESS	ACCESS
	read (editing in the back-end)	Assets in the Knowledge base: read, write / edit ,delete ALL assets	Assets in the Knowledge base: read, write / edit ,delete ALL assets	Everything: read write / edit delete create folders (all knowledge bases, topic folders, usergroups) move assets grant access rights

At the moment the identified user groups of the system are (from a technical perspective more user groups can be added at any time):

- NBI WRPM
- Other NBI SVP and SAP projects
- Consultants working on behalf of NBI
- National NBI focal points
- NBI Stakeholders (different levels, to be defined)

3.2. Login / Registration Process

Login

To login for the community the user clicks on “login” and must fill in a form with the following fields:

- Email
- Password

The number of attempts to login successfully is not limited. After the success login the user will be redirected to the community view / navigation point “Community”.

If the user *forgot his password* he can click on “Forgot your password” and a new automatically generated password for his account will be generated and sent to his email account.

Registration

Users wishing to enter community space have to register at the Nile-IS.

To *create an account* for the community level (NOT for the user groups!) the user clicks on “Create new account” and must fill in a form with the following mandatory fields:

- First name
- Last name
- E-Mail

In addition optional information can be inserted:

- Institution
- Language skill
- Job title

After the form was sent, the user receives an email with a welcome message (needs to be defined!), an automatically generated password, the username (which is the email-address) and a link. By clicking on this link, the account will be activated and the user can log in.

3.3. Full Text Search

Boolean operators and Wild cards

- The "AND" operator is the default conjunction operator. The "AND" operator matches documents where all terms exist anywhere in the text of a single document
- The "OR" operator links two terms and finds a matching document if either of the terms exists in the text of a single document
- The "NOT" operator excludes documents containing the term after "NOT"

The "NOT" operator cannot be used with just one term (eg searching for NOT Egypt will return no results).

- The “*” symbol to perform a multiple character wildcard search

Phrase search

A phrase is a group of words surrounded by double quotes (eg “nile water”). The use of wild cards and Boolean operators are not possible on phrase searches.

Search result

The search result list contains:

- Asset Title
- Text passages containing the search terms
- Metadata (not completely defined yet)

The search result page contains 25 entries. If more entries found a page turning function will be shown (eg “< 1 2 3 >”)

4. Data Model and Description

4.1. Data Objects (Asset Types)

The following Asset Types with the attributes will be available throughout Nile-IS:

Table 4.1 Asset-type: Theme

Field name	Field type
Theme Or Sector	Single-line text field
Key facts	FCK Editor
Key figures - country	Text area
Key figures – Nile basin	Text area
Policy/Strategy	1:1 Relation Document
Legal Situation	1:1 Relation Document
Regulations	1:1 Relation Document
Treaties	1:m Relation Treaties
Enforcements	Text area
Institutions – Governance	1:m Relation Institution
Institutions – Regulation	1:m Relation Institution
Institutions – Investment	1:m Relation Institution
Institutions – Service	1:m Relation Institution
Sector Coordination	1:m Relation Institution
Reform Processes	
Cooperation	
Projects	1:m Relation Project
Scientific Institutions	1:m Relation Institution
Civil Society	1:m Relation Institution
Private Sector	1:m Relation Institution
Community Level	
Key issues	
Conflicts	
Potentials	
Innovative WRM	
Climate Change	
Funding	
Cost Recovery	
Infrastructure	1:m Relation Infrastructure
Databases	1:m Relation Database
Time Series Data	1:m Relation Time Series Data
Spatial Data	1:m Relation Spatial Data
Models	1:m Relation Model
Identified gaps	
Documents	1:m Relation Document
Relevance For NBI-DSS	FCK Editor

Field name	Field type
Indicators	FCK Editor
Documents	1:m Relation to Document
Entry By	Automated by system
Create Date	Automated by system

Table 4.2 Asset Type: Country

Field name	Field type
Country	Single-line text field
ISO Code	Single-line text field
Area	Single-line text field
Area Nile	Single-line text field
Area Percent	Single-line text field
Pop	Single-line text field
Pop Nile	Single-line text field
Pop Percent	Single-line text field
Sub	1:m Relation to Sub-basin

Table 4.3 Asset Type: Sub-basin

Field name	Field type
Sub-basin	Single-line text field
SB ID	Single-line text field
SB Area	Single-line text field
SB Pop	Single-line text field
Upstream	1:m Relation to Sub-basin
Downstream	1:m Relation to Sub-basin
Country	1:m Relation to Country

Table 4.4 Asset Type: Institution

Field name	Field type
Institution Name	Single-line text field
Theme	1:m Relation Theme
Country	1:1 Relation Country
Sub-basin	1:m Relation Sub-basin
Thematic Focus	Single-line text field
Territorial Scope	Drop down list
Legal Status	Single-line text field
Steering	Single-line text field
Internal Organisation	
Organisation Chart	1:m Relation to Document
Decentralisation	Drop down list

Field name	Field type
Changes	
Mission / Responsibility	
Actual Functions	
Strategy	1:m Relation Document
Major Programmes	
Service Provision	
Performance, M&E	
Stakeholder Participation	
Gender	
Poverty Reduction	
Environment	
Budget	
Revenue	
Financial supervision	
Staff Number	Single-line text field
Staff Qualification	
HR Management	
Training Initiatives	
Pay Scale	
IT/GIS staff capacities	
IT/GIS Infrastructure	
Internet Access	
Scenario Definition	
Decision Making	
Interest In NBI-DSS	
Information Needs	
Data Collection	1:m Relation Time Series Data
Spatial Data	1:m Relation Spatial Data
Databases	1:m Relation Database
Models	1:m Relation Model
Identified Gaps	
Documents	1:m Relation Document
Cooperation	1:m Relation Institution
Projects	1:m Relation Project
Director	Single-line text field
Website	Single-line text field
Contact	Text Area
Entry By	Automated by system
Date	Automated by system

Important notice:

To fill out all the fields of the asset-type "Institution" may take a long time – the risk of a " system time out error" or losing internet connection during the input process could be a serious problem.

A conX asset-type should not have more than 5 FCK editors because of performance reasons.

Table 4.5 Asset Type: Infrastructure

Field name	Field type
Infrastructure Name	Single-line text field
Theme	1:1 Relation Theme
Country	1:1 Relation Country
Sub-basin	1:m Relation Sub-basin
Province	Single-line text field
Location	
Status	Drop down list
Owner	Single-line text field
Characteristics	
Water rights	
Water Requirements	
Source of Water	
Wastewater	
Construction Year	Single-line text field
Data Use	1:m Relation Time Series Data
Documents	1:m Relation Document
Information Needs	
Contact	Single-line text field
Entry By	Automated by system
Date	Automated by system

Table 4.6 Asset Type: Project

Field name	Field type
Project Name	Single-line text field
Theme	1:1 Relation Theme
Country	1:1 Relation Country
Sub-basin	1:m Relation Sub-basin
Acronym	Single-line text field
Lead / Host	1:1 Relation Institution
Institutions	1:m Relation Institution
Start Year	Single-line text field
Funding	
Status	Single-line text field
Objectives	
Activities	
Achievements	
Website	Single-line text field
Contact	Text area
Databases	1:m Relation Database
Models	1:m Relation Model
Documents	1:m Relation Document
Information Needs	

Field name	Field type
Entry By	Automated by system
Date	Automated by system

Table 4.7 Asset Type: Treaty

Field name	Field type
Treaty Name	Single-line text field
Theme	1:1 Relation Theme
Country	1:1 Relation Country
Sub-basin	1:m Relation Sub-basin
Full Title	Single-line text field
Year	Single-line text field
Legal Status	
Key Contents	Single-line text field
Documents	1:m Relation Document
Data Requirements	1:m Relation Time Series Data
Entry By	Automated by system
Date	Automated by system

Table 4.8 Asset Type: Database

Field name	Field type
Database Name	Single-line text field
Theme	1:1 Relation Theme
Country	1:1 Relation Country
Sub-basin	1:m Relation Sub-basin
Full Name	Single-line text field
Content	
Purpose	
Region	
Time Series Data	1:m Relation Time Series Data
Spatial Data	1:m Relation Spatial Data
Year	Single-line text field
Developed By	Single-line text field
Last Modification	Single-line text field
Responsible Institution	1:1 Relation Institution
Documents	1:m Relation Document
Entry By	Automated by system
Date	Automated by system

Table 4.9 Asset Type: Time Series Data

Field name	Field type
Dataset Name	Single-line text field
Theme	1:1 Relation Theme
Country	1:1 Relation Country
Sub-basin	1:m Relation Sub-basin
Parameter	
Unit	
Data Origin	
Spatial Res.	
Temp. Res.	
Method	
Start	Single-line text field
End	Single-line text field
Completeness	Single-line text field
Data Transmission	
Data Storage	1:m Relation Databases
Data Format	Single-line text field
Data Quality	
Data Availability	
Responsible for Update	1:m Relation Institute
Data Contact	
Documents	1:m Relation Document
Entry By	Automated by system
Date	Automated by system

Table 4.10 Asset Type: Spatial Data

Field name	Field type
Spatial Dataset Name	Single-line text field
Theme	1:1 Relation Theme
Country	1:1 Relation Country
Sub-basin	1:m Relation Sub-basin
Content	
Data Origin	
Spatial Res.	
Ref. Grid	
Year	Single-line text field
Last Update	Single-line text field
Data Quality	
Data Availability	
Responsible for Update	1:m Relation Institute
Data Contact	
Data Format	Single-line text field
Documents	1:m Relation Document

Field name	Field type
Entry By	Automated by system
Date	Automated by system

Table 4.11 Asset Type: Model

Field name	Field type
Model Name	Single-line text field
Theme	1:1 Relation Theme
Country	1:1 Relation Country
Sub-basin	1:m Relation Sub-basin
Full Name	
Type	
Purpose	
Region	
Spatial Res.	
Time Step	
Input	
Output	
Year	Single-line text field
Developed by	
Last Modification	Single-line text field
Programme Code	
Ready to Run	
Responsible Institution	1:1 Relation Institute
Interfaces	
Documents	1:m Relation Document
Entry By	Automated by system
Date	Automated by system

Table 4.12 Asset Type: Document

Field name	Field type	Dublin Core
Document Name	Single-line text field	
Theme		
Country		
Sub-basin		
Type of Document		
Full Title		DC:title
Editor (Institution)	1:1 Relation Institution	DC:publisher
Author (Person)	Single-line text field	DC:creator
Year	Single-line text field	DC:date
Language	Single-line text field	DC:language
Abstract		DC:description

Field name	Field type	Dublin Core
Availability		DC:rights
Doc Location		DC:identifier
Doc Format		DC:format
Entry By	Automated by system	
Date	Automated by system	
Document	File	

Table 4.13 Asset Type: Basic Information

Field name	Field type
Title	Single-line text field
Lead	FCK Editor
Theme	1:1 Relation Theme
Country	1:1 Relation Country
Sub-basin	1:m Relation Sub-basin
Content Blocks	See Content Block

Table 4.14 Content Block

Field name	Field type
Subtitle	Single-line text field
Long Text	FCK Editor
Opt. Picture	1:m Picture
Opt. Documents	1:m Relation Document

Table 4.15 Asset Type: Picture

Field name	Field type
Title	Single-line text field
Picture	Image

Table 4.16 Asset Type: User

Field name	Field type
First Name *	Single-line text field
Last Name *	Single-line text field
Email *	Single-line text field
Institution	Single-line text field
Language skill	Single-line text field
Job Title	Single-line text field
Change password	Single-line text field
Confirm password	Single-line text field
Administrator	Radio Button (Yes/No)
Back-End access	Radio Button (Yes/No)
Group	1:m Relation Group

Table 4.17 Asset Type: Group

Field name	Field type
Title *	Single-line text field
Description	FCK Editor
Members	1:m Relation User

* ... marked fields are mandatory

To any attribute of any asset type a proper conX-field type can be asserted. The following field types are available:

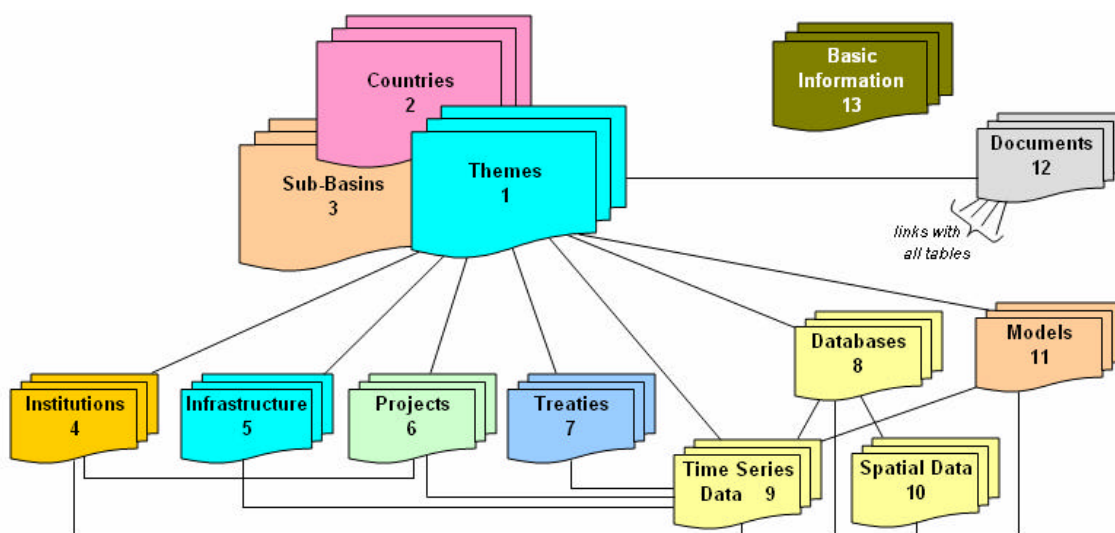
- Single-line text field (also used for numeric input)
- Text Editor (therefore FCK-editor with a limited number of functionalities² is used)
- Radio button
- Drop down list (to choose from predefined values)
- 1:1 Relationship (e.g. to link an institution with exactly one country)
- 1:m Relationship (e.g. to link a country with several sub-basins or maps etc.)

² For instance it is not desirable that the font can be changed by the user himself, because the presentation on the front-end would suffer from a minor readability

4.2. Data dictionary and relationships

The underlying data model is defined by so called “asset types”, their attributes and their m:n-relations to each other.

Figure 4.1 Data model



4.3. Metadata standards and feedback mechanism

Due to the wish of the client to implement a quality assurance system three special metadata attributes should be noted here:

- Any document can be rated by users who are logged in. By simply clicking on “thumb up/thumb down”³ they can express if a document should be considered of high or low quality. An average value (which is between 1 and 5 stars) will be calculated. First Example: After a document was added to the system (starting with 3 stars), three people clicked “thumb up” (which equals 5 stars), one person clicked “thumb down” (which equals 1 star), and maybe 10 others didn’t click at all. This will give a result of $(1*1+3*5+1*3)/5 = 3,8$ which will be rounded to 4 stars. Second example: 6 persons said “bad”, 11 say “good” will give a result of $(6*1+11*5+1*3)/18 = 3,56$ which will be rounded to 4 stars. Every user can only rate an asset once.

Figure 4.2 Vote button



- Any registered user can attach feedback (free text) to any asset he or she wants. Feedback will be displayed at the front end for any user who has access to the asset. Users can add feedback on assets as shown in the figure below. User may enter a subject and a message.

³See <https://slynkr.sunwarp.net>

Figure 4.3 Feedback on a asset

- **Feedback 1**
 Author: FirstName Lastname
 Date: 10.10.2007
 Feedback on a asset, Feedback on a asset, Feedback ...

- **Feedback 2**
 Author: FirstName Lastname
 Date: 10.10.2007
 Feedback on a asset, Feedback on a asset, Feedback ...

- For any asset of the system a full history of all versions will be stored and can be used for recovery

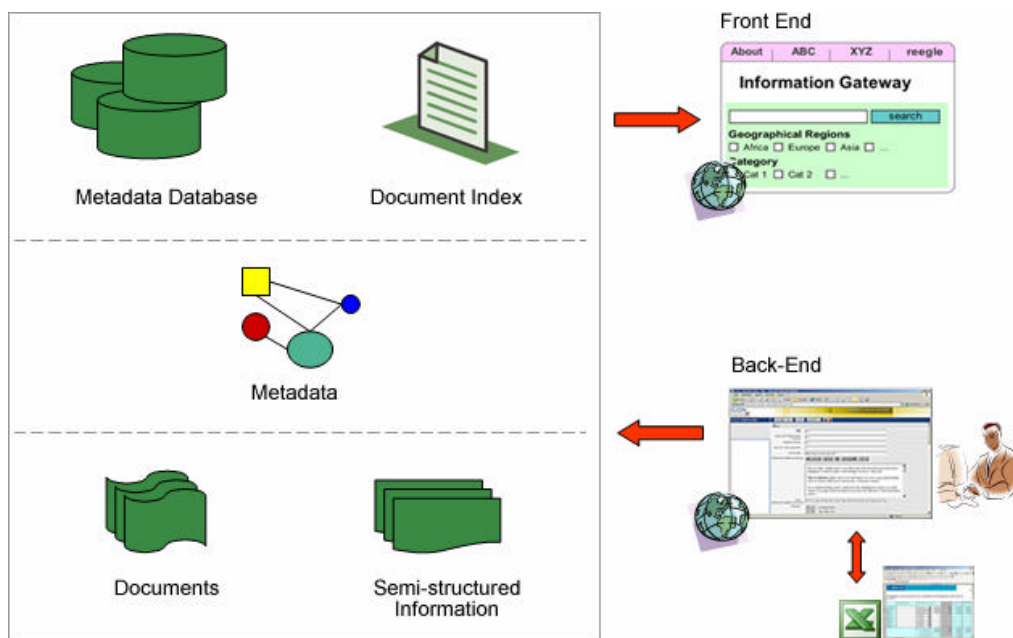
5. System Specification

Both the client’s system environment and the used system conX 2.5 are based on LAMP: Linux operating system with Apache webserver, MySQL database and PHP programming language. The system to be set up is scalable and flexible enough to accommodate large amounts of data.

Data exchange with other systems / databases can be managed through XML interfaces. In a first step an RSS feed will be implemented.

5.1. System architecture

Figure 5.1 System architecture



5.2. Content Management System conX

The system will be implemented on top of the Content & Community Management System called "conX". conX4 (which is implemented for the widespread LAMP-architecture) has been developed since 2001 and is available in version 2.5. It has been applied on several international projects having similar purposes to this (Reegle.info, EUWI.net, EUWI-CIS, Ecoi.net, PWM.at, Semantic-Web.at, ...).

5.3. System requirements conX 2.5

The current CMS conX 2.5 is using a LAMP architecture:

- Linux
- Apache web server
- MySQL database
- PHP as coding language

Web Server

Apache web server \geq 2.0

- PHP5 -> 5.2.0
- PHP5-gd
- PHP5-MySQL
- PHP5-XML
- Gettext 0.10.40-5

Database

- MySQL -> 4.0.24

Further Needed

- ASPELL for spellchecking

Hardware

- CPU \geq 1 GHz
- RAM \geq 1GB

5.4. System Requirements Search Engine

System requirements (search servlet)

- Java SE Runtime Environment
- Application server (jetty-5.1.12)
- Database server (mysql)
- Lucene-2.2.0
- Mounted file directory
- cron

The full text search engine will index following content:

- All assets in the database
- pdf (not encrypted, not password protected)
- doc (Microsoft word documents)
- html (Hypertext documents)
- txt (Text documents (.txt, .rtf))

Languages

- English
- French
- German
- or any language using latin character sets

Encoding

Any standard-encoding like ISO-8859-1, UTF-8, Windows-1252

Document size

< 20MB

Architecture

Main asset types (4,5,6,7,13, ...) will be indexed along with their country, topic and sub-basin information (1,2,3) into single lucene index-documents. Access rights as well as asset type information will also be saved in those. Index-documents resulting in the following index-document structure for a single instance of an asset type:

- Lucene Document
 - (Lucene field) Countries
 - Countries
 - (Lucene field) Themes
 - Themes
 - (Lucene field) Subbasins
 - Subbasins
 - (Lucene field) Assettype
 - One of (Institutions, Infrastructure,...)
 - (Lucene field) Content
 - Content (all fields) of asset type along with all attached documents and files
 - (Lucene field) Access rights

making it possible to have the following full text search possibilities:

- General Full text search - content of all asset types (all countries, all topics, all sub-basins) will be searched
- General Full text search with constraints content of the given
 - assettype
 - topic
 - country
 - subbasin

6. Other Requirements

6.1. Performance Requirements

The system will be designed for use through low bandwidth internet connections. In particular, the use of graphical and flash applications will be limited.

6.2. Security Requirements

System security is an important aspect: it was established that conX can't be hacked easily (A 100% percent guarantee can't be given of course, but so far conX has not been hacked at any time).

6.3. Screen design guidelines

- Screen resolution starting with 1024pxl * 768 pxl
- Emotions & identity: professional; plain; not overloaded
- Importance of full functionality of the information system (usability & accessibility) on several relevant operating systems and several relevant browsers
- The usage of sound-, animation- and/or video–elements is not needed because of the importance of high performance

7. Implementation arrangements

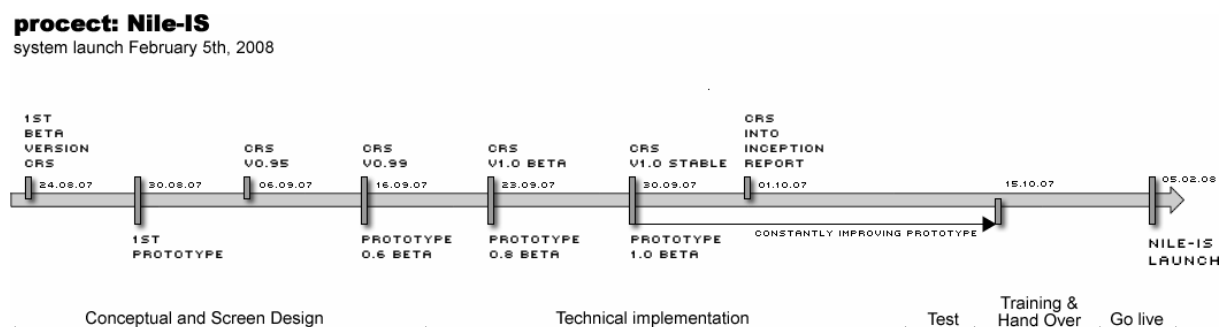
7.1. Schedule for Nile-IS implementation

A phased approach is suggested to ensure a high quality- and quick implementation of the Information System.

- Phased approach to implement the Nile-IS (Nile Information System)
 - Conceptual and Screen Design Phase
 - Technical implementation
 - Test Phase
 - Training & Handover Phase
 - Go live Phase

duration of this project component is approx. 6 calendar months.

Figure 7.1 Implementation schedule



The development began on 8 August 2007 with the kick off meeting in Addis Ababa. By the end of the project there will be a full handover of the system.

7.2. Acceptance Test Plan

Unit and system tests will be made by hydrophil after technical implementation. After the system has been proved stable, user acceptance tests and performance tests will be done in cooperation between hydrophil and the client (we have to discuss that topic.).

8. Future Directions, hosting and maintenance

Hosting

The System will be hosted in the first phase at hydrophil in Vienna. The advantages and disadvantages of hosting the system at NBI were discussed. The existing infrastructure of NBI (2 Dual Core 3.2 GHZ, 4GB, 3xHD 146 GB, Raid-5, Backup-Server, Huge USB, Hardware Firewall Cisco ASA5510) fulfils the system requirements for the installation of conX 2.5.

Future developments

- Multilingualism (Arabic, French, Swahili): System will be prepared at that stage for the implementation of further languages
- Public Nile-wiki
- Semantic search, automatic keyword extraction
- Related / similar documents (matched via the meta data structure)
- Social Networking: who knows who, who knows what?

In particular, the addition of web-based GIS mapping functionalities is anticipated for the future.

In the future, the system may also become the nucleus of the database component of the DSS, that will interact with the core database of the DSS through backend-backend communication.

Possible approaches which are to be considered (but which are not included in the standard design of the web-based system as offered here) are

- Offline use of the database with updating when good bandwidth is available (this solution is limited by space restrictions on user's computers)
- Mirroring of the CMS on national servers (as international satellite connections may be the bottleneck).