BIBLIOTHECA ALEXANDRINA
مكتبة الإسكندرية

BORN DIGITAL
THE NEW BIBLIOTHECA ALEXANDRINA

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1. INTRODUCTION

I believe that the future of Egypt, indeed of all the developing countries, will depend on a better appreciation of what can be done with the new Information and Communication Technology (ICT), the mastery of these technologies and their proper deployment in a strategic fashion. This requires that the national infrastructure with its international links be in place. I am happy to note that Egypt has, in the past few years, been blessed with a government that understands such issues and acts upon them. Providing free Internet access, and committed to increasing bandwidth, the Government has not spared any efforts in providing the broad national framework for institutions to respond to the challenge. Many have. The private sector responded. Mobile telephone and Internet subscribers exploded. However, the Arabic e-content lagged, and the systematic access to the knowledge and techniques necessary to respond to the new challenges of research and science needed organization and development.

Given the knowledge explosion, digital libraries seemed to be the strategic instruments of choice, to create knowledge hubs for access—in an organized fashion—to the enormous wealth of information provided on the Internet, as well as becoming the nodes for virtual networks of centers of excellence.

The Bibliotheca Alexandrina (BA), the new Library of Alexandria, was mandated from its birth to be an institution devoted to this role.

This monograph spells out what the BA was able to achieve since its inauguration on 16 October 2002. In this short time, with so little money and so few people, much has been done, and a great deal of recognition has been achieved. Many have contributed to the enormous achievements of the BA, especially Dr. Fathi Saleh and his team at CULTNAT who were international pioneers in the area of documenting heritage. However, this monograph addresses the vision of a complex institution that is "Born Digital" and lives by the intricate and seamless work of our ICT team. Here it is thanks to the guidance and leadership of Dr. Magdy Nagy and Dr. Noha Adly, who were able to assemble an excellent team of young specialists in a very short time, and it is primarily their work and their imagination that is being celebrated in the pages that follow.

2.   PRESENTING THE BIBLIOTHECA ALEXANDRINA

The Bibliotheca Alexandrina (BA), the new Library of Alexandria, was intended to capture the spirit of the original ancient Library of Alexandria, the ancient world's most prestigious center of learning. That spirit which

promoted rationality, encompassed universal knowledge and created a real dialogue between cultures, is truly needed in today's world. Some 1600 years after its final destruction, the Library was revived again, almost exactly on the same spot, on the shores of the Mediterranean, a stone's throw from where the ancient Lighthouse (Pharos), one of the seven marvels of the Ancient World, once stood. Occupying land on which Alexander and Ptolemy once walked, where Caesar, Cleopatra and Anthony played out the destinies of the world, and which produced an explosion in scientific knowledge that still awes us to this day, the Bibliotheca Alexandrina, to use the ancient Latin name, lives again. The new Library of Alexandria was inaugurated in October 2002.

Despite its youth—it has barely celebrated its fourth anniversary—the BA is a large and multi-faceted complex which encompasses:

- A library that can hold millions of books;
- A center for the Internet and its archive;
- Six specialized libraries for (i) audio-visual materials, (ii) the visually impaired, (iii) children, (iv) the young, (v) microforms, and (vi) rare books and special collections;
- Three museums for (i) Antiquities, (ii) Manuscripts, and (iii) the History of Science;
- A Planetarium;
- An Exploratorium for children's exposure to science;

- Permanent exhibitions covering (i) Impressions of Alexandria: The Awad Collection, (ii) the World of Shadi Abdel Salam, (iii) Arabic Calligraphy, (iv) the History of Printing, (v) the Artist's Book, (vi) Arab Muslim Medieval Instruments of Astronomy and Science, (vii) Mohie El Din Hussein and the World of Ceramics.
- Four art galleries for temporary exhibitions;
- A Conference Center for thousands of persons;
- Seven research institutes covering (i) manuscripts, (ii) documentation of heritage, (iii) calligraphy and writing, (iv) information sciences, (v) Mediterranean and Alexandrian Studies, (vi) arts, and (vii) scientific research; and
- A discussion forum.

In addition, the BA hosts a number of institutions, including the Anna Lindh Foundation for the Dialogue Between Cultures, the first Euro-Med institution established outside of Europe, and most recently a new Institute for Peace Studies, as well as the HCM Medical Research project, the Arab Society for the Ethics of Science and Technology, The Jean–Rene Dupuy Center for International Law, the Academia Bibliotheca Alexandrinae, the Arab Regional Office of the Academy of Science of the Developing World (TWAS), and the regional offices of other networks.

These many institutions have about 1600 staff members, remarkably young (27–28 years old on average)

and gender-balanced (54% female excluding security and custodial staff). They have organized and welcomed at the BA some 500 events and close to one million visitors in the past twelve months. Their collective work is beginning to be recognized nationally and internationally.

The BA's mission is easy to state: "*To be a center of excellence for the production and dissemination of knowledge and for the dialogue between peoples and cultures.*" We even sharpened our implementation focus into four clear objectives, namely, to be:

- The world's window on Egypt
- Egypt's window on the world
- A leading institution in the digital age, and
- A space of freedom for vibrant intellectual discussion and the dialogue between peoples and cultures.

3. THE BASICS

3.1 Basic Services

In the Digital realm, the BA provides all the basic services for a truly hybrid library, with OPAC and e-resources, and the proper management of the institutions from security to an oracle-based Enterprise Resources Planning System that covers all aspects of our transactions and our records, we have a large and ambitious program of Digital work that distinguishes us from most libraries

and most other cultural institutions, at least in our part of the world.

3.2   Basic Infrastructure

Although still a very young institution, the Bibliotheca Alexandrina can point to a substantial record of achievements. The Information and Communication Technology (ICT) infrastructure is arguably the best in Egypt: Fiber Optic backbone and Gigabit Ethernet technology throughout our buildings with 155 Mbps Internet connectivity; with over 360 public workstations and 940 for the staff, with over 60 servers. Most of the standard functions have been computerized: Library Information System, integrated digital library services, intranet, Enterprise Resource Planning and access control and ticketing systems.

An achievement which occurred in January 2005 was the Bibliotheca Alexandrina's successful upgrade of the Internet connection bandwidth from 10Mbps to 155Mbps (STM1) in cooperation with Telecom Egypt and generous support from the Ministry of Communications and Information Technology (MCIT). The upgrade places the Bibliotheca Alexandrina among the first few organizations—and the only cultural institution—in Egypt with STM1 connection. The new bandwidth will allow for high-speed access to the wealth of information offered through the Bibliotheca Alexandrina serving both

local and international communities. The upgrade will enhance the quality of services provided by the Bibliotheca Alexandrina to its physical and online visitors. Electronic resources and digitized collections will be accessed quickly and efficiently from within the Bibliotheca Alexandrina or through the Internet. Services such as web browsing, video conferencing and video streaming will become significantly faster. In addition, it will better support the hosting of websites developed in-house.

3.3 The Digital Laboratory

Within the International School for Information Science (ISIS), one of our specialized research centers, the Bibliotheca Alexandrina has built its own digital laboratory equipped with state-of-the-art technologies offering specialized digital services. The laboratory digitizes various media including slides in multi-formats, negatives, books, manuscripts, pictures, maps, audio and video, and is equipped with the necessary tools applied for indexing, archiving and management, thus automating the entire workflow.

The building of the laboratory was an essential starting point towards digitizing the Bibliotheca Alexandrina's collections and collections of other international libraries that are interested in pursuing the goal of "Universal Access to Human Knowledge". The Digital Laboratory is regularly visited by librarians, publishers and scholars worldwide.

During the past two-and-a-half years, the Bibliotheca Alexandrina had made a mark in its leadership as a digital library in Egypt and beyond, building collections of both traditional and digital materials. ISIS has worked on a number of projects such as the *Million Book* Project, the Nasser Digital Library, the *Dar Al-Hilal* Digitization project, *Description de l'Egypte*, and supported "My Book: Digital and Printed". Digitizing, archiving, indexing, retrieval and publishing was the major role of ISIS in those projects.

Specifically, it was at the digital lab that ISIS staff has succeeded in refining the techniques of Arabic OCR, to the highest standards in the world. We worked on the Automatic Reader software of *Sakhr* to develop a taxonomy of Arabic fonts and trained the system to increase accuracy levels to over 97%. We are now working also with NovoDynamics, the developers of *Verus* software, to improve the technology of Arabic OCR and other techniques.

3.4 Print-On-Demand

In addition to the above, the BA is the proud owner of the second instant printing machine made by the firm "On Demand Books" of the USA. Aptly named "The Espresso Book Machine", the machine will allow visitors to the Library to browse through an on-line catalog, and select the book of their choice from the catalog and have a

printed, bound copy in their hands within a few minutes. The purchase price will cover the cost of production and the remuneration of the author and the publisher. The electronic catalog comprises all of the BA's own material and the offerings of those publishers who have agreed to give their catalog in electronic form to the BA for use with the machine.

4.   THE DIGITAL LIBRARY FEDERATION

The Bibliotheca Alexandrina intends to become an active member among the leading digital institutions in the world. Towards that goal, the BA has embarked on a whole array of ambitious projects, in partnership with world class institutions. These range from hosting a mirror site for a significant part of the Internet Archive, participating in the Million Book Project, organizing the digital archive of the Gamal Abdel Nasser collection, presenting the first ever complete digital version of the *Description de l'Egypte*, to participating in advanced research such as the Arabic component of the UN-sponsored Universal Digital Language computerized multi-language translation program and offering the most advanced 3D virtual imaging techniques in an virtual immersive environment for Science and Technology (S&T) applications. Thus, despite being barely four years in existence, the BA has already a substantial record of achievements.

DLF Partners

- Bibliotheca Alexandrina
- British Library
- California Digital Library
- Carnegie Mellon University
- Columbia University
- Cornell University
- Council on Library and Information Resources
- Dartmouth College
- Emory University
- Harvard University
- Indiana University
- Johns Hopkins University
- Library of Congress
- Massachusetts Institute of Technology
- National Archives and Records Administration
- New York Public Library
- New York University
- North Carolina State University
- Pennsylvania State University
- Princeton University
- Rice University
- Stanford University
- University of California, Berkley
- University of Chicago
- University of Illinois at Urbana–Champaign
- University of Michigan
- University of Minnesota
- University of Pennsylvania
- University of Southern California
- University of Tennessee
- University of Texas at Austin
- University of Virginia
- University of Washington
- Yale University

These achievements did not go unnoticed. In 2005, the prestigious Digital Library Federation (DLF) officially invited the BA to become a strategic partner of the group. The Digital Library Federation, founded in 1995, is a partnership organization of academic libraries and related organizations that are pioneering the use of electronic information technologies to extend their collections and services (see *DLF partners*). Through its strategic partners, the DLF provides leadership for libraries by identifying standards and "best practices" for digital collections and network access; coordinating research and development in the libraries' use of technology; and incubating projects and services that libraries need but cannot develop individually. The BA was deemed an excellent partner with its advanced infrastructure and experience in digitizing, processing and encoding books, especially in the Arabic language. It is to be noted that the BA was only the second partner from outside the USA after the British Library, which joined the DLF in 2003.

Joining the DLF is an enormous vote of confidence by the premier institutions in the world. It is all the more gratifying that the BA was barely 30 months old when the invitation came in May 2005. The membership was officially announced on 1 June 2005.

Michael A. Keller, Stanford University Librarian and President of the DLF's Board of Trustees, states: "The Bibliotheca Alexandrina's digital library initiatives

extend the leading edge of digital librarianship by the creation of new professionals, by experimentation, by portal development, and by the addition of content, which includes the digitization of 15,000 Arabic books annually, the development of the Digital Library of the History of Egypt, and the scanning of numerous image collections."

New partners are selected based on demonstrable evidence that the institution:

- is able to contribute to DLF initiatives through staff time and creative leadership
- shows evidence of substantial digital accomplishments and of digital library initiatives that are advanced or advancing beyond start up or project-based phases
- is an acknowledged regional, national, or international leaders in some part of the digital library arena, and
- has some research and development capacity that is available to the library and is devoted to digital library developments.

Being a DLF Strategic Partner would enable the Bibliotheca Alexandrina to participate in the worldwide effort of development and promotion of strategies and standards for creating and maintaining sustainable and scalable digital collections. As a partner, the benefits for the Bibliotheca Alexandrina will include the increased interaction with the premier institutions in the field, and the increased possibility of arranging for additional collaborative programs.

For the end-users, the DLF service will provide new and dynamic research tools providing easy integrated access to digital resources. This opens new possibilities for innovative research.

5. A PLATFORM FOR 21ST CENTURY SCIENCE

In the last decade or so, a profound new development has taken place in science. Traditionally science has been defined as theoretical and experimental. Now, due to the enormous developments of the Information and Communication Technology (ICT), which constitute a real revolution, a third kind of science is emerging. It is a new kind of science, a form of simulation, an experimental science where the experiments are performed in silico, within computers. It is so much easier and less risky to run simulations and tweak the parameters to test results of particular hypotheses. Indeed, it is even useful to do this as a routine function to narrow down the range of options to be actually tested in the wet lab thereby reducing costs and risks.

The Bibliotheca Alexandrina (BA) the new Library of Alexandria, that aspires to be a worthy heir to the ancient Library of Alexandria, is dedicated *inter-alia* to be a leading institution in the digital age. However, the ICT infrastructure that we are building does much more than provide our visitors with electronic catalogs to consult or

digital databases and journals to work with. It allows them to use our facilities to undertake cutting-edge research in many fields, in collaboration with colleagues overseas, using our computers for data analysis and simulation and for various in silico experiments.

To that end, the infrastructure of the BA includes six components that stand in a mutually reinforcing manner to provide a wide array of services to researchers.

First: A general infrastructure and many applications that are described in more detail later in this monograph, which researchers can access from any of the over three-hundred computers deployed for the use of our visitors.

Second: A special infrastructure suitable for a true digital library, including a specialized workflow covering not only a massive digitization operation, but also archiving, encoding, indexing and publishing the digitized material. This infrastructure and massive wealth of digitized material provide a platform supporting research on image processing, OCR techniques, information retrieval, publishing techniques, search engines and machine translation.

Third: A super computer (to be operational in late 2007) to allow for massive data analysis and problem-solving.

Fourth: Mass storage devices for storing vast amounts of data starting with the web collections of the Internet

archive. These are in place and will be fully upgraded by December 2006.

Fifth: Massive links with the Internet2 network through the European Geant2 (to be operative in 2007), this will allow simultaneous on-line work on live databases in Europe and elsewhere, by researchers in Egypt, Europe, Japan or USA, solving particular problems together in real-time.

Sixth: A data analysis facility that includes 3D virtual reality simulations. It is VISTA (Virtual Immersive Science and Technology Applications) which is fully operational.

In this manner, the BA will provide the platform for the collaboration of young scientists from Egypt and the region with their peers in Europe and elsewhere. It will be a hinge between two communities of scientists, and a hub for their interactions. BA staff members will have access to all the scientific literature through the regular BA library e-resources, which include subscriptions to some 25,000 journals.

In addition, this remarkable infrastructure will also allow special operations such as developing pattern searches through the vast web collections, or undertaking historical research using the web archive or developing data mining techniques to enable the use of the huge storage resources to be used for a particular purpose.

Beyond this, as the ensuing material will show, the BA provides the basic services that would be expected for a modern digital library, plus a major effort whereby we deploy the new technologies to honor the past, celebrate the present, and embrace the future.

6.   OUR CREDO

Access to all information, for all people, at all times. That is the simple credo of the BA, and to that end, we are committed to:

• honor the past,
• celebrate the present, and
• embrace the future.

Under each of these three headings, we are active in a range of activities, involving a significant number of initiatives undertaken in digital form. The following is a partial listing of the various initiatives that we are undertaking.

7.   HONOR THE PAST

The BA is the leading institution in Egypt and the Arab world in systematically applying digital technology to document and present information about our heritage. Most of this work is undertaken by several of our research institutes, especially, the Center for the Documentation of Cultural and Natural Heritage (CULTNAT), and the International School for Information Science (ISIS) who

are playing major roles in this field, working hand-in-hand with our specialized centers, especially the Alexandria and Mediterranean Research Center (Alex-Med), the Center for Calligraphy and Writing; and the Manuscript Center. The Documentation of Cultural Heritage work is highlighted in our 2006 Annual Report, while ISIS' work was highlighted in our 2005 Annual Report.

Specifically, all the BA institutions that have something to do with the past, including the Manuscript Museum and the Antiquities Museum, are actively applying advanced digital technology to make their work more accessible to the public at large.

7.1 CULTNAT

The award-winning work of CULTNAT, from the world's first 9 screen interactive multi-layered digital "Cultural Panorama", called the CULTURAMA, to (www.Eternalegypt.org), a unique trilingual portal, to many other activities, has been providing a new multimedia means for people worldwide to learn more about Egypt.

CULTNAT has contributed towards the documentation and dissemination of information related to heritage by:

• Implementing the national plan of action's documentation program, making use of the most up-to-date information technology in collaboration

with the national and international specialized organizations;
- Increasing public awareness of cultural and natural heritage using all available media; and
- Capacity-building for professionals in the fields of conservation and documentation of cultural and natural heritage.

As the world is getting more interconnected in the digital age, new technologies are becoming the important tools, CULTNAT is working simultaneously on various programs for documenting Egypt's cultural and natural heritage:

- The archeological map of Egypt, providing easily accessible detailed information on the archaeological treasures of Egypt, building on layered databases including maps, images, text and video simulations;
- The architectural heritage of Egypt, providing similar treatment to the listed architectural monuments in Egypt's main cities;
- The natural heritage of Egypt, covering flora and fauna and the nature preserves of Egypt;
- Documenting Egyptian folklore by text, image and sound;
- The musical heritage of Egypt;
- The photographic memory of Egypt, collecting all the valuable old photographs of Egypt, from postcards to private mementoes; and

- The scientific Islamic manuscripts heritage, presenting in digital collections from the treasures of Egypt's national library and archives to the public.

In addition, CULTNAT has succeeded in developing impressive ways to communicate its research findings to the public. Online, the award-winning trilingual website (www.eternalegypt.org) presents a treasure trove for anyone interested in Egypt and its history. The website allows visitors to see Egypt, both as it was thousands of years ago and as it is today. It offers guided tours that go through the story of the Pharaonic, Greco–Roman, Coptic and Islamic periods of Egypt's history; www.eternalegypt.org was recognized internationally by several awards from Stockholm, to Vancouver, to Geneva, to Tunis. Equally impressive is the award-winning "Cultural Panorama" or "CULTURAMA", the world's first nine-screen interactive projection system.

New projects have been added to the overall mission of the Center:

- The indexing and organization and pilot digitization of the National Archives of Egypt (A four-year project which started July 2005);
- Documentation of the Coptic Heritage;
- Documentation of the old Egyptian Press;
- Documentation of Heliopolis Company documents;
- Documentation of Bank Misr and Talaat Harb documents;

- Documentation of the Egyptian Presidential Palaces Contents;
- Documentation of the maps and documents of the Egyptian Geographic Society.

The most recent project is the Global Egyptian Museum (GEM), a web-based database (www.GlobalEgyptianMuseum.org) created (2003–2006) to register and connect the estimated two million artifacts from Ancient Egypt, which represent cultural heritage of the Nile Valley and the Delta over 5000 years. This collection is dispersed over 69 countries outside Egypt. On 19 September 2006, the Centre for Computer-aided Egyptlogical Research (CCER, the Netherlands) which created the GEM website transferred ownership, management and hosting of this very unique project to the Center for Documentation of Cultural and Natural Heritage (CULTNAT). Currently, the website contains over 11,000 objects from twelve museums in eleven European countries.

CULTNAT (www.cultnat.org) has a set of exhibitions and projection where all projects are on display for public visits, and publishes material in print and CD formats. Most notable of these is the series of archeological atlases giving exhaustive maps, locations and descriptions of the archeological sites in Egypt, governorate by governorate.

7.2 Alex-Med

Alex-Med is a latecomer to a consortium of European and Mediterranean partners within the framework of the Strabon Program. The Program objective is to build a web portal which aims to raise awareness and share the cultural heritage of the countries surrounding the Mediterranean basin. The Bibliotheca Alexandrina is already present in Strabon through CULTNAT, and the contribution of Alex-Med will be to present the heritage of Alexandria on the Strabon portal through the following projects:

• The digital reconstruction of the Pharos Lighthouse;
• The Ottoman mosques of Alexandria; and
• A digital 3D model of the Qaitbey Fort.

The Alex-Med Strabon team received training on the structuring of data and adapting its format for the Internet. Another element of training will be that which the Heritage Unit will receive by MAP on the high-tech heritage recording methods such as photogrammetry and 3D scanning. This training will occur during the actual documentation and making of the 3D model for the Qaitbey Citadel.

The vanished Pharos, one of the seven wonders of the Ancient World, has intrigued scholars, architects and scientists who only have descriptions of the marvel but no accurate image. Alex-Med has produced a 3D digital reconstruction of the Pharos lighthouse, using these

descriptions and is also applying digital techniques to reconstruct how it fell. With the computer technology available today, it is possible to reconstruct a virtual model of the lighthouse, visualize existing hypotheses/theories regarding its initial design, and investigate certain issues. Current work by Alex-Med includes a seismic study to analyze from a structural engineering point of view the collapse of the Pharos. Fascinating investigations are underway to address questions such as: How was the lighthouse lit? How do the underwater archeological pieces in the site relate to the lighthouse?

The output will be in the format of a CD and it will also be uploaded on the Internet on the Strabon portal as well as being accessible through the BA website. Digital reconstructions are also under preparations for the Serapeum and the Kom el Dikka area in Alexandria.

7.3 Manuscript Center

Much, if not all, of the Manuscript Center's work has to do with the preservation, digitization, and management of heritage. In addition to its own work, the Center also displays manuscripts from the collection in the Manuscript Museum. There, visitors can use touch screen technology and a sophisticated virtual browser that allows the user to turn the different pages of the original manuscript with a simple touch of the finger, and gives full control options such as magnifying and minimizing the image. Other digital presentations include the virtual

visit to the Museum and the detailed text information on the available manuscripts in six languages (Arabic, English, French, German, Italian and Spanish).

The Digital Manuscripts Archive project aims to produce digital copies of the Bibliotheca Alexandrina's entire manuscript collection numbering more than 6000 titles, as well as rare books, maps and important documents. So far, over 600 manuscripts have been digitized. These are available for consultation and study in the Manuscript Reading Room.

In addition the Center publishes in digital CD-ROM collections of seven manuscripts in each collection, some of the most valuable of the manuscripts. Every set comprises seven CDs, each with an unabridged rare manuscript. These collections of which two have been released and the third is about to be released, are made available to scholars at cost.

The Manuscript Center has produced a digital manuscript collection of the codices held by Uppsala University Library, Sweden, within the framework of a bilateral cooperation agreement concluded between the two countries. Six rare manuscripts held at the Uppsala Library run on a sophisticated virtual browser that allows the user to turn the different pages of the original manuscript with a simple touch of the finger, and gives full control options such as magnifying and minimizing the image.

7.4   The Calligraphy and Writing Center

The Calligraphy and Writing Center has been active in working on the digital archiving of inscriptions and writings in Alexandria. The main aim of this project is to build an integrated digital library for Alexandria's historical writings and inscriptions. This is part of a larger project which aims to document the inscriptions on monuments from all over Egypt.

The project will study all the Islamic monuments from the calligraphic and epigraphic point of view. It involves recording, transcribing and translating the unpublished inscriptions of approximately 500 monuments in Alexandria (Pharaonic, Greek and Islamic). Some of the inscriptions that the project will completely record and archive are in serious danger from water table damage.

It should be noted that the principal focus will be to record lapidary inscriptions. These are in stone, but many have been preserved on wood and stucco. However, the project is larger than that; it will embrace historical and votive inscriptions, as well as religious and administrative inscriptions.

This project, for the first time, will allow researchers to know how many inscriptions each monument contains and where each one of them is published. Those who would benefit from this include historians, art historians, epigraphers, philologists and those working on the

conservation of monuments. Therefore, it will be a major step forward in documentation of monuments. Work is ongoing and as soon as a critical mass is organized it will be published electronically in a special portal. The Library will also publish learned monographs on each subset of inscriptions, as appropriate. ISIS designs, develops and provides the technical support for all this work.

7.5 The Antiquities Museum

The BA Antiquities Museum has equally taken great strides in this field, through the introduction of a Digital Guide in the Museum. Applying digital technology, the guide will make the Bibliotheca Alexandrina a reference on all 1079 pieces in the Museum. CULTNAT is providing the technical support for that program.

7.6 The International School for Information Science (ISIS)

In the area of honoring the past, ISIS is primarily responsible for the *Digital Library of the Modern History of Egypt*, an ambitious long-term project which is also to dovetail with some of the work of CULTNAT and Alex-Med.

Covering the history of Egypt for the past 200 years or so, the History of Modern Egypt has been identified by two major projects as "bookends" that mark the anchors at the beginning and the end of the period. The

first is the *Description de l'Egypte*, and the second is the Gamal Abdel Nasser Collection. Additional works on the periods, persons or institutions just before or after these two bookends is being pursued as well as other major collections in-between.

7.7   *Description de l'Egypte*

Description de l'Egypte was the outcome of the collaboration of more than 150 prominent scholars and scientists who accompanied Napoleon in 1798, and some 2000 talented artists and technicians. For over 20 years, they systematically examined almost every aspect of contemporary and ancient Egyptian civilization, producing 20 volumes of text and plates of unmatched accuracy and detail. Historically these engravings became the most comprehensive record and inventory of Egypt's land and monuments.

This valuable collection containing images related to antiquities, natural history, and the modern Egypt of those days, has been fully digitized and integrated on a virtual browser with the objective of preserving it and making it publicly accessible. The collection includes eleven volumes of plates owned by Bibliotheca Alexandrina, as well as ten volumes of text, a contribution from *l'Institut d'Egypte*. A tool was developed to publish books in the standard Extended Markup Language (XML) format where books may be browsed by a virtual browser or touch screen. The

project is composed of two stages. The first project stage was completed in October 2004 where the application was provided on DVD in high resolution with English and French interfaces. The relation between the text and images was also established and rendered in a searchable form. In the second stage, the whole collection is to be available in an integrated searchable form on the web.

7.8 *L'Institut d'Egypte*

The revival of the organization of *l'Institut d'Egypte*, built in Cairo by Napolean Bonaparte over 200 years ago, began through the project of the digitization of its entire collection, including over 35,000 volumes of rare and ancient references, books and periodicals in five languages. The effort started with the digitization of the 10 text volumes of *Description de l'Egypte*. Digitization of other special collections followed suit, such as the complete works of Voltaire (69 volumes), Des Mille Nuits et une Nuit (16 volumes), and Geographie Universelle (15 volumes). Eventually, the whole library of *l'Institut* will be digitized, processed, catalogued, indexed and made accessible in searchable form through the web. This will be the first attempt to digitize and publish a collection of such rarity and value. This integrated digital library includes the collection of specialized libraries belonging to eminent Egyptian politicians, authors and historians as well as content from all over the world related to the modern history of Egypt encompassing the past

200 years. The project's aims are to scan, catalog, index and OCR the collection and present it in a searchable form to users, and thus benefit from the Million Book project. The Nasser collection and the *Description de l'Egypte* are two examples.

7.9 Nasser Digital Library

In cooperation with the Nasser Foundation, the Bibliotheca Alexandrina was successful in digitizing the collection of late Egyptian President Gamal Abdel Nasser and publishing it through an integrated searchable web-based system. Intended for research and documentation purposes, the collection is continuously expanding with new entries and includes the following items:

• Documents published by the Public Records Office, London, United Kingdom, between the period 1919–1995 (around 1540 topics in more than 52,000 documents);
• Documents published by the United States Department of State (16 volumes of 7965 documents in 13,939 pages) during the period 1951–1978;
• Over 1300 speeches given by the President during the period 1952–1970, in both audio and printed format;
• Over 51,000 photos and 1000 portraits of the President covering more than 6000 events during the period 1930–1980;

- More than 1230 videos (over 50 hours) taken during the period 1948–1970;
- 1431 national songs;
- A complete archive of the articles published in the newspapers about the President and the 1952 revolution;
- The decrees issued by the Revolutionary Command Council (RCC);
- The daily news of the President;
- Minutes of the Central Committee for Arab Socialist Union (ASU);
- The President's personal correspondence and other relevant documents in his own handwriting (596 documents under 145 topics);
- A complete archive of the special weekly column "*Bisaraha*" by the Egyptian writer and journalist Mohammed Hassanein Haikal documenting all major events during the period 1957–1994 in simple writing for the general public;
- Books written by and about Nasser;
- A number of items representing the effect of Nasser on the culture of the region. The collection includes 138 poems, 50 rare stamps, 125 caricatures, 34 plastic arts illustrations, and 38 commemorative and circulating coins.

The collection was scanned, catalogued, indexed and subjected to Optical Character Recognition (OCR). A database was constructed for each topic storing each

document's text along with its metadata. The entire collection was presented in a web based interface with full-text Arabic and English search in both metadata and content. In October 2004, the website (www.nasser.org) was launched, facilitating browsing of the collection through the display of various items as well as providing full text and morphological searching. By integrating the different media and resource, researchers can easily find any documents, pictures, videos, stamps, articles, etc., pertaining to his field of interest.

7.10 *Al-Hilal* digital edition

Through an agreement concluded between the Manuscript Center and Dar Al-Hilal, with the aid of ISIS, an impressive project is currently being finalized to publish an exhaustive digital copy of the issues of *Al-Hilal* magazine since its first publication in 1892. The issues of each decade are compiled on a CD and provided with search tools.

Other collections, such as the *Suez Canal Collection*, the *Boutros-Ghali Family* papers, the papers of *Mohamed Mahmoud Pasha*; are also being digitized in agreement with the families concerned. CULTNAT is also undertaking a detailed documentation of the history of Egypt through such institutions as the *Heliopolis Company* Centennial, the *Misr Bank* and the *Egyptian National Geographic Society*.

8. CELEBRATE THE PRESENT

Along with other partner institutions, the Bibliotheca Alexandrina worked on additional numerous projects such as the Million Book Project led by Carnegie Mellon University; the Internet Archive, and the OACIS (Online Access to Consolidated Information on Serials) for the Middle East project. The Bibliotheca Alexandrina has thus developed the required expertise, equipment, and experience to make it the leading institution in the world in digitizing and archiving Arabic text of all varieties and types found in print in the modern world. In addition, the BA is also working on such initiatives as the Science Supercourse and the development Gateway.

8.1   Million Book Project

The Bibliotheca Alexandrina has been participating in the Million Book Project to create a Universal Digital Library. Initiated by Carnegie Mellon University, and with partners from China, India and USA, the project aims at digitizing one million books within three years and publishing them as a searchable collection on the Internet. By June 2006, ISIS scanned and digitized 21,722 Arabic books from the 75,000 target for the three-year time frame and OCRed over 15,400 books. Moreover, the project has provided a test-bed supporting research on improved scanning techniques, optical character recognition (OCR), intelligent indexing, machine translation, and information retrieval.

8.2 Internet Archive

The Internet Archive is a prime example of work regarding websites. The Internet Archive is a complete snapshot of all web pages on every website since 1996 till today. The purpose of the Internet Archive is to include the main part of the World Wide Web collection. Since the web changes rapidly—the average lifetime of a page on the Internet is 100 days—this snapshot is retaken every two months. In April 2002, the Internet Archive in San Francisco donated a copy of the Internet Archive to the Bibliotheca Alexandrina. The Archive at the Bibliotheca Alexandrina includes 10 billion web pages, 1996–2001; 2000 hours of Egyptian and US television broadcast and 1000 archival films. It represents 100 terabytes of data stored on 200 computers.

Entering its second phase, ISIS has just concluded an agreement for building the second generation machines for web archiving, the **Petabox**. The Petabox is a machine designed by Brewster Kahle, founder of the Internet Archive, to safely store and process one petabyte (a million gigabytes) of data. The machine features low power consumption, multi-operating systems, easy maintenance and software to automate mirroring. New machines for the 2007 collections will be designed and manufactured locally.

Synchronization with the Internet Archive in San Francisco has become faster and more reliable since the 155 Mbps bandwidth upgrade.

8.3   OACIS and AMEEL

Initiated by Yale University Library, Online Access to Consolidated Information on Serials (OACIS) for the Middle East creates a publicly and freely available electronic union list of serials and journals from or about the Middle East.

The OACIS system was launched in November 2003 and currently comprises 16 partners (including 11 US universities, one German, one Jordanian, one Syrian, one Lebanese and the Bibliotheca Alexandrina), 42 languages (with the top collections in Arabic, Persian and Turkish) and over 23,000 unique title records.

In January 2005, a mirror site of the system was launched at the Bibliotheca Alexandrina. The mirror site will enhance access to the OACIS database in the Middle East region and will serve as a backup to the original. A content retrieval web interface for the digitized serials and journals has also been designed and implemented. Implementing a system for automatic uploading of the Bibliotheca Alexandrina and other partners' records to the OACIS server has been completed. Automatic updating of the OACIS catalog is being designed and an Arabic web interface for the collection is being implemented. Scanning, processing and OCRing of the Bibliotheca Alexandrina and Yale University Library copyright-free collections are currently in progress, with 23 volumes

digitized for demonstration purposes. Today, OACIS has been completed and a follow-up project, Arab Middle East Electronic Library (AMEEL), addresses content in addition to the cataloguing work of OACIS. Yale leads this effort and the BA is intimately involved with it.

8.4 Science Supercourse

To empower teachers of science all over the world, the BA is working with a team of specialists to launch the first science Supercourse, comprising thousands of PowerPoint lectures made available for free to teachers and lecturers, who can use them as they see fit in their teaching of science. The Supercourse has been effectively implemented in the area of Public Health and Epidemiology, with some 30,000 faculty in about 150 countries and providing some 2600 PowerPoint lectures. Today we are working to try to set up a similar course in all fields of science. This initiative I described separately and in detail in the fifth chapter of *Reflections on Our Digital Future* "Prometheus and he Internet: A Science Supercourse for the 21st Century", which is co-authored with Professor Ron Laporte of Pittsburgh University,

8.5 Development Gateway

Set up by the World Bank and other international institutions, the Development Gateway quickly became the portal of reference for many practitioners of development all over the world. Communities of

practice take on particular topics or issues and share the best available experiences or new research available. The BA has agreed to Arabize the basics of this valuable reference and research tool, and will moderate the Development Gateway community on Arab Reform. The announcement was made at the World Summit on the Information Society (WSIS) in Tunis in November 2005.

9. EMBRACE THE FUTURE

The BA is determined to be an active player in creating a better future for Egypt and the region. Some manifestations of this determination are found in its role as a catalyst for Arab and Egyptian Reform, and its commitment to nurture children's talents. While both areas encompass many activities, only the digital and ICT-related aspects of some of the initiatives will be touched on here.

9.1 The Arab Reform Program

Since early 2004, the BA has been nurturing the Arab Civil Society in taking amore powerful role in the promotion of reform. The first major result was the *Alexandria Declaration* of March 2004, signed by 165 distinguished individuals from 18 Arab countries. Immediately thereafter the *Arab Reform Form* was established with a trilingual website was hosted by the BA.

Subsequently meetings were held, books and monographs were published conventionally and on-line, and finally a special Portal, *The Arab InfoMall* was set up and launched with messages from UN Secretary-General Kofi Anan and other dignitaries on the occasion of the WSIS meetings in Tunis in November 2005. That portal has hundreds of NGOs from 15 Arab countries listed with their reports and publications available for the first time in searchable form. In addition it provides a calendar of events, a public bulletin board and a public forum (chartroom). The BA is thus a real actor in the cause of reforms in the political, social economic and cultural areas.

9.2   Nurturing Children's talents

Three ICT-related projects are underway. *The Hole in the Wall* program aims to replicate India's successful initiative to allow disadvantaged children to acquire—without adult intervention—the skills of using a computer and searching the web. *La Main à la Pâte* is a French Portal to assist science teachers to present the process of scientific discovery to children. Pioneered by Nobel Laureate Georges Charpak, and supported by the French Academy of Sciences, the portal/website has had great success in France. The BA has agreed with the Academy to Arabize the materials and it has been launched on the occasion of the big scientific conference BioVision Alexandria in April 2006.

Another program made possible by the generous support of Brewster Kahle who donated the equipment and Rachid M. Rachid who donated the car, is the children's program entitled *My Book*: *Electronic and Printed*. Children select material from an electronic base, they then print it, cut and bind it and have their own little book that they made themselves. That brings enormous sense of pride and promotes attachment to reading. However, before they leave, they are asked to scan a page from the book they just made, and they see it re-appear on the computer! That is a moment of revelation that drives home the point that electronic and printed are different receptacles or vehicles for the same information. One setoff equipment is at the BA Children's Library, and the other is in the small car traveling to local schools. Invariably it has been a major hit with the children.

10.   TOOLS FOR TOMORROW

The BA is actively equipping itself with important tools for tomorrow's research needs. In order to maintain the digital library collections, and to develop our role and mission, the Bibliotheca Alexandrina developed the Digital Assets Repository (DAR) and the Universal Digital Book Encoder (UDBE). In addition, the BA is participating in the UN University's international effort to develop a Universal Networking language for machine-based translation, and is providing Egyptian researchers in many fields with state-of-the-art analytical

Immersive Virtual Reality IT support in what we have termed VISTA (Virtual Immersive Science & Technology Applications).

10.1   The Digital Assets Repository (DAR)

The Digital Assets Repository (DAR) was developed at the Bibliotheca Alexandrina to create and maintain the digital library collections. The system acts as a repository for all types of digital material and provides public access to digitized collections through web-based search and browsing facilities. DAR is also concerned with the automation of the digitization workflow and its integration with the repository. The digital laboratory plays a major role in this respect.

The management tools developed within DAR will help the BA preserve, manage and share its digital assets. The system is based on evolving standards for easy integration with web-based interoperable digital libraries.

DAR has the objectives of:

- Integrating the actual content and metadata of varieties of object types included in different library catalogs into one homogeneous repository;
- The automation of the digitization process such that human intervention is minimized and the outputs are integrated within the repository system;

- The preservation and archiving of digital media produced by the digital laboratory or acquired by the library in digital format;
- Enhancing the interoperability and seamless access to the library digital assets.

10.2   The Universal Digital Book Encoder (UDBE)

For the purpose of facilitating the electronic publishing of digitized material, UDBE (Universal Digital Book Encoder) was devised as a framework for the universal encoding of multilingual image-on-text documents, binding images and text in a compound format that allows retrieval systems to search the text layer and highlight hits on the original page images. The presented UDBE framework renders it possible to utilize OCR results of any engine to compile image-on-text documents in any valid target format by adopting the proposed Common OCR Format (COF). The current implementation of the UDBE illustrates the concept by implementing an OCR Converter for Automatic Reader and Format Handlers for the DjVu and PDF target formats, making it possible to produce multilingual—namely, Latin, Arabic, and Persian—image-on-text documents in an automated fashion, providing efficient image compression, multilingual text support and multi-paging.

In its performance evaluation, UDBE has shown to be comparable to other systems capable of producing

Latin image-on-text, namely, Acrobat, FineReader, and LizardTech's Document Express. It has shown that DjVu and PDF file sizes are large compared to UDBEs.

10.3   Universal Networking Language (UNL) program

The mission of the Universal Networking Language (UNL) program, initiated within the United Nations and devised by the Universal Networking Digital Language (UNDL) Foundation, is to enable all people to generate information and have access to cultural knowledge in their native languages. UNL is an artificial language attempting to replicate the functions of natural language in human communication. UNL applications will vary including creating multilingual web pages, UNL encyclopedia, etc. Currently, 15 languages have been incorporated and a number of institutions have started to work on their respective native languages. In July 2004, partnership with the UNDL was established and an agreement was signed in favor of the Bibliotheca Alexandrina to host the Ibrahim Shihata Arabic-UNL Center (ISAUC). The Center is funded by the ARAB Fund for Economic and Social Development (AFESD) in honor of the memory of Dr. Ibrahim Shihata, an international jurist and expert on international developments, and a great promoter of Arabic culture. ISAUC will play the major role in designing and implementing the Arabic component in the development of this language and will act as an active language center for Arabic.

By early 2006, progress had been made in three different components. Firstly, the Arabic Dictionary has been designed and the first version has been produced with about 50,000 entries. In addition, the workflow has been established for developing the Deco rules within the Arabic de-conversion component and the Deco rules design has been completed. Finally, design of the UNL Library Information Systems (LIS) is in progress and was demonstrated at the World Summit on the Information Society (WSIS) in Tunis in November 2005.

10.4 Virtual Immersive Science and Technology Applications (VISTA)

In the new world of 21st century science, the traditional categories of theoretical and experimental science are being complemented by a third: Simulation. Powerful, high-speed computers, are making it possible for all disciplines to test out ideas in virtual reality, trying out many combinations and permutations, before actually touching the complex, fragile or expensive real (physical) experiment. Earlier versions of such systems were used to train pilots in simulators to avoid crashing real aircraft. The realism of the simulations and the immersive quality of the 3D effects is needed to make the training effective. Today, these techniques have been refined and are applied in many disciplines.

The BA is proud to provide the first ever "Flex System" of immersive virtual reality with 10″ × 10″ screens and

64-bit technology. This should enable Egyptian researchers to work with their colleagues in advanced industrial countries with no compromises on the quality of the computer analysis being done. VISTA allows remote access and linking of researchers through web-based interfaces, where up to 90% of the work can be done on regular computer screens remotely. Finally, live sessions in the virtual environment of the VISTA are to complete the analysis. The ICT teams at the BA will provide the support for the researchers in medicine, engineering, biology or other fields who wish to use this new tool, opening up new possibilities for the young Egyptian researchers of tomorrow.

11. ENVOI

The strong corporate spirit that has infused the Bibliotheca Alexandrina encouraged synergy within the vast complex, making all staff from various departments work toward common goals through a multitude of activities. Working as one, pooling their effort and creative thoughts to enhance the goals of the Bibliotheca Alexandrina, our young staff, working across departments is committed to pursue our mission of becoming a center of excellence for the production and dissemination of knowledge, and to make the BA truly a leading institution in the digital age.

Today, we are establishing systematic standards for our work that are being undertaken in multiple locations in two cities, to ensure that our growing collection is developed to the best international standards. We are adopting MODS and METS standards, and ensuring a rapid growth of the availability and accessibility of Arabic e-content to the highest standards we know.

Thus the rebirth of the ancient Library of Alexandria in the beginning of the third millennium is not a return to the past, but a projection of a dream into the future. This new, young and dynamic institution is indeed "Born Digital" and aspires to live up to the enormous promise embedded in such a statement.

Ismail Serageldin

Director of the Library of Alexandria, also chairs the Boards of Directors for each of the BA's affiliated research institutes and museums and is Distinguished Professor at Wageningen University in the Netherlands. He serves as Chair and Member of a number of advisory committees for academic, research, scientific and international institutions and civil society efforts which includes L'Institut d'Egypte (Egyptian Academy of Science), The Academy of Sciences for the Developing World (TWAS), the Indian National Academy of Agricultural Sciences and the European Academy of Sciences and Arts. He is former Chairman, Consultative Group on International Agricultural Research (CGIAR, 1994-2000), Founder and former Chairman, the Global Water Partnership (GWP, 1996-2000) and the Consultative Group to Assist the Poorest (CGAP), a microfinance program (1995-2000). Serageldin has also served in a number of capacities at the World Bank, including as Vice-President for Environmentally and Socially Sustainable Development (1992-1998), and for Special Programs (1998-2000). He has published over 50 books and monographs and over 200 papers on a variety of topics including biotechnology, rural development,

sustainability, and the value of science to society. He holds a Bachelor of Science degree in Engineering from Cairo University and Masters degree and a PhD from Harvard University and has received 19 honorary doctorates.