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Demonstration for WP3
Platform and integrated applications

Author : Jean-Claude Derniame
INRIA
LORIA, Campus Scientifique. B.P. 239
54506 Vandoeuvre-lès-Nancy Cedex (France)
derniame@loria.fr

Abstract :

This document describes a demonstration scenario of the Simes platform functionalities and some tools as presented during the final review of the project. The demonstrations have been prepared by Georges Edouard Kouamou (Dschang University' team, now installed in Yaounde), Elisabeth Benga (ESNP Dakar) and Patricia Dzeakou (IRD).

Résumé

Ce document décrit un scénario de démonstration de la plateforme SIMES et de quelques outils, tel qu'il a été présenté lors de la revue finale du projet. Les démonstrations ont été préparées par Georges Edouard Kouamou (équipe de l'Université de Dschang, maintenant installée à Yaoundé), Elisabeth Benga (ESNP Dakar) et Patricia Dzeakou (IRD)

Demonstration for WP3
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1   PRINCIPLES

Before demonstrating anything, a brief survey of the underlying concepts is needed. The main idea for building a scenario is to show progressively the diverse functionalities of the platform and of the tools developed and/or integrated on the platform .

First of all the Fishing observatory in the Niger Delta will be presented with illustrative information : panoramas, photos (notably fishing techniques), bibliography with full text research.

 Around this Fishing observatory, we show what has been done on the aerial photographs (mosaïcing, navigation in the mosaic, on line segmentation).

Then the integrated model for the Delta is demonstrated with aspects such as hydrology, biomass, fishing, agriculture and populations migrations.

Relying on this model is shown the Observatory of hydrology in Western and Central Africa, using data on Niger flow at MOPTI, which are downloaded and can feed the model. It is a demonstration of co-operation with other data repositories.

A more general vision of a river environment is then tackled using data from the CSE on the Senegal river valley including flow, vegetation and particularly bush fires.

A methodology for managing and evaluating information on vegetal species, with the data base of the herbarium "l'Herbier de Yaoundé" is completed by an expert system for plants identification. This terminates the tools demos and the following is devoted to the platform itself.

It begins with the user interface demonstration, mainly showing the browsing facilities and the notion introduced and described in D20 such as the notions of session, view, portfolio, and data warehouse. Using the interface the demo shows how to browse through existing documents, to feed the repository or how to launch activities on the platform..

This demonstration scheme allows to make a quite eclectic review of all functionalities developed during the project and of the major environmental themes.

2   UNDERLYING CONCEPTS OF THE USER INTERFACE

2.1   Unique interface

A unique interface is defined which allows to choose the tools to run or to access all resources available on the platform. It allows to have a unique login, no matter the kind of activity the user wants to have on the platform, locally or not.

2.1.1   User working session

A working session is delimited between a user login and a user logout. A session can be suspended and resumed.

2.1.2   Activity

An activity is the execution of a tool accessible through the unique interface. The main activities on the SIMES platform are :

- Exploration : allowing to browse all the data repositories available on the platform, selecting set of artefacts (data or documents for instance).
- Data acquisition : set of services allowing to store new data
- Tools invocation

An activity can be immediate (it must be terminated to terminate a session) or mediate on the opposite. It can be interactive (it needs a dialog with a user) or automated on the opposite. When a user logs out a session, locally executed mediate activities are saved if they are interactive and they continue if not, as far as the processor continues to run. The activities running on other sites continue independently, their results being stored.

2.1.3   Resources (artefact specialisation)

Any object containing information and which can be stored on the platform (we will say "in a data warehouse") is called a resource. The main resources handled by the exploration tool are documents, portfolios and operations sequences.

2.1.4   Data warehouse

It is a persistent resource container. A public data warehouse contains resources accessible by all users. A private data warehouse contains resources accessible only by the user for whom it has been created.

2.2 Data acquisition activities

Data warehouses are implemented either with databases or as directories of files. In order to acquire data, the user can either call on the database tools or, for some applications, use the forms specifically defined for this purpose. As to the files, they are, as traditionally, edited with any kind of edition tool available on the platform, which accepts any format. So as to remain independent of the underlying systems, the platform uses a specific "Web+Coldfusion" technology for the presentation of files and directories which is implemented on Unix, Macintosh and Windows, Windows-NT.

2.3 Exploration activity

The exploration activity is a fundamental tool which helps the user in finding documents or data pertinent to his needs. It relies on two principles :

- Views allow to define different ways for browsing the data warehouses
- The result of a request can be queried itself with an other request using the same view or another one.

The exploration activity offers a lot of operations organised into views. An exploration activity is a mediate activity (i.e. it can be realised along several exploration sessions) and interactive.

- To each exploration activity is associated an exploration context.

2.3.1 Exploration profile

A user exploration profile is defined by a list of his views and his accessible resources (public ones and his private ones).

2.3.2 Portfolio

It is a temporary resource container which is used inside an exploration session, and which evolves dynamically during an exploration activity through the application of operations associated to views.

2.3.3 View

A view defines a set of operations allowing to build a new portfolio, by adding new resources through successive selections in the various data warehouses. View types (or templates) are provided : they facilitate the views management and allow to have an evolutive interface.

2.3.4 Exploration context

An exploration context informs on the activity state, the available views, the current view and the exploration history (ordered sequence of operations and of successive portfolios). At any time during the exploration activity, the user has the possibility of saving, in a public data warehouse or in his private ones, either the current portfolio or the history of operations executed since the beginning of the exploration activity.

An exploration activity can be :

* Active,
* Suspended : the suspension triggers the saving of the exploration context (snapshot) in a persistent space.
* Terminated ; the transition to "terminated" triggers the deletion of the exploration context.

2.3.5 File browsing and GroupWare support

One specific view of the interface allows the traditional browsing of the files stored on the platform. In addition, all files containing texts are fully indexed, thus allowing very useful searches.

A web site has been created in order to serve as a place for common information repository and as a window on the project. As well, a tool to share files, mails, and to manage fora was available. It is integrated in the unique interface. This tool offers :

* User management and authentication : after a login, the user receives the rights he has obtained from a specific administrator. In fact the administrator has the right to define roles, which are defined as a set of rights to enact some specific operations.
* The administrator can create, modify, delete members of the group and assign roles to them.
* Mail : mail can be sent to specific mailing lists (which may be limited to one person). Mailing lists have an history, and a specific right allows to manage it, including by deleting some mails.
* Forum : usual forum : there is a right to create a new theme of discussion and to manage the forum history.
* Contacts : list of contacts common to the group.
* Calendar: a common calendar on which events can be posted.
* Common bookmarks.
* File sharing : the SIMES users being geographically dispersed and accessing the platform through the web, this service is as fundamental as databases for having a complete common data access.

This GroupWare support is in fact the first layer of the platform. Details on its functionalities and how to use it are available in D19 "Data integration".

3   COMMON INTERFACE
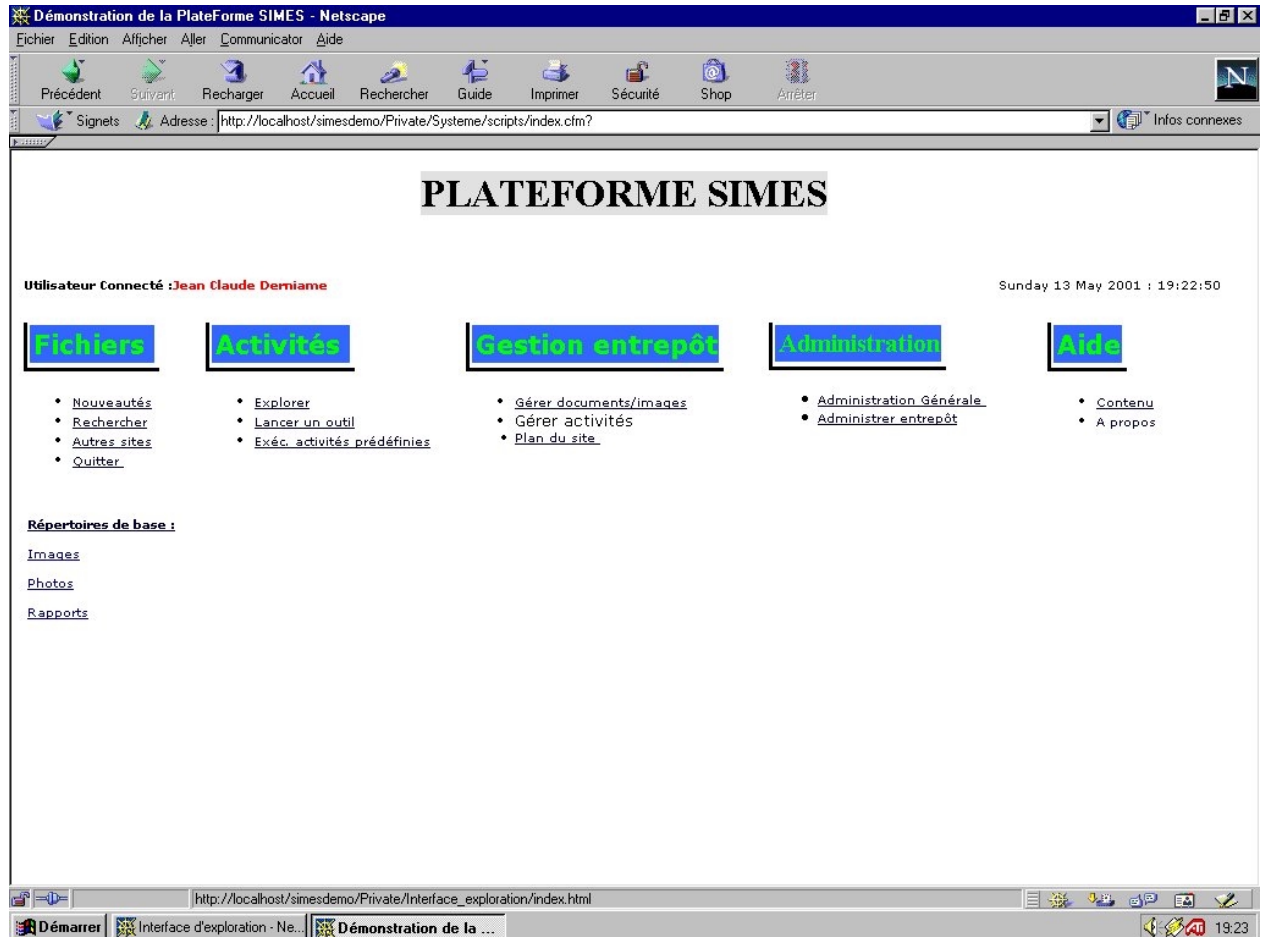
Figure 1 : *The general window*

On this screen can be viewed the functionalities of the unique interface. The user is logged in and can choose between five activities :

- ▪ "Fichiers" : the GroupWare tool with four main items : the novelties, the search engine (Verity from Allaire Software), the bookmarks, and quit ;
- ▪ "Activités" : here several activities are grouped : exploration, running a tool and executing predefined activities ;
- ▪ "Gestion d'entrepôt" : for data warehousing : managing documents, managing activities or accessing the site map ;
- ▪ "Administration" : used only by the site administrator ;
- ▪ "Aide" : online help with two items : the online help itself ; and an "a propos" item, which allows to find part of the help files pertinent for the user needs.

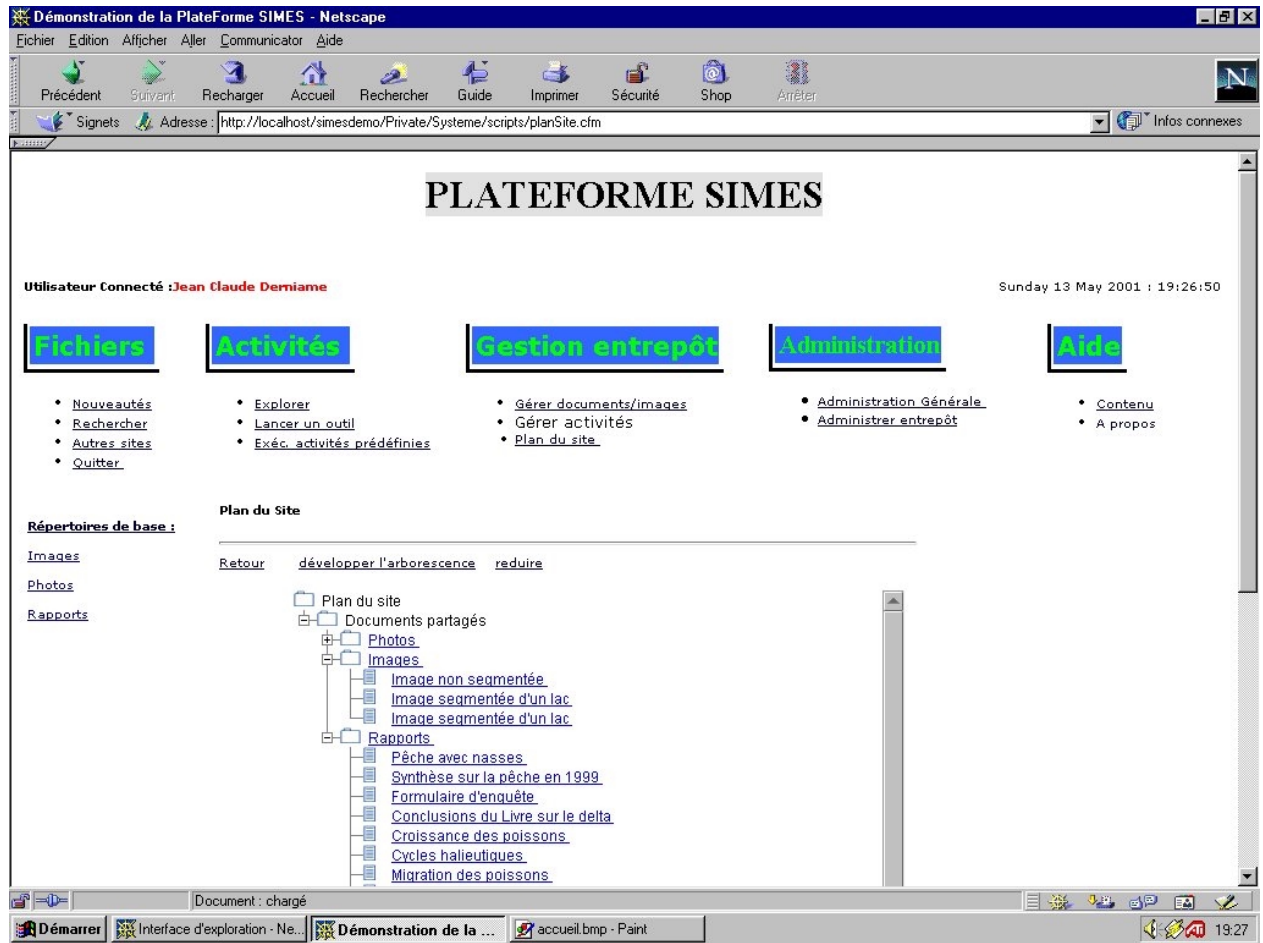The following view shows the data warehouses map : here the shared documents.

Figure 2 : *Site map for the documents*

In deliverable D19 are presented details on how to create a new data warehouse ; how to deposit a new document on the site for any kind of documents existing on the user's hard disks ; how to create and edit a new document with a specific on line HTML editor ; how to download ; etc.

4   THE EXPLORATION ACTIVITY DEMONSTRATION

4.1   Inventory of available resources

In order to run the demonstration some documents and data have been deposited onto the platform.

4.2   Buttons

Let us suppose that we have decided to run the exploration activity (button "explorer"). The following screen shows the initial state of affairs. Before detailing this screen let us precise the meaning of some buttons.

4.2.1   Available views

 List of views defined in this instance of the exploration interface by the administrator.

 : To add a view in the exploration user profile

 : To delete a view from the exploration user profile

4.2.2   Public resources

Public portfolios :

List of public portfolios defined in this instance of the exploration interface by the administrator.

 : To add a public portfolio in the portfolios basket (in order to apply some set operations)

 : To initialise the content of the current portfolio with the selected one. Nota bene : The initialisation of a portfolio sets the operation history to empty.

Public sequences :

 : To list the sequences defined in this instance of exploration interface by the administrator. They are accessible to anybody but cannot be modified.

 : To apply a sequence to the current portfolio.

4.2.3 Private resources

Private portfolios :

List of private portfolios defined in this instance of the exploration interface by the administrator. The available buttons are the same as above.

Private sequences :

List of sequences defined in this instance of exploration interface by the administrator. They are accessible only to their owner. They can be edited by him.

 : Display operation list of the selected sequence.

4.2.4 Utilities

Portfolios basket :

List of portfolios on which the user wants to apply a set of operations in order to initialise the current portfolio.

 : Moves the selected portfolio of the basket

 : Makes the union (fusion) of the selected portfolios and initialises the current portfolio.

 : Calculates the intersection of the selected portfolios and initialises the current portfolio.

 : Calculates the difference between the two first selected portfolios and initialises the current portfolio.

4.2.5 Sequence editor

It works on the list of operations in the selected sequence.

 : removes the selected operation from the sequence

 : Applies the edited sequence on the current portfolio.

The application considered is the "Fishing observatory in the Niger Delta". The available data warehouses are selected depending on the user profile. They are then considered as portfolios candidate to be selected by the user for this session. The warehouses used in this example are :

- The observatory itself : i.e. results of surveys and related contextual information
- "DCN" : book on the Delta written by IER and IRD
- Results from the integrated model of the Niger Delta
- "Indigo" : IRD's image bank of IRD
- A taxonomical database on African fresh water fishes
- "Letouzey" : database on plants and specimens of Cameroon's National Herbarium

Available views are : two taxonomies -one on the Delta itself, and one on plants- ; and a third view allowing to access data by zones (for document or data which are geo-referenced). One operation sequence called "filtre Mali" is registered. The user's private data warehouses are also selected and they initialise the private portfolios : "my preferred portfolio" ; one photographic collection ; one herbarium and one portfolio of fishing gears. Two operation sequences have been stored in a private part.
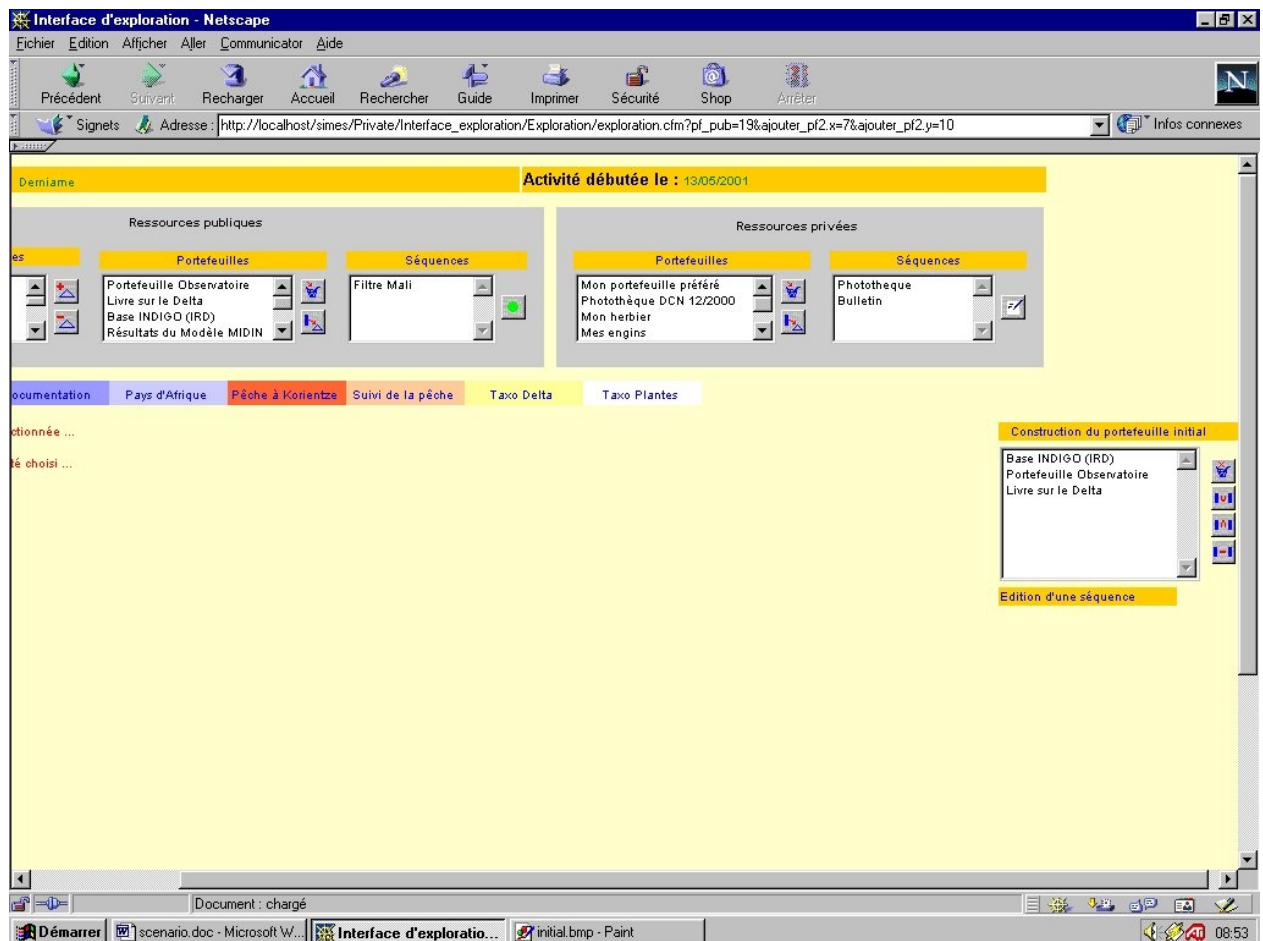
Figure 3: *Initial portfolios selection*

By selecting candidate portfolios in the various columns, the user as chosen to start his work with three portfolios : the Indigo database, the portfolio "Observatoire" and the book on the Delta. They appear in the list on the right. The buttons at the right of this list allow to manage it. For instance the button "basket" has allowed to put portfolios in it. The second one allows to make a fusion of these three portfolios stored in the basket, into a unique one which will be the working portfolio. A fusion is done, then the exploration can begin.

4.3   First step : to obtain resources on fishing gears

In fact the user has now to fix some parameters, in particular to select a view to begin his exploration. Some views are already available, it is suggested to add the view "Fishing follow-up" which presents the different zones in which IRD has done this fishing follow-up in the Niger Central Delta.

The number of resources available in this portfolio is 34. The user then decides to select the zone of "Batamani" on the south of the map. This extracts from the current portfolio the documents concerned with the Batamani zone. He uses now another view called the view "Taxon du Delta" which reduces again the number of pertinent documents. The list of key words which appear on the screen shows the effect of choosing a view : the available functionalities (here buttons) to build a selection are specific to each view. We select the taxon "engins" (i.e. gears). Now the current portfolio contains only documents coming from : the Indigo database, the portfolio "Observatoire" and the book on the Delta, concerned with "Fishing follow-up", adressing the "Batamani" zone, and concerned with fishing gears.

We save the current portfolio in the private data warehouse of the user under the name "Mes Engins". It will be useful later on.

4.4   Second step : to obtain plants photos

Then we re-initialise the current portfolio. This time we will explore the private portfolio "Mon herbier". It should be noted that during a session, and even during an exploration activity, several sequences of exploration can be done and saved, either as the resulting portfolio as above or as the sequence of operations which led to the current state ; the sequence can be replayed during the same or another session. We add the view "Taxon Plantes" to the user profile and we select it. Now the set of portfolios available for exploration to this user has been augmented and the exploration will continue in it. The view is again a taxonomy presented as a list of buttons. We select in this view the family "Caesalpiniacées". The number of pertinent documents had decreased . We select now the taxon Photos and we save the resulting portfolio in the private data warehouse under the name "Mes Plantes".

 We now have two portfolios related to our research. We put them in the basket and ask for a fusion. The resulting unique portfolio will be explored. In fact we will leaf through it. The successive screen images show different plants. We can observe that

some "Caesalpiniacées" pictures appear coming from Mali and Burkina Faso. The result being interesting we put it in the public data warehouse in order to make it available to anybody admitted on the site.

4.5   Conclusion

This part of the demonstration has permitted to reach several objectives :

– To better understand the power of having an exploration activity combining several ways of browsing the set of information present in the repositories.
– To show the different facets of an integrated platform allowing to do on the same interface every useful operation : acquiring and storing properly new information ; processing the information ; exploring the available information.
– To touch a little the real problems which need to be solved in an environmental observatory
– Through the picture shown, to give a small idea of what are the fishing conditions in Niger Delta.

The remaining of the demo is devoted to the tool integration and the applications developed on top of the SIMES platform.

5   TOOLS AND APPLICATIONS ON THE PLATFORM

5.1   Tool integration : Image processing

This demo uses the image processing tools installed on the SIMES web site in Dakar http://www.simes.sn, as described in the deliverable D12. Segmentation, mosaïcing, and navigation within a mosaic, can be run on line on aerial photos from the Niger Delta and from the Senegal river. The same tools and the same demonstration are installed on any SIMES platform . The demonstration shows the easiness of integrating a new tool and of using it through the unique interface. Being a good example of important commercial tools integration, details on this part can be found in the deliverable D20 on tools integration.

5.2   Data and tool integration: The integrated model of the Delta

Then is presented the integrated model of the Delta . This multi-layer model is made of a set of tools and data corresponding to different facets of information, such as aspects on hydrology, biomass, fishing, agriculture and population migrations.

From this model we can connect to the hydrological observatory of Western and Central Africa and download data on the rate of flow in the Niger valley at Mopti, data which feed the model.

This allows to study some behaviours. The same model tools and integrated model are used also on the Niger Delta information, in connection with the data warehouses devoted to collect data on fishing activities, so as to compare with data issued from the model, and finally to calibrate the model or enrich it.

Here the difficulties are more related to the heterogeneity of the data to be included in the data warehouses : for instance, the flow rate representation is different in the source site and in the integrated model. The interface developed for this activity permits to choose which data to observe and to follow up their dynamic evolution. The following figure shows one example of simulation.
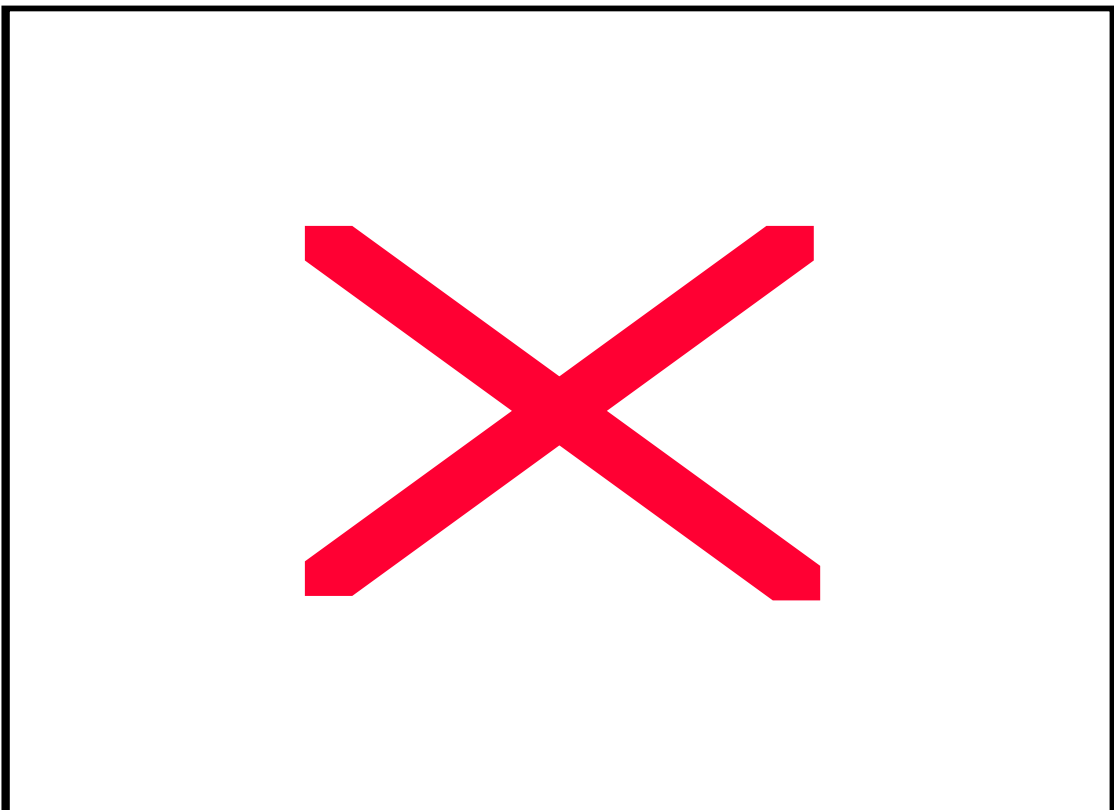
Multi-layer integrated model of the Central Niger Delta

Some parameters can be determined by the user. They are :

– fish renewal : initially equal to 0.50
– fish diffusion : supposed to be zero
– easiness to be captured : 60kg by outing
– fish price : 500F CFA by kilo
– rizicultural productivity : 900 kg/hectare
– Rice price : 100F CFA by kilo

- Flooding level : 1
- Available seed : 50%

In blue appear the lakes, flooded areas and river segments, with a size depending on their surface, in green the fishers communities, in yellow the agricultural areas and in purple the livestock farming areas. The circle on the bottom shows the time flow. As the time runs, the graphical part shows the evolution of the flood and the distribution of activities in the different areas.

5.3 Integration of dedicated pre-existing systems

5.3.1 *Socio-economic data on Senegal*

In fact the integrated model could have been considered also as an integration of a pre-existing system : it has been developed during the first stages of the SIMES project in Orléans on Mathematica and was then translated in Java in order to be integrated with the Fishing Observatory Web interface : it is now operational on the SIMES platform.

Another application, related to Senegal river valley environment and using data coming from the Senegalese Centre for Environment Surveillance (CSE), has been developed and demonstrated : it relies on large amounts of socio-economic data on the population census, on the vegetation evolution, on bush fires, etc. It allows to edit maps when crossing different parameters.

5.3.2 *A Herbarium*

The Yaounde Herbarium collection data base is operational. It is described in the deliverable D17. It is part of a larger project aiming at building a network of herbaria data bases in Africa. Yaounde Herbarium's collection data base, called "Letouzey" can be easily accessed via a mirror installed on the IRD-Orléans web site : http://www.orleans.ird.fr/~chevillo/letouze/letouzey.htm

It has been integrated on the SIMES platform as a data warehouse. Then, it can be used either as any data warehouse, as we have seen in paragraph 4.4 in the second step of the exploration activity demonstration ; or as an integrated application.

This application permits essentially consultations but also uses an expert system engine to assist in plants identification. It is possible in particular to :

- Look up the different specimens starting from a scientific name,
- Look at the taxonomic referential or associated entities (types, studied material, bibliography, biological status, vernacular name, etc…),
- Look up specimens collected by botanists, witha few associated images
- Obtain the distribution of collecting points by plant name,
- Identify a plant name from the characteristics observed on a particular specimen.
 The two following pictures come from the integrated version of the herbarium.

5.3.3 Conclusion

This demonstration scenario has allowed to see the general approach of the platform. We have used different activities, browsed through various data warehouses, and presented the general interface. We have seen how to add documents, retrieve them, and search among all kinds of information (including in full text), as well as how to integrate new repositories, new tools, and pre-existing applications.

This demonstration proves the high potential of the SIMES platform. Other applications are currently under development and integration by the team of Dschang University, now installed in Yaounde.