

# *The Development of Digital Libraries in South Korea*

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As information technologies have developed, the digital library is making the library undergo a changing paradigm of its role to create, organize, and distribute information resources. Digital libraries have created and promoted innovative information services with digitization of resources. The development of digital libraries has been attracting the attention of many countries and South Korea is no exception. This article provides an overview of recent developments in digital libraries in South Korea. To build the digital library, various innovative projects are currently in progress in-

volving a range of different libraries and institutions. This article also discusses information policies, standards, and technical issues in South Korea in recent years. Until now, the various projects involving digital collections and digital libraries in South Korea have been carried out with very little coordination. If a more coordinated and coherent approach to building digital libraries is to succeed in South Korea, all libraries and institutions will need to work closely together to establish the appropriate framework for co-operation.

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## *Introduction*

A wide variety of opinions and definitions of the digital library has been offered during the past few years and the concept of a digital library means different things to different people (DLF 1999, Schwartz 2000). Digital libraries emerged primarily because of concerted efforts in the mid- to late 1990s by national government agencies or large-scale collaborations.

- Digital Libraries Initiative (DLI) Phase 1, 2: DLI is administered by the National Science Foundation (NSF) in the USA (DLI2 2002).
- American Memory: American Memory is a gateway to rich primary source materials relating to the history and culture of the USA (LC 2002).
- The Digital Library Federation (DLF): The DLF is a consortium of libraries and related agencies that are pioneering in the use of electronic-information technologies to extend their collections and services (DLF 2002).

In South Korea the number of broadband subscribers was 370,000 in 1999, 4.02 million in 2000

and 7.81 million in 2001. And the 10 million mark was finally set on November 2002. The 10-million mark stresses the fact that South Korea is the “No. 1 Internet nation” in the world (Yang 2002). Most important digital library projects in South Korea were initialized in the mid 1990s. In 1995, the first Internet-based digital library service was provided by the LG Sangnam Library. At present there are quite a large number of activities and projects being undertaken in South Korea with respect to digital libraries – some on a national level and others on a much more local level. Some projects cover subject areas (e.g. science or culture); others cover types of material (e.g. journals, rare books, or reports), while still others focus on the issues and challenges surrounding digital libraries (e.g. standards, intellectual property, or technological issues). The purpose of this article is to provide a brief overview of some of the digital library projects in South Korea and is to address the issues, standards, and challenges that are confronting libraries in their desire to go digital.

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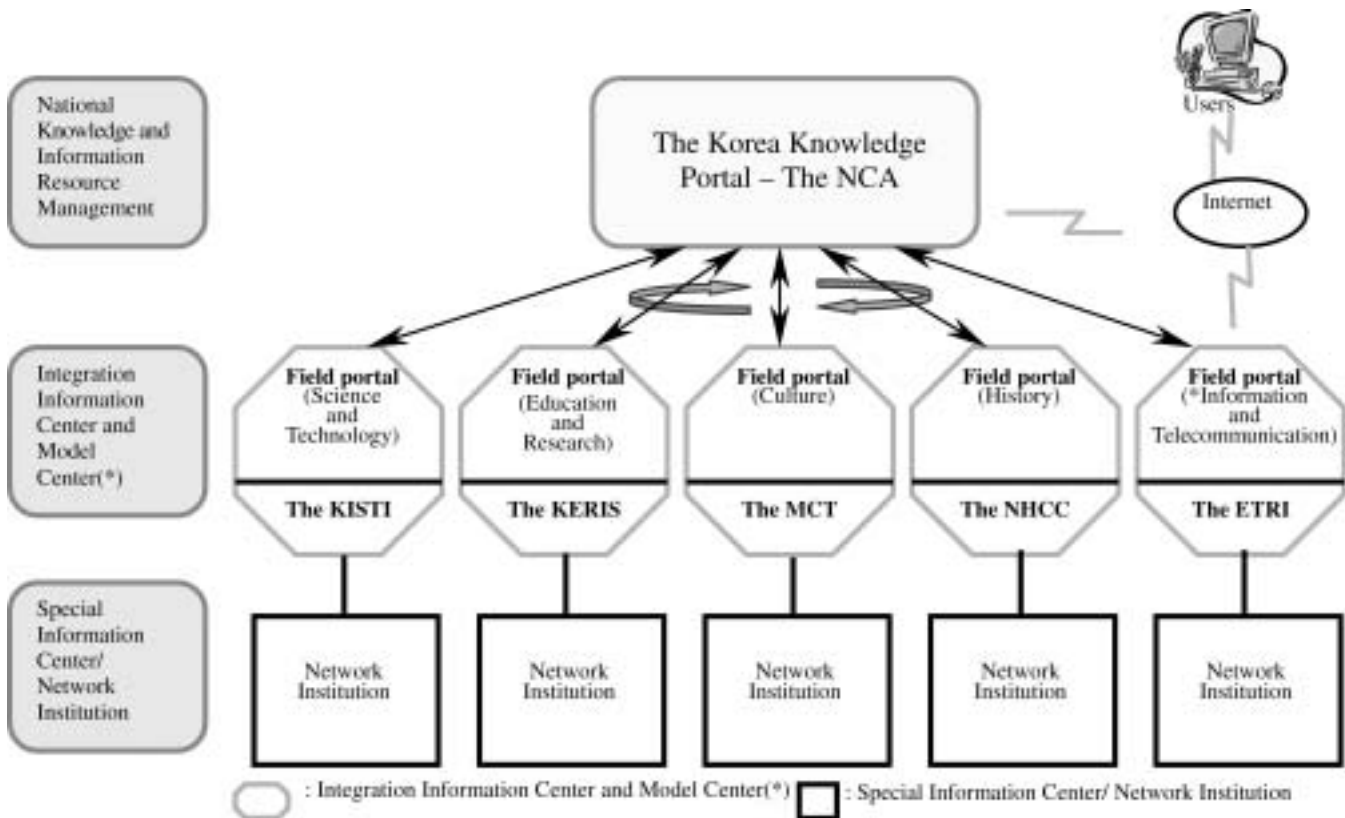


Figure 1: The core components of the KIRM architecture

### *Projects funded by the National Knowledge and Information Resource Management*

#### *The Knowledge and Information Resource Management*

The South Korean government has been developed to improve national competitiveness in the information society of this 21<sup>st</sup> century by providing needed information for the general public as well as some researchers through online, by way of national information capacity enlargement linked with domestic major libraries and institutions, and by balanced regional development and enhancement as well as by development of the sharing system in national information resources. The knowledge and information resource management (KIRM) business has developed based on an act on the management of knowledge and information resources (enacted on January 2000), an enforcement decree on management of knowledge and information resources (enacted on August 2000), and an enforcement act on management of knowledge and information resources (enacted on August 2000). They were enacted in order to

ensure the infrastructure for the national information industry so that public and private sectors can actively utilize systematically managed information resources, which were scattered in the central and local governments. They provide basic guiding principles on management and use of the information resources of South Korea.

The objective of the KIRM is to construct an electronic sharing system of various information resources, which share the values of preservation and use from the viewpoint of a nation. An electronic sharing system of information resources is a system in which anybody can easily acquire useful information at anytime and anywhere by redesigning the managing process of information resources, using information technologies. The implementation of these projects depends on various government agencies, libraries, and related institutions. The Ministry of Information and Communication (NIC), through the National Computerization Agency (NCA), is funding the development and distribution of the KIRM projects. Figure 1 illustrates the core components of the KIRM architecture. The major missions and functions of the KIRM are summarized as follows:

- The NIC and The KIRM Committee: Establishment of a master plan and project implementation policies.
- The KIRM Centre – The NCA: Selection of projects requiring support, project implementation management, project supervision, and budget execution.
- Integration Information Centre/ Model Centre: Selection of system suppliers, supervision of project execution, and evaluation of results.
- Special Information Centre/ Network Institution: Acquisition and management of licensed information resources and project development management.

Currently the KIRM projects comprise 40 projects. The majority of these projects were developed for collections in various genres and subject areas by government or public institutions. Others are building new services that will enrich users' experiences with these digital collections. If some members of this larger community participate as users, some actively contribute related contents, and some become part of the digital library, the result will be a heterogeneous community of participants and technologies. The various projects in the KIRM have been carried out with little coordination among them. The KIRM should seek innovative and cost-effective means to strengthen resource sharing. If a more coordinated and coherent approach to building digital libraries is to succeed in the KIRM, every institution will need to work closely together to establish the appropriate cooperation and framework. Table 1 illustrates the current status of field, structure, participating institutions, and information resources.

*The Korea Knowledge Portal (URL: <http://www.knowledge.go.kr/>)*

The Korea Knowledge Portal (KKP) is designed to improve access to, and enhance transfer of, the information resources contained in South Korea by providing digital collections available from four integration information centres and one model centre. The KKP will enable institutions to effectively manage all of its networked collections. Users of the KKP are very diverse, including the public at all levels, students, researchers, the KKP partners, librarians, and community interest groups, and so on. Users can access collections and information services through the portal site and metasearch system. The core service of

the KKP is the integrated retrieval service through integration information centre and model centre in the KIRM projects.

The KKP does not own digital libraries and resources; it sends search terms to the databases maintained by the integration information centres and model centre. The KKP metasearch system produces the integrated search results of the integration information centres and model centre for up to 20 seconds. Many types of metadata can be associated with a digital object in a metadata repository. The KKP retrieval system will be enhanced by the inclusion of metadata and metadata repository in the collections that are given a higher weighting by the more sophisticated search engines. The challenge associated with the KKP retrieval system is to encourage end-user resource discovery and information use, in a variety of formats and from a number of local and remote sources, in a seamlessly integrated way. The KKP should organize an environment of continuous planning and innovation. The KKP will be the extended knowledge portal site for national information resources in the KIRM projects.

*The Scientific Information Integrated System (URL: <http://science.knowledge.go.kr/>)*

The Scientific Information Integrated System (SIIS) is developed by the Korea Institute of Science and Technology Information (KISTI). The KISTI is an affiliated information organization of Korea Research Council of Public Science and Technology under control of Prime Minister's Office. The purpose of the SIIS provides a portal system, science technology information database, and science technology facts information database. Users can access various collections and services through the portal site running on the web page. The integrated search service by metasearch is used in a participating organization of the SIIS. The SIIS provides a direct access to following digital collections:

- National Research Report Database, Korea Science Citation Index, Overseas Industry Technology Information, Standards and Specifications Information, Science Education Information Database, and so on.

The SIIS also provides a link access to following portal sites.

Table 1. The current status of information resources.

| Field                             | Integration Information Centre / Network Institution Model Centre      |  | Examples of Information Resources   |
|-----------------------------------|--|--|---|
| Science and Technology            | The Korea Institute of Science and Technology Information (KISTI)      | <ul style="list-style-type: none"> <li>• 18 institutions for science and technology</li> <li>• Korea Science Foundation etc.</li> </ul>  | <ul style="list-style-type: none"> <li>• National research report database</li> <li>• Science education information database</li> <li>• Advanced science information database etc.</li> </ul>   |
| Education and Research            | The Korea Education and Research Information Service (KERIS)           | <ul style="list-style-type: none"> <li>• Universities</li> <li>• Research institutions</li> </ul>  | <ul style="list-style-type: none"> <li>• Book/Non-book catalogue</li> <li>• Journal catalogue and holdings information</li> <li>• Korean academic Journals in full-text</li> <li>• Thesis and dissertations in full-text</li> <li>• Science and education DB etc.</li> </ul>                      |
| Culture                           | The Ministry of Culture and Tourism (MCT)                              | <ul style="list-style-type: none"> <li>• Cultural Properties Administration</li> <li>• National, public and private museums</li> <li>• University museums</li> <li>• National Theatre of Korea</li> <li>• Korean Cultural Policy Institute etc.</li> </ul> | <ul style="list-style-type: none"> <li>• Cultural property information</li> <li>• Documented pictures of artefacts</li> <li>• Performance script / score</li> <li>• Program, poster</li> <li>• Culture and artistic yearbook etc.</li> </ul>  |
| History                           | The National History Compilation Committee of Republic of Korea (NHCC) | <ul style="list-style-type: none"> <li>• The NHCC</li> <li>• Korean Classics Research Institute</li> <li>• The Academy of Korean Studies</li> <li>• The Kyujanggak of Seoul National University</li> </ul>   | <ul style="list-style-type: none"> <li>• Chronological table of Korean history</li> <li>• Diary of the royal secretariat</li> <li>• Documents of modern times</li> <li>• Translated selection of Korean classics</li> <li>• Document, archives, maps of traditional times etc.</li> </ul>         |
| Information and Telecommunication | The Electronics and Telecommunications Research Institute (ETRI)       | <ul style="list-style-type: none"> <li>• 15 institutions for information and telecommunication</li> </ul>  | <ul style="list-style-type: none"> <li>• Research and development report</li> <li>• Theses and dissertations</li> <li>• Seminar information</li> <li>• Korea's IT industry production status, postal services</li> <li>• White paper on the ethics of information, communications etc.</li> </ul> |

- Construction and Transportation Digital Library: This portal, which is operated by the Korea Institute of Construction Technology (KICT), provides digital collections and various information services in construction related technology including civil, architecture, facilities engineering, and so on. URL: <http://www.codil.or.kr/index.html>
- Maritime Affairs and Fisheries Institute Knowledge Inventory Service: This portal, which is operated by Ministry of Maritime Affairs and Fisheries, provides digital collections and various information services of maritime affairs and fisheries related institutions (e.g. National Oceanographic Research Institute, National Fisheries Products Inspection Station, and National Fisheries Research and Development Institute). URL: <http://www.ocean.go.kr/>

- Korea Forest Service: This portal, which is operated by Korea Forest Service, is separated into two categories dealing with insects and plants in Korea. URL: <http://insect.foa.go.kr>

***The Research Information Service System (URL: <http://www.riss4u.net/>)***

The Research Information Service System (RISS) is the national research information system for some 400 universities and research institutions and places a high value on collaboration, co-operation and partnering. The Korea Education and Research Information Service (KERIS) takes

on a larger role and responsibility as an educational service provider. Since its establishment in 1999 as a government-funded institution under the Act of Korea Education and Research Information Service, the KERIS has set up and operated extensive educational information systems and has been committed to policy studies and projects.

Funding for the KERIS comes from the central government and its own budget. The primary service of the RISS is separated into four categories dealing with nationwide resource sharing, overseas academic database services, seminar information, and research backup. If a more coordinated and coherent approach to building digital libraries is to succeed in the RISS, the KERIS and participating libraries will need to work closely together to establish the appropriate framework. The RISS provides a direct access to following digital collections:

- Nationwide resource sharing: Korean academic journals in full-text (450,000 items), Thesis and dissertations in full-text, and nationwide interlibrary loan service (photocopying service).
- Overseas academic database services: OCLC FirstSearch, CSA-IDS (Cambridge Scientific Abstract Internet Data Service), PQDD, ACM electronic journals and proceedings and DDOD (Digital Dissertation on Demand).
- Seminar information: Information on seminars and academic events held at home and abroad.
- Research backup: Course outlines and lecture notes from leading overseas universities.

### *The Culture Information Integration Searching System (URL: <http://www.culture.go.kr/>)*

The Culture Information Integration Searching System (CIISS) is managed by the Ministry of Culture and Tourism (MCT). The CIISS aims to build up an intellectual database of cultural property information. The CIISS does not own digital libraries and resources; it sends search terms to the databases maintained by the participating institutions. The CIISS provides integrated access to the database of 32 related institutions and offers the search results that are retrieved and classified by bibliographical, domain, and directory information.

The CIISS contents are classified into cultural heritage and art information. The cultural heritage contains digital collections of the Culture Properties Administration and 26 museums. The art

information contains digital collections of 6 institutions (e.g. National Theatre of Korea, National Museum of Contemporary Art, National Centre for Korean Traditional Performing Arts). Its digital collections contain diverse media (e.g. texts, digitized documents, photographs, audios, videos) and information accumulated and retained by the nation's major cultural and art organizations. The CIISS also links related organizations via an online network and the portal site including following services: Cyber museum, Cyber cultural assets inquiry, Internet broadcasting, and Art webzine.

### *The Korean History Data Integration System (URL: <http://koreanhistory.or.kr/>)*

The Korean History Data Integration System (KHDIS) consists of four official supervisors: The National History Compilation Committee of Republic of Korea (NHCC), Korean Classics Research Institute, The Academy of Korean Studies, and The Kyujanggak of Seoul National University. The Kyujanggak of Seoul National University has been in charge of the representative superintendent agency.

The KHDIS is still in an early stage. But the ultimate purpose of this project is to provide Korean history information to the Internet users in the world through the totally systemized computerization and each four organizations provide data of research work of Korean history. The KHDIS supports Unicode and character input system. The KHDIS retrieves the classified collections by category, period, and Korean alphabetical order. Examples of this category are: Documents of Traditional Times, Archives, Maps, Translated Section of Korean Classics, Comprehensive Korean Classics Written Collection, Documents of Modern Times, Periodicals of Modern Times, Newspapers of Modern Times, Data Related to Anti-Japanese Movements during the Period of Japanese Colonial Rule, and Woodblocks for Printing.

### *The Information Telecommunication Knowledge Portal (URL: <http://www.itfind.or.kr/>)*

The Information Telecommunication Knowledge Portal (ITKP) aims to build a portal site and intellectual database of information telecommunication. The ITKP provides access to various

information resources for direct access to various materials in both print and electronic formats. The ITKP, with government funding and its own budget, was developed and operated by the Electronics and Telecommunications Research Institute (ETRI). The ETRI is a non-profit government-funded research organization and has successfully developed information technologies such as TDX-exchange, high-density semiconductor microchips, mini-super computer (TiCOM), and digital mobile telecommunication system (CDMA).

The ITKP, which is supported by the ETRI Information Telecommunication Information Centre (ITIC), gives users access to a vast array of digital resources owned by 15 related institutions: NCA, ETRI, Institute of Information Technology Assessment, Korea Information Society Development Institute, Korea IT Industry Promotion Agency, Korea Association of Information and Telecommunication, Federation of Korean Information Industries, and so on. The integrated search service by metasearch is used in participating institutions of the ITKP. The ITKP provides access to the following digital resources: patent, research and development report, thesis and dissertation, journal, newspaper, standard, specification, seminar information, annuals, white paper on the ethics of information communications, Web document, and other ongoing publications.

### *Other core digital library projects in South Korea*

#### *The National Digital Library and The National Library of Korea (URL: <http://www.dlibrary.go.kr/>)*

The National Digital Library (NDL) is the first alliance of South Korea libraries and institutions that recognizes the growing importance of digital information and wishes to collaborate to ensure better use of digital information and better service to its users. The NDL has been promoted, according to the information superhighway construction plan, in three steps since 1996. The NDL includes major libraries in South Korea: The National Library of Korea (NLK), The National Assembly Library, Supreme Court Library, Korea Institute of Science and Technology Information, Korea Education and Research Information Service, and Korea Advanced Institute of Science and Technology Science Library. Funding for the NDL comes from

the central government and each institutional budget. If a more coordinated and coherent approach to organize an environment of continuous planning and innovation is to succeed in the NDL, all libraries and institutions will need to work closely together to establish the appropriate framework for cooperation.

The NLK, which is a government institution established by the Ministry of Culture and Tourism, is dedicated to collecting not only books and other materials of historical value, but also all products of today's modern publication industries. The NLK is committed to the development of standards, policies and practices supporting universal and equitable access as well as most of efficient exchange of information related to digital library and library resource sharing. To date, the NLK has provided the secretariat for the NDL and has been involved in a number of digital library projects and programs. Currently the NLK digital collections consist of 224,789 items and 57 million pages (Lee 2002a).

The NDL digital collections are being made by standard methods (e.g. KS C 5601, TIFF, SGML, GIF, MPEG, PDF) and the TIFF and SGML image viewers of the NDL are provided. The integrated search service by metasearch and Z39.50 service is frequently used in a participating organization of the NDL. The core digital collections of the NDL are: Antique Book, Official Gazette, Data Published by Ministry of Culture and Tourism, Newspaper (before the year of 1945), Hundred Pieces of Korean Classics, Korea-Related Data Published in Foreign Language, Data of Single Edition (before 1996), Doctoral Dissertation of Humanity Science Field, Korean Studies, Case Information, Laws and Regulations Information, and so on.

#### *The Industrial Information Network (URL: <http://magic.iin.co.kr/>)*

The Korea Electric Power Data Network (KDN), under the supervision of the Ministry of Commerce, Industry, and Energy, is charged with implementing the Industrial Information Network (IIN). The purpose of the IIN is to enhance the industrial productivity and competitiveness of companies and to provide industrial information distribution system or portal service. The IIN, with government funding and its own budget,

has been providing industrial database services via the Internet since 1998. The IIN has put into place up to 72 industrial database service systems, including linking 20 databases and developing 52 databases while undertaking the industrial database implementation project from 1999.

The IIN portal provides free access, in a customized environment, to a full range of industrial information resources and services. The IIN portal consists of industrial database, industrial newspaper, digital book, industrial knowledge market, and communication. Currently mobile industrial information services are offered through the wireless Internet services of three domestic mobile telecommunications companies (SK Telecom, KTF, and LG Telecom). The integrated search service by metasearch is used in participating institutions of the IIN. The IIN should sustain and develop mechanisms to support industrial information database services and seek innovative and cost-effective means to strengthen resource sharing.

The categories of 72 specialized industrial information database services are as follows: Construction, machinery, policy fund, trade and commerce, energy, electricity, design, electronic, steel, chemistry, automobile, texture, and so on. Examples of these digital collections are: Industrial Areas and Factories, Global Industrial News, Steel Industry, Manufacturing Machines, Export/Import Guide, Biotechnology Pipeline Product, Industrial Colour Library, Information of Human Resources in Electric Industry, Electric Parts and Materials, Aerospace Industry, Petrochemical Industry, and so on.

*The National Assembly Library (URL: <http://www.nanet.go.kr/>)*

The National Assembly Library (NAL) was established by the Parliament of South Korea in 1953. The NAL has built a range of catalogue, abstract and full text information to help users identify relevant materials. Most digital collections are developed using NAL's own budget. But some of the NAL digital collections, currently more than 588,540 items and 33,293,660 pages, cannot be accessed through the Internet due to the copyright laws. However, users may get access to the digital collections at the NAL or at authorized academic libraries and institutions. Examples of these digital collections are:

- Legislative knowledge database: This comprises bibliographical information, full-text materials and information supplied by the specialists. This database is designed to be used exclusively by the members of the National Assembly and authorized officials involved with legislative activities. (URL: <http://bluesky.nanet.go.kr>).
- Other digital collections: Government Series (11,797 items), Social Sciences Doctoral and Masters Theses (213,796 items), Social Sciences Journals (298,358 items), Government Publications (9,530 items), Translations of the various overseas laws (5,762 items), Series Catalogue (17,123 items) and so on.

*The Korea Institute of Science and Technology Information (URL: <http://www.kisti.re.kr/>)*

The Korea Institute of Science and Technology Information (KISTI) aims to contribute to advancing national science, technology and industry through the establishment of R&D and service systems for national science and technology information infrastructure. The KISTI, with government funding and its own budget, provides access to many information resources for locating or gaining direct access to various materials in both print and electronic formats. Some of these resources are developed and maintained by the KISTI, while others are licensed from commercial providers.

The KISTI provides access to following digital resources:

- Science and Technology Bibliographic Database: Bibliographic Database on Science and Technology (6,400,000 items), Table of Contents of Journal (9,100,000 items), Research and Development Reports (200,000 items), Master and Doctoral Dissertation (700,000 items), Books on Science and Technology (840,000 items)
- Overseas Scientific and Technical Database: INSPEC (7,200,000 items), COMPENDEX (4,900,000 items), and FSTA (310,000 items)
- Union Catalogue: Journal Union Catalogue (25,000 items)
- Patents: Korea Patents (2,100,000 items), Foreign Patents (14,000,000 items)
- Manpower Database: Manpower Database on Science and Technology (54,000 items)
- Factual Database: Science and Technology Factual Database (1,400,000 items), Scientific Materials and Instruments (22,000 items)
- Trends Database: Foreign Science and Technology Trends Database (60,000 items)

*Academic libraries, research libraries, and other institutions*

Most of academic and research libraries in South Korea are facing the need for an extraordinary initiative related to the digital library. The development of the digital library is, in part, one of the responses to trends in communication. Many libraries and institutions, with or without government funding, have created the digital library. While it is not exclusively devoted to the digital library, most of digital library projects are consciously constructed on the integration of digital resources into enormous existing traditional collections. The hybrid library is on the continuum between the conventional and digital library, where electronic and paper-based information sources are used alongside each other (Pinfield 1998, Garrod 2001). The integrated management and access to collections, regardless of format, are the two major purposes of projects.

Most academic and research libraries provide access to many information resources for locating or gaining direct access to scholarly materials in both print and digital formats. Some of these resources are developed and maintained by the libraries, while others are licensed from commercial providers. Services for locating and using materials vary depending on the libraries. They are building a similar infrastructure, comprised of the catalogue, the e-reference collection, electronic journals and digital collections that will enable the library to manage effectively all of its networked collections. They include:

- The catalogue: contains bibliographic records that identify and locate materials (e.g. books, serials, dissertations, sound recordings, computer files, visual materials, maps, music scores, recordings) in the libraries.
- The e-reference collection: provides access to resources that primarily direct you to information. It contains primarily catalogues and periodical indexes (e.g. CSA, Nexis/Lexis, Proquest). In addition, the e-Reference Collection offers access to electronic reference sources such as almanacs, encyclopaedias, dictionaries, and directories.
- Electronic journals: contains major scholarly publishers and information providers licensed by the libraries.
- Digital collection: digital information resources licensed by the libraries that facilitate and provide access to materials such as theses and dissertations, journals, manuscripts, photographs, and works of art held in li-

braries, museums, archives, and other institutions. The digital collection includes digitized versions of many of these materials as well as archival finding aids, or collection inventories that help students and scholars to identify and relevant primary source materials.

They also provide more efficient a set of inter-lending and document supply services. They also provide the My Library service, which is a collection of personal electronic services that can be customized to reflect personal interests and research needs. Most libraries and institutions provide public access to the Internet through the World Wide Web to various digital resources and are exploring methods to ensure perpetual access to them. In general the use of most of digital collections outside of libraries is restricted to their faculties, students, and staffs. They have concerted projects underway, in some cases projects of considerable magnitude. While every project is not exclusively devoted to digital collections, most projects cover issues and activities related to digital libraries. Table 2 illustrates the core examples of digital library projects in South Korea.

*Technical standards and issues in South Korea*

There are demands to develop and apply technical standards for the efficient management of digital information resources. Standards can provide optimum interoperability and interchangeability, well-constructed tool sets for developers and solutions for complex systems. Technical standards and issues in South Korea include requirements relating to resource encoding standards, resource description standards, interoperability standards, resource identification standards, intellectual property rights management and data archiving standards.

*Resource encoding standards*

Resource encoding standards define formats for the different types of digital resources. They include standards for page description formats, graphics formats, structured information, moving images, audio formats, and so on. Because standard formats are desirable when implementing digital libraries, adherence to this type of standard allows data compatibility across a wide range of systems. Digital contents should be developed in such a way that the content is as technically

Table 2. The core examples of digital library projects

| Project  | Category             | Organization  | URL   |
|--|----------------------|---|---|
| The Comprehensive Culture and Art Information System (CCAIS) Data Bank | Culture and Art      | Ministry of Culture and Tourism (MCT)                               | <a href="http://www.culture-arts.go.kr/">http://www.culture-arts.go.kr/</a>   |
| EDUNET   | Education            | KERIS   | <a href="http://www.edunet4u.net/top.html">http://www.edunet4u.net/top.html</a>   |
| Environment Digital Library Net  | Environment          | The Ministry of Environment   | <a href="http://lib.me.go.kr/lib/index.htm">http://lib.me.go.kr/lib/index.htm</a>   |
| Ewha Woman's University Library  | University           | Ewha Woman's University   | <a href="http://lib.ewha.ac.kr/DLSearch/TGUI/Theme/main.asp">http://lib.ewha.ac.kr/DLSearch/TGUI/Theme/main.asp</a>   |
| KAIST Digital Science Library  | University           | Korea Advanced Institute of Science and Technology                  | <a href="http://darwin.kaist.ac.kr/Ko/main.html">http://darwin.kaist.ac.kr/Ko/main.html</a>   |
| Keymyung University Dongsan Library                                    | University           | Keymyung University   | <a href="http://kimsweb.keimyung.ac.kr/DLSearch/TGUI/Theme/main/kmuniv/index.asp">http://kimsweb.keimyung.ac.kr/DLSearch/TGUI/Theme/main/kmuniv/index.asp</a> |
| KIEP Digital Library   | Economic             | Korea Institute for International Economic Policy (KIEP)            | <a href="http://kiep.go.kr/dl/digital.nsf/web_home?OpenFrameset">http://kiep.go.kr/dl/digital.nsf/web_home?OpenFrameset</a>                                   |
| Knowledge@SERI   | Economic             | Samsung Economic Research Institute                                 | <a href="http://seriecon.seri.org/">http://seriecon.seri.org/</a>   |
| Korea Agricultural Science Digital Library                             | Agricultural science | Rural Development administration                                    | <a href="http://lib.rda.go.kr/">http://lib.rda.go.kr/</a>   |
| Korea University Library   | University           | Korea University  | <a href="http://kulib.korea.ac.kr/">http://kulib.korea.ac.kr/</a>   |
| Korean Integrated News Database System                                 | Newspaper            | Korea Press Foundation  | <a href="http://www.kinds.or.kr/">http://www.kinds.or.kr/</a>   |
| Korean Studies on Net  | Korean studies       | The Academy of Korean Studies                                       | <a href="http://www.koreandb.net/">http://www.koreandb.net/</a>   |
| MOE and HRD Knowledge Information Centre                               | Education and human  | Ministry of Education and Human Resources Development (MOE and HRD) | <a href="http://library.moe.go.kr/">http://library.moe.go.kr/</a>   |
| The National Museum of Korea   | Museum               | Ministry of Culture and Tourism (MCT)                               | <a href="http://www.korea-museum.go.kr/">http://www.korea-museum.go.kr/</a>   |
| Paiknam Academic Information Centre and Library                        | University           | Hanyang University  | <a href="http://library.hanyang.ac.kr/dlsearch/TGUI/Theme/Hanyang/main.asp">http://library.hanyang.ac.kr/dlsearch/TGUI/Theme/Hanyang/main.asp</a>             |
| Seoul National University Library                                      | University           | Seoul National University   | <a href="http://library.snu.ac.kr/">http://library.snu.ac.kr/</a>   |
| SungKyunKwan University Central Library                                | University           | SungKyunKwan University   | <a href="http://skkcl.skku.ac.kr/">http://skkcl.skku.ac.kr/</a>   |
| Yonsei University Central Library                                      | University           | Yonsei University   | <a href="http://libsvr.yonsei.ac.kr/dlsearch/TGUI/Theme/Yonsei/main.asp">http://libsvr.yonsei.ac.kr/dlsearch/TGUI/Theme/Yonsei/main.asp</a>                   |

neutral as possible, permitting output in a variety of digital formats and in print according to what the user needs. The most common text formats in digital library projects in South Korea are PDF, TIFF, XML and SGML. Recently Adobe PDF and XML became a widely used standard for digital document distribution worldwide in many institutional settings (Lee et al. 2002). Unicode supports and fosters the multilingual computing world community. It also provides the foundation

for internationalization and localization of software. Recently the Unicode also became a widely used standard for digital library projects in South Korea.

### *Resource description standards*

Resource description standards can facilitate effective resource discovery. These include description standards such as MARC (Machine-Readable

Cataloguing) and Dublin Core, a descriptive metadata standard developed for resource description on the Internet. The Dublin Core element set has been developed over the past years as an open, consensus-building effort with strong involvement of practitioners from many user communities (Dekkers and Weibel 2002, Dublin Core 2002). The metadata should cover the requirements of various types of organizations and be standardized for interoperability. Efforts to develop tools for automatically creating metadata are needed. Metadata recently became a widely used standard for resource discovery in many digital library projects in South Korea (Min 2002, Kim et al. 2001). The metadata registry also will be developed by the KIRM projects.

### *Interoperability standards*

This type of standard allows communication between different systems, facilitating the discovery of and access to digital information. National Information Standards Organization Z39.50 Information Retrieval Protocol (Z39.50/ISO 23950) defines a standard way for two computers to communicate for the purpose of information retrieval (NISO 2002). In South Korea, Z39.50 became a widely used standard for resource discovery in many digital library projects (Lee 2002b). Many digital libraries currently only ask a vendor whether or not their system is compliant with the Z39.50 standard. Unfortunately, because of the wide variation among different implementations, this does not guarantee that the searching problems described above will be eliminated. Libraries need to be able to specify a more specific set of Z39.50 requirements, but should not need to become Z39.50 experts in order to purchase and effectively use these systems.

### *Resource identification standards*

A way of uniquely identifying digital resources is desirable to ensure long-term and reliable access to resources while they are available over the Internet. There are many formal identifier or naming schemes that have been discussed in the context of the naming of digital resources (e.g. URI, URN, DOI, Handle, ISBN, ISSN). The Digital Object Identifier (DOI) is a system for identifying and exchanging intellectual property in the

digital environment (DOI 2002). It provides a framework for managing intellectual content, for linking customers with content suppliers, for facilitating electronic commerce, and enabling automated copyright management for all types of media. In South Korea, many publishers, libraries, and related institutions are interested in the DOI system and some researches are under active consideration (Oh and Hwang 2001).

### *Intellectual property rights management*

Copyright restrictions can affect the preservation of access to digital information by limiting the use of preservation strategies. Legislation in many countries makes allowances for copying material for preservation purposes (NLA 2002). In South Korea, library fair use is allowed by the public for information services. But the right of reproduction and right of communication for the public in the Copyright Act of South Korea has been criticized as amended in 2000 to bring it in line with the new environment around digital networks. The amended version places too much limitation in private use and library exemption concerning authors' property rights (Kim and Jung 2002, Jung and Lee 2001). Content providers also are understandably nervous about the safety of their intellectual property. Intellectual property rights management systems are under active consideration in South Korea. But in digitization projects, the process of identifying copyrights and obtaining permissions remains time consuming, expensive and full of challenges.

### *Data archiving standards*

The Open Archival Information System (OAIS) reference model is a model for an archival system for the long-term preservation of and access to digital information. It defines content information as the set of information that is the original target of preservation (RLG 2002). A number of digital initiatives in the library community, such as the CEDARS, PANDORA and NEDLIB projects, have either adopted the OAIS reference model as the conceptual framework behind their digital preservation efforts, or have been informed by its conclusions (Choi 2001). The OAIS framework currently enjoys the status of a de facto standard in digital preservation. In South Korea, it is not

yet clear whether the OAIS reference model will be the consensus approach to the long-term maintenance of digital information. But at the very least, the OAIS reference model is laying important foundations for a coordinated and widely applicable solution to the challenges of digital preservation.

### Conclusion

The concept of the digital library will continue to evolve. While preservation and access are important concepts for the present, digital libraries are evolving into digital communities uniting people with common interests in new ways. A digital environment enables cross-community interactivity and collaboration, regardless of physical location. The environment of the digital library world is dramatically changing and digital library services will be expected to improve the life of peoples. In South Korea there are plenty of ideas and a growing level of interest, illustrated by the variety of digital library projects currently in progress – many of which focus on developing digital versions of collections of texts and other resources. A service framework for libraries is the hybrid model – implementing new digital services and products while maintaining more traditional print-based services.

Digitization presents opportunities for long-term preservation of bodies of information. The standards and issues of the digital library require thinking about funding, common standards, collaborative management, intellectual property rights, interface and presentation design, evaluation, and integration into existing structures. There also are standards and issues for the many different aspects of storing and accessing digital information. It is difficult to predict exactly the future of information technologies and standards related to the digital library world. There remains a real and persistent need for a more solid, empirical understanding of the range of audiences, of user content needs, and of how digital libraries of diverse media are being used. There is also a pressing need to understand more about the economic, intellectual, and social impacts of access to digital library collections and services.

Success of the digital library is dependent on large-scale collaboration. Until now, the various projects involving digital collections and digital

libraries in South Korea have been carried out with very little coordination. But there are signs that the idea of a nationally coordinated and planned approach is beginning to gain some acceptance. Partnerships and collaboration between different types of organizations – libraries, government, museums, related institutions and interest groups – will be essential to work together to establish the appropriate financial and organizational frameworks necessary to create a true network of digital libraries in South Korea.

### Acknowledgement

This paper was supported by Konkuk University.

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*Editorial history:*

*paper received 10 November 2002;*

*final version received 14 March 2003;*

*accepted 24 March 2003.*