BUILDING DIGITAL MEMORY OF THE SUDAN BASED ON PROFESSIONAL PERSPECTIVES

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ABSTRACT

This paper aims to develop plans and guidance that help to secure, improve the reliability of Memory of the Sudanese Nation as well to identity digital technology as the transfer of information and communication technology from perspectives of professionals. It has reviewed and assessed infrastructures, resources, systems and ICT readiness which will contribute in building digital memory of Sudan. The outputs guide to run reforms and rehabilitation; to build capacities and revitalize infrastructure of digital environment which affect reliance and shared resources in memory institutions. It is concluded that memory institutions as repository of Sudanese intangible and tangible content which will be represented in the digital memory of Sudan. Finally the paper proposes to revitalize the country’s cultural policies in line with the principles of cultural diversity and development of a comprehensive strategy for long-lived digital explicit and tacit knowledge.

Keywords: ICT transfer, Digitization, Memory of the Sudan, Sudanese digital content, National Digital strategy

1. INTRODUCTION

Knowledge usually accumulated in human memory, which has been only knowledge storage and access device [1]. Then, the man had realized the importance of accumulated knowledge and carried out many trials to find a way to store and keep his tremendous signs, marks and information for his future or the next generations. The ancients had used this concept or the term information consolidation outside human memory as Extra Somatic Memory [2]. The various waves of inventions were really milestones in the history of information storage which led the development of external memories or aided memories and today reached a kind of maturity in the age of memory.

The development of nations can be measured according to their information progress because it shows how a country or nation generates, uses and reserves...
knowledge in documentary institutions. These institutions have mainly been developed over the course of centuries optimized a series of “best practices” for managing and keeping information using Information and Communication Technologies (ICT). Archives, documentation centers, libraries and museums are guardians of the documentary heritage of mankind.

Wikipedia [3] the free encyclopedia has simply defined the documentary heritage as institutional memory contains a collection of facts, concepts, experiences and know-how held by a group of people. As it transcends the individual, it requires the ongoing transmission of these memories between members of this group. Elements of institutional memory may be found in corporations, professional groups, government bodies, religious groups, academic collaborations and by extension in entire cultures. It is noticed that as institutional knowledge that memory depends upon the preservation of data and also the analytical skills necessary for its effective use within the institution. Peter and Mirta [4] define national memory as the sum of information contained in a country's documentary heritage i.e. Assets of National Knowledge Systems.

As humans, we are looking for our existence and recognizing that memory is an integral part of our existence. Winogard [5] refers to the terms "human memory", "computer memory" and "memory institution" as metaphors. UNSECO informatics expert Abid [6] has clarified these metaphors in light of his explanation to the term "memory of the world". The memory of the world is source of knowledge and memory of the peoples (nations) of the world is of vital importance in preserving cultural identities, in linking past and present and in shaping the future. These identities are affiliated to heritage which is a vast reality covering numerous domains such as archives, libraries, documentation and information institutions, museums, monuments and places, botanical gardens, zoological gardens and all kinds of collecting institutions. They are considered the main pillars of the nation's documentary heritage "nation's memory". They concern with the management, preservation and the exploitation of rich collections of old, rare and valuable materials ('treasures') as well as the provision of access of the society to the information and knowledge. The success of any nation lies not just on its resources (money, buildings, people, tools and technologies), but in how it deploys these resources and builds them into capabilities, deliver and services [7].

2. DIGITAL WORLD

We are living in a digital world which has resulted from the information and communication technologies revolution from which our fundamental resources of knowledge to become interchangeable and secure. Digitization has become the process of converting any physical or analogue item into an electronic representation [8]. Digital conversion is the building process of digital surrogates for use will preserve the original from the wear and tear of repeated access. These surrogates are digital forms of recorded images, sound files, text documents. They are objects of historical, scientific, or cultural interests which accessed through electronic media virtual reality. It led to "digital preservation" which often arises when selecting special collections of unique and treasured items in documentary institutions for digitization. This indicates that the virtual memory institutions do not house actual objects and therefore lack the permanence and unique qualities of documentary institutions [9]. Atentions have been drawn to the ever growing digital heritage in the world and the need for an international campaign to safeguard endangered memory at different levels.

3. MEMORY OF THE SUDANESE NATION

The Sudan is a diverse multi-cultural rich heritage nation with valuable indigenous knowledge known as the silent Sudan treasures. This heritage is still abound locally and not yet simultaneously disseminated by the outside world. The modern information technologies have
offered the Sudanese Society a great chance of projecting its culture to mankind global culture. In addition to the outcome of local research efforts or intellectual production in various fields of knowledge scattered all over the country. These are mostly owned by individuals/ tribe/ category of society/ private or public offices/ stores/ memory institution/sites including internet sites are largely unrealized or unorganized even some are semi deteriorated. Such materials are important essential parts of memory of the Sudan. i.e. the Sudanese Nation indigenous knowledge.

These institutions must also embark on aggressive acquisition of the Sudan collections including grey literature, materials, databases, physical objects, multifunctional information and knowledge systems and networks. But the cultivation of these technologies in the Sudan is weak what is conceptually known as digital divide. ICT Opportunity Index has introduced the notions of a country's info-density and info-use based on which the Sudan is classified as less economy in Info-state growth. It showed achievement Info-state value of 38.56 in 2007. This growth led to catch up to ICTs employ them to store large amounts of information economically and improve the capabilities of retrieving that information for as long as it is needed [10].

Advances in information technology and communications led to the emergence of modern digital systems that facilitate the exchange, archiving of information and innovations. Since the application of ICT, the most of the Sudanese professionals have been familiar with the problems of physical carriers require specific media. Such cases they will need to decide whether it is reasonable to require transfers via specific media that they can process, or to invest in facilities to handle a wider range of media. The more advances are made in the field of digitization led to more generated digital surrogates. The index cards replaced by databases, the long-term preservation of electronic data are gaining an importance for our growing information society because the percentage of information which is available exclusively in digital form is rising rapidly. The problem is becoming more acute; especially for institutions whose principal task is the preservation and documentation of our cultural heritage.

This study focuses on the generation of public knowledge in advanced ICTs using digitization on which is based the vision of networks and services. It specifically aims to establish; maintain and reinforce the Sudanese "local" knowledge or content does not find position at the international forefront of scientific and technological developments; address the most urgent needs for research and novel applications in the present unfolding of new technology. Since the Sudan has started to introduce digital initiatives while some are currently being at the initial implementation phases but the effectiveness of these initiatives affected by Insufficient testing of these initiatives and projects under task loaded conditions and lack understanding of changing requirements and environments

i. Knowledge systems do not constitute the totality of the nation concerns with the adopted technology. Most frequently cited obstacles to optimal technology adaptation in the memory institution setting were lack of digitization policies, staff time, funding, and inadequate collaboration on digitization efforts

ii. Shortage of work about the perception of digital technology among users

This study aims to plan, secure, improve the reliability of Memory of the Sudan and make its contribution more significant in the Global Digital Memory and Knowledge/ e-initiatives.

4. ASSESSMENT OF DIGITAL TECHNOLOGIES IN SUDAN

The components which build a Digital Memory of the Sudan are not uni-dimensional phenomenon which guides to understand complex and recursive relationships between factors related to technology, management, and policy.
Mingers [11] presents several reasons for using a combination of research methods in conducting research. This study adopted mixed approach which is combination of surveys distributed to memory institutions either directly or emailed. This combination of data collection methods was used to gather and analyze data on the nature and types of collections as well as ones to be digitized in institutional memory. The policies and programs have placed for digital technology needs and requirements, and future plans for developing digital programs. The universe of this study of high potential memory institutions were grouped into: research centres and units; cultural and folkloric centres; academic institutions; documentation and information centres; herbaria and botanical gardens, museums, archives; libraries; broadcasting and television; mass media centres; and parks and reserved areas which constitute main criteria of repositories that contribute effectively in building Memory of the Sudan and will have real existence in the Nation memory.

The random sample of 300 memory professionals and administrators was collected from 42 memory institutions. Professional participants were selected according to a set of criteria designed to ensure that they were likely to be representative of current practice and behavior, based upon the premise that those memory institutions that have Internet access are more likely to consider using digital images. Thus, all participants had to be current Internet users.

The 284 participants represented the memory professionals around the nation who hold key positions in memory institutions as the researchers determined from the identification of roles central to the functions of the Sudan memory institutions in this study’s literature review and visits of the sites. Some of Professionals were asked to follow-up interviews were recruited from those who were asked if they were willing to be interviewed.

The findings of these study digital approaches in these institutions in following sections: descriptive analysis of the variables representing general the perspectives of the professionals as the vision of this study is to consider digitization as communication and information transfer. Upon which this study was conducted in the period of June 2006-June 2008 to address the knowledge chain in communication in the direction of this new paradigm.

4.1 Memory Institution System Analysis

It is necessary to plan for Digital Memory of the Sudan which reviewed and evaluated the current status. The collected information cited empirically in the comprehensive survey of proposed and under implementation e-projects and digital initiatives as well as set of instruments which used for gathering of information on memory institutions, risk management, preservation, awareness accessibility, training and professional development, and coordination and networking. Analysis of data has been carried out using a first principles approach. The Sudan’s infrastructures were analyzed including geography, environment and history, resources, information /communication in regards to telecommunications in the Sudan generally. It elaborate the existing memory institutional systems and effort has directed toward the development and implementation of new technological tools in memory institutions which is important because it can help them to become more relevance and adaptable. The drafted current digital initiatives or projects in Sudan have a strong relationship with UNESCO’s Memory of the World Program and Global Memory Net which are examined according to these principle reasons; criteria for selection; technical requirements and implementation; legal aspects; budgeting, human resource planning; development and maintenance of web interfaces; and preservation of digital content.

The role of the memory professionals grew from that of a collector and preserver of information resources to a professional involved in very complex issues of organization, the dissemination of and access to information. The role of the memory professionals, particularly during
the past two decades, has further evolved to encompass the burgeoning technological developments. Their role is to select, acquire, organize and make available an appropriate subset of resources in the digital world. They have done these jobs but they are moving beyond the traditional roles of collection maintenance and custodial duties to newer functions of translating, accessing and marketing resources beyond the physical boundaries.

A total of about 300 questionnaires were distributed, 284 (95%) received of some who agreed and sent online to the email addresses collected of different memory institutions in the Sudan mainly in Khartoum State. The density of professional population varies and ranges from high to low as presented in Table 1.

Table 1: Distribution of Professional Population Density in Memory Institution

<table>
<thead>
<tr>
<th>Institution</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Centres and Units</td>
<td>37</td>
</tr>
<tr>
<td>Culture/Folkloric Centres</td>
<td>15</td>
</tr>
<tr>
<td>Academic Institution</td>
<td>36</td>
</tr>
<tr>
<td>Documentation/information Centres</td>
<td>30</td>
</tr>
<tr>
<td>Herbaria/botanical garden</td>
<td>10</td>
</tr>
<tr>
<td>Museums</td>
<td>11</td>
</tr>
<tr>
<td>Archives</td>
<td>22</td>
</tr>
<tr>
<td>Libraries</td>
<td>76</td>
</tr>
<tr>
<td>Broadcasting and TV</td>
<td>11</td>
</tr>
<tr>
<td>Mass Media Centres</td>
<td>24</td>
</tr>
<tr>
<td>Parks and Reserved Areas</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>284</td>
</tr>
</tbody>
</table>

4.2. Characteristics of the Professionals

Based on the data collected, the number of females is considerably higher (170) than males (114) these institutions. The scattered of gender in these institutions mainly depends on the discharging activity of the institution. Their ages are among the three age groups (31-40, 41-50, and 51-60). Thirty two (11.3%) reported being under 30, eighty two (28.9%) between 31 and 40, eighty nine (31.35%) between 41 and 50, seventy four (26.1%) between 51 and 60, and only seven (2.5%) over 60. There is relatively equal distribution of ages with the exception of the group of “over 60” respondents.

The level of educational attainment, fifty eight (20.4%) indicated that they had a bachelor’s degree, thirty four (12%) higher diploma, half of the respondents “one hundred forty two (50%) a master’s degree and fifty (17.6%) are PhD degree. The majority of Professional were Graduates of Faculty or Arts (Departments: Library; Anthropology; Archeology, Mass Media, and History). For those who were working in herbaria and botanical gardens/parks and reserved areas and museums (excavations) were graduates of Faculty of Science [Departments: Zoology; Botany; Geology] or Natural Resources Colleges. Some of those working in folkloric and cultural centres are graduates of Faculty of Fine Arts or Folkloric departments. It was found a range of 2-4 graduates/memory institution was of computer sciences and information technologies mainly in the information Centres or units. Majority of MSC and PhD holders had completed the required coursework on traditional techniques and not acquainted any technological requirements during their research program. The research centres and academic institutions hosted the highest population of PhDs holders.

The relationship between the use of digital technologies and the content of different memory jobs was explored. More than ten divisions were represented: 18% of them worked in technical processing division, followed by 15% in public awareness, 14% in research and publications, 10% in conservation and preservation, 10% in client services, 10% in information technology, 8% collection development and 8% in training and education. The amount of experience with their computer use at the memory institution, 19.4% indicated that they had been using computers in their work for one to four years in archives, cultural and folkloric centres and museums; and 39.1% for five to ten years with high ratios at libraries, mass media centres and parks and
reserved areas. The majority indicated that they have used computers for their tasks for more than ten years 41.5% mainly at libraries, research centres, academic institutions and documentation and information centers. The approximately peak time that they spent time at their work institution ranges from one to three hours daily 84.5%. This indicated that the computers have introduced in some aspects of memory institutions. The population of computer users has grown as more and more professional find it a space where they can express their points of view and communicate with others as they can access internet from desktop 66.9%.

The majority of memory institutions' professionals described themselves as having an expert level of computer skills 40.8%, 31.7% intermediate level and 21.37% novices in the use of software tools. Whereas the level of internet skills: 21.53% Internet searches (via Internet Explorer), a novice level, 32.7% intermediate level, 45.8.5% an expert level of experience in Internet searches as indicated in Figure 1.

![Graph](image)

**Figure 1: Relationship among respondents’ age, levels of computer and internet expertise**

### 4.3 Actual Use of Digital Technology

The preference of professional to resources, particularly in relation to their job needs when searching for images and information related to their needs or work. The tendency of the preference: journals and books is 61.6% and followed by catalogues and citations 61.3% mainly in libraries, academic institutions, research centres, documentation and Information centres and archives. 25% preference for the use of digital images was in research centres, and mass media. Some indicated the importance of both the originals 22.2% in research and folkloric/cultural centres and photographs 21.5% in their work received similar ratings as well as in CD-ROMs 16.9% : same preference in mass media, research and documentation and information Centres and multimedia 15.8% in parks and reserved areas, mass media centres and broadcasting and TV. They did not indicate generally a preference for using the maps 7.4% in their works but were kept in libraries.

The perceived benefits of the use of digital products among professionals were tested to indicate the degree to which they agree or disagree with a series of statements about digital images including concerned: ease of use and edit; accessibility; interactivity; image selections and distribution; text information; and protection for the originals. They chose ratings between Neutral and Agree for the statements “Easy to access instead of going to storage/library facilitates their work” as their top choice with 65.5%. Their second choice was “Easy to reproduce/copy digital images” 57.8%, and their third was “Adequate delivery Speed,” 52.5%, their fourth choice was “Easy to manipulate/edit digital images” 52, 1%. On the other hand “The quality of digital image resolution is adequate” 46.8%. The lowest amount of digital images online databases/ website is adequate resulted in 38.4% followed by digital images prevent wear and tear on the Original” 37%. They believed that the amount of digital images available on websites and databases to the public is insufficient. Interestingly, the respondents chose neutral as their response to this prompt. But the most beneficiaries of these statements are libraries, academic, research centres and mass media while cultural centres, museums, parks and reserved areas are least ones.
The barriers and problems perceived by professionals in the use of digital images on the job. Such perceptions were rated by the respondents in terms of the following categories: image selection, unreliability, lack of technology support, cost, lack of incentives, and image right and permission. The used rating scale was: agree, neutral and disagree. The results suggest that most respondents chose ratings between Neutral and Agree for the questions. Management permission such as copyright/fair was 95.4%. There are not enough staff and/or instructions on searching and using digital images in memory institutions was 89.8%. Not enough computer equipment and/or software Tools 80.6% to use digital images more effectively at work, Technical problems 78.2% and weak incentives 71.5% to discharge the work efficiently or run smoothly, in addition to the high cost of acquiring of digital collection 68.3% is barrier in use. On the other hand, mentality of change 41.2%, low delivery speed 36.3%, inadequate databases / websites 18.3% and the quality and information offered by digital image collections/databases are not reliable, 16.5%.

This study reflects the importance of digital technology for practice and its most valued usefulness and received a highest recognition among professionals [12, 13].

5. BUILDING DIGITAL MEMORY OF SUDAN "DMS"

The findings of this research recommended strongly running the structuration and rehabilitation of DMS institutions. It should base on building capacity, digital infrastructure and the adoption of the knowledge partnership system of the Sudanese nation. The results also verified that the assumption of this study, given great importance to the quantity and extent of the expansion of digital technologies in the memory institutions. These encourage building DMS based on UNESCO strategy of knowledge for all. It also has a strong relationship with UNESCO’s Memory of the World Programme for safeguarding the world’s documentary heritage. Thus elaboration is targeting decision makers, memory institutions managers, and curatorial and technical staff members, particularly those in institutions which satisfy a large and more diverse population. This can help to seek partnerships with other institutions to capitalize on the economic advantages of a shared approach and to take advantage of financial opportunities.

The socio-technical imperative of digital technologies is applied in all aspects. Repositories are the products of the interaction of people and these technologies and their sustainability is dependent on the continuation of that interaction.

In order to build an open scalable infrastructure of DMS will be guided by GMNet’s vision and conceptual framework. This framework is a multi-purpose image knowledge base and portal to meet multiple needs of multiple users in the world, who are interested in cultural, historical, and heritage contents [13]. DMS development is a very challenging task but attempts to be beneficiary the multiple kinds of technologies which utilized to enable dynamic retrieval of the valuable resources as well as dynamic management of various system components. The most important component clearly is collections because content is of overriding significance of any digital memory institution, and technology is only the tool. Therefore, the tangible and intangible Sudanese content is collaborative and workable model at all levels for delivering multimedia content over the web by utilizing cutting edge content-base image retrieval technologies in addition to the traditional metadata-based searching. It allows users to find images based on an integration of visual similarity and metadata relevance.

The gateway function is not just a simple web-link. The infrastructure is ready to embrace more participation including digital contents for the world regions. Output of this the study indicated that there are many attempts in the country have done such as experiment of University of Khartoum has initiated and developed in-
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house Linux/MySQL/PHP-based platforms on open standards. This will lead to carry out a number of upgrading to be compatible with and suit interactive Multimedia Content retrieval System (i-M-C-S) with much added functionalities. This generic version of i-M-C-S is a Triple-tier system, which is developed to meet the needs of interested organizations depending on the technical sophistication and capabilities of each of them. The triple system has almost all the systems features of the current Global Memory Net. It requires a server, with staff possessing knowledge and expertise in Linux, PHP, and MySQL etc. It will use PC as server and the functionality encourage an institution with less technical capabilities to start developing its digital collection database(s), knowing whether that all digital applications require functional digital databases. The implementation of DMS cooperative models requires a number of considerations abided by the rules of World Trading Organization, national and global ICT strategy and network.

6. CONCLUSION

Finally we can conclude that there are no magic wands or pansies in our world, human memories fade, can be completely lost when people die, events can be forgotten, also extend to causes of storage failures and damage of physical media and memory devices. But appreciations to the careful work of our professionals in memory institutions have always been an integral part of societies and canonize the pasts and presents of individuals and communities. In Sudan’s cultural, educational and scientific collections reside millions of things that document our past and present. The Sudanese collections are distributed nationwide in diverse institutions and memory resources.

As this study revealed the ways in which professionals are currently using digital images to perform their jobs effectively and efficiently after the identification the positive and negative uses of digital images. The advances in digital technologies create new interesting ways among professional and providing them with mechanisms of extractions and integration their professional work. For this purpose, the Sudanese Nation received guidance from UNESCO which also supports the preparation, evaluation and revitalization of the country’s cultural policies in line with the principles of cultural diversity and development of a comprehensive strategy for long-lived digital explicit and tacit knowledge based on UNESCO and global memory net initiatives.

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