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Challenges of building digital repositories in Africa: A case study of best practise

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Conference Theme: ***"Digital Libraries and Archives in Africa: Changing Lives and Building Communities"***

Title of the paper: **CHALLENGES OF BUILDING DIGITAL REPOSITORIES IN AFRICA: A CASE STUDY OF BEST PRACTICE**

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Outline

This paper is within the framework of experience sharing and hope entertaining from successful achievements, symbolizing a step forward, in the long and fruitful undertaking of African scholarly heritage preservation and valorization . Its argumentation is in two parts:

Introduction

I - Challenges attached to the preservation and valorization of African scholarly contents

After presenting briefly the context of accumulation of scientific materials in Africa, namely in Afrique occidentale française (AOF), we focus on the benefit effects of digitizing African scholarly contents and how it can impact on the dissemination of research outputs and sustainable development

II - Promoting access through a digital repository: a case study of best practice

This part is demonstrative and illustrates that some African academic institutions adapt to innovative change and develop capacities to build worth institutional repositories. This case study is from Institut fondamental d'Afrique noire Cheikh Anta Diop (FAN Ch A Diop).

Conclusion

Introduction

Creating the sustainable means to safeguard and make the African scientific memory evolutive for future generations make challenges regarding preservation and knowledge sharing most acute. Then, many initiatives have been developed to generate synergies at a national and regional level in order to raise awareness in the urgent need to implement policies and programs to safeguard and valorize the rich African historical, scholarly and cultural heritage.

But, despite resolutions and recommendations outlining road maps to root out the continent from isolation regarding the internationally networked system of knowledge production and sharing, there are now few relevant African contents freely accessible. And this, in spite of the existing potential and huge progress made in ICT outputs. In the general African context, with limited economic resources, one can therefore understand why such challenges are of urgent pressure.

- 1 - Challenges attached to the preservation and valorization of African scholarly contents.
- 2 - Presenting a case study of best practice: the digital repository of IFAN Ch A Diop.

Challenges attached to the preservation and valorization of African scholarly contents

1 - Historical Context

2 - The benefit effects of digitizing African scholarly contents

- Preservation / Safeguarding of the collective memory
- Information Dissemination /Sharing

3 - The impact of African digital libraries on research and sustainable development

- Impact on research
- Impact on sustainable development

Historical Context

- All over Africa there had been a strong need to settle a scientific institution in charge of the coordination of research, the use of research outputs, the preservation of documentation and archives within a specific historical context.

- Then, Madagascar possessed an Académie des Sciences malgaches in 1902, Morocco an Institut des Hautes Etudes marocaines in 1920. French speaking Africa had also its savant society in 1915, the Comité d'Etudes Historiques et Scientiques de l'AOF. In 1918, it was replaced by the Bulletin du Comité d'Etudes Historiques et Scientifiques de l'AOF. The Institut français d'Afrique noire (IFAN) was born in 1936 from the works and experience of these two federal organizations.

Historical Context

- These scientific institutions, generally libraries, archives and museums, have witnessed an intense period of fertile intellectual production in a specific historical context: slavery, colonization, wars.

- For this reason, they inherited from foreign research institutions on the continent or collected high value-added historical, scientific, cultural and religious materials. This documentation, generally recorded in various formats: manuscript, printed, audiovisual, iconographic, audible, are worth to be qualified of heritage collections. These scholarly contents in various languages are dispersed throughout the continent and abroad.

Historical Context

Witnessing land mark period in Africa's history fortified such institutions, libraries in particular as enlightened places of knowledge reproduction by research and its sustainability through learning. They exist in every region of the continent, In West Africa, some can be identified:

- Arewa House (Kaduna, Nigeria)
- Northern History Research Scheme (Université Ahmed Bello, Zaria, Nigeria)
- Centre de Recherche et de Documentation historique Ahmed Baba (Tombouctou, Mali)
- Institut fondamental d'Afrique noire - Cheikh Anta Diop (Dakar, Senegal)

The benefit effects of digitizing African scholarly contents

Preservation / Safeguarding of the collective memory

Many factors have not ensured long term investments to secure the rich heritage of the African scholarly wealth : The general climatic conditions of the continent (wetness, inundations, dust), existence of rodents and the general African economic context. Why digitization has proven highly efficient ?

- in the academic environment, the digital content is now compulsory because libraries more and more represent a bridge between remote users and resources;
- as a new mean to reproduce and vehicle printed materials, digitization has given to African libraries the historical responsibility to safeguard, in the long term, valuable contents for future generations and for educational purpose;
- With endless capacities of storage and open source infrastructure and tools which foresee sustainable solutions to quick obsolescence of support, format, and computer system, building digital repositories have never been so hopeful, in a context with limited financial resources;

The benefit effects of digitizing African scholarly contents

Preservation / Safeguarding of the collective memory

- Digitization is now a big challenge in African universities. Dissertations, thesis, and articles which constitute the wealth of universities are particularly strategic and self-archiving becomes relevant in the eLearning system;

- Another advantage of digitizing the collective memory of African people is its contribution to strengthening historical and cultural identity. In so doing, Africa will be able to bypass its status of active consumer of contents from the North and become a content provider by positioning itself in the international scheme of knowledge production and sharing.

The impact of African digital libraries on research and sustainable development

Impact on research

- Very few researchers in low-income countries can follow current subscriptions to research journals because for-profit journal publishers barred access to key scientific information, except for those who can afford to pay.

- Tough, there is a big social disproportion between the North and the South, and at a regional level, achievements of many digitization projects in Africa demonstrate that, with a strong political will, financial backing and managerial abilities, it is possible for the continent to contribute efficiently to the construction of a better world.

The impact of African digital libraries on research and sustainable development

Impact on research

- Many initiatives in support to researchers from the South have therefore been developed. In this respect, The World Health Organization and the World Organization for Food and Agriculture, in partnership with publishers decide to provide free access to research outputs for developing countries through programs like HINARI, AGORA and OARE. This is also of measurable impact, because according to the 2010 UNESCO World Report,"… the developing world's share of articles in science, medicine and engineering rose from 30 % in 2002 to 38% in 2010." **(UNESCO Science Report 2010)**

- But, however valuable scholarly contents coming from the North may be, the challenges of African digital libraries are most significant with research performed in the continent. The historical, cultural and socio-economic context in which the African researcher is immersed endows him with other abilities to address local problems successfully.

The impact of African digital libraries on research and sustainable development

Impact on research

- Even if Africa is poorly represented in the world scientific community, all is not bleak in the continent. In new trends related to information access, librarians and researchers are conscious they should develop capacities to adapt to innovative changes;

- But, however valuable scholarly contents coming from the North may be, the challenges of African digital libraries are most significant with research performed in the continent, because the historical, cultural and socio-economic context in which the African researcher is immersed endows him with other abilities to address local problems successfully.

The impact of African digital libraries on research and sustainable development

Impact on research

The greatest challenge is that the latent demand for research information and the unexplored potential offer of the rich African scholarly capital in terms of contents and expertise could be met :

- training librarians in self-archiving to develop digital repositories;
- persuading African researchers to give instant worldwide visibility to their works;
- training them to the use and appropriation of open source tools and standards in order to build progressively, through collaboration, an authentic African scientific common;
- backing from decisions-makers and substantial investments from governments and funding agencies, targeted to build and sustain local capacities in science and technology in all sectors are vital.

The impact of African digital libraries on research and sustainable development

Impact on sustainable development

Generally based on free and open source software, and using Internet as a powerful technology to share knowledge instantly worldwide, digital repositories are not so expensive to build and sustain :

- information access being most crucial in developing countries, providing online access to African scholarly contents can narrow the gap of ”knowledge divide”;
- making Science and Technology research outputs freely available, especially in the African context ensure a measurable quality-based and value-added sustainable well-being;

The impact of African digital libraries on research and sustainable development

Impact on sustainable development

- empowering universities to provide more knowledge and knowhow and libraries facilitate information access and sharing,

- advocating towards African decision-makers to equip them with an adequate technological environment and enable them to build managerial abilities in ICT, will contribute to a better collaboration between research, industry, business communities, and other informal sectors developing innovative activities to fight against poverty.

The impact of African digital libraries on research and sustainable development

Impact on sustainable development

- The unprecedented opportunities in knowledge dissemination, nourished and entertained by awareness regarding the wealth symbolized by the African scholarly heritage, vehicled and sustained by open source technical support, are hopeful for the continent.

- they accelerate the endless process of knowledge production, transfer, dissemination and use, in a moving educational context where eLearning has proven almost compulsory.

Promoting access through a digital repository: a case study of best practice

The institutional context of IFAN Ch A Diop

- IFAN Ch. A. Diop (Institut fondamental d'Afrique noire Cheikh Anta Diop) was founded in 1936, but its origins dated back in 1915 with the creation of the *Comité d'études historiques et scientifiques de l'AOF* (Afrique Occidentale Française) by Clozel, the General Governor of AOF.

- Its objective was to coordinate research and publication, to disseminate its outputs and to ensure its continuity. From 1930, the idea of funding an institute of black Africa is born and continued to gain support until 1936.

- IFAN has then played an essential part in the history of the building, accumulation and dissemination of knowledge in Africa, especially West Africa in a colonial context.

Promoting access through a digital repository: a case study of best practice

The institutional context of IFAN Ch A Diop

- As an institution dependent on the federal government of AOF, it contributed to create a great space of expression for african knowledge.

- IFAN was a colonial project and this was signified by Albert Charton, the General Inspector of Education, in his address at the inauguration of the institute in 1936 ," *Science is an auxiliary of colonization, Africa should possess a science, [..] so that France knows its Africa, throughout its resources, its human reality. Africa should reveal to itself, so that the educated indigenous, through a better acquaintance of their country, love their soil, which will make them our collaborators and associates as well* ."

Promoting access through a digital repository: a case study of best practice

The institutional context of IFAN Ch A Diop

- The institute of Dakar became a federal centre at the head of a regional network of local institutes called Centrifans.

- They were progressively settled in Saint-Louis, (Senegal), Abidjan, Niamey, Porto Novo and Abomey, Conakry, Ouagadougou and Bamako. As a federal structure, IFAN has then promoted the professionalization of research, in organizing the accumulation of scientific materials, the building of knowledge and the dissemination of the rich African scientific common all over Africa and particularly in AOF (French Speaking West Africa)

Promoting access through a digital repository: a case study of best practice

The institutional context of IFAN Ch A Diop

After independence period, its sphere of research was narrowed with new assignments:

- to produce, arouse and promote scholarly works dealing with Africa in general and black Africa in particular;
- to ensure scholarly publishing and dissemination;
- to gather in its museums, archives and library scholarly collections and the documentation required to learning and research issues on black Africa;
- to develop partnership and exchange throughout the world;
- to contribute, by its learning and research outputs, to the “africanization” of curriculum and the enhancement of Africa historical and cultural identity.

Promoting access through a digital repository: a case study of best practice

The institutional context of IFAN Ch A Diop

The organization of Research

Department of Research	Laboratories/Services/Museums
Sciences Humaines	Laboratoire de Sociologie Laboratoire de Géographie Laboratoire d'Histoire Laboratoire de Préhistoire et de Protohistoire Laboratoire d'Anthropologie physique Laboratoire du Genre
Langues et Civilisations	Laboratoire d'Islamologie Laboratoire de Littérature et Civilisation africaine Laboratoire de Linguistique Laboratoire d'Anthropologie culturelle
Biologie Animale	Laboratoire de Zoologie des Vertébrés terrestres Laboratoire de Zoologie des Invertébrés terrestres Laboratoire de Biologie marine Laboratoire de traitement des eaux usées

Promoting access through a digital repository: a case study of best practice

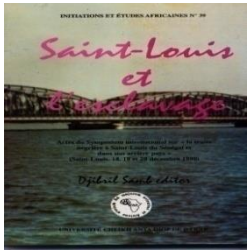
The institutional context of IFAN Ch A Diop

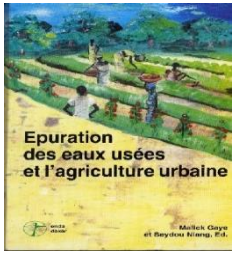
The organization of Research

Department of Research	Laboratories/Services/Museums
Botanique et Géologie	Botanique et Géologie Laboratoire de Carbone 14 Laboratoire de Botanique Laboratoire de Géologie
Information Scientifique	Service de la Documentation Service des Publications Service Audiovisuel Service des Archives Unité de Micro-informatique éditoriale
Musées	Musée d'Art africain Musée de la Mer de Gorée Musée historique de Gorée

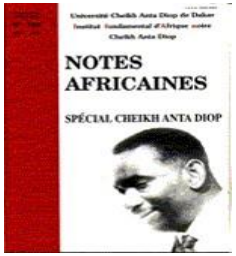
Samples of IFAN Collections



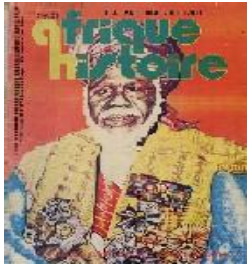








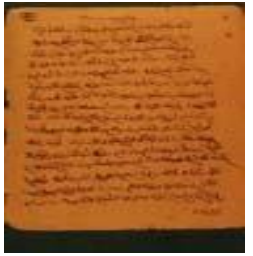










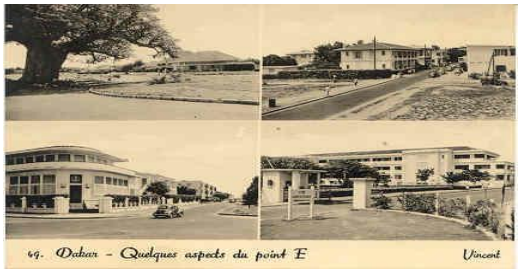


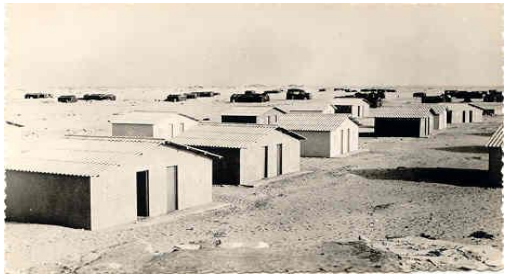






Samples of IFAN Collections













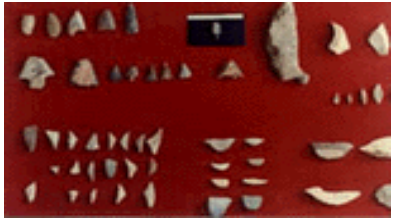




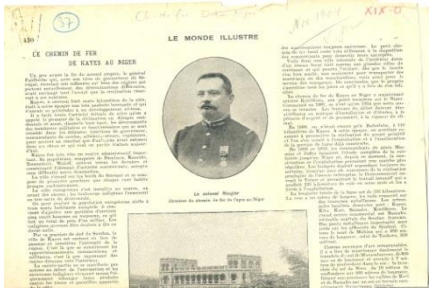








Samples of IFAN Collections


LE MONDE ILLUSTRE

LE CHEMIN DE FER DE HAUTE AU NIGER


LA NOUVELLE POLITIQUE COLONIALE

qu'on voudrait à base de confiance n'a guère de succès à Dakar : ni les Blancs ni les Noirs ne la servent

De notre envoyé spécial Jean-Pierre VIVET


LA FETE DES SALTIGUIS A DIABRAO









Promoting access through a digital repository: a case study of best practice

Building an institutional repository

- Through a Project entitled: "***Biens culturels africains. Sauvegarde et valorisation des patrimoines documentaires audiovisuels, iconographiques, sonores et textuels de l' IFAN Ch. A. Diop***", in partnership with the University of Toulouse-II Le Mirail and the financial support of FFI (Fonds francophone des Inforoutes), IFAN has successfully settled an institutional repository. With a dual objective, this work ensures the safeguarding of audiovisual, iconographic, audible and printed materials as well as providing access to them.

Promoting access through a digital repository: a case study of best practice

The justification of the Project

- After inheriting such valuable scholarly collections, and having capitalized over 70 years of experience and expertise on learning and research on issues related to black Africa, IFAN has felt the need to bring a rupture. Conscious of the stakes related to the valorization of its scientific patrimony, IFAN has decided to fit within the contextual framework of Open Access and OER (Open Educational Resources) movement by devising its own content creation and sharing model.

Promoting access through a digital repository: a case study of best practice

The justification of the Project

Many factors have given birth to the implementation of its institutional repository :

Internal factors

- inexistence of reliable indicators regarding collections, physical deterioration because of inadequate conditions and methods of preservation;
- quick obsolescence of audiovisual materials, particularly drives to access contents of old disks and magnetic bands;
- shortage in equipments and lack of specialized training for the staff;
- lack of communication and interaction between departments and laboratories;
- urgency to harmonize methods of work in the management of collections (storing, cataloguing, indexing, disseminating) through a common application;
- moral obligation for IFAN to safeguard its heavy heritage and root it from vulnerability to loss.

Promoting access through a digital repository: a case study of best practice

The justification of the Project

External factors

- moving academic environment, where reforms of curricula and the development of eLearning imposes new challenges to research institutions for an efficient contribution to the development efforts of universities;
- urgent need for IFAN to position itself by adopting ICT as a value-added factor in the management of scholarly information and dissemination of knowledge;
- necessity to display its rich contents in a digital showcase (institutional repository) and to deploy a community virtual space for exchange and collaborative works;
- obligation for IFAN to position itself in a competitive global world, by becoming a content provider and then enhancing its support to pedagogy and research worldwide.

Promoting access through a digital repository: a case study of best practice

Methodology

Initial objectives	Associated activities
To realize an inventory of collections, to specify homogeneous units to be digitalized and their scholarly interest	*complete inventory of collections *identification of corpus from units : Library, Publications, Archives, Manuscripts and Audiovisual *commission of an expertise on audiovisual materials *drawing up of a unique sheet for the common bibliographic description of collections *setting up of thematic and geographical thesaurus *searching out copyright holders for specific collections *intellectual Property right : devising a license to access digital collections
To equip IFAN with technological infrastructure and tools for the implementation of its institutional repository	*technical feasibility study *redaction of articles and conditions (technical specifications) *invitation of tenders to apply *renovation of the working areas: building work, electricity supply, etc. *Internet network wiring *purchase of servers, computers, scanners, drives, disks, softwares, etc

Promoting access through a digital repository: a case study of best practice

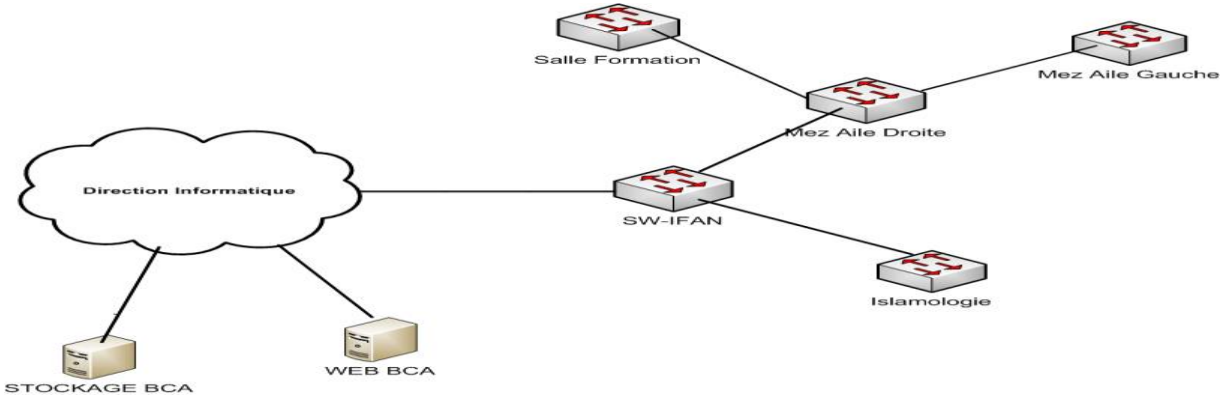
Methodology

Initial objectives	Associated activities
To equip IFAN with an open source application using international standards	*configuration of two linux servers: storage and web server *choice of the open source application: Dspace *installation of Dspace application and associated tools on linux servers *definition of technical choices : format, resolution, name identifying system for digital files
To train staff	*training workshop on digitization, safeguarding and management of digital collections for staff *training to the management of workflow in Dspace and to the administration of the platform *specific technical training with regards to challenges related to institutional repositories
To safeguard and valorize collections	*feed continuously the storage server for safeguarding purpose *devise an OAI repository *devise a web interface (a portal) for content access and retrieval *devise an up-to-date web site which constitutes a showcase of IFAN rich scholarly contents in various format, with virtual exhibitions, and many other value-added services.
To communicate and disseminate in order to duplicate such an innovative experience at a national and regional level	*organize scientific communication around the IFAN institutional repository: conferences, exhibition, publications, etc.

Promoting access through a digital repository: a case study of best practice

Results

IFAN technological infrastructure has been implemented, administrated and deployed locally.



The network wiring of the Project

Promoting access through a digital repository: a case study of best practice

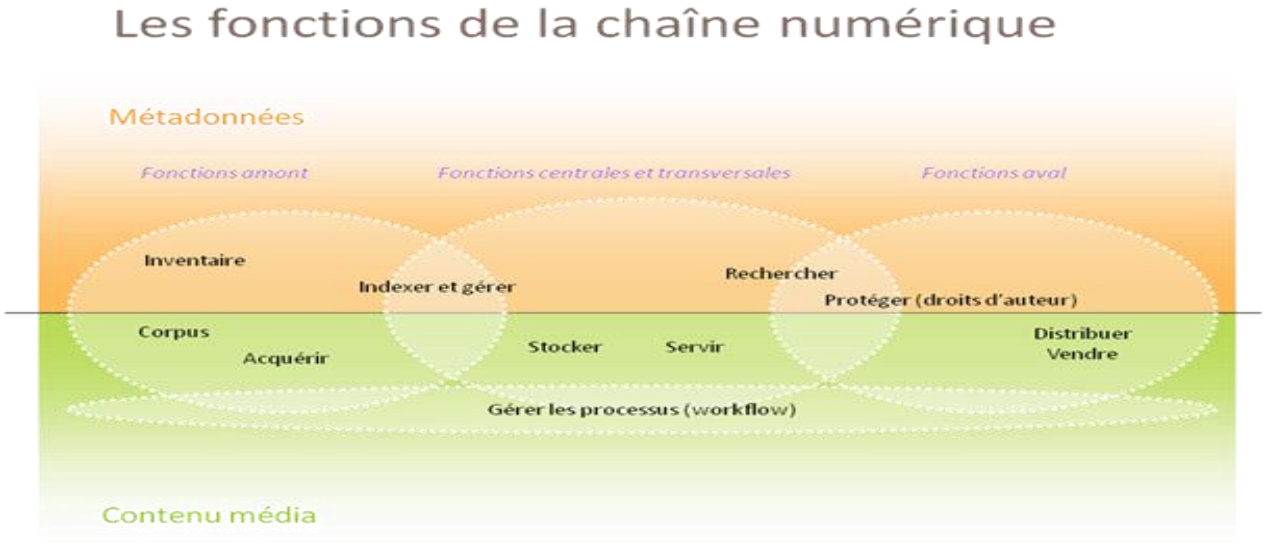
Results



Two linux servers running in an open source environment have been purchased
•A storage server of 3 To (Tera octet) extensible to 6,48To
•A web server of 2.5 Tera ocktet

Promoting access through a digital repository: a case study of best practice

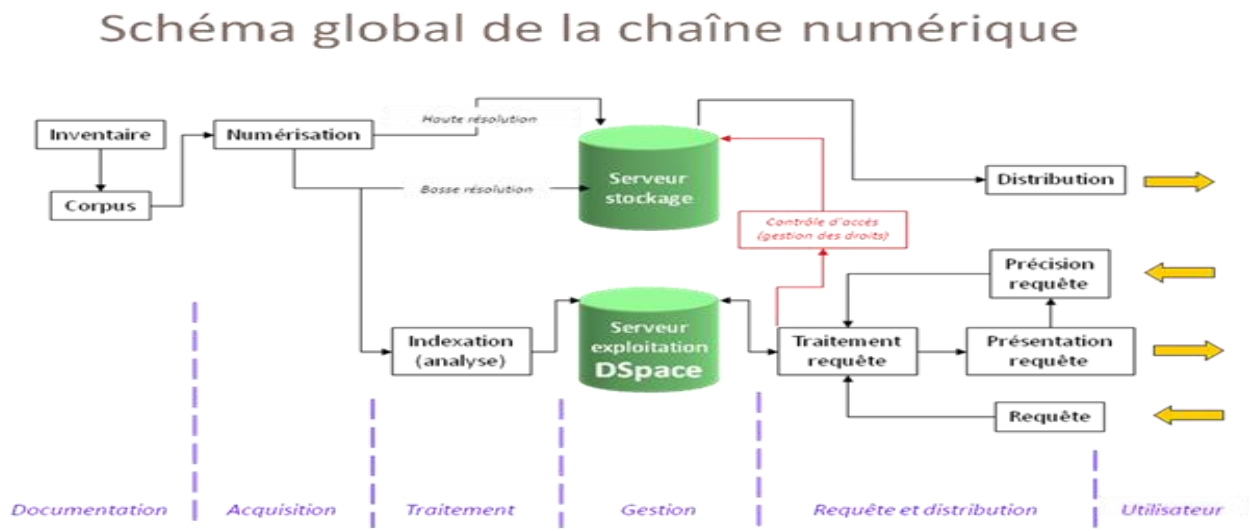
Results



The main functions of the digital process

Promoting access through a digital repository: a case study of best practice

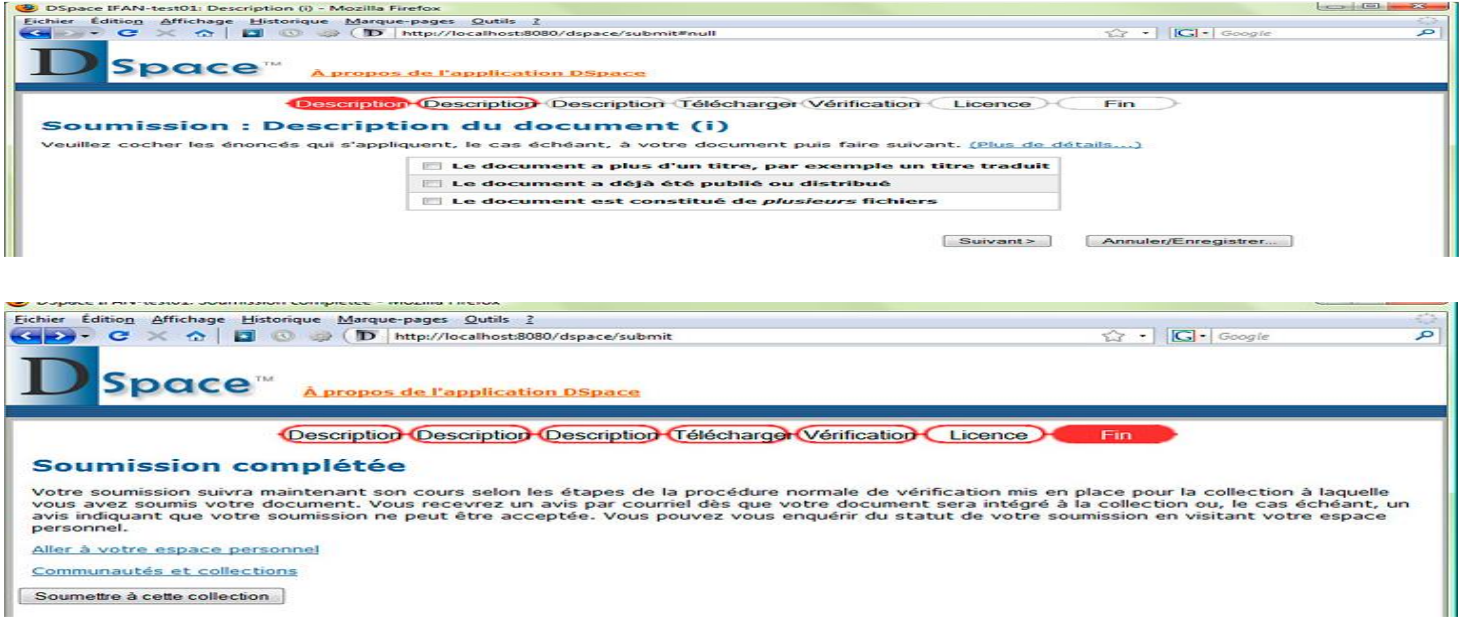
Results



The global scheme of the digital process

Promoting access through a digital repository: a case study of best practice

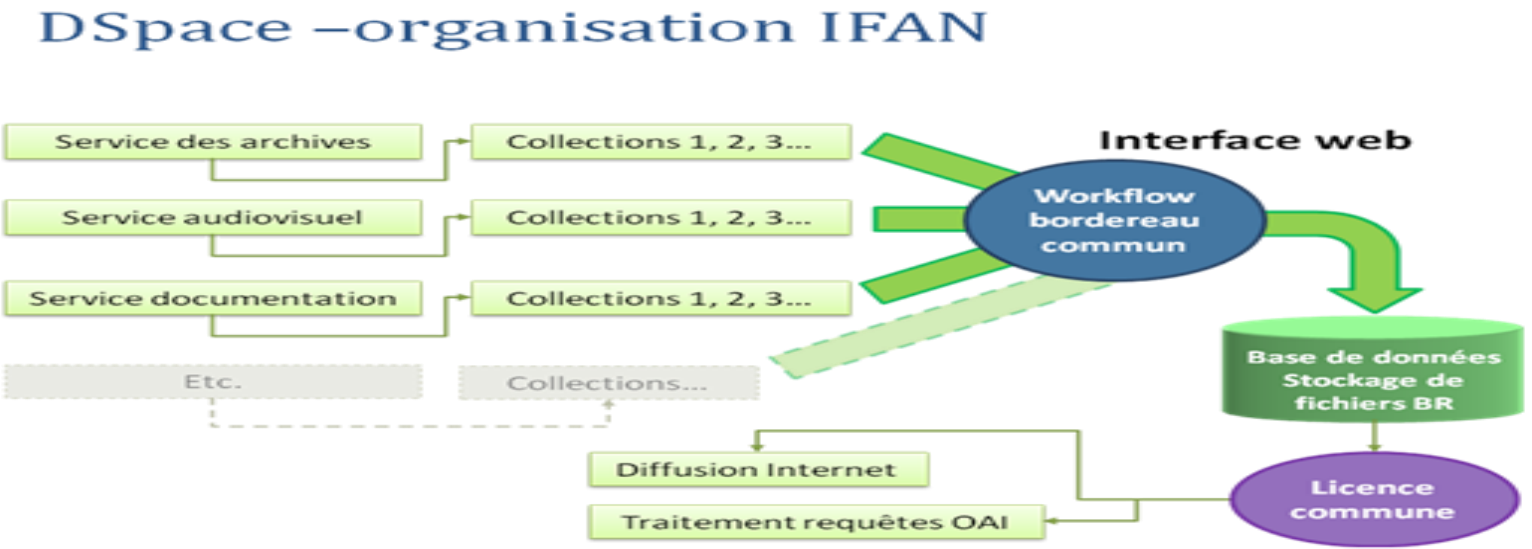
Results



The process of submitting a document in the Dspace Sheet

Promoting access through a digital repository: a case study of best practice

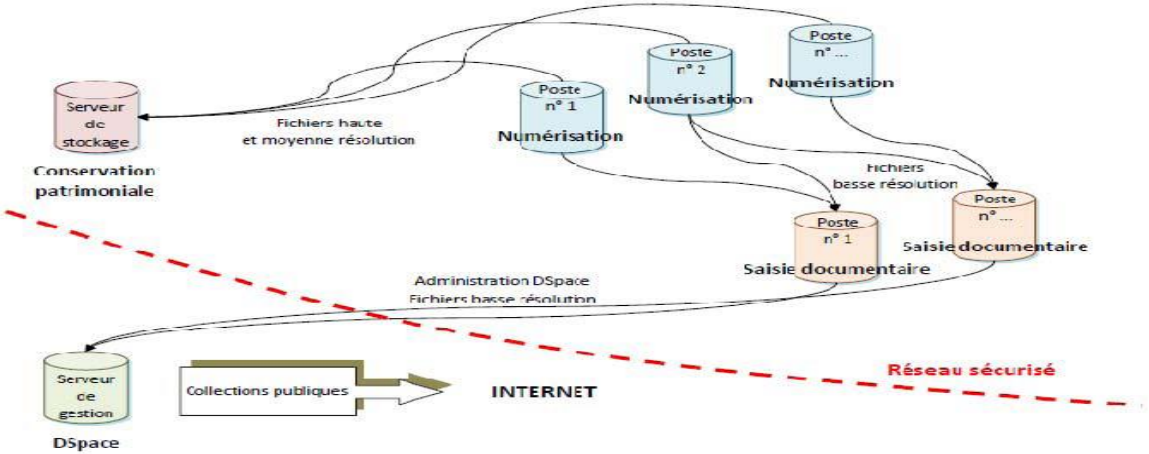
Results



The organization of contents in the Dspace model of IFAN

Promoting access through a digital repository: a case study of best practice

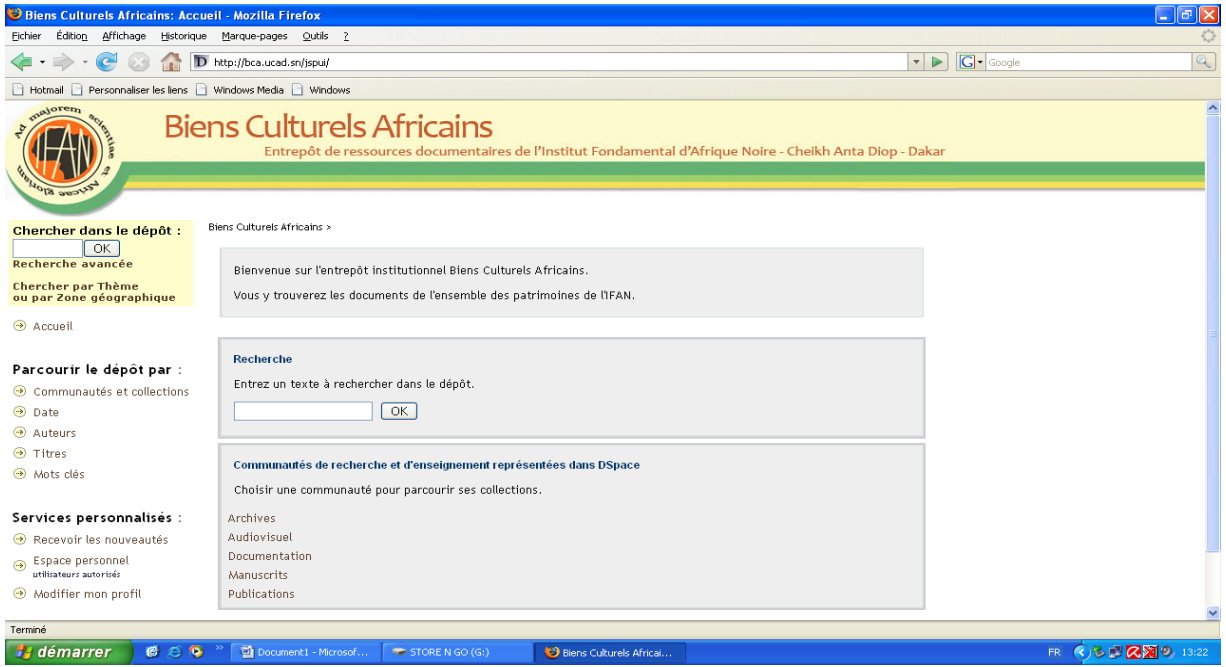
Results



The organizational scheme of the IFAN digital repository

Promoting access through a digital repository: a case study of best practice

Results



The Web interface of IFAN "*Biens culturels africains*" repository
http://bca.ucad.sn/jspui

Promoting access through a digital repository: a case study of best practice

Difficulties

The settlement of IFAN institutional repository has been an exciting adventure because of a lack of experience regarding the implementation of digital repositories. But this deficiency has been quickly overwhelmed and turned into strength due to obligations of success in front of the huge challenge that represents online access to such contents for Africa. Some difficulties have been experienced during all the stages of the Project:

- fitting activities within the previous chronogram, which induced on delays of realization;
- coordinating and evaluating on a regular basis the work of different teams;
- configuring linux servers for the first time : computer specialists were more familiar with commercial options;
- settling Dspace applications on linux servers : there was any prior experience at a national level;
- difficulties to devise a thesaurus as a reference of keywords to be used in the system;
- difficulties in defining technical choices in the implementation of the Dspace sheet for the description of metadata;
- frequency of bugs in the system.

Promoting access through a digital repository: a case study of best practice

Prospects

- making the repository more dynamic with the integration of social media for a wider interactive dialogue between scholars, and a various range of services related to open educational opportunities for faculties, staff, students, pupils and other literate communities;
- settling a policy to sustain the technological and human resources: long-term safeguarding and preservation of collections, continuous capacity building, evaluation of impact, and development of management and marketing skills for a good governance;
- fostering international visibility by referencing the repository near great search engines (harvesters) and making it interoperate with similar digital repositories;
- widening the partnership network to reproduce such an experience over the continent, and profit from other experiences;
- integrating new ICT-based methods for strategic changes in the relation between IFAN and its public;
- leveraging the digital repository for standardized research and pedagogical effectiveness.

Conclusion

Far from being a mere phenomenon brought into fashion, implementing successful digitization programs has become a reality in Africa.

- It contributes, in a measurable way, to shape a new generation of librarian by empowering him with skills in information access, retrieval, use and production. It is also a strategic solution in the advocacy against barriers to perform and foster research in the continent;
- In providing technical facilities, open source tools can support efforts to sustain the rich African scholarly collections. They develop information access and knowledge sharing, build capacities, and promotes local contents in indigenous knowledge and know-how, and consequently enable achievements worth to be set up as models and duplicated throughout the continent ;
- Huge progress in Internet connectivity in Africa, namely the ACE (Africa Coast to Europe Submarine Cable), which is said to extend over 17,000 km from Brittany (France) to Cape Town (South Africa), at depths close to 6,000 metres below sea level, linking Europe to Africa with high-capacity broadband connectivity, and will give all countries in Africa the opportunity to access the international broadband network at a lower cost is hopeful;
- Federating successful digitization experiences in the ADL (African digital library) will indeed rank Africa among the most fertile contributors in the global scheme of scholarly communication.

Thanks for your attention