

# 21 世纪

## 大学图书馆的新使命

——庆祝北京大学建校一百周年国际学术研讨会论文集

Proceedings of the International Conference on  
New Missions of Academic Libraries  
in the 21st Century



Oct.25 ~ 28,1998  
Beijing, China

北京大学出版社

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**Dedicated to the Centenary of  
Peking University**

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## FOREWORD

Late in 1996, a decision was made to hold an international conference in 1998 to celebrate the centennial of the founding of Peking University as well as the completion of the new Peking University Library building. The idea was fully supported by Dr. Hwa-Wei Lee and Ms. Bessie Hahn, distinguished Chinese American Librarians in the United States, and long-time friends of the libraries in China. After a series of discussions with them and other international academic library leaders, two organizing committees were formed to plan this conference. The International Organizing Committee was responsible for the selection of international participants, and the Internal Organizing Committee coordinated the selection of participants from China. In September 1997, a Call for Papers were formally released.

After a whole year's preparation, we are pleased to present you with this publication. Thanks to the excellent work of the two organizing committees, we selected 142 papers from more than 300 papers, among which 109 are in English, 33 are in Chinese (with English abstracts). Focused on "New Missions of Academic Libraries in the 21st Century", the papers are listed under 6 topics, with an author index as an appendix.

I would like to express my gratitude to all the participants who have enthusiastically supported the conference and contributed papers to the Pre-conference Proceedings. Their collective vision for the future of academic libraries, and their deep insight into the issues challenging institutions of higher education in the 21st century, as presented here, will enlighten academic librarians around the world.

I would also like to thank all the members of the International Organizing Committee, especially the co-chairs – Dr. Hwa-Wei Lee and Ms. Bessie Hahn. They dedicated their time, energy and experiences without reservation, thus ensuring the successful compilation of the Pre-conference Proceedings prior to the actual conference. A special commendation must go to Ms. Susan Wawrzaszek, Ms. Hahn's right hand, who has kept all the participants informed of every step along the way of bringing the conference into reality.

Finally I would like to thank all my colleagues at Peking University. The Pre-conference Proceedings would not have been completed in time for the conference without their support, coordination and hard work.

Zhu Qiang  
Professor and Deputy Director  
Peking University Library

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# **THEME 1**

**Mission and Purpose of Academic  
Libraries in the 21st Century**

## **NEXT GENERATION INTERNET AND THE ACADEMIC LIBRARY'S ROLE IN KNOWLEDGE SOCIETY**

**Ching-chih Chen**

Professor, Graduate School of Library and Information Science  
Simmons College, Boston, MA 02165, U.S.A.

It is indeed a great privilege to take part in this historical event, and I find the theme of this meeting, "New Mission of Academic Libraries in the 21st Century" so incredibly timely and significant.

This is a magic moment — the 100th anniversary of this great university, which I remember, when I was very little, how I was at awe to hear just the name mentioned. But like all moments it will not last forever. We must make the most of it. This is why I stand before you and hope to explore together with you the exciting and changing time we are in, and how important it is for us to know what to do to prepare our academic libraries for the next century. If we can hold fast to our guiding principles on information access and provision, and know how to use the available technologies effectively, we can make this time of change a moment of dazzling opportunity for all academic librarians.

There is little historical precedent for the swift and dramatic growth of the Internet. In just a few short years, the Internet had evolved from a somewhat esoteric phenomenon to mainstream reality, and from what was a limited scientific communication network developed by the U.S. Government to facilitate cooperation among Federal researchers and the university research community, to a ubiquitous communication and information access tool across all levels of educational institutions, and a popular global open system, which has changed the way we work, we function, we learn, and we communicate. Knowing that many excellent papers at this conference are on academic library network developments via the Internet and innovative use of this generation Internet for better information access and service provision, I have chosen to speak more on the *Next Generation Internet* and the changing role of academic libraries in the digital knowledge society.

As a member of President Clinton's Advisory Committee on High Performance Computing and Communications, Information Technology, and Next Generation Internet, I have been enormously privileged to work with a group of high-power IT leaders on the committee and have kept more up-to-date with the US government's new direction in this area of developments. Let me share with you first a short 5 minute video called "*Advanced Networking: Connecting to the Future*".<sup>1</sup>

[Showing of *Advanced Networking: Connecting to the Future*]

Clearly we can begin to imagine what the future will hold for us for document delivery, for education, for home and schools, etc. We can begin to imagine the vision of the Next Generation Internet.

## **Next Generation Internet (NGI) Initiative**

### *The NGI Vision*

In the 21st century, the Internet will provide a powerful and versatile environment for business, education, culture, and entertainment. "Sight, sound, and even touch will be integrated through powerful computers, displays, and networks. People will use this environment to work, study, bank, shop, entertain, and visit with each other. Whether at the office, at home, or traveling, the environment and its interface will be largely the same. Security, reliability, and privacy will be built in. Customers will be able to choose among different levels of service at varying price points. Benefits of this dramatically different environment will include a more agile economy, improved health care — particularly in rural areas, less stress on the ecosystem, easy access to life-long and distance learning, a greater choice of places to live and work, and more opportunities to participate in the community, the Nation, and the world"<sup>2</sup>.

### *The NGI Goals*

To make this vision possible, President Clinton and Vice President Gore announced on October 10, 1996 the Next Generation Internet (NGI) Initiative, which will accelerate the introduction of new networking services for our businesses, schools, and homes with the following specific goal<sup>3</sup>:

NGI's first goal is to research, develop and experiment with advanced network technologies that will provide dependability, diversity in classes of service, security, and real-time capability for such applications as wide-area distributed computing, teleoperation and remote control of experimental facilities. These activities focus on network growth engineering, end-to-end QoS, and security.

Accompanying the development of advanced network technologies is NGI's second goal, development of the next generation network fabric. This effort will overcome today's speed bumps slowing end-to-end usable connectivity caused by incompatibilities in switches, routers, local area networks, and workstations. Two thrusts within this goal are planned: First, construction of a high-performance distributed laboratory consisting of the 100 NGI sites at universities, Federal research institutions, and other research partners at speeds in excess of 100 times today's Internet. This laboratory will be large enough to provide a full-system, proof-of-concept tested for hardware, software, protocols, security, and network management required by the commercial NGI. Second, developments of ultra-high speed switching and transmission technologies and end-to-end network connectivity at more than one gigabit per second. Such networks will be high-risk, pioneering networks limited to 10 NGI sites at speeds 1000 times faster than today's Internet. The network fabric for NGI is vans for the moment.

These two goals — experimental research of advanced network technologies and development of the next-generation network fabric — will provide the basis for terabit per second networks operated by appropriate network management and control providing guaranteed end-to-end QoS.

Finally, Goal 3 to test the advanced capabilities of the first two goals. It will demonstrate a selected number of applications requiring these capabilities over the NGI network(s). Procedures have been established to ensure that selected applications provide robust, realistic complete tests of technologies that can be extended and adapted to other applications. Initial applications are being chosen from the federally focused applications in appropriate technology classes, such as digital libraries, remote operation of medicine, and crisis management<sup>2</sup>.

Virtual environments (VEs) will also be developed. These are applications of potentially wide-spread utility in medicine, design, collaboration, and training that demand high bandwidth, low latency communications, and have the potential to exploit vast amounts of computational and storage capabilities. Through the use of virtual worlds tailored for specific educational or training tasks, VEs have the promise of fostering fast and effective learning ... In the academic environment, VEs can engage students and foster faster learning ... Virtual laboratory infrastructures can be easily applied to educational purposes, augmenting science education. Collaborative VEs are expected to help develop social and team communication skills that prepare students for an information-based society and work force.<sup>3</sup>

This multi-agency NGI initiative — a solid partnership with industry, academia, government and the American public — provides the catalyst for the development of high-performance, secure, reliable networks of the future and holds great future promises.

#### *Internet2*

The NGI initiative is closely related to Internet2, a collaborative effort by more than 100 U.S. research universities to create and sustain a leading edge network capability enabling the creation of the broadband applications, and education. While the goals of the NGI and Internet2 are complementary and interdependent, they are clearly distinct. The NGI initiative is a Federal mission-driven R&D program, while Internet2 focuses on innovation in academic research and education applications. The NGI initiative will create an experimental, wide area, scalable tested to develop mission-critical applications; Internet2 will meet end-to-end performance requirements by developing and deploying advanced network infrastructure. Much of the wide area tested for Internet2 will be provided by the NGI Initiative. Both the NGI initiative and the Internet2 project will develop and test advanced network technologies not supported by today's Internet, primarily through NGI-funded research at Internet2 universities. Continued strong coordination and communication between the Federal and academic communities will be crucial for the success of both programs.<sup>2</sup>

#### **Digital Library Development**

At the present time, we do not have a clear "theory" of digital libraries. The term, "digital library," has been used rather loosely. Although simple definitions have been given by many, they are generally not well defined. For example, Lesk called a "digital library" "a collection of information that is both digitized and organized"<sup>4</sup>. This can have so many different interpretations ranging from a digital collection of digitized books, journals, reports, or photo collections to something more complex ones in network-based collaborative knowledge environment. Yet, they all share some common characteristics — i.e., a digital library can be searched, accessed all over the world, and copied without error.<sup>4</sup> In order to do this, a digital library must have digital CONTENT, and content must be properly stored, organized, so that it can be found or retrieved. This is why so many current "digital library" projects have been heavily involved in making the library collection digital or bringing together available digital files so that information can be accessed and shared via the network.

The "digital library" applications solicited for the NGI initiative will not be concentrating in the baseline efforts for scanning and digitization. Instead, as articulated by the National Science Foundation (NSF)'s Human Centered Systems (HuCS) program, effort will be made to support university-led research in the development of advanced methods for collecting, storing, and



organizing information in digital form for network access; and advances in multi-agency supported basic research on multimodal interaction with computing systems, including speech, text, image, and multimedia advanced technology. As of today, NSF has already supported 6 major “digital library” projects and the FY 1998 NSF’s HuCS R&D areas include the continuing development of knowledge repositories and information agents that sort, analyze, and present massive amount of multimedia and multi-source information; collaborators that provide access to knowledge repositories and facilitate knowledge sharing, group authorship, and control of remote instruments; systems that enable multimodal human-system interaction including speech, touch, and gesture recognition and synthesis; and virtual reality environments and their use in scientific research, health care, manufacturing, and training<sup>5</sup>.

### **Future Higher Education Institutions**

With the potential of NGI, the notion of university campus will take on a very new meaning. We will see more geographically dispersed learning centers come to being, distant-learning and “one-to-one” interaction will be very viable means of education provision, university research will have more global collaboration, and educational services will follow and extend the medical center model. No wonder Peter Drucker and others have predicted that in thirty years the university as we know it will no longer exist. Yet some think that for the short run, however, the Internet will probably augment higher education more than it will transform it, because the Internet is still too new, too costly, and perhaps too threatening to bring about major change any time soon. They argue that regulation, bureaucracy, tradition, and turf will block its more revolutionary potential<sup>6</sup>.

Regardless what, it is sure that the Internet will provide “better, faster, cheaper” additions to existing academic structures and traditions, as well as open the playing fields of higher education to private-sector firms, sometimes in cooperation and sometimes in competition with academic institutions<sup>6</sup>. Thus, for academic libraries of the future, the NGI’s opportunities for convenient and timely knowledge update and access and for efficient transfer of knowledge are enormous. Undoubtedly, NGI will fundamentally and radically change the way which higher education faces new demands, and academy libraries provide aggressive information services.

### **Global Digital Library (GDI) and Universal Information Access**

In recent years, we have passed several “information jumps” from speech to writing to printing, and now to wire and wireless communications. Now, this gigantic open system —— the Internet —— has offered tremendous opportunities to library professionals, but it also has many inherent problems, such as traffic congestion, the lack of bandwidth, quality of services, etc. As the NGI develops, current Internet problems will have been addressed and what lies ahead is a real jump for us toward universal information access. This means that technologically, anyone, anywhere, could talk, write, confer with, or send multimedia —— textual, audio, and visual —— digital information to anyone else in any part of the world! So, the concept of the digital “Global Library,” which I have been advocating in the last decade, is not only conceptually sound but also technologically feasible now. Yet, we still need to pass many hurdles before we can reach this goal because there are still many barriers. Some of the major issues include<sup>7-9</sup>:

- System-centered issues:
  - Scalability