

FUTURE LIBRARY TRANSFORMATION TO GLOBALIZATION

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ABSTRACT

In the last decade, many libraries have been constructed in Egypt to accommodate the need of knowledge for people but little attention has been given to form an information policy which links, exchanges, or transmits information between them. As we rush into the global village, this paper aims to identify the recent transformation of libraries to globalization. The transformation that libraries architecture is undergoing in many ways reflects changes in our culture: the information age and the electronic storage of text. The study investigates the main aspects that contribute to change library buildings design over the centuries: the form of information; the nature of the library's use and readership; and technological development in both architecture and librarianship. The paper focuses on advances in information technology and the development of digital libraries and its current problems. Future libraries either academic or public have to increase their services to be able to send information out to academic departments, to business and to people at home.

Keywords: Future libraries, Librarianship, Globalization, Multimedia Center.

INTRODUCTION

The library is older than the book, older than paper and older than print. Although the word *library* is derived from the Latin *liber*, meaning book, it is the repository for various forms of recorded information [1]. It extends back to the scrolls, papyrus and clay tablets that appear near the dawn of writing-back to the ancient Mesopotamian and Egyptian civilizations.

The first Egyptian library, containing 20,000 papyrus scrolls, was found by Ramses II in 1250 BC [1]. The greatest library of the ancient world was the Alexandria library that established by the Greeks in the 3rd century BC. It was a center of learning for the entire Hellenistic world, (see Figure 1). It consisted of a museum, a library of 700'000 rolls on papyrus or linen and facilities for copying and translating texts in many languages.

In the 8th and 9th centuries, Muslim scholars adopted the Chinese methods of papermaking and lowered the cost of books. By the 10th century, Córdoba, had a library of 400,000 books. From the middle of the fifteenth century printed books joined manuscripts as communicators of ideas. Libraries steadily increased in size with the great growth of printed book production. During the 17th and 18th centuries, national libraries began to be established throughout Europe. The first public library, supported by government and designed for the education of the masses, was begun in Manchester, England, about 1850. Other forms of libraries developed during the early 19th century.

The Library of Congress (USA) was established in 1800 and rebuilt after the War of 1812 (see Figure 2). By the nineteenth century, lending books for use off the library became common.



Figure 1 Ancient Library of Alexandria [1]



Figure 2 Library of Congress [1].

The first revolution was the miniaturization of information in the form of microfilm. The microfilm never did replace the book but after its general acceptance by 1940s, it provided space-saving advantages in the storage of large amounts of journals and newspapers. It was also of a great value in copying rare books making them available to libraries particularly in developing countries [2].

The computer was a product of military research in the Second World War, and it entered libraries in the 1950s to announce the beginning of the information age [2]. The possibility of putting information in a database form and retrieving it, led to the development of computerized catalogue. A further step was the centralizing of such

records so that many persons in different libraries could catalogue the same books at the same time. The next step was the on-line catalogue for reader use, which introduced in 1967. By the late of 1980s runs of journals were made available on laser-read compact discs. On-line public access catalogues are gradually becoming the norm and anyone can access by personal microcomputer.

In recent years, libraries have undergone a phase of rapid development and changes that has extended their scope and identity. Some public libraries are fast becoming community centers. As a result of these changes, the library today may be called a "multimedia store of information and ideas", "material sources center" or "learning resources center". Not enough is known about the continuing change in the technology of communication to predict exactly how they will influence the library building of the future.

FUNCTION OF THE LIBRARY

Through all the centuries of its existence the library has had three main traditional functions: to collect, to preserve and to make available. In other words, the library has to storage the information in different formats (books, journals, maps, recorded music, CD-ROM) and to make it accessible by individuals at a time of their choosing [3].

Different types of libraries have different functions. The museum-like function was particularly the case with research and academic libraries because their collections contain many rare and valuable materials. But, public libraries were always more user oriented ones. Their collections contain social services information, reference works, records, recreational books, paintings and films. With the radical shift towards the digitalization, the virtual library gives now access not only to its own collection but it is a part of a network without walls. It sends information to people, whereas in the past, normally people came to the information. Future libraries will not only store information but will actually create it, possibly both in electronic and printed form.

CHALLENGES IN THE INFORMATION AGE

In the second half of the Twentieth Century, there has been a radical transformation in the role of information in the society. At the same time, there was a revolution in the technology used in information production and dissemination. This new change brings with it managerial, technological and educational challenges as we seek to integrate an expanding universe of print and multimedia sources into our daily life [4].

Our libraries face multiple challenges that encounter library designers:

Rising Material Costs

Collections have been significantly affected as inflation rates for subscription exceeded increases in the library's materials budget over the last decade. Elimination of duplicate serial and journal subscriptions provided only temporary relief, and deeper cuts in the journal collections were affected. The continuing build-up of vast quantities of books can only take place in a few rich countries. So, there is much work to be done particularly in bringing up the rest from other libraries collections through electronic services.

Insufficient Shelving Spaces

It is over fifty years since Freemont Rider reminded us that: *"If libraries continue to grow, and the collection size doubles every 25 years, then there is a predictable time when the whole land mass will be covered with libraries"* [4].

Issues must be addressed to resolve a space problem; current collections contain outdated and duplicate copies of materials. Weeding and relocating selected portions of the collection into compact storage can provide significant shelving space for new materials. Acquisition and installation of compact shelving is a must in order to maximize utilization of current facilities and to avoid the construction of new structures. As more information becomes available on-line, some books and periodicals are used

less frequently. Compact storage is helping to shelve these printed materials in condensed space that is still accessible to the library patron.

Inadequate Storage Facilities

Programmers assume a constant 5% increase in the size of book collections for a 20-year building life, but they fail to recognize the space or supported needs of electronic devices such as terminals, printers, fax machines, disk storage, manuals and copiers besides out-of-service technical and media equipment and supplies.

Insufficient Staff

As the variety and complexity of information resources increase, there is greater need for librarians who assist users in selecting, accessing and using these resources. Librarians will be essential participants in a cooperative effort for productive instruction and research.

The Illumination Level

The lighting engineers have been raising the recommended light level in libraries to have good reading and working light. But with the use of viewing screens, video screens, or computers, we don't use such intense illumination. Lighting quality can be enhanced with higher wall reflectance, fixture locations that reduce glare.

The Computer Center

The physical area in which the computer is to be installed will still require certain environmental protection. The computer area should be dust free, under temperature and humidity control and constructed with a raised floor.

Cost

It should be fairly obvious to everyone that a fully electronic library will be more costly than the traditional one. We can't build in air conditioning and power requirements for machines without increasing costs. Also, the maintenance of hardware and software is too expensive. Disks and tapes degrade

information. So, they must continually be indexed and backed up.

We have to determine the position of our libraries in the electronic future: are they to change into the place where all computer-based information is stored and accessed, or would they be completely bypassed, remaining only as the holder of printed material?

Also, we have to know who will pay the costs of supporting the book stock purely for browsers when the book stock is no longer the chief source of information.

ADVANCES IN LIBRARY ARCHITECTURE

Library buildings have changed over the centuries in response to some major influences:

- The form in which information is recorded.
- The nature of the library's use and readership.
- Technological development in both architecture and librarianship.
- Recognition of traditional architecture as part of the cultural heritage.

The Roman library had a single large reading room lined with shelves for scrolls and codices. In the Middle Ages, books were read at counters, at study carrels or in alcoves near windows. But with the spread of printing from 1400s, libraries expanded their reading areas and developed storage systems "large halls, housed both readers and books".

Free-standing book stacks furnished with metal shelves become common in the 19th century.

With the rapid expansion of information technology since World War II, libraries considered new methods of storage such as compact movable shelving, microfilming of bulky or deteriorating materials and the relegation of less-used materials to storage. Many of these libraries were based on ideas of flexibility and the creation of large flat floors capable of taking either stacks or readers. The interior design of them determined by practical consideration. Lighting was

bright, furnishings were sturdy and structural elements were designed to conserve energy. But these open-plan libraries make the librarians concerned with the possible aural and visual distraction of readers.

With the introduction of computers, there is no longer the need for flat floors as book trolleys are no longer a necessity [3]. For example, the kind of stepped reading terraces become at once more feasible "Alexandria Library".

Today, the current concept of reading is changing: the cultural weight is more on visual information in a variety of formats and less on book-oriented activity. The digital revolution, compressing time and space are challenging the definition and the role of libraries. To get a picture of the library of thirty years ahead, we must turn to those who are doing the research into the future of communications.

The new technologies will make it more economical for libraries to produce, distribute and share or sell new publications. The new format of information is inexpensive to replicate. Also, we need only to invest for developing the first copy. Recently there has been an increase in materials published in electronic formats directly available via the internet. Further advances in information technology will provide the scholar with an electronic library far larger in scope and capacity than any physical library. As the amount of digitized information is only 10% of all text, we think that libraries will continue to provide open archives for books and digital information.

At present, we know that books will survive centuries without their content being affected in any way but no one knows how long electronic forms will last. Also book is so handy, so easily used under all conditions from lying in bed to sitting on a mountain, so independent of any support system such as telephone lines.

The architectural challenge is to design libraries that synthesize both the real and virtual worlds while still meeting the constantly changing demands of technological developments. In the seventeenth and eighteenth centuries bibliothèques were

produced, not as "a gallery building full of books" but as a collection. A compilation of several works of the same nature or of authors who have compiled all that can be on the same subject. This might take another form where the library was no more than a "catalogue". A single volume which listed and located each literary work, not in a single building but distributed through the collections of the globe. "The closed world of individual libraries could be transformed into an infinite universe of books noted, reviewed, visited, consulted and eventually borrowed" [4]. If this idea has a long history, it now has a new reality with the impact of computers. Now, the library as a place melts into cyberspace, its location is immaterial.

From Physical to Virtual Library

One of the most profound implications of networked computing may be the development of digital libraries around the world, making the accumulated knowledge of the ages available instantly and universally. Digital libraries make texts, images, audio and video available to more people more often than before. As we rush into the global village, we are forced to confront the boundaries of our current information technologies. Students, teachers and business people need to work together, sharing information across disciplines and across cultures. Digital libraries have the potential to help bridge some of the distances both in information access and cultural understanding.

The goal is to advance the means to collect, store and organize information in digital forms, and make it available for searching, retrieval and processing via communication networks. Nicholas and Negroponte reported that "The transformation of libraries is like the difference between atoms and bits. Atoms are the basic units of physical matter and bits are the basic units of information" [4]. Digitizing atoms (printed information) makes information accessible to million of people at the same time. It also makes it

possible for many people to publish information.

Previous information systems, such as the book, were based on the process that the message that entered a system was the message that was received. But the newer communication technologies on the Internet are interactive, that is the capability of modifying messages and creating new messages exists within the system. This new systems such as electronic bulletin boards, e-mail groups and direct telemarketing are controlled by managers who store and transmit information.

The new information networks are no longer tied to places and it is possible to attain a centralization of managerial control and decentralization of production.

The Image of The Future Library

The following examples illustrate the architectural potential of the future libraries:

Library as Fluid Space

The Sendai Multimedia Centre was the subject of an open competition launched in 1995 [5]. Toyo Ito's design represents the architect's attempts to create spaces that are light, fluid and gravity-defying spaces in respond to the forces shaping a Twenty-First century society, (see Figure 3). Its constructive organization is based on three sets of components: tubes, platforms and building skins. Twelve irregularly-shaped, tube-like, steel structures pass through the habitable platform and carry all of the building's services including vertical circulation, energy (light, air, water, sound) and the information systems. The open, cage-like tubes reveal all their contents while providing a light source through an integral prism system. The glass prisms capture exterior light and filter it deep within the building, creating changing internal light patterns.

By considering the technical and use parameters within a fully integrated tectonic and spatially configured building, Ito has transformed conventional library building typologies.

Library as Message

If the media is the message, then the electronically charged skin of Tschumi's Karlsruhe ZKM (Centre for Art and Media) is the message, [6] (see Figure 4). The architect didn't want to design a facade, so instead he decided to create a changing skin using LCD panel technology. The researchers and artists would be able to program the facade as an enormous piece of artwork. In this way, each cell (15 x 15 cm) become like a pixel in an image.

Tschumi's proposal reveals the processes and activities of a contemporary multimedia research centre by using advanced glazing technologies that also invite us to re-evaluate the nature of architectural enclosure. He says: "Architecture is no longer the place of permanence, but the place of constant change" [6].

Library as Void Carved from Information Blocks

The architectural Premise of OMA's National Library of France proposal in 1989 recognizes that "the electronic revolution is dissolving everything solid" and that the role of the architect will be to create symbolic spaces that respond to the persistent desire for collectivity [7].

Koolhaas created a solid block of information filled with stacks [7]. Out of this block, he carved five public spaces: the current events library, the study library, the catalogue room and the research library. These seemingly suspended volumes are accessed through a system of regularly spaced elevators. The building's cubic volume is partially covered by semi-transparent glass façades. This proposal represents a prescient interpretation of the library's transition from the physical to the electronic realm, while creating symbolic public spaces, (see Figure 5).

Library as Research Centre

The Undistinguished exterior of the MIT Media Lab 1985 designed by I.M.Pei, like the boxy and modular designs of most computer CPUs, reveals little of its interior workings, (see Figure 6) [8]. Security access to the workspace is strictly enforced and block

exterior glass dims the luminous and vibrant colors of the lab's computer monitors. The design, which contains a number of public communal spaces, raises important issues about public and private thresholds in the physical and virtual environment.

Much of the work takes place in the *Terminal Garden*, a large communal space inhabited by a multitude of students and computers. At the windows, a continuous, narrow band of dark glazing helps minimizing computer-screen glare. The architecture manages to be animated not by the simple, container-like space, but by the ever-changing illumination coming from the computer screens. The design of the Media Lab provides a banal and undifferentiated, albeit flexible space [8].

The challenge for future designers is to create environments that keep structures such as the Media Lab secure, while loosening up the demarcation between the lab's internal and external worlds to the architecture express the openness of the virtual world.

Library as Café

Marshall Smith is looking to break into the online multimedia sector with Cybersmith; a combination of software, retail and multimedia café [9]. This new marketing concept gives consumers the opportunity to experiment with new technologies, offering them a mixture of effort-free learning and an interactive shopping. Its aim is to attract a broader public to the world of virtual consumerism: the market of the future.

The design by Boston architects Schwartz Silver with the London consultancy Fitch in 1996 marks the beginning of a nationwide programme of branch openings after a pilot project in Cambridge [9], (see Figure 7).

Cyber-booths housing computer stations and on-line services are designed on one side. They have been designed to reconfigure into multiple seating arrangements that allow visitor to learn as a group. A bar and library featuring the latest CD-ROMs are on the other side. Users who decide to buy software get a refund on their testing time. Virtual reality stations inhabit the outer perimeter besides the entrance [9].

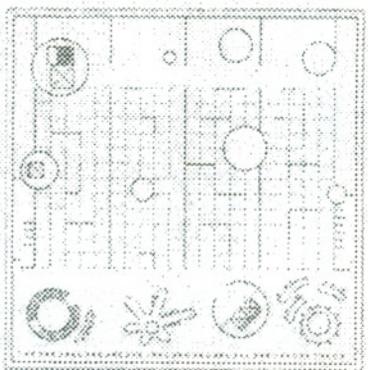
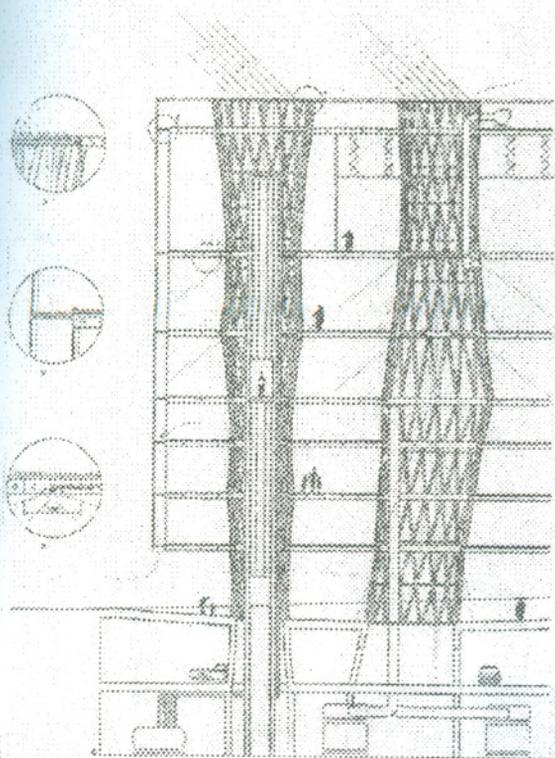
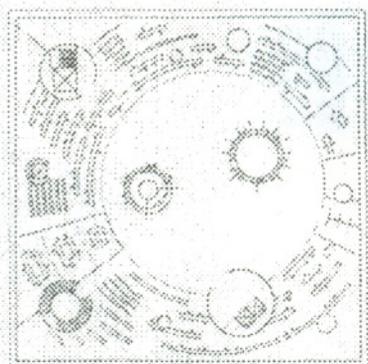
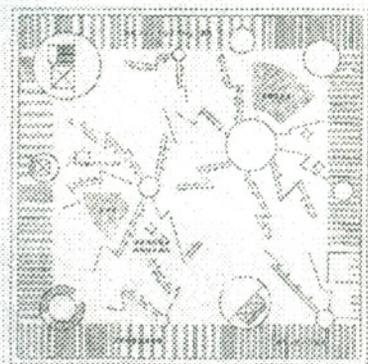
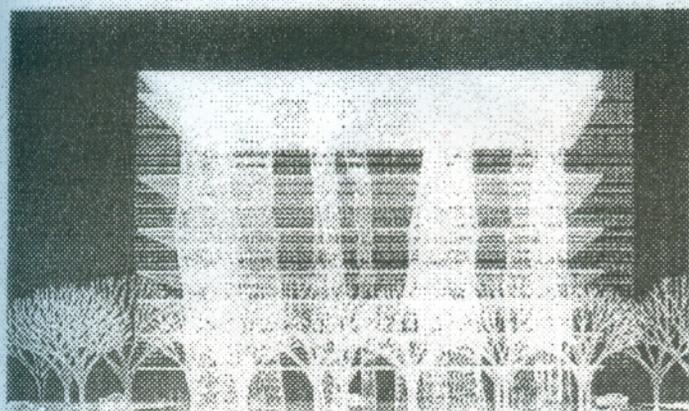


Figure 3 The Sendai Multimedia Centre [4].

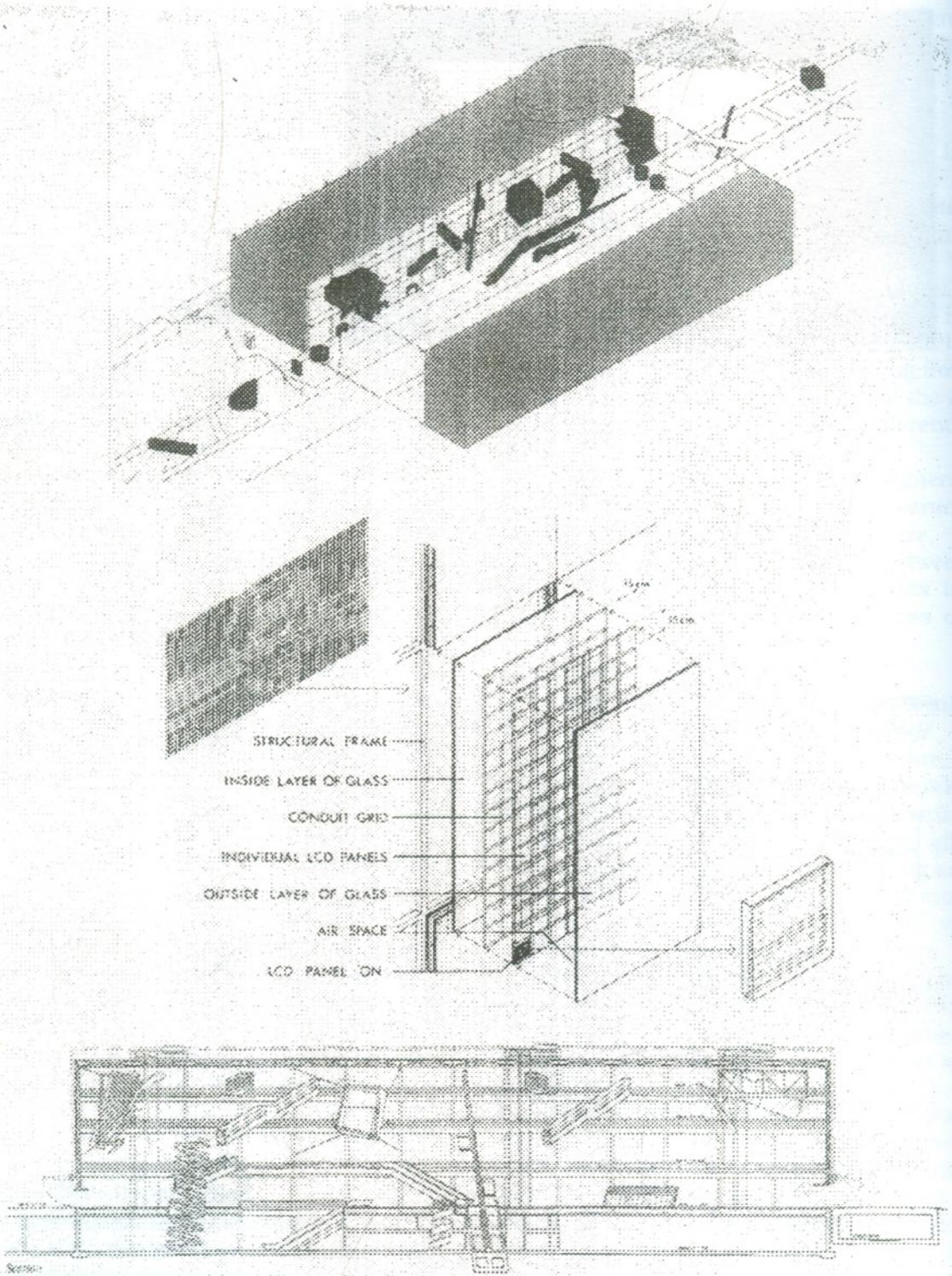


Figure 4 Bernard Tschumi, ZKM Centre for Art and Media [7]

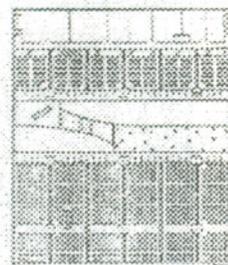
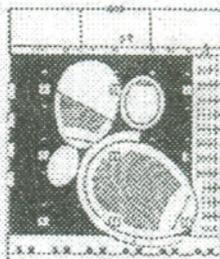
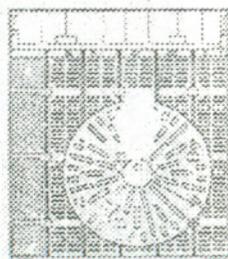
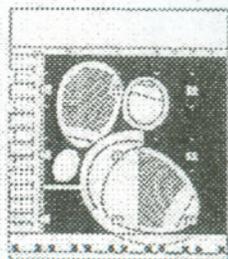
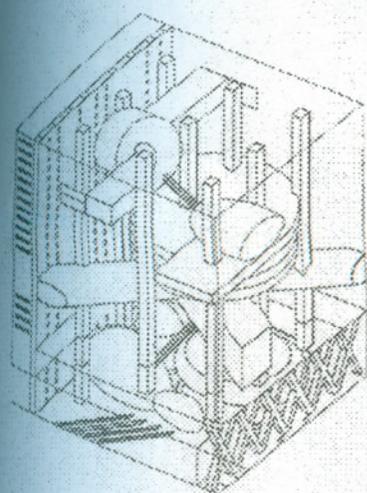


Figure 5 Koolhaas, National Library of France Proposal [8].

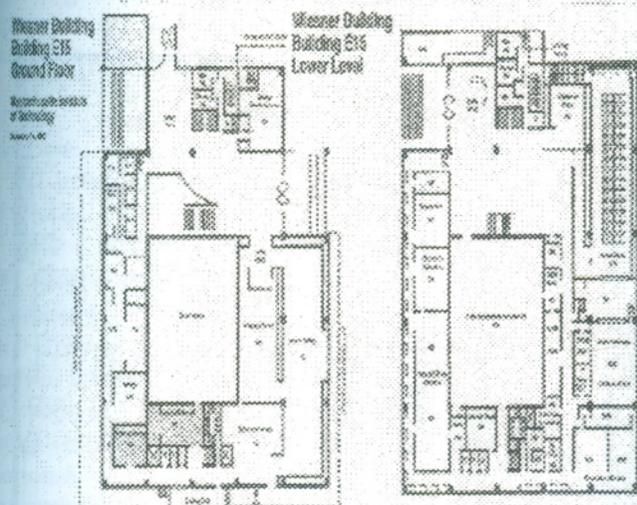


Figure 6 I. M. Pei, MIT Media Lab 1985 [9].

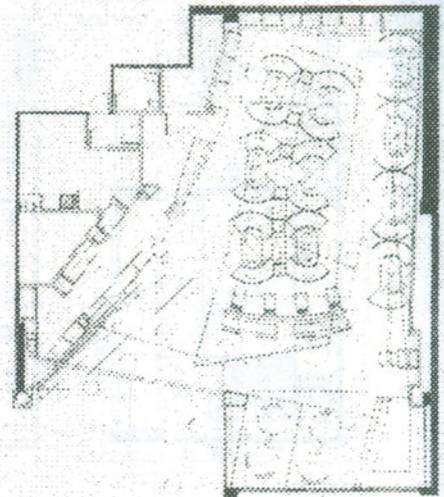
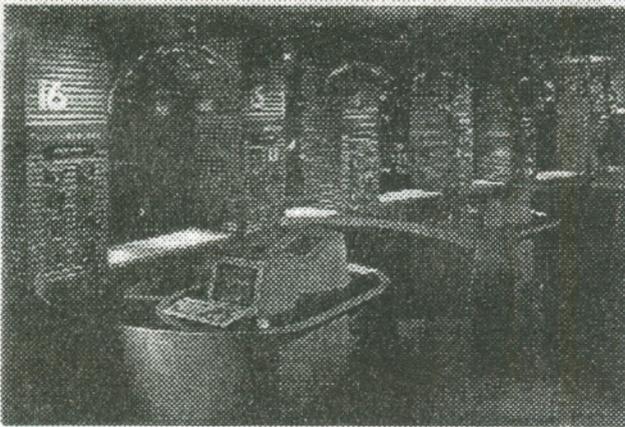
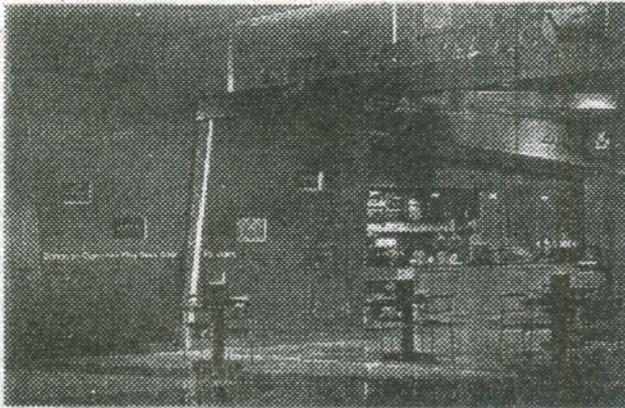


Figure 7 Schwartz Silver & Fitch, Cybersmith 1996 [10]

Library as Resource Centre

Learning Resources Center designed by Richard Rogers is situated on the Thames Valley University campus in Slough, UK [10]. It has been developed to fulfil a necessary role as an information center, housing information in multi formats - videos, CD-ROM and books. All users of the building will have access to computers to work on, in an open computer-oriented environment with a limited number of enclosed seminar rooms. The form of the building is broken into two distinct segments: a three-storey "warehouse" of printed information housed in a simple concrete-framed block and, in contrast, a ground level and a mezzanine multimedia study area beneath a curving light-weight roof, (see Figure 8).

The project is a successful prototype for a future library design that provides the hardware or software for access to online information. It also demonstrates that these resource centers can supply the training and skills required to process and disseminate information.

Library as Marketplace

As the marketplace is the place for the exchange of goods and services, an intelligent marketplace is where the exchange of information and other services occur. The project gives form to a real world public place celebrating an evolving electronic infrastructure. It would give individuals access to information systems to develop creative work, conduct studies, network with others with similar interests and use electronic multimedia.

City as Library

Peter Droege's winning scheme in the international competition for Kawasaki, Japan in 1987 proposed informationising the city so that every laboratory, office or household could become a classroom wired into a city-wide network [7]. The urban plan calls for developing a network of neighborhoods (home-bases) where parents with small children could find ample opportunity for work, commerce, daycare and leisure within one square kilometer. They also share access to information and opportunity for life-long

education. An information spine would link the neighborhood (home-bases) with a system of media cores, which include neighborhood offices and community information centers serving up to a thousand people with direct access to Kawasaki, Tokyo and beyond, thus reducing the amount of long distance commuting. The information spine would also have smaller-scale outlets networked throughout the city in markets (intelligent souks), streets and plazas (intelligent shojis) and public spaces (intelligent fountains and gardens).

The library then becomes part of a larger urban electronic topology where any information is available at any point in the city: virtual agglomeration (aspatial linkage within information networks) and fictive mobility (ubiquity by virtue of information transmission at the velocity of light) obviate spatial proximity.

NEW ROLE FOR THE FUTURE LIBRARY

Modern libraries have to try to develop new services, to provide new resources, and to alter the public perception that libraries are mostly old-fashioned print warehouses that predate the modern era. Also, it is important to maintain the uniqueness of each library and to avoid duplicate efforts.

First: Shifting to electronic service

Libraries must monitor and offer the latest features of electronic resources which integrate sound, text, data and images. These electronic resources will complement existing library resources. Replacing some printed resources, they will produce saving in storage costs. Computer workstations should be introduced in the same reading areas along the reading tables at several points connected with the main computer by cables. These workstations would be public resources where word processing, e-mail functions, electronic newsgroups, CD-ROM's, and world wide Internet access are standard services.

Using software programs, either daily digital newspaper or magazine articles can be downloaded to disk or printed on paper.

Seventh: Enhancing the Place of the library in the life of the community

Facilities which are intended to play that role, are social cultural activities such as exhibitions, galleries, community meeting rooms, children story room and multimedia spaces.

CONCLUSION

The design of future libraries is a problem positioned at the intersection of cyberspace and architectural space. Will the library, as we know it, cease to exist and disperse into infinite bytes, or will it be replaced by a hybrid building type serving multiple uses? Both options present parallel, overlapping trends. While the online library resources, breadth, affordability and ease of use continue to make it a powerful tool, the library will still serve the traditional expanding roles.

All of the online libraries' web sites have a corresponding physical address which in turn houses resources and staff.

The librarians' expanding roll will include editorial and publishing duties, as they edit, categorize and disseminate information on the web that is generated at local libraries.

The library as a hardware/software resource center complements existing educational and training programs.

The library's role as a symbol of shared cultural and community values will remain. We are social creatures who need to be seen belong to larger groups, empowering ourselves and our sense of community.

A society based entirely on virtual online communities can only result in a virtual and disembodied society. Our libraries respond to our deep human need for community in the nebulous ether of cyberspace.

NOTE

The Information Age is a new phenomenon since 1950 used to describe a society in which there is a great dependence on the use of computers and data transmission linkages to generate and transmit information.

REFERENCES

1. H. Stam, David and C. Deirdre "Library", Microsoft Deluxe Encarta Encyclopedia, CD, <http://encranta.msn.Com>. (1998).
2. Thompson, Godfrey, "Planning and Design of Library Buildings", The Architecture Press Ltd., London, Third Edition, pp. 13-19, (1989).
3. Brawne, Micheal, "Library Builders", Academy Editions, London, pp. 6-9. (1997)
4. Brce, Lorne, "Public Libraries and the Information Ago", Edited version of a speech at Kitchener public library, Libraries Today, Oct. 95, web-site at <http://www.Uoguelph.ca/~lbruce>.
5. Roulet, Sophie, "Au - Dela du Visible", Techniques and Architecture, no. 422, October/ November, pp. 56-61, (1995).
6. Futagawa, Yukio (Ed.), "Bernard Tschumi", GA Document Extra, Vol.10, A.D.A. EDITA Tokyo Co., Ltd., Japan pp. 113-117, (1997).
7. Lukez, Paul, "Library Builders", Academy Editions, London, pp. 13-19. (1997)
8. I. M. Pei, "The Wiesner Building", Web Site at <http://www.media.mit.edu>.
9. Riewoldt, Otto, "Intelligent Spaces - Architecture for the Information Age", Laurence King Publishing, London, pp. 168-170, (1997).
10. Futagawa, Yukio (Ed.), "Richard Rogers", GA Document Extra, Vol.2, A.D.A. EDITA Tokyo Co., Ltd., Japan pp. 130-136, (1995).

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مكتبة المستقبل : التحول الي العالمية

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ملخص البحث

علي مشارف القرن الحادي والعشرين وفي ضوء استراتيجية الدولة للتنمية الثقافية المتمثلة في تطوير وإنشاء العديد من المكتبات فان البحث المقدم يطرح تصورا لتصميم مكتبة المستقبل التي تلبى الاحتياجات المعرفية والثقافية المختلفة للمجتمع المصري .

يعد تصميم مكتبات المستقبل هو إشكالية حضارية تنطلق من كونها تقع في مساحة الالتقاء بين الفراغ المعماري والفراغ التخيلي المعلوماتي ، ولذا فان الورقة البحثية تناقش التحول المعماري المعاصر في تصميم المكتبات والذي يعكس التغيرات الثقافية والاجتماعية التي صاحبت الثورة التكنولوجية للمعلومت .

يقدم البحث من خلال خلفية تاريخية استعراض للعوامل الرئيسية التي ساهمت في تغيير تصميم المكتبات ثم يتعرض للتحديات الاقتصادية والمعمارية والثقافية التي تواجه المكتبات المعاصرة من ارتفاع لتكلفة اقتناء المكتبات للكتب والمراجع العلمية إضافة الي تكديس المكتبات والعجز في المسطحات اللازمة.

ثم يركز البحث علي التطور في تكنولوجيا المعلومات وظهور ونشأة المكتبات الالكترونية ومدى تأثيرها علي التصميم المستقبلي للمكتبت .

وأخيرا يتناول البحث بعض الرؤي المستقبلية المعمارية لمباني المكتبات موضحا الدور الحديث الذي يجب أن تقوم به مكتبة المستقبل والذي يعكس علي تصميمها وعلي الفراغات المطلوبة بها.