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Technological Potentials for The Global Library: Realities and Challenges

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Abstract

National libraries in the world have been store houses of their countries' treasures and rich information resources for centuries. However, the contemporary roles of national libraries go far beyond those of the store houses. Each national library needs to be the dynamic and aggressive information provider of both its country's enormously rich information resources, as well as an effective node of global information network which can provide access to all needed global information..

This paper explores the concept of "The Global Library" in which national and research libraries can be linked together as nodes of the worldwide information network. Given the incredibly fast technological developments in recent years, particularly in the area of multimedia, telecommunications, and digital technologies, the potentials for fast and effective information access to this kind of universal library are great. So are the challenges! This presentation hopes to elaborate on these potentials and challenges.

I am delighted to be here to celebrate the 60th Anniversary of the National Central Library together with my colleagues in library and information fields in the Republic of China. As we all know, years ago, futurists like Toffler predicted the coming of a shrinking global village, and today, at this happy occasion, we are experiencing the true meaning of such a shrinking globe. When well-wishers and library/information leaders representing almost 30 countries in the world are sitting together in one room, it is an awesome feeling indeed.

Occasions like this is perfect for us to take a few moments away from our rushed routine and reflect on where we were with strong sense of nostalgia as well as look forward to our challenges with anticipation, excitement, and a certain sense of bewilderers. Some of you probably know that during the last quarter of 1992, I was involved in numerous whirlwind trips around the world, which included two major consulting trips to 9 countries of the Eastern Europe. During those two trips, I was privileged to meet and discuss with the government officials as well as National

Librarians of those countries. It was indeed a privilege to be exposed to the enormously rich resources of the region, many countries in that region were newly opened to the world.

Caught in the midst of these jet travels, familiar with the current state of technological environment and where the technology is leading us to, and excited with the current development of the global telecommunication networks, it is for me easy to envision "The Global Library," which I hope to share with you *conceptually* in this talk.

AN ERA OF UNPRECEDENTED CHANGE

Since the World War II, we have been in an era of unprecedented technological, social and economic changes. These changes have been particularly dramatic in the past decade. Technologically, the advent of microcomputers, optical discs and other mass storage media, worldwide packet networks and communications technology, digital image technology, computer graphic technology, multimedia technologies have dramatically changed the way we live, think, and communicate with each other, and certainly the way we use and view technologies. The fast-paced technological developments in these areas, while expected, have surprised many in terms of its widespread scope and intensity. As we have witnessed in recent months, they have surprised even some of the most established computer giants such as IBM. Communication satellites, global trade and investment, global technology transfer, and jet travel have prompted dramatic social and economical changes as well. These have pushed the national economies into an integrated world economy. As the cold war ended, the Soviet superpower dissolved, and the iron curtain broken down, we have witness that the global economic and political center of gravity shifted toward Asia. Since the industrial development and growth have in recent years been fueled by technology, particularly the electronic products and service industries, many countries in the Pacific have become world leaders in the development of technology-based industry and services. This means that many firms in the Pacific area have been shaping the dimensions of our information society by their creative R&D. In this kind of environment, Asian national libraries with strong economic environment, such as the National Central Library, are in very favorable positions to lead libraries into the 21st century. For that, I have viewed the theme of this conference to be most timely and exciting.

TELECOMMUNICATIONS & UNIVERSAL INFORMATION ACCESS

Viewing this situation from the angle of communication, in the past we have passed several "information jumps" -- from speech to writing to printing, and now to wire and wireless

communications. The last make effective economic and political organization possible on a continental scale, and is taking us toward a global civilization. For example, once the exclusive domain of research scientists and computer specialists, electronic mail on the Internet - the global communication network started in 1969 by the US Defense Department, but greatly expanded in the last couple of years - is fast becoming a medium of mass communication. It is estimated that well over 10 million people in the world have E-mail now.

As to the wireless communications, expected to be one of the most important technologies of the next decade, it will be as commonplace as wired one within three years. With the appropriate hardware platform and proper communications, network and user interface software, packet radio node can serve as part of an "ad hoc" network of other packet radio nodes. Each packet radio system within the network becomes a de facto member of the "ad hoc" network. [Mello, 1993] In most cases, this network is then connected to the larger wired network such as Internet. Wireless communications is driven by two forces -- the trend to untether computers from the desktop, and the desire for universal connectivity. Normally, the forces of portability and connectivity are at odds, but wireless communications permits one to have the best of both worlds -- freedom from the desktop and connectivity.

Thus, as computing and telecommunications develop and merge, what lies ahead is another jump toward what might be called universal information access. This would mean that anyone, anywhere, could talk, write, confer with, or send both textual and visual information to anyone else in any part of the world. This means that the concept of "The Global Library" is not only conceptually sound, but technological feasible now. With this kind of universal library, we would have access to global information resources which can be considered as the collection of the world's great libraries.

WHERE ARE THE TECHNOLOGIES GOING?

In a major study of the Information Industry Association in 1989, entitled *The Information Millennium: Alternative Futures*, many major technological changes that may occur during the last decade of this century were identified. Let me list only a few in the following for illustrative purposes:

- Microcomputers (PCs) will have a processing power of 20-40 million instructions per second (MIPS), compared with 1-3 MIPS today.
- 90% of the work now done on mainframes will be done on desktop computers by 2000.

- Optical storage density will increase by a factor of six through data compression and other techniques.
- The phone system will be end-to-end digital, capable of carrying text, data, graphics, pictures, and full-motion video, as well as voice.
- Fiber optics will be the dominant transmission mode for most fixed applications, and fiber transmission into homes will be beginning.

As time passes, it becomes clear that predictions like these are going to be realized sooner than expected. It is also clear that we are truly entering the digital and visual information age (Chen, 1990). Yes, the technologies are available to link all the global information together to form "The Global Library." But, are we ready to have our information resources available in digital form so that they can be linked together by utilizing the available technologies? This is the central question! If not, how do we work toward that?

SHIFT TOWARD A LEARNING-ORIENTED SOCIETY: THE NEW EMPHASES

With all the unprecedented changes, it should not be surprising that there is an increasing demand for better access to needed global information to enable us to have a bigger picture on the world in which we are living in, a better global view on our environment, our history, our cultures, our economy, etc... Thus, information, has become the key to productivity, and there is a shift toward a knowledge-based learning-oriented "creative society." In this type of society, we are witnessing the following change in emphasis:

- Societal values change from "acquiring" to "learning"
- Growing motivation of individuals for knowledge
- More people learn to use information creatively
- More demand for multimedia information
- More demand for global information

It is clear then that a changing society characterized by continuing technological progress, societal and economic changes will definitely pose new challenges to libraries. It demands our libraries to transcend traditional methods of providing information access within the confines of physical structures to providing access to services and global information resources to people at home, in school, at work, or any place so desired by them.

THE CONTEMPORARY ROLE OF LIBRARIES

Before we address the role of national libraries, it is important to discuss the changing role of libraries in general in this new age.

In 1986 when I discussed the current day's libraries in the midst of a period of unprecedented change and adjustment, I advocated the need for libraries to shift focus to include the following directions in addition to our basic functions (Chen, 1986):

- From library-centered to information-centered.
- From the library as an institution to the library as an information provider, and the librarians as a skilled information specialist functioning in an all-related information environments.
- From using new technology for the automation of library functions to utilizing technology for the enhancement of information access not physically contained within the four walls of the library.
- From library networking for information provision to area networking for all types of information source providers.

Basically, these directions have not changed since then. However, we can further expand accordingly with the following shifts:

- From information-centered to knowledge-centered
- From information access to selectivity of the most relevant
- From centralized information systems to distributed information systems
- From national networks to a global "network of networks"
- From a focus on libraries being the warehouses of library materials to focus on the "content"
- From technology that supports the library staff to technology that empowers the library user
- From the adaptation of individual technology utilization to technology integration in libraries.

THE CONTEMPORARY ROLE OF NATIONAL LIBRARIES

Now, coming to the national libraries. Up to now, unquestionably, for centuries, all national libraries have been store houses of their countries' treasures and rich information resources. But,

the contemporary roles of national libraries have to go far beyond those of the store houses. Each national library needs to be the dynamic and aggressive information provider of both its country's enormously rich information resources, as well as an effective node of global information network which can provide access to all needed global information. Each contributes effectively toward the eventual realization of "The Global Library", in which national and research libraries in the world can be linked together as nodes of the worldwide information network.

In order to assume this role, the integration of new information technology becomes essential. Instead of staying on the early stage of technology applications by simply applying new information technology to traditional functions, processes and procedures, such as cataloging, circulation, OPAC, etc..., the libraries need to use the new, exciting technology as a means of changing what they do, not just how they have done it. The multiple convergence of various types of technologies -- with powerful central processing units, versatile and inexpensive micro-processors, very high density storage devices particularly the optical media, facsimile transmission, improved graphics imaging and printing, powerful software development, multimedia applications, wire and wireless communications, etc... -- is enabling us to rethink how people gain access to all types and formats of information in non-traditional ways.

In the current environment, in order to adapt successfully to the technological, social and economical changes, there may be a need to change our keyword from "access" to "selectivity." If our multimedia information resources are available in digital format as alluded earlier, then, in the big ocean of digital information, the most important thing will not be the access of this big ocean, but will be "how to find and retrieve the most relevant from this big ocean." This will be a great challenge for all information professionals. In addition, what seems critical for adapting to the changes is not so much access to data or information of every sort, but rather a new level of knowledge and wisdom. Clearly, national libraries will be on the front lines of meeting this challenge.

THE GLOBAL LIBRARY SCENARIO

In "The Global Library," we can visualize the extensive use of new information technology as illustrated in Figure 1. Global communications make it possible to connect national libraries from different part of the world together. These national libraries become regional "knowledge centers" which can access information from the entire global "network of networks." High-density optical storage in jukeboxes makes a vast increase in global collection size possible. Cutting-edge technologies such as multimedia and digital imaging, available in this high-speed global network so that texts, images and even voices can be transmitted from one part of the world to the other.

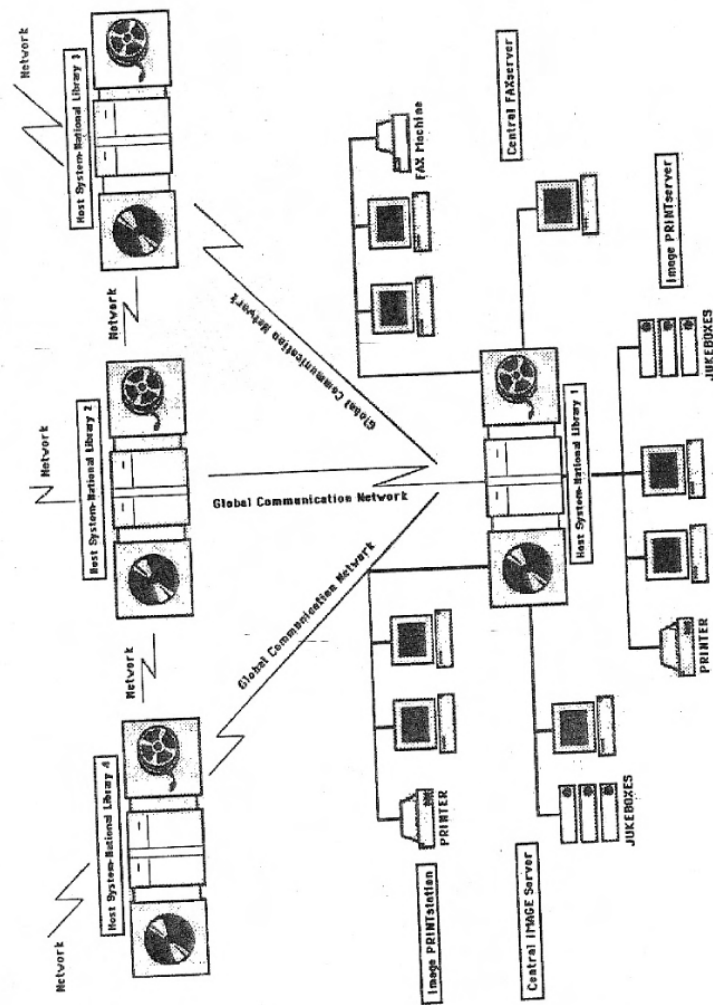
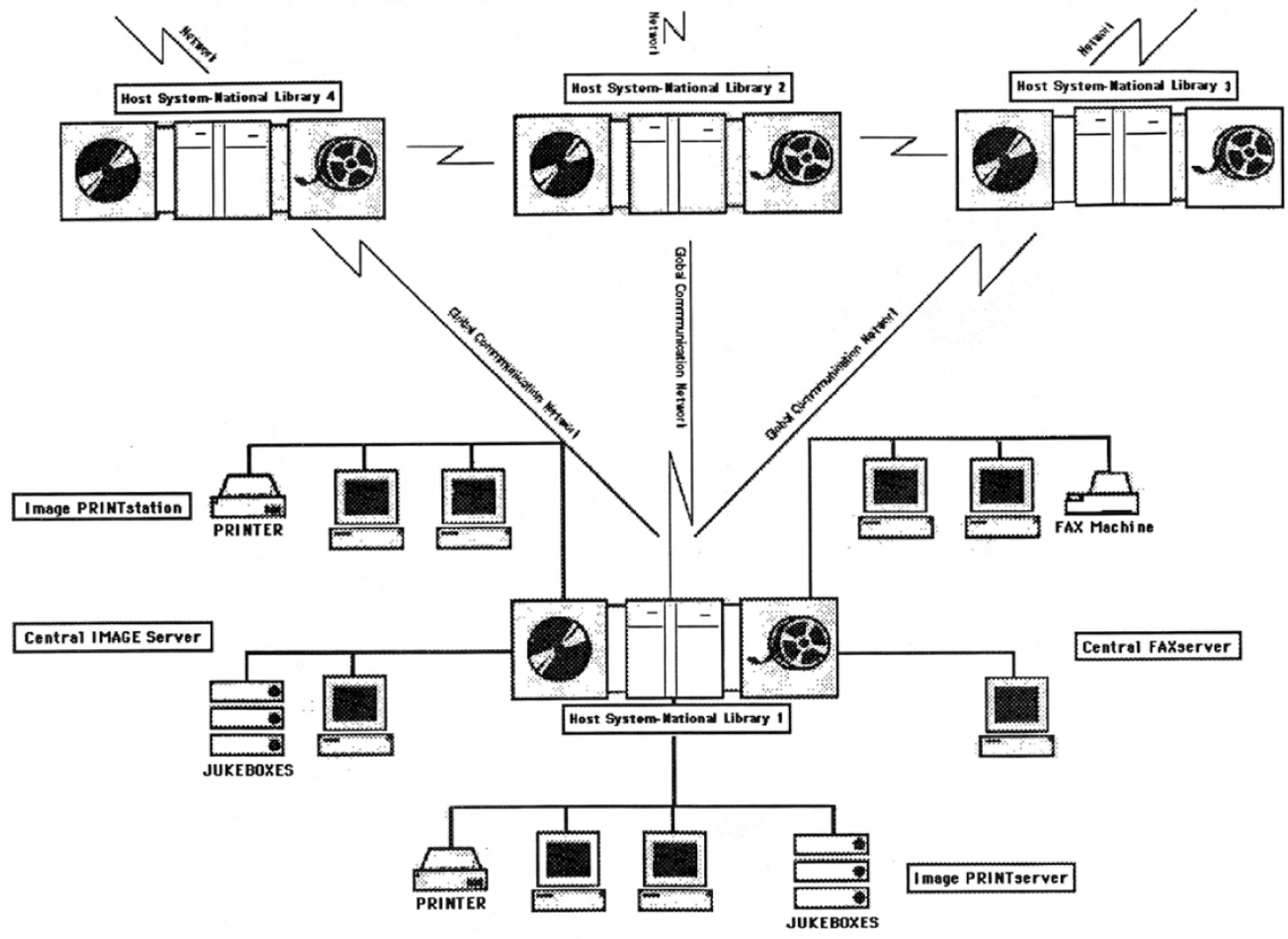


Figure 1. The Global Library - Conceptual Diagram



At the same time, however, nationalism becomes a stronger theme: building national collections, serving as an information source for national government, collecting national history, culture etc. The use of multimedia and Knowledge Navigator enable the delivery of these information as well as information of other countries to citizens' homes, schools, and offices. In this kind of environment, printed information sources, such as books, journals, and archival materials, become a highly competitive technology. Digital information sources become essential.

BARRIERS TO THE GLOBAL LIBRARY

As expected, there are many barriers to implementing The Global Library. In 1987, when discussing the barriers to international information exchange, Roland Brown stated that despite the numerous obvious benefits, there are also substantial barriers to international library networking and resource sharing and to user access to international bibliographic and other information resources (Brown, 1987). These include:

- National policies that tightly control, discourage or even prohibit transnational data flows,
- Lack of interest on the part of information professionals to exchange information -- a lack of vision,
- Lack of common standards for both manual and machine-readable cataloging, interchange codes, protocols, character sets, etc...
- Distance and the availability and cost of telecommunications;
- Lack of foreign exchange to purchase equipment, SW and data acquired from outside the country,
- Language,
- Difference library customs,
- Difficulty in finding supportive local environment.

All these barriers also exist for The Global Library. In addition, there are substantial more logistical, political, technological, and economical issues as well, which I shall have to leave them for you to imagine due to the lack of time.

CONCLUSION

Despite of these potential difficulties, barriers, and challenges, one thing is sure that the technologies and the infrastructure are in place now for us to experiment such an universal library. For the first time ever, lack of proper technology is no longer an obstacle. But, technology is not

the end in itself rather the means to an end. We should not suffer from the loss of direction caused by preoccupation with technology. Thus, at this important *International Conference on National Libraries: Toward the 21st Century*, in addition to speculate on the libraries in the next millennium, what we must do is to make sure we can develop a vision for our library's future, and define its role in facing a new frontier. Caught in the middle of the information revolution, between traditional academic conservatism and tantalizing possibilities of the high-tech world, the right vision will chart the right course of our library developments, and ensure us that we will fit into this period of unprecedented, continuous change and adjustment, and not be lost in the shuffling of this new digital visual information age. Our challenges are indeed great, so are our potentials!

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