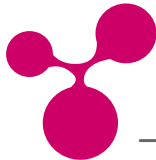Technische Universität Dresden – Fakultät Informatik
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E.4   Virtual Communities in Egypt -
The Digital Library as a Model

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1   Introduction

The global community is witnessing considerable progress due to the scientific and technological developments as well as the economic and political changes that increased since the end of the twentieth century. Communication and information technologies have developed very quickly and knowledge has doubled during the last three decades. Consequently, the world has turned into a small village with some economies depending on the digital technology. This has led to the emergence of virtual communities.

The term virtual community is attributed to the book of the same title by Howard Rheingold, published in 1993 [1]. Virtual communities involve a combination of physical and virtual interaction, social imagination, and identity [2].

Virtual communities are used for a variety of social and professional groups. It does not necessarily mean that there is a strong bond among the members, although Howard Rheingold mentions that virtual communities form when people carry on public discussions long enough, with sufficient human feeling, to form webs of personal relationships. The explosive diffusion of the Internet since the mid-1990s has also fostered the proliferation of virtual communities taking the form of social networking services and online communities [3].

Virtual communities may be distinguished from physical communities in that virtual communities can extend the range of community, and individuals can tailor their personal communities [4]. In cyberspace the economies of interaction, communication, and coordination are different than when people meet face to face. These shifts make the creation of thousands of spaces to house conversations and exchanges between far-flung groups of people practical and convenient. Using network interaction media like email, chat, and conferencing systems like the Usenet, people have formed thousands of groups to discuss a range of topics, play games, entertain one another, and even work on a range of complex collective projects. These are not only communication media; they are group media, sustaining and supporting many-to-many interactions [5].

Virtual education refers to instruction in a learning environment where teacher and student are separated by time or space, or both, and the teacher provides course content through course management applications, multimedia resources, the Internet, videoconferencing, etc. Students receive the content and communicate with the teacher via the same technologies [6].

Virtual reality is being used for several education uses. Two of the most prominent uses are: advanced simulation training; and virtual education as distance instruction programs evolve with higher-order VR applied science. Virtual reality is, even now, being used to train physicians, aircraft pilots, soldiers, and people in other professions. With respect to distance education, the virtual education revolution is, even now, underway. Distance instruction that started with basic text and image exchange, is evolving into educational programs that involve the human brain multi-dimensionally and interactively through several senses. While three-dimensional (holographic) virtual instructors do not currently lecture around the globe, this may happen some day in the not-so-distant future [7].

It has been commonplace to describe the learning environments mediated by computers and digital technologies as virtual learning environments (VLEs) in order to separate them from the real world learning environments that have been with us since individuals came together to form communities and societies at the dawn of our various cultures [8].
Virtual learning offers new opportunities for both educators and learners to enrich their teaching and learning experiences, through virtual environments that support not just the delivery but also the exploration and application of information and the promotion of new knowledge [9].

Many virtual study programs are mainly text based, using HTML, PowerPoint, or PDF documents. Multimedia technologies have been investigated for many years and eventually found their way into practice. Today a wide spectrum of instruction modes is available, including the following [10]:

- *Virtual Classroom:* A virtual classroom is a learning environment created in the virtual space. The objectives of a virtual classroom are to improve access to advanced educational experiences by allowing students and instructors to participate in remote learning communities using personal computers; and to improve the quality and effectiveness of education by using the computer to support a collaborative learning process. The explosion of the knowledge age has changed the context of what is learnt and how it is learnt – the concept of virtual classrooms is a manifestation of this knowledge revolution.

- *Hypertext courses:* Structured course material is used as in a conventional distance education program. However, all material is provided electronically and can be viewed with a browser. Hyperlinks connect text, multimedia parts and exercises in a meaningful way.

- Video-based courses are like face-to-face classroom courses, with a lecturer speaking and Powerpoint slides or online examples used for illustration. Video-streaming technologies are used. Students watch the video by means of freeware or plug-ins (e.g. Windows Media Player,RealPlayer).

- *Audio-based courses* are similar but instead of moving pictures only the sound track of the lecturer is provided. Often the course pages are enhanced with a text transcription of the lecture.

- *Animated courses:* Enriching text-oriented or audio-based course material by animations is generally a good way of making the content and its appearance more interesting. Animations are created using Macromedia Flash or similar technologies. These animations help understand key concepts and also allow for better retention of learning.

- *Web-supported textbook courses* are based on specific textbooks. Students read and reflect on the chapters by themselves. Review questions, topics for discussion, exercises, case studies, etc. are given chapterwise on a website and discussed with the lecturer. Class meetings may be held to discuss matters in a chatroom, for example.

- *Peer-to-peer courses* are courses taught "on-demand" and without a prepared curriculum. A new field of online education has emerged in 2007 through new online education platforms.

The digital library has emerged as one of the most powerful tools of virtual education. In the following lines, there will be a discussion of the reality and challenges of digital libraries in the Arab world as well as a framework of how to achieve the Arabic virtual community.

A digital library is a library in which collections are stored in digital formats (as opposed to print, microform, or other media) and accessible by computers. [11] An informal definition of a digital library is a managed collection of information, with associated services, where the information is stored in digital formats and accessible over a network [12].

The digital content may be stored locally, or accessed remotely via computer networks. A digital library is a type of information retrieval system. The first use of the term digital library in print may have been in a 1988 report to the Corporation for National Research Initiatives. The term digital library was first popularized by the NSF/DARPA/ NASA Digital Libraries Initiative in 1994. These draw heavily on As We May Think by Vannevar Bush in 1945, which set out a vision not in terms of technology, but user experience. The term virtual library was initially used interchangeably with digital library, but is now primarily used for libraries that are virtual in other senses (such as libraries which aggregate distributed content) [13].

A distinction is often made between content that was created in a digital format, known as born-digital, and information that has been converted from a physical medium, e.g., paper, by digitizing. The term hybrid library is sometimes used for libraries that have both physical collections and digital collections. For example, American Memory is a digital library within the Library of Congress. Some important digital libraries also serve as long term archives, for example, the ePrint arXiv, and the Internet Archive [14].

The advantages of digital libraries as a means of easily and rapidly accessing books, archives and images of various types are now widely recognized by commercial interests and public bodies alike [15].

A traditional library must spend large sums of money paying for staff, book maintenance, rent, and additional books. Digital libraries may reduce or, in some instances, do away with these fees. Both types of library require cataloguing input to allow users to locate and retrieve material. Digital libraries may be more willing to adopt innovations in technology providing users with improvements in electronic and audio book technology as well as presenting new forms of communication such as wikis and blogs; conventional libraries may consider that providing online access to their OPAC catalogue is sufficient. An important advantage to digital conversion is increased accessibility to users. They also increase availability to individuals who may not be traditional patrons of a library, due to geographic location or organizational affiliation.

- No physical boundary. The user of a digital library need not go to the library physically; people from all over the world can gain access to the same information, as long as an Internet connection is available.
  Round the clock availability. A major advantage of digital libraries is that people can gain access to the information at any time, night or day.

- Multiple access. The same resources can be used simultaneously by a number of institutions and patrons. This may not be the case for copyrighted material: a library may have a license for "lending out" only one copy at a time; this is achieved with a system of digital rights management where a resource can become inaccessible after expiration of the lending period or after the lender chooses to make it inaccessible (equivalent to returning the resource).

- Information retrieval. The user is able to use any search term (word, phrase, title, name, subject) to search the entire collection. Digital libraries can provide very user-friendly interfaces, giving clickable access to its resources.

- Preservation and conservation. Digitization is not a long-term preservation solution for physical collections, but does succeed in providing access copies for materials that would otherwise fall to degradation from repeated use. Digitized collections and born-digital objects pose many preservation and conservation concerns that analog materials do not. Please see the following "Problems" section of this page for examples.

- Space. Whereas traditional libraries are limited by storage space, digital libraries have the potential to store much more information, simply because digital information requires very little physical space to contain them and media storage technologies are more affordable than ever before [16].

According to the OASIS Committee, [17] the digital library universe is complex and comprises multiple elements. The representation of the details of these elements depends upon the introduction of frameworks supporting different levels of abstraction: [18]

1) **Reference Model** - A Reference Model consists of a minimal set of unifying concepts, axioms and relationships within a particular problem domain, and is independent of specific standards, technologies, implementations, or other concrete details. Digital libraries need to obtain a corresponding Reference Model in order to consolidate the diversity of existing approaches into a cohesive and consistent whole, to offer a mechanism for enabling the comparison of different DLs, to provide a common basis for communication within the DL community, and to help focus further advancement.

2) **Reference Architecture** - The Reference Architecture is an architectural design pattern **indicating** an abstract solution to implementing the concepts and relationships identified in the Reference Model. There may be multiple Reference Architectures that indicate how to design Digital Libraries Systems

built on the Reference Model. For example, we might have one Reference Architecture for DLSs supporting DLs constructed by federating local resources and multiple organizations, and another one for personal DLs or for specialised applications.

3) **Concrete Architecture** - At this level, the Reference Architecture is actualised by replacing the mechanisms envisaged in the Reference Architecture with concrete standards and specifications. For example, a Concrete Architecture may specify that the run-time environment deployed on the hosting nodes will be CORBA or the Web Services Application Framework, and that four specific communicating Web Services will implement the Search functional component.

The relationship of these three frameworks to the general digital library environment is shown in Figure 1.
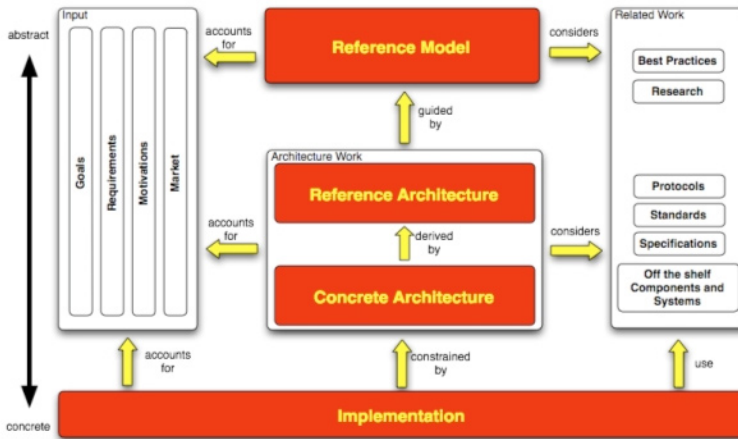
Figure 1: The Digital Library Universe

Source: Candela, et al. (2007), Setting the Foundations of Digital Libraries, D-Lib Magazine, [13].

Maintaining a library of digital objects requires maintaining metadata about those objects. The metadata necessary for successful management and use of digital objects is both more extensive than and different from the metadata used for managing collections of printed works and other physical materials. [19]

Metadata has taken on a new look with the advent of XML and digital resources. XML provides a new versatile structure for tagging and packaging metadata as the rapid proliferation of digital resources demands both rapidly produced descriptive data and the encoding of more types of metadata. Two emerging standards are attempting to harness these developments for library needs. The first is the Metadata Object and Description Schema (MODS), a MARC-compatible XML schema for encoding descriptive data. The second standard is the Metadata Encoding and Transmission Standard (METS), a highly flexible XML schema for packaging the descriptive metadata and various other important types of metadata needed to assure the use and preservation of digital resources. [20]

METS is an XML document format intended for the encoding of complex objects within digital libraries. It provides the means to record all of the descriptive, administrative, structural and behavioral metadata needed to manage and provide access to complex digital content. While it was designed to promote interoperability of digital content between digital library systems and contribute to the preservation of digital library materials, a variety of practical barriers to achieving these goals remain. However, many of these obstacles are shared by other communities of practice, such as the eLearning community working on the IMS content packaging standards and the MPEG-21 community, and the digital library community faces a unique opportunity at the moment to work closely with others to try to improve the interoperability of our content not only with our own repository systems, but those being used by others. [21]

In Egypt, the digital library is the one that attempts to increase its possessions of digital resources whether these originally produced in the digital format or those that are digitized. This library is bibliographically organized through an integrated automated system which uses tools that allow the research and retrieval of the different resources either the original documents or their alternatives. This library also allows access to its inside and outside containers and offers services through computer networks or through the Internet [22].
Therefore, it can be said that the digital library in Egypt [23]:

- is the digital interface of traditional libraries because it includes both paper and electronic materials.
- is the digital resources available outside the concrete existence of any traditional library.
- can execute all the processes that represent the backbone of the library. However, theses processes should be revised and developed with regard to the differences between digital and traditional media.

- serves the same audience served by the traditional library. However, this audience can be distributed all over a network.
- requires skills of those specialized in libraries, information, and computers.

EULC (Egyptian Universities Library Consortium) is the first library consortium of Academic and Research libraries in Egypt. Currently it includes 15 Public Academic Universities in Egypt, which means it serves about 75% of researchers and scientists in Egypt. It is funded by Egyptian Universities (under the Supreme Council of Universities) & the ICTP project (Information and Communication Projects in Higher Education.) [24]

The EUL project consists of two main components:
1) Establishing a Consortium for E-Resources.
2) Establishing a Union Catalogue for Egyptian Universities Libraries.

This web portal includes the initiative of the first component which deals with Access to E-journals & E-books. Currently the project provides access to more than 22,000 e-journals (Bibliographic & Full Text) that cover most of the interested fields for the members of the Egyptian academic community. More journals and databases will be added in the near future.

Table 1: Institutions Contributing to EULC [25]

Institution	Number	Percentage
Governmental universities	17	63%
Foreign Universities	3	11.1%
Private Universities	3	11.1%
Other	4	14.8%
Total	27	100%

EULC aims at [26]:

- Consolidating the official relationships among the members of the consortium
- Supporting the ideal access to information by the members of the consortium
- Supporting the construction of group libraries
- Providing funds to develop library systems that contribute to the consortium
- Improving information awareness skills
- Selecting digital information resources that are suitable to the Egyptian scientific research community
- Developing a list of the required digital information resources

- Negotiating with the agents and distributors of digital resources to reach the most discount in the fees paid to use digital resources

To achieve those aims, EULC is carrying out the following projects:

The digital library project

This project was initiated in February 2005 in order to build a digital library for Egyptian universities with the purpose of providing a large number of databases as well as electronic periodicals, books, and dissertations. Searching and downloading these resources (whether abstracts or full texts) can be done through the gate on www. eulc.edu.eg

In the first phase of the digital library project, three text databases were owned. These databases were:

- Academic Search Premiere
- Science Direct
- Wilson Humanities

Moreover, EULC owned three bibliographical databases in the medical and agricultural fields in addition to 240 electronic periodicals in the medical fields. Nowadays, the digital library contributes in 14 databases.

The project for the mechanization of the Egyptian universities libraries

The consortium seeks to construct a unified index for the information resources available in Egyptian universities libraries. This index allows the searching and browsing of more than 3.5 million sources of information. The mechanization of the Egyptian universities libraries was initiated in April 2007 in 60 academic libraries in 15 governmental universities.

The project for the mechanization of the national library university dissertations

This project aims at constructing unified database of university dissertations. This database includes more than 260 thousand dissertations and offers bibliographical data and abstracts for these dissertations. The consortium seeks to initiate a project for electronic theses and dissertations which would provide full texts for the theses and dissertations approved by Egyptian universities.

The project for developing Future Library System

This system was constructed by two Egyptian Universities in 2000: Mansoura University and Zagazig University. This system seeks to develop Future library system so that the consortium can analyze and design the models and systems and the detailed characteristics required by the system.

Future library system has the following characteristics:

- Through the unified index of the Egyptian libraries, one can know where a certain reference is and how many copies are available.
- All the bibliographical data of a certain reference can be known through the system.
- The employee that entered the data of any reference can be recognized
- Data enterers are allowed to edit, delete, and add references
- The reader can know whether a book is borrowed or not
- The system allows the importing of books from another library
- The system allows the user to suggest the purchase of a certain book and to send a complaint
- The system allows the librarian to change his/her username or password
- The system allows the users to read the full text of some books. This service is rarely available on the Internet.

Generally, Egyptian universities offer 10% of the budget of the infrastructure of EULC as well as 30% of the budget of the digital library.

Table 2: Universities' Contributions to EULC

University	Contribution
Cairo	651.930
Alexandria	890.206
Ain Shams	841.018
Assiut	807.411
Tanta	602.693
Mansoura	548.150
Zagazig	836.996
Helwan	1.156.601
Minia	618.760
Menufia	973.785
Suez Canal	595.892
South Valley	948.740

Beni Sweif	603.640
Fayoum	484.333
Benha	647.859
Souhag	--------
Kafr El-shiekh	--------
Total	11.207.983

In spite of the Egyptian developments in the field of digital libraries, there are still many procedures to be followed in order to achieve full prevalence. This might be attributed to many economic, social and cultural reasons in addition to issues related to intellectual property.

The Digital Library in Egypt: A Futuristic View

Renewing thought in the field of libraries is no longer a luxury, but a requirement of good education. Therefore, there is a need for a futuristic view of a digital information community as well as self-learning in light of a virtual community which is getting wider every day. This can be achieved through:

- Considering the preparation of the Egyptian Society for the requirements of the virtual education as a national affair.
- Putting a strategic plan to reach the knowledge and information community
- Studying the current educational system and recognizing the gaps in order to put national educational plans through educational Arabized software and giving attention to the Arabic Language technology
- Finding information integration between local and international institutions and constructing and information web which contributes to the scientific and educational benefit.
- Improving the quality construction of information staff with regard to the educational background and training.
- Putting suitable legislations which protect intellectual property rights in such a way that encourages concerned institutions to invest in the field of information.
- Encouraging researches and creative works in the field of investment in information and effective contribution in information forums.

Therefore, our Egyptian schools and universities need digital/virtual libraries to compensate the shortage in actual libraries or to carry out what is difficult in actual libraries as well as to present our scientific production. We need virtual community technologies to train staff specialized in information technology in a world fundamentally changing in all aspects of life.

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