

## The Library Automation and Network Development and Prospect in Taiwan Area

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### 【Abstract】

本文敘述台灣地區圖書館自動化發展的歷程，分為啓蒙（1961-1970）、萌芽（1971-1980）、全國性的規劃（1981-1990）、以及資源共享等階段（1991-），並介紹與圖書館自動化發展相關連之台灣地區三大網路：台灣學術網路（TANet）、網際資訊網路（HiNet）、以及種子網路（SEEDNet），最後提出圖書館自動化未來發展的方向：(1)針對需求，提供個別化服務；(2)網網相連，共享資源；(3)數位化資訊，無遠弗屆；(4)資源指南，全民共享。

The paper briefly states the library automation development in Taiwan Area from the enlightenment (1961-1970), budding (1971-1980), National planning (1981-1990) to the resources sharing (1991-) periods, introduces the three main networks in Taiwan Area that are closely connected with the library automation development, namely, TANet, HiNet and SEEDNet, and indicates the future possible trends of the library automation development as follows: 1. to render individualized service in accordance with the actual demands; 2. to offer network-to-network information sharing; 3. to provide global digitalized information, and 4. to sponsor information orientation for people of all walks of life.

#### 關鍵詞 Keyword

圖書館自動化 圖書館網路 資訊系統

Library automation; Library network; Information system



## 1. Foreword

The development of the library automation in Taiwan Area has gone through the searching and growing stages from the early self-development of the library automation system respectively by each library to the development of the integrated library automation system and the library and information network. Generally speaking, with the support of the Ministry of Education the college and university library automation has been much more developed than that of other types of libraries. Especially after 1990 with the strenuous promotion of the Taiwan Academic Networks (TANet) by the Ministry of Education the library automation has been developed on system integration and network basis. As to the planning of the library automation and information network development for the public libraries the Department of Education of Taiwan Provincial Government assigned the Taiwan Provincial Taichung Library in December 1995 to activate the Information Network Guidance Committee for Public Libraries in Taiwan to formulate the "The Planning Highlights of the Public Library Automation and Information Network in Taiwan" so as to serve as a useful reference for the automation and information network development by the libraries of the cultural centers of various cities and counties in Taiwan. The continuation and promotion of the said assignment has been turned over since May 1997 to the newly-activated Department of Cultural Affairs of the Taiwan Provincial Government.

All in all, the library automation in

Taiwan Area has been developed from the respective efforts to the standardized levels and electronic library. Such progress owes to two important factors: one is the joint ventures of library and information scientists and the support of the governments at various levels, and the other is the progress of the computer and network communication technology.

## 2. The Library Automation Development in Taiwan Area

The computer data processing in Taiwan Area started early in 1951 while that by libraries in Taiwan began in 1960. The following is an account of the library automation development in five stages during the past four decades in Taiwan Area:<sup>①</sup>

### 2.1. Enlightening Stage: 1961-1971

During this stage several universities in Taiwan Area first began to install computer main frames for backing up teaching and research. Among them are the National Chungshan Institute of Science and Technology and Tamkang University. The library of the former introduced and used the LC MARC Tape of the United States for printing the card catalogs of the Western-language books while the library of the latter used the computer for printing the Western-language collections catalogs. Since librarians were then not very clear about the computer functions and the computer people were not familiar with the library operations there were no Chinese versions of the computer operations during this stage. Computers could only be applied to Western-



language data and used just for printing.

### *2.2. Budding Stage: 1971-1980*

As a result of the progress of the information technology the computer users were on the increase and there had been better communication between computer programmers and librarians. Therefore, library automation was rapidly developed then. For instance, in 1972 the Library of Physics of the National Chinghua University used the IBM-1130 available in the campus to print the book-formed Western-language catalogs. In 1973 the Science Technology Information Center of the National Council of Science used computers to print the third edition of the Union Catalog of Science Periodicals in Western-language of the Republic of China. That is the first union catalog edited and printed with computers in Taiwan Area, pioneering the computer cataloging in Taiwan.

In 1977 Tamkang University used computers to print the order form of acquisitions of Western-language publications, accessions and periodicals catalogs. In 1978 the National Taiwan Normal University Library set up the Educational Database in the Chinese Language, published in 1980 by computers the third issue of the Educational Abstracts Information Service, and introduced into Taiwan in May 1980 the ORBIT and DIALOG systems through the Universal Database Access Service (UDAS), marking the new record of the online retrieval of foreign information systems by libraries in Taiwan Area. In 1979 the National Central Library collaborated with Wang An Computer Company to publish the Union Catalog of Chinese Periodicals. In 1980 the National

Central Library cooperated with the Directorate General of Budgets, Account and Statistics of the Executive Yuan to set up the Index to Chinese Periodical Literature of the Republic of China. The Agricultural Information Service Center established "Agricultural Technology Management Information System", and the Chinese Characters Working Group completed the Chinese Character Codes for Information Interchange (CCCII). The CCCII has since then been a useful reference for handling Chinese information with computers and also a standard of the Chinese character codes for information interchange.<sup>②</sup>

### *2.3. Nationwide Planning Stage: 1981-1990*

With a view to improving the library management, upgrading the information service quality, and coping with the requirements of information and cultural interchange at home and abroad the Library Association of China and the National Central Library jointly organized the "The Library Automation Planning Committee" to prepare the "Library Automation Plan" so that the library automation would have an integrated planning and common development objective. The said Plan has completed the following important tasks and laid good foundations for the library automation:

1. Unify the formulation of the Chinese information automation
  - (1) The revision of the Chinese Cataloging Rules
  - (2) The preparation of the Chinese Subject Heading (Draft)



- (3) The formulation of the Chinese Machine Readable Cataloging, (Chinese MARC)
2. Develop the library cooperative cataloging automation system and set up the largest Chinese Bibliographic Database in the world.
3. Set up and introduce Western-language databases from abroad so as to meet the demands of information service.
4. Build up the national information network framework to cope with the requirements of the national reconstruction and promote the development of academic research.

#### 2.4. Information Resources Sharing: 1991-

Since 1982 owing to the rapid development of the Chinese computerization, the completion of the revision of the Chinese MARC and the broad use of the ISO 2709, Documentation-Format for Bibliographic Information Interchange on Magnetic Tape, the development of domestic or foreign information systems has been made toward the unification and standardization and the development and introduction of the library automation systems has been made in large quantity in Taiwan Area. These systems include the following ones: the INNOPAC system of the Innovative Interface Inc. (III) of the United States introduced to Taiwan in 1991 by the Academia Sinica, which has been adopted by the National Chengchi University, the National Taiwan University and the National Taiwan Normal University and has been designated as the main information

system since 1997 by the National Central Library for its National Bibliography Center to serve as the basis of bibliophile resources sharing in Taiwan Area.

The T2 system was developed in 1995 by the Transtech Computer Co. of Taiwan and T2-2.0 version was further brought about in 1997. Since T2 is the library automation system studied and developed by Taiwan-oriented computer company it has great potentials for further development.

The institutes and organizations that have used the above-mentioned two systems have activated the "User's Group" to establish cooperative relationship through such automation systems. The existence of such library cooperation groups has its positive significance for information sharing.

In 1997 the National Chiaotung University worked out the "Introduction and Installation of Foreign Electronic Periodicals and Full Texts Database Plan" (InfoSpring)<sup>3)</sup> to offer electronic periodicals and reference materials from Elsevier Science, OVID, etc.. Since then there has been the recognized tendency to engage in cooperative ventures for database setup and the full text information service in the library automation development. In the same year realizing the situation that the implementation of the library automation by various libraries in Taiwan with their own information systems without unification has led to the difficulty in maintenance, the interchange among different information systems and obstacles in information sharing, the Ministry of Education entrusted library and information scientists to jointly formulate the "the common standards for the library automation systems hardwares and softwares" to serve



as the reference for the development or selection of new library automation systems on the part of libraries and information circles.

In short, during the last ten years of the twentieth century large libraries in Taiwan Area have mostly begun to change their old automation systems and the Internet has been developed and the online databases have been extensively used during the same period. So the idea of information sharing among various libraries has been gradually materialized.

### 3. Establishment of Library Information Systems

#### 3.1. Development and Introduction of Library Automation Systems in Taiwan Area ④

After the successful implementation of CCCII and Chinese MARC the introduction and development of library automation systems has been quickly grown up. The systems domestically developed and introduced from abroad can be briefly described as follows:

##### 3.1.1. Systems Developed by Domestic Computer Companies

Since there is the basis of the integrated planning standards for the development of library automation systems, various systems can be formulated and marketed with the standardized model. Furthermore, owing to the improvement of the computer software and hardware technology, lower prices, and the emphasis on the library development by the government, the information systems

companies have more willingly invested on the library automation softwares and consequently more systems have been developed by libraries themselves or computer companies with their investments and they can be accounted as follows:

#### (1) *Trilateral Information Service Library Automation System (TISLAS)*

This system is fit for public libraries, school libraries and small-type special libraries. At present there are 102 users ⑤ including public libraries, college and university libraries, high schools and primary schools libraries, special libraries and county and town libraries. So it is the automation system more broadly used by more libraries in Taiwan Area.

#### (2) *Technology Opulent TRANSTECH Automated Library System (TOTALS)*

The Transtech Computer Company in Taiwan developed in 1974 the first set of Chinese computer system entitled "Chinese Number one", built up a set of Chinese cataloging demonstration system in 1985 jointly through the technological cooperation with the Department of Library and Information Science of the National Taiwan University, developed the "the National Taiwan University Library and Information Management System" in 1986 with the National Taiwan University Library that can handle information in the Chinese, Japanese, Korean and English languages, and commercialized the said system in 1987 for the extensive use in the fields of library and information science. There are so far 15 users in Taiwan, mainland China and



Germany. ⑤ Then in 1995 Transtech Co. started to develop TOTALS II (Technology Opulent TRANSTECH Automated Library System II, T2) and formally manufactured for marketing in 1997. T2 is designed with the Client/Server structure and with the Web served as the interface of public catalog search. Up to 1997 its users in Taiwan Area have included 18 public and private university libraries (the National Chinghua, Chiaotung, Chengkung and Chungsin Universities, etc.) and six libraries of government-owned and private institutions<sup>(7)</sup>, thereby indicating the urgent concern of its development by libraries in Taiwan Area.

#### *(3) Rainbow Bridge Library Automation System*

This system is developed by Rainbow Bridge Computer Company and made available in module forms suitable for the utilization by college and university libraries, public libraries, school libraries and special libraries.

#### *(4) Prime FORMOSA System*

First International Computer, Inc. developed this system jointly with the Fungchia University in 1990 and had online operations in January 1991 with PRIME as its main frame. It is made available with modules and is fit for use by public libraries, university libraries and special libraries.

#### *(5) Chinese Library Automation System (CLA)*

Taipei Join Computer Company developed this system with personal computers. Join Computer Company is the main supplier of

CCCII softwares in Taiwan Area and has made considerable contributions to the library automation in Taiwan Area.

#### *(6) ARTIS Library Automated System (ARTIS)*

Wen Kang Computer Company developed ARTIS in 1991 with Client/Server structure and MS-Window as work platform supplying Graphic User Interface (GUI), and made available with modules. It fits for university libraries, public libraries, school libraries and special libraries and has at present four users in Taiwan Area including Tainan College of Arts.<sup>(8)</sup>

Besides, there are over twenty small systems such as Chingchiang Number One Library Automation System, Po Teh Library Automation System, Hsueh Ying Number Three Library Management System,...etc. all with personal computers and small-type libraries chosen as their users. The availability of so many competitive information systems is evidence of the emphasis on the library automation development in Taiwan Area.

#### *3.1.2. Foreign Systems Introduced by Domestic Computer Companies*

During the 1980s foreign information systems were introduced to Taiwan Area and were revised or Sinolized to meet the library requirements in Taiwan Area. Some of such systems can be briefly described as follows:

#### *(1) DOBIS/LIBIS Library Integration System*

In 1984 Tamkang University cooperated with Taiwan IBM Company to develop the



DOBIS/LIBIS Sinolized Library Integration System, DOBIS/LIBIS/TALIB (TALIS) that has become the first Chinese library automation integration system adopted with the software packages.

### *(2) Syscom-introduced UTLAS/T50 System*

UTLAS/T50 System was developed by Syscom of Taiwan with the Chinese version revised from the Source Codes of UTLAS Company of Canada authorized to Syscom and has been formally used since September 1990 by the National Chengkung University Library.

### *(3) Software Enhancement Application Universal Real Time Information Control and Access (SEA-URICA)*

In October 1985 Taiwan Top Business Machine Co. introduced the URICA integrated library automation system developed by the AWA (Australia Wireless Amalgamated) Company of Australia to Taiwan, had it Sinolized and converted it into a system suitable for use in the Chinese environment.

### *(4) American INNOPAC Library Automation System*

In 1990 UNIWISE Information Corporation introduced the INNOPAC system of the Innovative Interface Inc. (III) of the United States and had it Sinolized so as to be applicable in the Chinese environment.

### *(5) Dynix Library Automation*

In 1990 Taiwan IBM Company introduced Dynix system from the United States and had it developed as an integrated Chinese library automation system.

### *(6) VTLS-Vitua System*

In 1997 Chin Shan Information Company introduced VTLS-Vitua System from the United States and being Sinolized at present for utilization in Taiwan Area.

## *3.2. Development of CD-ROMs ⑨*

The development of CD-ROMs in Taiwan Area began in 1986. The main Chinese CD-ROMs provided by libraries in Taiwan Area are as follows:

### *3.2.1. Cataloging in Publications on CD-ROM System*

The National Central Library cooperated in 1993 with the Flysheet Information Service, Inc. Company to develop the Chinese Publications Catalog on CD-ROM (SinoCat) that has accessed all the Chinese bibliography data collected by the National Central Library up to 1993 including books, periodicals, audio-visual materials, microfiches and computer files on the "Chinese MARC Format" and it is scheduled for revision semi-annually ...

### *3.2.2. Index to Chinese Periodical Literature on CD-ROM*

The Index to Chinese Periodical Literature on CD-ROM was brought about in August 1993 by the National Central Library with the cooperation of the Institute of Technology Research on Industry (ITRI) and the Institute of Computer and Communication Industry with all bibliography of articles in Chinese and Foreign-languages published in Taiwan Area included in CD-ROMs and with revisions semi-annually for publication. Besides, there is also the Current



Chinese Periodicals Contents Database ® developed by Hsu Wen Information Company with related data jointly supplied by the libraries of the National Central University, the National Taiwan Normal University and the National Chengchi University. The entries include the contents of Chinese periodicals published in Taiwan Area or collected by the various libraries and are made available through WWW for searching of articles, authors and periodicals titles by readers in general.

### 3.2.3 *Index to Dissertations on CD-ROM*

Flysheet Information Service, Inc. presented in September 1992 Index to Dissertations on CD-ROM collecting the indexes and abstracts of Ph.D. Dissertations and master degrees' theses written by Chinese scholars from Taiwan, mainland China, Hong Kong, the United States of America and Canada. Besides, the National Chengchi University libraries also published the Index to Chinese Dissertations on CD-ROM with their collections from 1949 and semi-annual revised editions.

### 3.2.4 *Chinese Ancient Works on CD-ROM*

Chinese Ancient Works on CD-ROM was developed in July 1984 by the Academia Sinica with full texts of the Twenty-five history collections databases as its backbone. It was completed in June 1990. Footnotes of the Thirteen Classics (9) and nineteen classics by scholars of the early Chin Dynasty were later added in the CD-ROM, thus totaling over 90 million characters in the CD-ROM and making it an important tool for the

study of Sinology at home and abroad.

### 3.2.5 *Special Subjects Literature on CD-ROM*

#### (1) *Management Abstract Retrieval System (MARS)*

This CD-ROM was developed in May 1994 jointly by the Graduate Institute of Business Administration of the National Chengchi University and Transmission Information System Company (TISC) with collections covering dissertations and theses in the fields of business management and administration, commerce and international trade. It has further been made available since 1997 with the Web Site for information retrieval by individual users.

#### (2) *Chinese Library & Information Science Abstracts (CLISA)*

This CD-ROM is developed by TISC with Professor Lee Teh-chu of the Graduate Institute of Library and Information Science of the National Taiwan University as advisor. It collects abstracts of literature related to the library and information science written in Chinese and English at home and abroad from 1955 to 1997. Its contents cover an index to periodicals articles, BA, MA and Ph.D. dissertations and theses, books, conference papers, and research reports. And it falls into five categories: general and administration, library automation and information science, technical service, reference information service, and non-book information. CD-ROM and online Web site editions were published in June 1997 with over 5,000 entries collected from Taiwan Area. And its later new edition also includes works by scholars of library





and information science and Ph.D. dissertations and MA theses at several main universities on mainland China including Peking University, Nanking University, Wuhan University, Nankai University and Sun Yat-sen University.⑩

### 3.2.6 *Index to Chinese Newspapers on CD-ROM*

The *Index to Chinese Newspapers on CD-ROM* was developed in 1996 by the National Chengchi University Libraries jointly with TISC. It is the only newspaper articles index on CD-ROM that collected articles from 21 popular newspapers in Taiwan Area. Besides, there is also the *Current Newspaper Headlines Index Database in Taiwan Area* that collects daily headlines of all pages of five popular newspapers: the *United Daily*, *China Times*, *Economics Daily*, *Commercial Times*, and the *Central Daily*. It has been made available since January 1, 1996 with contents covering politics, social news, financial and economics, recreation, sports and literary supplements.

### 3.2.7 *Civil Service Examinations Questions and Answers on CD-ROM*

This CD-ROM is developed by Flysheet Information Service, Inc. with questions from national civil service examinations held from 1992 to 1995 included by classification and analysis titles. And through Boolean searching information retrieval for each question is made available for the related names of the examinations, abbreviations of the examinations, positions classification, years of the examinations held, specialized

fields of study, subjects examined, nature of the examinations, titles, questions types, questions examined, and file numbers.

## 4. Information Network System Development in Taiwan Area

### 4.1. *Taiwan Academic Network (TANet)*

In 1986 China Bureau of Telecommunication installed fiber cables in Hsinchu Area and connected the National Chiaotung University, the National Chinghua University, Hsinchu Science Park, and the Institute of Technology Research on Industry in one computer network system. In 1990 the Ministry of Education developed the campus network for twelve colleges and universities including the National Taiwan University and completed the initial stage of the Taiwan academic network. The basic framework covers three levels: campus network, inter-campus network, and international network.⑪

#### 4.1.1. *Basic Framework*

##### (1) *Campus Network*

In 1990 the Ministry of Education implemented with its Office of Technology Advisors the "Three-year Development Plan of the Campus Network" and supported main universities and colleges to set up their own campus network so as to integrate computer resources available in the campus through the planned network and to serve as the transmission channels for academic teaching and research.

##### (2) *Inter-Campus Network*

The development of the inter-campus



network can be traced back to 1986 when the computer main frames of the same brands at several national colleges and universities were connected through the data channels of the China Bureau of Telecommunication. Such kind of the network is basically connected on main-frame-to-main-frame basis. It covers (1) Information Network (IFNET), IFNET connected with the VAX main frames of the information science-related departments or computer centers of six universities. (2) UNiversity NETWORK (UNINET): The network connected with CDC main frames of computer centers of seven colleges and universities. But regrettably these two networks are not inter-communicable. (3) The teaching and research information service network of the Ministry of Education that is connected with 15 colleges and universities including the National Taiwan University on IBM main-frame-to-main-frame basis or by setting up working stations within the campuses.

### *(3) International Network*

In 1987 BITNET was joined by Taiwan Area. That is the first international academic network used by the Republic of China on Taiwan and is an important turning point to the academic world in Taiwan for it signifies that Taiwan keeps pace with the global information and shares the brotherhood with other parts of the world. Although BITNET is not so important now as it was in the past, it has really introduced new information to Taiwan and has promoted the present development of the Internet in Taiwan Area.

### 4.1.2. TANet Structure<sup>③</sup>

TANet is a national teaching and research network that has been jointly set up since July 1990 by main national universities and the Ministry of Education. Its chief purpose is to back up academic research activities among various schools at all levels and research institutes for mutual resources sharing opportunities for cooperation. TANet has the backbone and regional network structure and also the information infrastructure related to research information application.

*There are three levels in the TANet structure:*

*The first level: National Backbone Network:* It is expected to connect internally with regional network centers in different areas and to connect externally with the international networks as those in the United States of America or Japan. And it is responsible also for connecting domestically related networks such as HiNet, SEEDNET, administrative networks, etc. All this is in charge of the regional network center of the Ministry of Education.

*The second level: Regional Network:* It connects with the National Backbone Network through the regional network centers and sets up whenever necessary regional backbone channels to connect municipal and county educational networks through municipal and county educational network centers. Basically each city and county should set up its educational network to provide education and research-related information network for its own use. This task is undertaken by the regional network centers and the municipal and county



educational network centers.

*The third level: Campus Network:*

This is the regional network for the individual research institutes, educational administration organizations, social educational institutes such as libraries and cultural centers, campus network offers two kinds of service: (1) calculation sharing on the networks and (2) information retrieval. Libraries can make use of these functions to render service in information sharing.

The TANet backbone is connected by the Ministry of Education through T1 with the regional network centers of the National Taiwan University and the National Chengchi University and through T3 with the National Chiaotung University and the National Chengkung University. It is the largest-scale information network in Taiwan Area.④

#### 4.2. HiNet⑤

After its commercialization the Internet has been more popular internationally. It has not only become the focus of the public's attention in Taiwan but has also brought the government's more emphasis. Therefore, the government has worked out a blueprint for the National Information Infrastructure (NII) to positively implement the plan of "electronic government" and "government service on the network". Furthermore, the government has clearly indicated to the public its willingness and determination to carry out the objective of elevating the integrated competitive potentials of the country to the effect that the plan of "E-mail Transmission to High and Primary Schools" will be implemented so as to promote the computer information

application technology to the grassroots and realize the goal of "Computers Available in Each Village and Network at Each Subward".

To cope with the government policy and meet the requirements of the computer industry and the public China Telecommunication Data Processing Company embarks on the task of building up the national information highway. It completed the establishment of HiNet on March 31, 1994, had it used tentatively for one year, and then formally opened it to the public for commercial use from April 1, 1995. Up to the present its users have been on the increase in large numbers. So the HiNet is now the largest commercial information network in Taiwan Area. Its main service covers: ⑥

- (1) Internet communication service
- (2) Terminal communication service
- (3) Information application service

#### 4.3 SEEDNet⑦

SEEDNet is originated from the four-year plan of the "Software Engineering Environment Development" (SEED) made by the Institute for Information Industry in July 1990 at the request of the Ministry of Economic Affairs. The objective of the said plan is to upgrade the software development and the quality of its application. But in order to make the plan really fruitful it has been connected with the available public data processing installations to set up an open network, namely, the SEEDNet. Since 1992 SEEDNet has been open to people of all walks of life for practical use in Taiwan with satisfactory results and has thus turned



out to be the earliest Internet rendering network service to the industry in Taiwan. The rendered service includes the following:

- (1) Internet dial-first-pay-later service
- (2) SEEDNet service, offering hard disk rent of WWW Server
- (3) Homepage design agency, CGI interface utilization, etc.
- (4) SEEDNet Homepage bulletin board rent, rendering the best network bulletin board service to the business and industry circles in Taiwan
- (5) SEEDNet main frame dial service
- (6) Network title application service

SEEDNet Online Service is the first Chinese instantaneous service system of the Internet with its service covering global financial news, financial news of Taiwan, and the foreign exchange quotations, etc.

## 5. Integrated Automation System and Information Sharing

Information sharing is the ultimate objective of the library automation and its means is the inter-library cooperation to be achieved through the network. When libraries in Taiwan Area have completed their automation, they begin simultaneously to integrate all library systems and build up the network structure. Especially since 1991 the Ministry of Education has positively promoted the academic network and integrate the automation systems of libraries at all levels in the hope that the new frontier of information sharing can be materialized at an early date.

Many plans related to the library and information network have been made with the support of the Ministry of Education. The important ones are described as follows:

### 5.1. Integrated Planning of the National Library and Information Network System

In June 1991 the Library Development Committee of the Ministry of Education invited ten experts including Professor Lee Teh-chu of the National Taiwan University to engage in the study of the "Integrated Planning of the National Library and Information Network System". It is suggested that the said Plan be developed in three stages. In the first stage four university libraries are to be used as the network centers of all cities and counties. Four sets of computer equipments will be procured, bibliophiles be set up, telecommunication channels be rented, the said four centers be connected into one network (long-ranged), cooperative cataloging softwares be developed, the standard research group be activated, the long-term planning implementation group be organized, inter-library loan regulations be formulated, and specification of online searching be worked out. In the second stage county (city) libraries, senior high school libraries, and libraries of cultural centers are to be additionally included in the network. Computer facilities (including network software and the network softwares of libraries developed in the previous stage) will be installed, telecommunication channels be rented, bibliographic database be established, inter-library loan be developed, e-mails and other similar softwares be utilized, network



basic softwares management formulations be made and network trials be undertaken. In the third stage facilities will be renewed, developed standards, formulations and softwares be better improved, advantages and disadvantage of the initial plan be reviewed, and the national development plan be prepared.

### *5.2. Senior High School Library Integrated Automation System Planning*

In June 1993 the Department of Middle School Education of the Ministry of Education invited several experts including Professor Ou-lan (Hu) Chou to prepare the "Plan for Senior High School library Automation System Integration". According to the said plan the existing senior high school library automation systems will be first integrated, the senior high school library network be set up then, and the senior high school library network center be activated by establishing four regional centers in the northern, central, southern, and eastern parts of Taiwan. Each senior high school library in each region can make use of the PC Computer to connect with the regional centers so as to obtain the bibliography available at the libraries of other senior high schools in the region and other regions. And each regional center can connect with TANet through the network channels so that the bibliographic database of the National Central Library can be made available at the senior high school libraries.

### *5.3. Conversion Formats for US MARC and Chinese MARC*

Ever since the presentation of the Chinese

Marc Format in 1981 it has been popularly used and emphasized by the libraries in Taiwan Area. Its third edition in 1989 was also used on the bibliographic network by the National Central Library. The Ministry of Education has further directed that the said Format be formally used as one of the models of the integrated library automation. Therefore, it is necessary to work out conversion formats for the Chinese MARC and the US MARC so as to facilitate their transmission, storage and interchange. Henceforth, the Ministry of Education has entrusted the Library Association of China in Taiwan to complete the conversion formats for the Chinese MARC and the US MARC as useful reference by libraries at all levels and software development companies and as an important tool for the integration of library automation.

### *5.4. Library Automation Common Software & Hardware And Inter-library Resources Sharing*

In March 1997 the Computer Center of the Ministry of Education invited Professor Ou-lan (Hu) Chou of the National Chengchi University Libraries and other experts to prepare the "Library Automation Software And Hardware Common Models"<sup>①</sup> for reference by libraries and computer circles in their developing or choosing new library automation systems.

Moreover, although the library automation has been carried out at all levels of schools with concrete achievements, their softwares packages are mostly different, there is not enough budget for procurement, human resources are insufficient, there is difficulty in maintenance and additional requirements



for installations are subject to the bargaining with computer companies. Beside, information interchange is not so easily made available among different systems and each library just operates its automation by itself without coordination with other libraries. Therefore, the "Software and Hardware Common Models" can be helpfully used by libraries to request computer system companies for the necessary revision or renewal of the system on the basis of the said models so that there will be inter-communication among various systems through the standard interface.

## 6. Conclusion: NII And Library Automation System Development Trends

The ultimate objective of the library automation is information and resources sharing. From the technical viewpoints resources sharing is to be immediately feasible. Therefore, it is very urgent to share the idea and willingness of the inter-library cooperation and prepare regulations of mutual cooperation. In Taiwan Area there has been over twenty to thirty years' experience in the library automation and network development from the individual development and planned integrated development to the current stage of integrated resources, diverse-service resources sharing. It is especially noteworthy that since 1994 the China Bureau of Telecommunication has made the domestic network intercommunication open to the public and has connected the TANet of the Ministry of Education, the SEEDNet of the Institute for Information Industry and the HiNet of the Taipei Telecom itself. Network

users can communicate each other through any one of the above-mentioned three networks at any location and make online access of all sorts of domestic and foreign information. Such information service has largely extended the scope of academic research and interflow and has accelerated for the business world the availability of market information and the control of business opportunities. People are made to understand the policy of the government and have common awareness and the integrated competitive potentials of the country are thus reinforced. Therefore, NII has become an important information policy of the government and also a hot topic in the study of the national development by the public in our society.

In 1994 with realization of the importance of NII Premier Lien Chan directed in August that year that the "National Information Infrastructure Project Working Group" be activated under the jurisdiction of the Executive Yuan to promote with all efforts the said allout national development project and the social development that is closely related to the life of the people. There are five sections of the said NII Working Group with the main goals as follows:

- (1) Construct the country as one of the most progressive computerized countries in the world
- (2) Materialize concretely the concept of the Asian-Pacific Regional Operations Center (APROC)
- (3) Develop new technology and support the development of the new-generation information industry



(4) Upgrade the welfare of the life of the people

(5) Create a better humane social environment

It is evidently perceivable from the above-mentioned five goals that no matter whether in NII, the newly-conceived "Asian-Pacific Regional Operations Center", or even in the "Cross-Century National Development Plan" recently proposed by the Council for Economic Development of the Executive Yuan<sup>⑨</sup>, the "information" demand and supply are essentially related to any of them. And the information supply and demand and the information sharing are the ultimate objectives of the library automation development.

Furthermore, from the observations of the fundamental spirit of the "widespread service" of NII, how to supply the information to the most required people at the proper time and place, how to let the public fairly approach the information, how to distribute reasonably the resources of the established networks—all these are the basic principles of the NII establishment. In other words, when the government uses the revenues to set up the national information network, the social resources spent in the said network development must be shared in turn by all the people.<sup>⑩</sup> This is actually the essence of the library information service. Therefore, the trends of the library automation development will be mentioned in the following as the conclusion of this paper for reference by experts in the library and information science and other fields of study:

(1) *Individual service rendered to cope with the actual requirements*

It is generally agreed that there is abundant information on the HINet. But without proper collection and organization it will make the information circulation difficult. If the information is not offered to the users for the solution of their problems, it will become meaningless. At present there is information service rendered on the networks to users on the basis of their problems and demands. In the future the library automation will be developed in accordance with readers' requirements and there will be the function of individually — rendered service.

(2) *Inter-network connection and information sharing*

"Cooperation" is the basic concept of the library management while the inter-network connection is the best means of realizing the cooperation. The development of the library automation on the network basis is the approach to the realization of resources sharing. After all, the library automation development is ultimately for the inter-network connection and resources sharing.

(3) *Widespread extension of digitalized information*

Digitalized libraries are also called as electronic libraries. They are at present the hot topic internationally and also the trends of the library automation development. The information supplied by the library automation will be no more restricted to the simple bibliography for in the recent years the popularity and utilization of WWW has turned the information transmission from



the simple-media presentation into the multi-media one. The far-reaching digitalized information will turn out to be one of the main information sources supplied by the library automation.

(4) Resources guidance and sharing by all people

The ideal of the widespread service of NII will be materialized by the library functions because the library automation will become in the future the main tool used by all people for online information retrieval and the library automation will turn out to be the guidance of the network resources.

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