Feasibility Study on the Establishment of a Greenstone Support Organization for Africa (GSOA)

Prepared by Dr D P Peters, DISA
for
The University of Waikato

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1   Overview of the current situation

As we move into the 21st century, higher education and heritage institutions in Africa are facing fundamental transformation. This transformation is due in part to the increasing use of sophisticated information and communication technologies. It is due also, to a re-examination of the role of public institutions to preserve the heritage of local communities in a global society.

In a post-colonial era, cultural heritage institutions are transforming their role in promoting indigenous knowledge systems to construct a theory of heritage that is based on social justice, to stimulate dialogue between individuals and communities, and foster respect and tolerance for diverse cultures. Conversely, education has become a significant market for cultural heritage, the target group a growing number of mature students encompassing a generation of historically disadvantaged groups, in providing improved access to information in an open, democratic and knowledge-based society.

If the legacy of colonialism, a history of injustice, inequality and oppression is to be overcome, social and economic transformations must underpin the rejuvenation of Africa. Sustainable development is recognized as an African imperative, providing countries with the opportunity to focus on immediate poverty alleviation and beyond, on using information as a tool for life long learning and the empowerment of all sectors of society. The support for digital library development is also a significant vehicle for harnessing the value of indigenous knowledge systems (IKS). The production, transmission and utilisation of indigenous knowledge and technology plays an important role in nation building, in heritage management and in education. Digital libraries in Africa have immense inherent value as the interface of indigenous knowledge systems with other systems of knowledge, capturing oral, visual and documentary formats, and integrating IKS into the mainstream of education.   This changes the direction of the traditional flow of information from the North to the South and provides developing countries with the tools to enable them select information appropriate to their own assessment of their needs. {WILD, 1994 #52}   In a knowledge and technologically driven globalised world, education in general and higher education in particular must lie at the heart of these transformations.

In response to these challenges, the New Partnership for Africa's Development (NEPAD) developed a vision and strategic policy framework for African renewal. {NKUHLU, 2003 #33} This policy recognises the need to sequence and prioritise four major programmes be fast-tracked, in collaboration with development partners:

– Communicable diseases: HIV/AIDS, malaria and tuberculosis;
– Information and communications technology (ICT);

– Debt reduction;
– Market access.

It is the second of these programmes that points to the potential in Africa for the development of digital libraries and the usage of GSDL. Comparative advantage in Africa's integration into the global economy is identified by NEPAD in the intensive use of ICTs, a number of these objectives impact on the need to develop digital libraries:

- To provide impetus to the democratisation process and good governance;
– Facilitate the integration of Africa into the new information society, using its cultural diversity as a leverage;
– Assist in a wide range of applications, such as remote sensing and environmental, agricultural and infrastructural planning;
– Better utilize existing complementarities to provide training that would allow for the production of a critical mass of professionals in the use of ICTs;
– Establish African research programmes as well as technological exchange programmes capable of meeting the continent's specific needs, with particular regard to the fight against illiteracy;
– To establish regional distance learning and health education programmes to improve the situation in the health and education sectors.

The potential in Africa for development of digital libraries and usage of Greenstone Digital Library software must therefore acknowledge existing complementarities within the various sectors. Recommendations for an appropriate business model for a GSOA must take into account the higher education and cultural heritage sectors already discussed. In addition, valuable complementary work is being conducted by a number of NGO's, such as InfoWorld, INASP, and the Commonwealth of Learning (http://www.col.org/). These will also be considered in the recommendations on the outcome of this study.

2   Background to study

The study was conceptualised and originally motivated in 2004 by Dynal Patel, a senior student in Computer Science at the University of Cape Town. In providing training in the use of Greenstone Digital Library software in Africa, as well as ongoing user support, he was able to gain valuable insight into the challenges experienced when contemplating the establishment of a digital library. He expressed the need for a Greenstone support organization in Africa (GSOA) whose objectives would be to:

i)   promote the Greenstone Digital Library (GSDL) software;

ii) support African users in initiating, developing and sustaining DL projects;

iii) provide a permanent training resource facility which will back up national training efforts;

iv) develop and maintain an African DL portal;

v) encourage the availability of developmental content on the Internet and on CD-ROMs;

vi) collaborate with both local and international institutions, particularly within the NZDL network;

vii) organize general promotional awareness-building activities and on Free Open Source Software (FOSS), seen as a vehicle for increasing collaboration and technical know-how, creating wealth and attracting foreign investment in Africa.

The proposal drawn up by Dynal Patel forms the basis of this study. The "*Proposal for a Feasibility Study on Greenstone Support for Africa*" provides additional information on the realization in three phases of a Greenstone Support Organisation for Africa (GSOA). In Phase 1 a comprehensive feasibility study would be conducted with the support of an advisory panel of African specialists, to serve as the basis for an agreement on the organization and initial financing of the GSOA. In Phase 2, the facilities and resources for the iminitial GSOA activities will be prepared. During Phase 3 all the services will be launched and monitored. Sustainability should be reached on completion of the third phase.

The proposal found the support of UNESCO in the form of a grant to the University of Waikato. Prof Ian Witten, of the Department of Computer Department of Computer Science, responsible for the development of the the software at University of Waikato, in Hamilton, New Zealand, was nominated the Project Convenor. The feasibility study envisaged in Phase 1 was sub-contracted to DISA (Digital Imaging South Africa). The Project Manager, Dr Dale Peters had been previously engaged in similar research on skills development needs in the use of digital technologies for libraries and archives in South Africa.

The sub contract for the provision of research services specified the following objectives:

1. On the basis of existing research, studies, action plans such as NEPAD, supplemented as necessary by follow-up contacts to individuals and institutions, provide an overview of the current situation and potential in Africa for the development of digital libraries and the usage of GSDL;

2. Identify the types of digital library support services required and which could be offered through the GSOA (including but not limited to training, funding, equipment acquisition/maintenance, project

formulation etc.) and establish priorities;

3.   Examine possible GSOA organizational structures and provide recommendations on the model that should be adopted;

4.   Identify the minimum human resource, equipment, financial and other operational requirements for the establishment of a GSOA and develop a detailed business plan, budget and funding strategy for meeting these needs and implementing phases 2 and 3 of the project;

3   Steering Committee

The project proposal made provision for a steering committee made up of African digital library specialists and more general complementary expertise in the areas of open source software and cooperative electronic information projects at the regional level. Nominated persons were invited to participate by contributing their time and expertise to the study in an advisory capacity.

In addition, language group representatives of the French, Arabic Portuguese, and Amharic language groups were invited to promote the study in their own national language community, by means of a sub-regional complementary study. The intention was to gain a wider regional perception across diverse multi-lingual African communities.

The terms of reference for such complementary studies were defined as follows:
-       to draft a work plan fro the complementary study in conjunction with the feasibility study work plan;
-       to circulate an announcement of the general and complementary studies, based on a circular letter distributed for that purpose;
 -      to translate the survey instrument in the national language;
-       to identify actual and potential Greenstone users in the specified language community;
 -      to distribute the survey instrument accordingly and collate returns;
 -      to submit a report in English or French on user needs in terms of support for Greenstone software implementation.

The feasibility study work plan was designed to provide specific points of referral to the Steering Committee. These were identified in the circulation of the draft report for comments of the Steering Committee and their recommendation on potential sponsors and donors, and a final round of consultation prior to submission of the report to the University of Waikato. At the suggestion of the researcher, the level of consultation was subsequently extended to include commentary on the design of the survey instrument, and commentary on the survey report.

The Steering Committee comprised the following persons:

Contact Person	Institution	Notes	Country/Region
Barry, Boubakar	University of Dakar	French language representative	Senegal
Rose, John B.	Waikato University representative		France
Were, Jacinta	IFLA Africa Section		Kenya
Belcher, Martin	INASP		Sweden
Benjamin, Peter	OneWorld Open Knowledge Network		South Africa
Patel, Dynal	University of Cape Town, Computer Science Dept	Greenstone representative	South Africa
Raseroka, Kay	IFLA	Chairperson	Botswana
Chisenga, Justin	FAO		Ghana
Mustafa, Kamal	University of Khartoum	Arabic language representative	Sudan
Xerinda, Leonardo	Eduardo Mondlane University	Portuguese language representative	Mozambique
Dorri, Birru	International Livestock Research Institute	Amharic language representative	Ethiopia

4   Survey Methodology

A survey instrument was designed to measure feasibility, highlighting for analysis the actual challenges experienced, rather than a general poll of African opinion (The instrument is available as a separate document).

While originally focused on support for GDL, the scope of the study was considerable widened, following a recommendation from the Steering Committee, to examine the need for support for general digital library development.

Design principles guiding the structuring of the survey questionnaire were threefold:
- To identify types of DL services required;

- To identify services which could be offered by a GSOA;
- To examine possible organisational structures as motivation for an appropriate business model.

The survey instrument was divided into five parts, designed to take no more than ten minutes of the respondent's time.

The first part aimed to characterise the digital library community on the African continent. Questions related to the host institution and staff roles. The second part investigated the nature of digital libraries in Africa -both planned or created - in support of the needs analysis in the third section. Greenstone digital library software use and support was measured in the fourth section. The final section sought comments and ideas on the organisation structure most appropriate to the formalization of such a support organisation.

The contribution of the Steering Committee to the research methodology was of great value to the study. A draft questionnaire was circulated to the Steering Committee on 26 June 2005, for pre-testing, with request for input by 4 July.   The purpose of pre-testing the questionnaire was to remove any ambiguities, gather additional information, remove any irrelevant questions and hence reflect a true picture of the environment in which the survey is to be conducted. Four responses were received by 11 July, when the discussion was closed.   The summary of that discussion is outlined below.

Dr Justin Chisenga of the FAO in Ghana noted that Section 4 was structured to be answered by individuals who are currently using the Greenstone software, and that he recommended that questions in that section be structured in such a manner that both current users and potential users of Greenstone are able to provide inputs.

This recommendation was supported by John Rose and Martin Belcher, who shared his concern about distinguishing between needs for Greenstone support and broader digital library support. It was felt that many African librarians will be more comfortable about advising on the need for broad digital library support, but that, Greenstone potentially has a special role to play because of its simplicity and flexibility of usage. The distinction between digital library issues and Greenstone-specific issues, considerably widened the scope of the study beyond that contractually agreed, but was implemented nonetheless to maximize the value of the study. This was achieved by redesigning the questionnaire in Week 9 to include a new section 4, entitled "Greenstone use and support", and the previous section 4, entitled Organisational structure",   became section 5.

The survey was circulated on Wednesday 13 July, with a covering letter of invitation.

Circulation

A list of ninety four contact names was submitted by Dynal Patel as a basis for circulation of the survey. This list represented an interest group amongst whom were known and prospective Greenstone users. The listed contact details were compiled into an e-mail group.

Notice of the survey was posted to the group, and to the following discussion lists and news groups:

DISA
SASA
SAPCON
AFLIB
AFRICOM
SABINews
IFLA-ALP Gaborone Alumni
LIASA online

The e-mail invitation to participate in the survey was distributed to an estimated 203 recipients. Included in the invitation was a request to forward the invitation to other interested parties, and actual total distribution is expected to have been in excess of this number. From 203 recorded invitations, a total of 31 responses were received, indicating a response of 15,2 %.

Although the country of origin of respondents was not requested, IP addresses and institutional affiliations of respondents reflect the following range of countries represented in the resultant data set:

South Africa   (20)
Kenya   (4)
Zimbabwe   (1)
Namibia   (2)
Ethiopia   (2)
Zambia   (1)
Botswana   (1)

The total of 31 responses represent a response of 15,2%. Subsequent surveys in the designated language group communities, conducted following the publication of the main survey results, resulted in the following additional respondent figures:

Senegal   (7)
Ethiopia   (1)
Sudan   (34)

	Circulated	Respondents	%
French	12	7	58
Amharic	1	1	100
Arabic	100	34	34
English	203	31	15
TOTALS	**316**	**73**	**22**

It should be noted therefore, that the combined results of the various surveys tend to be skewed by the differential sample bases circulated in each, as typified in the Amharic response rate of 100%. The representation of the sample bases circulated also tends to skew results, eg. French respondents limited to university staff, and should be considered in interpreting outlying results reflected.

Method of circulation

The English language survey was made available online on the DISA website at:

http://disa.nu.ac.za/gsoa/survey.htm

Difficulties were experienced in submitting the online HTML version by respondents where the e-mail service was not linked in the browser. Instructions to this effect were added to the website, and alternative formats in MSWord and PDF made available for download. Ten respondents chose to download, print and return their submissions by fax.

The Arabic survey was distributed by e-mail to one hundred persons with printable attachment. Approximately thirty were undelivered, where the e-mail bounced. This was noted as being a common problem, where few respondents have access to domain-specific e-mail addresses, and use a variety of generic service providers, like yahoo and g-mail.

The Francophone survey was distributed to twelve colleagues in Dakar University, and the Amharic report was complied on the basis of personal interviews.

5   Survey Response Reports

5.1   Method of collation

The data gathered in the English language report was collated in SPSS V11.5.0 (2002) statistical software and transferred to MSExcel for reporting purposes. Both frequencies and percentages are reflected in the statistical report, but the graphical representation thereof was limited to percentages for ease of interpretation. This was found to be most effective in evaluating multiple selection responses that predominate in this study.

At points of requested elaboration, actual responses were recorded and included in the report *verbatim*. Comments or points of clarity by the research co-ordinator were clearly marked.

The English survey response report was circulated to the Steering Committee for comment. Further language group surveys were conducted subsequently, and reports submitted for inclusion in this report.

The Arabic survey report followed exactly the format of the English report. The Amharic report took the form of narrative discourse, while the French report addressed the five topics comprising the survey structure, *viz*. profile; digital library experience; digital library support services; organisational structure of future DL support organisation; and general comment.

5.2   Analysis

The language group representatives were requested to submit their analysis of the survey responses each received, and these reports are collated under the same reporting structure adopted in the survey design.

- Respondent profile
- Digital library experience
- Digital library support services
- Greenstone use and support
- Organisational structure of future DL support organisation

The combined analysis of the survey reports conducted in the Amharic Arabic, English and French language groups in Africa follows the design structure of the survey tool, and includes the subsequent input of the Steering Committee.

Section 1   Respondent profile

The digital library community on the African continent was characterized by a series of questions related to the host institution and staff roles. While personal identification was requested for possible clarification of responses given, the option to withhold such details from further distribution was exercised freely. It may be assumed that beyond personal privacy issues, respondents may have lacked confidence in answering questions in a new

area of experience, or may have felt that responses provided did not match those of the institution represented.

The workplace in all surveys reflected a concentration of digital library activity within university or college libraries. (Question 1.6) In order of diminishing value, this is followed by research institutes, and can be similarly accorded to the academic computing environment provided by the higher education sector. This result is significant for the recommendations on the organisational structure and business models envisaged for any support organisation.

Question 1.7 sought to validate the result of the preceding question, in the identification of the sector in which interest in digital libraries is evident or in which digital library activity is currently taking place. In that respect, the results clearly reflect predominant activity in the higher education sector, ranging from 50% upward, with the upper value slightly skewered by the limited base of Amharic and French surveys, limited to university staff. In addition, the high value reflected in the Arabic report (58,8%), is also attributable to the rapid growth in the number of universities in the Sudan, from seven to twenty six institutions in the past ten years. Nonetheless, this result is not unexpected, giving evidence to the growing demand for electronic research resources over the past ten years.

The relatively large proportion of digital library interest or activity reported from the public or government sector is accounted for in the representation of national libraries, archives and museum. This result is supported in the report on digitisation activities at national libraries in Africa, conducted by the National Library of South Africa in 2005. {TSEBE, 2005 #56}

Although disputed in the design stage, the question on sector affiliation sought also to provide a comparison with the recommended organisation framework queried in question 5.6. In doing so, the value of responses provided to 5.6 is enhanced by a reflection of the level of degree of confidence in known organisational structures.

The main role or function of respondents queried in question 1.8 revealed four interest groups at two levels of intensity; firstly the librarians and IT specialists, followed by university lecturers and researchers. Multiple selections all included an additional IT specialization, indicating an add-on function of in-service training.   That a relatively small proportion of respondents claim to be academic staff using digital technologies in teaching and learning, is a consideration for special attention in the business plan of the proposed support organisation.

The range of professional backgrounds of respondents provides a useful profile of the digital library community in Africa, and provides some explanation for the wide ranging opinions noted in the survey responses.

Section 2   Digital library experience

The second part investigated the nature of digital libraries -both planned or created - in support of the needs analysis in the third section.

Question 2.1 set out to establish what proportion of the respondent base was involved I the planning or creation of digital library collections. 87% responded in the affirmative in the English survey, and 67% in the Arabic survey. 100% of respondents in the French were planning to develop collections, and the response to the Amharic survey was not clear on this point.

The invitation to elaborate, intended to reveal the state of progress from planning to implementation, was not specifically framed as such, and interpreted by some respondents as an invitation to describe their planned or extant digital library collections, resulting in some redundancy with the following question. Other volunteered information on their personal experience in areas such as library automation or data entry and maintenance.

Question 2.2 sought to identify digital library types under consideration or developed, as a means of assessing the growth areas and potential for sustained support. The results indicate that electronic theses and dissertations have captured considerable support in the Arabic community, followed by special collections, while the English community are working predominantly on special collections, followed by institutional repositories. Personal administrative archiving is the main interest of the French community. In general, the majority of digital library initiatives are still emanating from Special Collections, but interest in instutional repositories is growing in response to widespread support in Africa for the Open Access movement.   This result was confirmed by Martin Belcher as similar to the experience of INASP.

The wide range of interest expressed is possibly less strategic and due rather to previous exposure of respondents to the potential of digital libraries to meet the need in their particular areas of interest.

Question 2.3 aimed at an evaluation of media types comprising digital collections. The question was not framed specifically to indicate this, and was therefore open to misinterpretation and confusion around digital or physical collections.   Multiple selections were noted, as expected in accordance with the physical holdings of collections in a variety of media. That text based media were most commonly identified is also expected, but the high proportion of images, video and audio collections was surprising, given the increasing technical complexity in conversion and in the management of the

resultant range of file formats. However, this result was also confirmed by Martin Belcher in the similar experience of INASP.

Question 2.4 identified the overwhelming majority of collections to by dynamic, indicating a strong and active interest in digital library developments. This interest does not in itself motivate for a support organisation, which should rather be extrapolated from this in conjunction with subsequent reponses, especially Q5.1 whre the need was directly questioned.

Question 2.5 focused on the computing skills available to the respondent within the organisation. This proved to be a key question of the survey, both in characterising the African digital library environment and in indicating areas of need and potential areas for support.

It was noted that general computing skills were widely available to all respondents in the English and French speaking communities, and was most commonly available elsewhere. Key specialized skills were less readily available, with human computer interface specialists reported as least readily available, except in the Arabic report. This would reflect a strong internal support infrastructure for general institutional computing, but little specialization, which was again confirmed by martin Belcher as similar to the experience of INASP.

The investigator noted that the question should have included an enquiry into specific digital library skills of staff.   Dynal Patel suggested that such information might be extrapolated in conjunction with Q2.11, which sought an assessment of training programmes attended. Since it was confirmed (in Q2.10) that most training opportunities have derived from workshops and conferences, Q2.11 does provide some insight into the skills acquired in this manner.

When considered in conjunction with subsequent responses on support services (Q3.1) and challenges perceived (Q3.2), this response does not reflect the lack of specialised digital library staff, and must rather be seen within the predominantly academic computing profile of respondents. (Q1.6)

Furthermore, this question did not follow up on the percentage of staff with various skills, which may have provided a more accurate profile of computing skills in Africa.

Question 2.6 queried whether collections were hosted locally, or externally. or both. The aim of this question was to reveal both the technical capacity of institutions as well as the will to support an external hosting service, such as might be offered by a support organisation.

The latter was clearly supported in the response of the majority of respondents in all surveys, who indicated that they were planning to host

their collections both externally and locally (47-71%). This result was surprising, and while it could indicate limited local storage facilities, it may also indicate a high level of willingness to share content. Precedent for this has been set in existing initiatives, like the Sudanese Libraries Virtual Library organized by the Ministry of Higher Education in Sudan, and the DISA project in South Africa.

The relatively small proportion of institutions reliant on external hosting (12-14%) again reflects a strong institutional computing environment. It should be noted that a consistent result was reflected in all surveys undertaken, presenting an accurate reflection of current development in technical capacity.

This aspect was further reinforced in Q2.7, which solicited a description of the infrastructure available for systems administration. Responses varied by institution. No servers were reported in the French or Amharic surveys, but other respondents reported access to good server and backup systems, with network connection ranging from leased lines to the dedicated national network (TENET) available to South African universities.

Question 2.8 queried the level of familiarity with the use of digital library software. The result varied between 45-69% in English and Arabic surveys. Except for the French survey which reported a high level of awareness, specific experience of the Greenstone software was rather low, and commented on by the Steering committee. The user base in Francophone Africa was reported to be very low, despite three training workshops conducted by UNESCO in that region in recent years. The level of awareness of Greenstone software is an issue for the consideration of a support organisation, given the obvious need for greater publicity.

As stated above, Q2.10 confirmed that workshops and conferences provide the most effective training opportunities currently available. Formal educational opportunities appear to be available only in the Sudan, where 22.5 % of respondents reported experience of having attended classes. Of further interest is the recorded use of online or computer-based tutorials, reflecting a reliance on personal initiative to achieve professional development. This again indicates a clear objective of any support organisation, to examine the Sudanese model, and to provide and encourage training, as confirmed in sections 3 & 4 below.

The final question in Section 2 (Q2.11) sought details of training programmes, and a brief assessment of the effectiveness and usefulness of each. The close examination of these responses was recommended by Dynal Patel, as a means of elucidating the skills base reported in 2.5 above.

While it should be noted that attendance at a workshop or conference does not assure the acquisition of skills. The experience of the DISA project in this regard has led to a recognition of the need to assess serious training

needs and separate these from the associated allure of foreign travel provided in workshop attendance. Further details are provided in Q3.2 below. The most frequently reported training programmes attended denote a general level of awareness of basic digital library practice, with technical expertise limited to website architecture and design. There seems also to have been some confusion regarding digital library training and that in the use of CDS/ISIS and related online public access (OPAC) bibliographic database software systems. This would indicate a introductory level of exposure to electronic interfaces.

Jacinta Were commented specifically that competition from systems like WINISIS should be considered, since many institutions in Africa have made an investment in training staff in CDS/ISIS. For them to convert to Greenstone or other products, they would need assurances of the added value. John Rose responded that an interface had been developed with UNESCO support, to enable the building of digital libraries using the metadata entered into CDS/ISIS databases, so that libraries using CDS/ISIS can use Greenstone to provide full text access to their documents while retaining their CDS/ISIS applications for assignment of metadata and for library automation. He commented that when one speaks of "competition" to Greenstone, it would seem appropriate to consider other packages with similar digital library functions (for example, DSPACE), rather than CDS/ISIS. This competition is confirmed in the South African experience, where recent interest in digital library software has been driven by training in the use of D-Space software for institutional repositories (IR's). A current barrier to wider Greenstone application in Africa, as is that of other digital library software systems, is its small user base, and resultant difficulty in providing adequate local and regional support in Africa.

Digital library experience in Africa would seem therefore to be generally low, although a growing interest in academic applications in ETD'S and IR's, beyond the traditional conversion projects emanating from special collections. There is evidence of adequate technical infrastructure available but few training opportunities for the professional development of information specialists. Knowledge of Greenstone software is minimal, and following even repeated training opportunities provided in Francophone Africa, the implementation rate is low. This would suggest a need for ongoing support in implementation, in the establishment of a support organisation with the widest possible user base, and that training should be an important objective of such an organisation.

Section 3   Digital library support services

With the establishment in section 2 of the nature of digital libraries, section 3 comprised a needs analysis to elucidate the technical and other related problems faced in creating digital libraries in Africa.

Question 3.1 queried the perceived need for support services in a range of areas. These included services identified in advocacy for digital library development; a dedicated African digital library portal development; to encourage the availability of African indigenous knowledge content online; to promote general awareness of Free and Open Source Software (FOSS); to facilitate collaboration with related local and international institutions; to strengthen civil society in building repositories of information useful to individuals, NGOs, business and governments; and to contribute to the preservation of African works of cultural and historical importance.   These were areas of support considered in the survey design to be valid. The questioned was open-ended in the additional request to elaborate on these or other perceived needs.

The response was informative for any business proposal, in that respondents selected multiple and often selected all available options, and added comments that all identified services were needed. Responses to this question therefore provide a valid needs assessment. It was noted that this multiple selection question elicited a most enthusiastic response, resulting in high scores, reflecting both breadth of need and a possible lack of DL experience to discern areas of prioritisation.

It is interesting that a relatively low score was assigned to need to strengthen civil society, and that more immediate informational needs were given higher priority.

Advocacy and a vehicle of collaboration emerge as the most sought-after services in Africa. Comments on this question were particularly informative, in the identified need for "home grown solutions" to a unique African environment, and in the perceived need for co-ordinated effort.

The major challenges that might be encountered within institutions outlined in Q3.2 included a lack of funding, multiple languages, a lack of specialist staff, managerial apathy, poor vendor support, inadequate infrastructure, (in terms of electrical wiring, telephone lines, buildings) and slow network connectivity.

The response was consistent across all surveys, in that the greatest impediment to development was the lack of funding, followed by the lack of specialist staff.   Managerial apathy and slow network connection were also rated significantly, followed by the inadequate infrastructure reported in the Francophone survey.

It is notable however, that both funding and staffing are managerial, rather than technical issues. This points to an important target group of any support organisation. The experience of the DISA project in consulting for UNESCO, IFLA , ICA and other international organisations is that multi-national training programmes, designed for specialist technical staff, are often intercepted and retained by management of invited national libraries and national archives, as a "perk of the job", and not filtered down to the appropriate target level of technical staff.

Contrary to level social inclusion in the global information society enjoyed by information professionals in the developed world, the availability of a single leased line to the national library or national archives excludes many interested African information professionals who wish to develop the level of information literacy required for digital library work. When permission must be sought from the director to use the single available Internet connection, technological access problems are compounded by the problems of social hierarchy.

As a result, the training is ineffectual as long as managers, despite their inability to affect specialist digital library training offered, continue to retain such invitations for themselves. It is therefore imperative that future support structures should clearly define the target support groups; that managers are provided with training in strategic planning; that managers are requested to endorse digital library support in terms of the strategic plan of the institution, and that mechanisms are put in place to assure a level of accountability to implement the training provided.   This latter consideration has relied in an honour system of subsequent reporting at predetermined intervals – a request that is often ignored. This aspect of accountability is an important consideration of a support organisation in the formulation of legal agreements and financial loans to participating institutions.

Section 4   Greenstone use and support

Greenstone digital library software use and support was measured in the fourth section. Question 4.1 determined the level of current usage of the Greenstone software. In all surveys, the positive response was very low, averaging 15%, except for the French response of 100%. However, that outlying result is due to the fact that the French survey was limited to seven recipients of recent Greenstone software training programme.

The small user base in Africa is evidenced in this result. The level of awareness of Greenstone software is an issue for the consideration of a support organisation, in the obvious efficacy of training, and the need for greater publicity.

The responses to Question 4.2, in describing the strengths and weaknesses are of interest to the software developers. The digital library interface and specifically the search functionality have wide appeal. The need to repeatedly rebuild and the limitation on collections size are seen as disadvantages. Perceptions that were expressed included the questionable long term development, outdated architecture, and high level of computer literacy required. These perceptions should also be addressed by a support organisation.

The existing support services provided by the New Zealand Digital Library (NZDL) project were queried in Question 4.3, in terms of their use in implementing Greenstone. The manual appeared to be most well received, followed by tutorials where those had been held, and then the discussion groups. Mr John Rose noted that the support service infrastructure was reportedly more widely used than the software itself, as reported in Question 4.1. This would indicate that a greater number of respondents had investigated the software than those who implemented it.

No difficulty was reported in Question 4.4 in making use of the support mechanisms provided by NZDL; and no suggestions for improved services were offered in response to Question 4.5.

What types of digital library services should be developed as a priority for Africa was the framework for Question 4.6 The range of options covered operational support, digital library management management support, and software development. The English language group clearly favoured operational support, with the prioritization of training. The French group identified training, guidelines for best practice, and the mobilization of fundingas areas of priority, while the Arabic group favoured the digital library management areas like organistional and strategic planning and software development above training.

Martin Belcher commented on this result, that most respondents want general advice (e.g. on digital libraries per se and all softwares) and also training, but that is often also generally on offer from other sources (such as INASP) as well.

Further analysis of the perceived need for support services is provided under Question 5.5

Section 5 Organisational structure of a digital library support organisation

The final section sought comments and ideas on the organisation structure most appropriate to the formalization of such a support organisation. This section reflected a high proportion of missing values, indicative of a lack of experience at the management level amongst respondents.

Question 5.1 Do you consider an African-based support organisation for digital library initiatives/projects is needed?

The general perception of need for an African-based support organisation for digital library initiatives and projects was measured in Question 5.1. The positive response was overwhelming, ranging between 88 -100% across the language groups. No negative responses were recorded.

Question 5.2 If so, what model might be appropriate, in your opinion, for structuring such a support organisation?

An appropriate model for structuring such an organisation was sought in Question 5.2. The options of centralized, networked and associative received varied responses, with comments indicating ranging interpretation of the question. Distinctive roles and functions of the various models should possibly have been clarified to obtain a more indicative result. Despite wide ranging comments, valuable points of interest in motivating for a support organisation are revealed: co-ordination and direction needed; requisite skill set spread so thinly as to support collaboration; accessibility to expert services and benefit from shared typically African experience; need for wide representation of various stakeholder communities; sustainability. Opinions indicated that the centralised model, or centres of excellence, appeared to offer greater sustainability, while the associative model seemed to offer more opportunities to share experience.

The networked models clearly favoured in the English and Arabic communities would suggest a positive previous experience of this model, and a strong existing network infrastructure. The networked model follows international trends, and could also accommodate an association around a central service centre. The DISA model has proven the efficacy of such a networked association, but the benefit from this model is apparently not evident where the existing network infrastructure does not provide adequate access. A greater level of support was shown by the French and Amharic communities for an associative rather than a networked model. This is consistent with the lack of infrastructure reported in the French survey (Q3.2)

This social division need further investigation to ascertain the significance of this result, which may be indicative of the level of social inclusion in the

context of that community, reflecting institutional and societal structures that support access to ICT.

Question 5.3　　What governance mechanisms should such a support organisation employ?

Question 5.3 offered the option of four governance mechanisms: a governing committee; user representation; national chapters, and professional organisations or NGO's.

The wide range of results from different surveys requires further consideration and consultation on the preferred governance mechanisms. However, only the mechanism of a governing committee received consistent support from all respondents in all surveys. The strongest level of support however, was recorded for the use of local professional organisations and relevant NGO's, but seems to be dependent on previous existence and positive experience of vibrant professional organisations, as reflected in the Arabic community.

The significant number of missing values recorded in response to this question reflects uncertainty, and even a lack of management experience among digital library practitioners.

Comments received provide valuable insights into concern about structural proliferation, political implications of resource control, and the need to position a support organisation within the information profession.

Question 5.4　　How would you support the sustainability of a digital library support organisation?

Opinion on sustainability is significant again in the variation of responses based on cultural divisions, with English language group preference for membership subscription, indicative of a higher level of confidence in organisational commitment, based possibly on positive experience of exisiting library consortia relationships. This is reflected in contrast to greater support for contributions in kind, expressed by other communities.

Noteworthy is the multiple selection breakdown, by which the fee for service model is seen to achieve the highest common level of support across all communities. The range of options selections is clear recognition of the need for a combination of strategies to promote sustainability of a support organisation.

As in the previous question, the high number of missing values recorded in response to this question again reflects uncertainty, or a lack of management experience among digital library practitioners.

Question 5.5   If you support a fee for service model, for which of the following services would you be willing to pay a fee?

The responses to this question indicate the level of current digital library development in Africa, with the combined surveys reflecting the following result, ranging from the highest bid for consultancy and training services, to the lowest in areas of providing DL services:

Consultancy: 45.5%
Online training courses: 39.4%
External hosting: 21.2%
Access rights management: 24.2%
IP Management : 18.2%
Content payment mechanisms: 15.2%

These responses are both direct indicators for support in areas for DL startup. The marked increase in missing values for the remaining options can bed seen as evidence again of a lack of experience in the subsequent provision of such services. With respondents indicating a consistent need for training throughout the various communities, this question provides an accurate needs profile, and a fair reflection of the status of digital libraries in Africa.

The response to this question provides an interesting correlation on sustainability, in addition to that questioned in Q5.4 above.

Q2.6.3 Plan to host collections on an external host   (12.9%)
          and
Q5.5.3 Willingness to pay a fee for dedicated external hosting service (22.6%)
More respondents are more willing to pay for a service than are currently using external hosting. This indicates a strong market opportunity, serving the sustainability of a support organisation.

The response to this question also provide an interesting needs analysis in terms of services for which respondents are less prepared to pay, in comparison to those support services prioritized in Question 3.1 and the need for general support services identified in Question 4.6.   The questions were not formulated in identical manner, complicating a direct analysis. Therefore, two common, and most frequently selected values are compared here, training, and intellectual property management. In both cases the willingness to pay for such services is lower than the suggested level of need. Clearly there is an expectation that services should be made available freely. In the case of intellectual property management, there seems to be an

unwillingness to outsource the provision of such service, which may well indicate a confusion between ownership of physical collections and rights to use digital reproductions of local content, despite the long existence of such organisations in the music industry (eg. South African Music Rights Organisation (SAMRO)).

This question reflects the status of digital libraries in Africa, where start-up operations (and predominantly training), are currently valued more highly than the development of essential new service areas.

Question 5.6   In which kind of organisational framework could such an organisation   best be positioned / structured?

Strongest overall support was recorded for a combination, or cross-sectoral organisational framework, followed by the highest single sector support for the university/higher education sector.

This question was deliberately included as means of evaluating confidence in respondents' own sector to support DL development as indicated in the sector affiliation profile provided in question 1.7. The level of confidence in the private commercial sector matches that of current affiliation, (both 3.2%), while that of the independent legal entities, such as NGO's, notably exceeds that of current affiliation. Current confidence levels in the other sectors do not meet the requirements of respondents, to provide a suitable organisational structure for a support organisation. This may be interpreted as a perception that NGO's tend to offer focused core function services, as against peripheral functions of other sectors.

The outcome of this comparison, together with the range of preferred governance mechanisms expressed, confirms the strong support for a cross-sectoral organisational framework, as indicated in question 5.6, and led by a dedicated NGO, preferably with access to the technical infrastructure afford by a university, but also affiliated to the information management sector. This is a major finding of the survey, with implications for the development of an appropriate business model.

Conclusions to survey responses

The survey results offered above are based mainly on the English-language survey, with differentiation of analysis provided by leaders of the sub-regional language group surveys.   The results were integrated only for section 5, based on the suggestion of Martin Belcher, and supported by other Steering Committee members, that the validity of the feasibility study was questionable, given the meagre response provided to this section on the management of the GSOA and how to pay for it. It is hoped that the synthesis of all regional analyses will allay this perception.

However, it should be pointed out that while the similarity in English and Arabic sample sizes provided for legitimate comparison, the variable sample sizes and limited number of respondents French and Amharic language surveys often provided misleading outlying results. For example, the entire French sample was university based, preventing useful measurement of other organisational structures supported by that community.

Report On The Workshop Discussion Regarding The Establishment Of A Greenstone Support Organisation For Africa.

The findings of the feasibility study were presented for discussion to the Greenstone Training Workshop, led by Prof Ian Witten, and held at the University of Cape Town on 1 December 2005.

The workshop was attended by 26 participants representing not only South Africa, but also Lesotho, Namibia, Ethiopia, Senegal and Sudan.

It was noted that the results of regional surveys, conducted in the French, English, Amharic and Arabic speaking communities were compiled for evaluation purposes. The response in areas of strategic management had been limited, and number of issues were opened to discussion by the workshop participants as an supplementary multinational group, informed on the level of support required.

The discussion was minuted by Dynal Patel for purposes of reporting, and the response documented here as a means of testing the validity of the findings of the study.

1. Fee for Service

Participants believe that access rights are important. There is confusion between ownership and copyright. Perhaps this confusion could have skewed results. There seems to be a reluctance to outsource IP management. Many participants confirmed that they had sold their heritage in exchange for equipment etc. Libraries are unwilling to pay a subscription fee. There is a contradiction in the vision OPEN ACCESS vs Fees for content for sustainability. Also Africans cannot be expected to pay for their heritage. Perhaps the GSO should focus on using content that is less contentious. The question that arises then is if the content will be relevant or useful? External hosting does not seem as viable an option as suggested, since DISA currently offers the service for free.

2. Governing Mechanisms

There is an inclination that the GSO should be affiliated with NGOs. The

reason being that there is generally a positive experience when collaborating with NGOs. The governing committee of the GSO should be affiliated with Universities or other organizations to take advantage of the networks that currently exist.

3.Ways Forward

For the GSO to work towards sustainability it explore two options: consultancy and online courses. Once must be careful as consultancy is a loaded term, that in essence covers the spectrum of activities that are necessary for sustainability. Institutions such as UNISA have had a mindset and now encourage their employees to enroll for training programs. GSO must align its vision with this emerging trend.

For there to be any DL development in Africa the content development must be free. There is a need for managers capable of strategic planning amongst other things. Training must target the right individuals and not managers wanting to go for a free holiday. There are lots of individuals attending training but there are still nothing to show at many institutions. There is a need for a more holistic approach for DL training. There is a need to train everyone in the chain.

In West Africa, the strategy in promoting Greenstone has been to offer courses. The emphasis has been on promoting free and open source software. There is a need to involves everyone NGO, Government, Academic instructions and Global organizations. There is a need for several determined experts in each of these organizations.

6. Recommendations

It is inevitable that the recommendations on the feasibility of establishing a digital library support organisation should be coloured by the personal experience of the investigator, as project manager of DISA. A grant-funded not for profit organisation, DISA was established in 1998, primarily to test the feasibility and lately to support digitisation efforts in South African libraries and archives. It is further notable that following a seven year period of operation, a number of responses, especially those of South African respondents may be perceived to be similarly coloured. The potential bias this represents in the study is therefore acknowledged.

By way of balance, and despite the resultant delay, the analysis of each of the parallel regional language group studies has been considered, and significant results integrated in this report. In addition, the input of the

Steering Committee was sought at predetermined intervals, and at the conclusion of the study.

The major design principles guiding the structuring of the survey questionnaire were threefold:
- To identify types of DL services required;
- To identify services which could be offered by a GSOA;
- To examine possible organisational structures as motivation for an appropriate business model.

The combined analysis of the survey reports above allows for a number of recommendation to be made in these three areas of investigation.

6.1 Types of digital library services required

The nature of digital libraries identified in Section 2 of the survey, and the inquiry into computing skills available proved to be a key area of investigation, both in characterising the African digital library environment and in indicating areas of need and potential areas for support. These were specifically queried in Section 3, to establish technical and other related problems experienced in creating digital libraries in Africa.

6.1.1. African advocacy for digital library development

The perceived need for digital library services was measured across a range of options, including advocacy for digital library development; a dedicated African digital library portal development; building African indigenous knowledge content online; promoting general awareness of Free and Open Source Software (FOSS); facilitating collaboration with related local and international institutions; strengthening civil society in building repositories of information useful to individuals, NGOs, business and governments; and contributing to the preservation of African works of cultural and historical importance.

Advocacy and a vehicle of collaboration emerge as the most sought-after services in Africa. Further comments on this question were particularly informative, in the identified need for "home grown solutions", appropriate to a unique African environment, and in the perceived need for greater co-ordinated effort.

6.1.2 Digital library training

The overwhelming demand for technical training was paramount to the findings of the survey. One of the most significant additional outcomes of the study is the identified lack of management experience among digital library practitioners. This finding was indicated in poor response rates to relevant questions in Section 5, and was also reported indirectly in the challenges encountered within institutions. Although managerial apathy was

listed third, after the major challenges of lack of funding and lack of specialist staff, the latter are notably managerial rather than technical issues. In addition, the need for digital library management training is also identified by the Arabic community as the highest perceived priority for the development of digital library services, in areas of organisational and strategic planning.

It is recommended that this important management target group is clearly identified and fostered in a number of ways:

- Managers should be provided with training in organisational and strategic planning;
- Support for policy development should include lifecycle management, ie. e-Resources collection development, content management and digital preservation;
- Mangers should be required to endorse digital library support in terms of the strategic plan of the institution, and that mechanisms are put in place to assure a level of accountability to implement the training provided.
- Managerial accountability should be supported in the formulation of legal agreements around financial loans to participating institutions who may wish to benefit from other services provided.
- The emphasis on digital library management training should not be seen as downgrading the immense need for more technical training and awareness in the digital library area.

6.1.3 Start-up support

The combined surveys reflected consistent willingness to pay for aggregated services in three distinct areas of priority:

- consultancy and training, followed by
- external hosting, followed by
- delivery services, such as access control, IP management and content payment mechanisms.

These responses are both direct indicators for the development of support in areas for DL startup. The consistency reflected throughout the various communities provides an accurate needs profile, and a fair reflection of the current status of digital libraries in Africa.

6.2   Services offered by a GSOA

The target market of the support organisation is identified in four interest groups at two levels of intensity; firstly the librarians and IT specialists, followed by university lecturers and researchers. Given the relatively small

digital library community in Africa, the synergy between these two groups is critical, and demands attention to their separate needs, outlined below, to support their reciprocal relationship in developing digital libraries.

6.2.1   Training and consultancy services

While there is evidence of adequate technical infrastructure available within the African academic computing environment, few training opportunities exist for the professional development of information specialists in the library and IT group.

The percentage of staff in possession of various computing skills was unfortunately not measured, making it difficult to draw up an accurate profile. It is apparent however, that **g**eneral computing skills were widely available and additional skills are available on a decreasing scale, with human computer interface specialists reported as least readily available.

Workshops and conferences currently provide the most effective training opportunities available, formal educational opportunities appear to be available only in the Sudan. The current skills profile is therefore best characterized by reported workshop attendance, reflecting a general level of awareness of basic digital library practice, with technical expertise limited to website architecture and design.

The recommendation is therefore linked to and develops upon the need for start-up support in 6.1.3 above, and should entail:

- introductory operational training in basic digital library practice
- information literacy services
- consultancy services in areas of specific need, eg metadata, web design, xml, etc.
- ongoing implementation support for defined period following training
- all training designed as modular units certified by a reputed qualification authority

6.2.2   User support

Digital library experience in Africa would seem to be generally low, although a growing interest in academic applications in ETD'S and IR's, beyond the traditional conversion projects emanating from special collections. This is believed to be due in part to widespread African support for the Open Access movement .

The recommendation is to provide user support to the secondary group identified, comprising university lecturers and researchers.   Such services should include areas of support for teaching, learning and research:

- Educational technology, eg. Integration of content with online learning sysytems
- User interface development eg. Personalization, portals and gateways
- Online interaction in blogs, messaging and chat

6.2.3   External hosting

The majority of respondents in all surveys indicated that they were planning to host their collections both externally and locally (47-71%). This result was surprising, and while it could indicate limited local storage facilities, it may also indicate a high level of willingness to share content.

The subsequent correlation those who plan to host collections on an external host   (12.9%) and those willingness to pay a fee for dedicated external hosting service (22.6%) reveals a further recommendation of note, viz. that more respondents are more willing to pay for a service than are currently using external hosting, providing a strong market opportunity, serving the sustainability of a support organisation.   The substantial demand for paid external hosting services is inferred however, from the comparison of relatively small figures from two questions which were not formulated with this comparison in mind. Greater emphasis must be placed on the clear demand for consultancy and training, while the idea of hosting services as an interesting lead.

6.2.4 Marketing

The level of awareness of Greenstone software is a further issue for the consideration of a support organisation, given the obvious need for greater publicity.

6.3   Organisational structures

A concentration of digital library activity is evident within university or college libraries. (Question 1.6) In order of diminishing value, this is followed by research institutes, which can be similarly accorded to the academic computing environment provided by the higher education sector. The sequential level of activity listed under government or public institutions can be accorded to the role of related heritage institutions, archives and museums.

Given that advocacy and a vehicle of collaboration emerged as the most sought-after services in Africa, it is not surprising that strongest overall support was recorded for a combination, or cross-sectoral organisational framework, followed by the highest single sector support for the university/higher education sector.

The level of confidence in independent legal entities, such as NGO's, notably exceeds that of current affiliation. Current confidence levels in the other sectors do not meet the requirements of respondents, to provide a suitable organisational structure for a support organisation. This may be interpreted as a perception that NGO's tend to offer focused core function services, as against peripheral functions of other sectors. It may also be a result of the large number of respondents who preferred an unspecified combination of sectors including perhaps their own. The emphasis displayed here on higher education, cultural heritage and indigenous knowledge applications is based to a large degree on the affiliation of respondents, on existing applications and on an analysis of certain development and political tendencies. While the importance of these application
areas is acknowledged, the GSOA should reamin open to other sectors such as government information, scientific research and the media.

The outcome of the regional comparison, together with the range of preferred governance mechanisms expressed in the data, confirms the strong support for a cross-sectoral organisational framework, as indicated in question 5.6, and led by a dedicated NGO, preferably with access to the technical infrastructure afford by a university, but also affiliated to the information management sector. This is a major finding of the survey, with implications for the development of an appropriate business model.

Role of African Universities

There is increasing recognition that the role of universities in Africa in research, information transfer and technology development is critical to national social progress and economic growth. The results of this study highlight significant nodes of digital library development within African universities. The consideration of any business plan must therefore take cogniscence of the special role of universities as potential partners. A history of poor national economic performance, inappropriate governing structures, political interference, weak internal management and political instability all contributed to a decline in tertiary education infrastructure the latter half of the twentieth century. In the light of these developments the Association of African Universities (AAU), the World Bank, African organisations with an interest in higher education and the Working Group on Higher Education, proposed strategic guidelines in 1999 for the revitalisation of universities in Africa.

University leaders and stakeholders were encouraged to exercise strategic planning as a means to analyse conditions, express a vision and formulate goals thereby promoting the advancement of the institution in a systematic manner. Critical issues identified for discussion included the budget allocation process, management, institutional autonomy, accountability to government and the public etc.   The significance of these issues suggest the need for carefully negotiated agreements between the proposed support organisation and African university partners.

The adoption of state of the art management information systems was also recommended by the Working Group on Higher Education, as a powerful instrument that enables accessible information on institutional performance, to support the management of learning, and to achieve meaningful change by re-designing instructional technology as both a strategic and a cognitive tool. The role of digital library development in support of research, teaching and learning has become well established in the developed world, but this study confirmed the limited uptake of educational technology by academic staff in Africa. A number of reasons were cited by respondents, paramount being a lack of resources and a lack of trained staff.   This is an area of activity that deserves closer attention in the establishment of a digital library support organisation for Africa.

The AAU is establishing an ICT Unit to constitute a clearing house for information on relevant ICT initiatives, trends and opportunities. This Unit and its stated aims are of particular relevance to this study in the potential parallel role to a digital library support organisation: in facilitate networking, collective action and the sharing of good practice and expertise; in undertaking informed advocacy and lobbying on ICT issues affecting Africa's knowledge centres. {HOBA, 2005 #61}

Diversification of the funding base of higher education institutions to supplement government funding was further recommended by the AAU to include the charging of tuition fees, the mobilisation of donor funding and the establishment of private-public partnerships in order to position the university at the centre of the information technology driven developmental pathway.   {, 2004 #1} This recommendation might suggest a similar business model for a Greenstone support organisation in Africa.

6.4   Business model

6.4.1 Suggested models

The survey did not provide a clear indication on the most appropriate organisational structure for a support organisation. The wide ranging results on preferred governance mechanisms was also inconclusive.

John Rose suggests that he main reason why such uncertainties exist is the low level of awareness and expertise in the digital library area in Africa, which has led to a low level of response to the survey in terms of both quantity and quality.

The strongest level of support however, was recorded for the use of local professional organisations and relevant NGO's. Some concern was expressed however, on unnecessary structural proliferation, political implications of resource control, and the need to position a support organisation within the information profession.

6.4.2   Sustainability

The variation of opinion on sustainability based on regional divisions is again, inconclusive. The willingness of respondents to pay a fee for services rendered proves in itself, the feasibility of establishing a support organisation to provide the services identified. However, there is some ambiguity between the recommendation here that the GSOA be established within the higher education sector, and the analysis in section 5.6 which indicates a greater level of confidence in the NGO sector. The inference could also be drawn that the result of the survey has been coloured by the DISA model, which currently functions as a national collaborative grant funded project based within the higher education sector. While that model does not provide a sustainable solution in itself, without a more detailed concept of the organizational structure and terms of reference of the GSOA, it does serve as a basis from which to develop an NGO, which could approach potential donors or sponsoring organizations for support.

Much of the existing digital library development has undeniably been made possible by donor funding. That such funding is relatively readily available in the higher education sector may account for the predominance of this sector recorded in this study. However, donor agencies have historically operated individually in the African context, and not always with the priorities of African higher education in mind. Concerns of cultural imperialism have arisen from experiences of obligatory partnerships with institutions in donor countries, without proper legal framework for shared management of intellectual property rights, and the resultant loss of swathes of indigenous

knowledge, held for "safekeeping" in a donor country.   This experience supports the establishment of a GSOA based within the higher education sector, where donor funds are most readily available, but it is recommended that the GSOA serve as a gatekeeper, to advise the wider library community in the development of digital libraries. It is further recommended that such libraries do not continue to rely solely on grant funds; that the GSOA assists in building meaningful and constructive partnerships that avoid the exchange of sovereignty over local heritage and memory in return for seemingly expensive equipment that is inevitably obsolete within a few years. {PETERS, 2001 #290}

- It is recommended that the nature of such partnerships be carefully considered as a core function of a digital library support organisation in Africa. The role of donor agencies in a GSOA private-public partnership should therefore be well defined within the framework of investment in higher education for social and economic development.

- Donor support for a GSOA should be deflected from content ownership and concurrent intellectual property rights issues, and redirected into higher level digital library development activities such as advocacy, collaborative agreements, strategic planning, information and communication technology infrastructure, institutional linkages within and between existing consortia and in digital library management training.

- Given that advocacy and a vehicle of collaboration emerged from the survey as the most sought-after services in Africa, an appropriate organisational model for implementing digital library services is one that is limited to facilitating these services and indirect in their implementation. This would entail the establishment of a small organisation, possibly only one person primarily responsible for advocacy, and closely linked to the existing formal library structures, such as IFLA-Africa.   Such a model would be facilitative in directing African libraries and archives to the relevant resources, including exisiting NGO's working in related areas. Support for this limited model would entail a salary at library management level to effect the necessary profile. Together with office administration expenses, and a limited travel budget, this model is estimated at US$50,000 per annum.
- A digital library support organisation designed to implement the full range of digital library services identified is closely aligned to the organisational model of a associative collaborative framework with direct representation of various stakeholder groups at the level of a governing board. This model does equate to a dedicated NGO, aimed to meet the needs specific to the support of digital library development in Africa.

This fully-fledged support organisation would require, in addition to the facilitative model above, further two posts to meet both technical and information management service requirements, as well as one administrative support post.

The cost of establishing a fully-fledged support organisation is estimated as follows:

Staff salaries	50,000
Furniture and equipment	35,000
Operating expenses	45,000

US$ 130,000 per annum

- The full implementation is based on the combined content development, including remote hosting and capacity building services identified in the study. Given the rate of technological advancement in digital libraries, this model is designed to stay abreast of developments and convey relevant aspects in training workshops.

- This necessitates a fully operational digital library service, with hardware and software expenses reflected under furniture and equipment. This should comprise a a networked environment with 2-3 media-specific capture workstations; a 10 seater LAN teaching environment; a high-speed server, with generous extensible data storage capacity, RAID controller and backup hardware.

7.   Conclusions

Rosenberg reports on the current status of African university libraries in Africa that while libraries worldwide have increased their holdings of electronic information and automated their operations over the past fifteen years, within Africa digital development has been uneven. {ROSENBERG, 2005 #58}

Evidence would point to the risk of a growing digital divide. Supporters of globalization see the current advancement of ICT as an opportunity to gain access to knowledge and services from around the world in a way that would have been unimaginable previously, as well as allowing Less Developed Countries (LDCs) to leapfrog the development of their infrastructure and economy by providing a unique opportunity for low-income countries to approach equity in their utilization of wireless network.   Globalisation skeptics however, view the current technological revolution as creating a new digital gap between rich developed countries and LDCs. Developed countries possess the required capital and technology and thus, have much greater access to the Internet and communications services.   {WAHAB, 2003 #57}

The AAU recognizes the threat of the growing digital divide stemming primarily from the overarching condition of poverty and limited resources experienced in Africa. In addition specific challenges identified within the higher education sector include the absence of the required infrastructure, services and policy at the national, regional and international levels, resulting in inadequate connectivity and high cost. ; weak institutional and individual capacity to design and manage effective systems, leading to sub-optimal use of available bandwidth and other facilities; and the absence of content and structures that place a premium on collaboration and networking as key means of information sharing and knowledge generation. {HOBA, 2005 #61} The key issues identified by the AAU that also emerge from this study are "content" and "collaboration."

The objective of this study was to assess the feasibility of developing a digital library support organisation in Africa. The recommendations set out above indicate that such an organisation should seek to address the digital divide on a number of levels, more complex than a bipolar division between haves and the have-nots.

A support organisation aimed at the use of technology for social development in Africa cannot be limited to the provision of physical resources in the expectation of digital resources in return. It cannot aim to support digital libraries for the sake of content alone. It is evident from this study that access to online information is framed by the political, economic, institutional, cultural and linguistic contexts considered here. Given that advocacy and a vehicle of collaboration emerged from the study as the most sought-after digital library support services in Africa, the inequality of the

digital divide must be recognized as primarily social, not digital.
{WARSCHAUER, 2003 #59}

A number of conclusions can thus be drawn from the results recorded in this study, on the feasibility of establishing a digital library support organisation for Africa:

1. The first is the need to include African experience in developing an international private-public partnership to build African digital library content, and provide a framework for African collaboration.   Multi-national partnerships are sought that are meaningful in their recognition of equity, and operate within the proper legal framework for fair management of intellectual property rights to protect indigenous knowledge systems and ensuing knowledge products.

2. The recommendations draw attention to the role of the existing academic computing environment within African universities and the work of existing NGO's, providing nodes of infrastructure as bridges across the digital divide. A second conclusion can be drawn in the need to utilise this enhanced level of technical infrastructure currently enjoyed in the higher education sector in Africa. This infrastructure offers the highest current level of social inclusion in the global networked environment, where ICT and online access are embedded in the institutional culture.

3. In addition, such partnerships need to respond to the increased demand for e-learning, distance education, and the integration of indigenous knowledge systems into the mainstream of education. Digital library support is therefore critical not only in the provision of hardware and software, or even in basic digital library operational skills, but in developing human capacity within African universities, and particularly in African libraries, in the pedagogy of instructional technology and the effective use of ICT's to access, adapt and create new knowledge.

4. A digital library support organisation for Africa is mandated by the outcome of this study to build a support infrastructure for the management of digital content.   This entails the collection development and management policies to build e-resource collections, hybrid collection comprising non-digital, born digital and those collections resulting from the digitisation of local content. , and the assurance of long- term provision of such e-resources.

5. In addition to content building, a DL support organisation in Africa will have to give some attention to building human capacity evidently lacking at present to provide the necessary information services required. Information literacy services are already growing, and were not included in this study, but should be given consideration in the vital role of the digital library to utilize

technology for greater social inclusion. Information services investigated and which merit further support include the development of user interfaces to provide easy access through websites, gateways and portals. They include the development of local ontologies and standard analytical tools to enable users to navigate, search retrieve and re-use information; and personalization services and online interaction models (wicki's, blogs, chat) that allow the remote user to participate in the process of resource discovery.

6. There is a further need expressed in the survey responses, (reflected negatively in the high level of missing values) for a DL support organisation to aim also at the underlying service infrastructure. This includes support for improved national network connectivity, access management policies for common authentication and authorisation, in a single sign-on facility (eg. Shibboleth). The service infrastructure might also include payment services for subscription-based content, and billing systems for intellectual property rights and related services through a common interface.

7. The significance of the survey lies in the lack of management experience currently evident among digital library practitioners. This mandates a DL support organisation to address the need for a digital environment that is managed both strategically and operationally. Staff development and training needs should reflect the strategic vision in the library. Support for policy development and legal frameworks are needed to control Internet usage, the licensing of commercial content, and the digitization and intellectual property management of local content. New job descriptions and performance measurements are required in the digital environment. The managed digital environment should also reflect a commitment to providing long-term access to electronic resources.

NEPAD is evidence that Africa has embarked on a process of accelerating the bridging of the developmental, trade and digital divide. The strategic policy framework acknowledges that bridging the development gap between the North and the South is ultimately the responsibility of the South. It is timely indeed to realize the objectives of the major identified programme in information and communications technology, to be fast-tracked, in collaboration with development partners.

There is now an urgent need to attract further funding to this GSOA initiative to support digital library development in Africa that will enable the creation and management of electronic information resources, to preserve the heritage of indigenous knowledge in a global information society, and strengthen the mechanisms and capacity of civil society.

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