Symposium Paper

Electronic Publishing in Japan

-- with Emphasis on Academic Publication -- [1]

Masamitsu NEGISHI

National Center for Science Information Systems
Otsuka, Bunkyo, Tokyo 112, Japan

Electronic publishing in Japan has a quite long history since the "New Media" boom over ten years ago. The interests were mainly in publications in CD-ROMs, and related standards, such as EP-WING and "Electronic Book," were developed by Japanese companies. However, the electronic publications had not been popular before the Multi-Media boom of these years. The paper first summarizes historical development of CD-ROM publications with reference to the software / hardware standards and products. Then process of electronic publishing from writing to distribution is examined in accordance with Japanese situation including Japanese word processing. Finally recent development towards network publishing and electronic libraries are is discussed with reference to related governmental policies for the national information infrastructure.

1. Introduction

Electronic publishing is one of the keywords in the recent multimedia boom in Japan. Though the word has been used for over ten years since the "New Media" movement of the past, it does not appear to achieve popularity in Japanese publications. The paper will first describe publishing activities in Japan with the statistics. Then electronification in publishing is reviewed in accordance with the process of publication with reference to Japanese situation. Electronic library projects in Japan will be summarized, as they have importance especially for academic publication. The author will make a final remark by referring to recent governmental policies related to "informatization," because they appear to be promising for the progress of academic electronic publishing.

2. Situation of Publishing [1][2][3][4][5][6]

2.1 Paper Publications

The Table 1 shows the statistics on number of books published in countries a year. As the statistics are collected from yearbooks published in each country with individual statistical criteria, accurate comparison is impossible. However it gives a rough image of publishing activities in each country, and Japan appears to be one of the big countries in publication.

The number of publications discounted by population of each country shows another picture, that is, UK is the most publication oriented country among the countries in the table, and USA and China are the least ones. Anyway, here we would like to see that Japan is one of the countries of prosperous publication in terms of the absolute number and the number relative to its population. Some other figures related to publication market in Japan are shown in Table 2.

2.2 CD-ROM Publications

2.2.1 The New Media Movement

CD-ROM publications in Japan started 10 years ago together with the "New Media" movement. It should be noted that the Japan Electronic Publishing Association (JEPA) was established in 1986 as a voluntary group of publishers and computer related companies. The New Media became the keyword to depict a new market for the information industry,

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Table 1. Number of book publications in various countries (New titles)

	Japan	USA	UK	Germany	France	China	S Korea
1993	48053	43410	--	49096	21109	--	--
1994	53890	--	68877	52767	21472	69779	29554
Per mill. pop.(94)	433	168	1189	650	372	59	671

Table 2. Market of books and magazines in Japan (1995)

	Books	Magazines
Titles	58310 (new)	4178
Copies sold	1498 mill.	5117 mill.
Sales (JPY)	1050 bill.	1555 bill.

Table 3. Trend of CD-ROM publication in Japan

Year	87	88	89	90	91	92	93	94	95	Total
Titles	1	0	5	1	2	3	8	36	88	144

where videotex and ISDN by NT&T are expected to play the key role for online distribution of information, complemented by the offline distribution with CD-ROMs. However, the situation did not develop as had been expected, and now "New Media" is a dead word, which was replaced by "Multimedia." Critics of the recent multimedia boom would often like to refer to the past New Media boom, and to make skeptical comments on the current boom.

To my view, the failure of New Media could mainly be attributed to unpopularity of personal computers (PCs) in Japan at that time. Because Japanese language capability requires big computer power, it was more fitted to the special machines designed solely for Japanese language processing, the "Word Processors." This made word processors far more popular than personal computers of general use, and personal computers were regarded as the machine for a small number of computer oriented people.

The unpopularity of personal computers resulted unpopularity of CD-ROM drives, and CD-ROMs had been regarded as special media very much fitted to database or dictionary type publications. As the hardware and CD-ROMs were very expensive in those days, CD-ROM publishers were aiming at libraries as its main customers.

2.2.2 Handling Japanese on PCs

Situation has changed with the advancement of computer power. In 1990, IBM Japan developed a new OS, "DOS/V," which can handle Japanese on world popular IBM-PCs without any support of special hardware. Before that, Japanese personal computer market had been dominated by the NEC PC98s which had special hardware architecture of Japanese handling. The DOS/V invited many foreign computer makers to get into Japanese market with their low priced IBM compatible machines. As the results, there occurred a dramatic price down of PCs in Japan around 1993, and PCs now are getting more and more popularity.

At almost the same time, computer manufactures began to ship PCs with a built-in CD-ROM drive. This naturally worked favorably for CD-ROM publications. Before that, CD-ROM drives are optional and it was quite difficult for ordinary users to set them up on their PCs, because it requires some technical knowledge.

2.2.3 Trend of CD-ROM Publications

Table 3 shows the statistics of CD-ROM titles published in each year. The figure only contains CD-ROM which are published mainly by book publishers and sold via book distribution channel, thus many other CD-ROMs for software products and games are excluded. Therefore, the figures in the table represent the number of CD-ROMs which have the contents suitable in discussing electronic publishing. Up until 1993, the numbers had been very small, and a big jump was realized in 1994 due to the above

mentioned conditions.

Magazines with CD-ROM and CD-ROM Magazines -- In 1995, an organization of magazine publishers, which regulated on a voluntary basis, the matters related to magazine publishing to reserve fare competition, admitted CD-ROMs as the supplement to magazines. As the results, all most all the computer related magazines now have become to include a CD-ROM supplement in every issue. In the new trend, there appeared the CD-ROM magazines in which CD-ROM comprises the main body with supplementary paper magazine. This again had a considerable effect on making CD-ROMs major media of publication.

2.2.4 EP-WING: a CD-ROM Standard

CD-ROM publications in Japan in their early period around 1990, were mainly applied to dictionaries and directories which needed some retrieval software for their use. FUJITSU, DAI-NIPPON Printing (one of the two biggest printing companies), SONY and IWANAMI (a leading publisher) fixed a standard on structure of index and search function for these types of CD-ROMs, "EP-WING format." With this standard, they intended to have CD-ROM publications and the search software as independent products and be developed and sold separately. This resulted costumers that they had to purchases the software as well when they were going to use these CD-ROMs.

We can see the reason for unpopularity of the CD-ROMs in the fact that the software as well as CD-ROMs was quite expensive. Moreover, in those years of Japanese DOS, there existed incompatibility among types of Japanese PCs, and it was often the case that the users had to prepare a particular type of PC for running the EP-WING software. This would be almost prohibitive condition for many of the potential users of CD-ROMs of EP-WING.

The introduction of the Windows 3.1 Japanese version in 1993, which eliminated incompatibilities among types of Japanese PCs, had the favorable effect on CD-ROM publications that a version of software would run on all types of machines, and now almost all the CD-ROM publications have become to include their retrieval / viewing software in the CD-ROMs themselves.

2.2.5 Distribution Channels for CD-ROMs

CD-ROMs have been sold through various types of shops: book stores, music CD shops, game shops and computer shops. So far, CD-ROMs have been distribute according to their contents, such that CD-ROMs produced by book publishers go through conventional book distribution channel and games are sold at game shop through toy channel. In around 1994, there appeared "Media Complex" shops which deal with all types of electronic media including CD-ROMs of various contents, music CDs, videos and game cassettes. It is said that now we are in the age of wars when all of the conventions of business categories, distribution channels and business conditions are being reorganized.

2.2.6 Share of Electronic Publishing and DVD-ROM

An estimation indicates that the share of electronic publications with CD-ROMs, "Electronic Books," and "Digital Books" (mentioned later) is only 0.3% in all the publications including conventional paper media. Now CD-ROM is expected to play a key role in coming multimedia age due to its capability of handling letters, images and sounds with versatile linking and composing techniques.

The biggest interest of the industry is now on the DVD (Digital Video Disk). In 1995, SONY and TOSHIBA reached an agreement on the standard of DVD. Because DVD can also be used as DVD-ROM which hold up to 17GB data, that is, 30 times as large as the capacity of ordinary CD-ROM, various types of contents are expected to distributed via DVD. MATSUSHITA is to release the first DVD player in November 1996, and it may release a DVD-ROM drive to be connected to PCs toward the end of 1996. Thus DVD-ROM is expected to be a major media in coming multimedia society, along with high speed networks, which would mainly be applied to real time information,

2.3 "Electronic Book"

In 1990, SONY released "Data Discman," the "Electronic Book" player. The Electronic Book (EB) is the SONY designed standard composed of software and hardware specification. The EB is recorded on a 8cm CD-ROM of the EP-WING based format in the specially designed case. SONY invited publishers to produce EBs, and some 200 titles of mainly dictionary and directory type contents were published so far (Table 4).

The EB was significant so long it pulled the CD-ROM price down and make CD-ROMs more familiar to customers. In addition, the dedicated player system required no computer knowledge to users, and the

Table 4. "Electronic Book" publications

Year	90	91	92	93	94	95	Total
Titles	25	24	47	43	42	26	207

players are sold at reasonable price at electric household appliance shops. This was a plausible strategy in the period of unpopularity of PCs.

In 1995, SONY began to promote utilization of EBs on PCs by licensing accessing software development to software houses. Now the EB access software products for Windows and Macintosh have become available, and EBs are expected to be used more on PCs. The EB has enhanced the specification so as to incorporate multimedia contents. A topical recent EB was for the famous serial cartoon in a newspaper. You can see the pictures and hear the dialog of the characters both in Japanese and English.

2.4 "Digital Book"

Another dedicated player system in electronic publication was developed by NEC in 1993, that is, the "Digital Book" (DB). The DB was designed to read paperbacks with the dedicated portable player of the nearly same size as a paperback. The content is supplied by a floppy disk, and users download the content to RAM in the DB player. The DB publications were 61 titles in 1993, 75 in 1994 and 11 in 1995. This shows that the DB system does not seem to attain a large market, and is now mainly accepted as the convenient media for GO and SHOGI (chess) game books. Though the DB was a proposal of new reading style, it does not appear to be more successful.

3. Electronification in Process of Publication

Process of publication can be depicted with related topics as follows. Electronification is now going more and more to penetrate every stage of publication process.

(1) writing: hand writing, word processors, word proc-essing on PCs

(2) editing, formatting: hand typesetting (type picking), computer type setters, DTP system, multimedia authoring system, TeX, SGML, HTML

(3) reproducing: paper printing, CD-ROM reproduc-tion

(4) distribution: physical transportation, network distri-bution (BBS, Internet)

(5) reading: paper products, download and print, soft copy

3.1 Electronic Writing

For the purpose of writing manuscript in electronic form, three types of machines are being used: word processors, PCs with word processing software, and electronic pocket books.

3.1.1 Word Processors

Word processing of Japanese language on computer was first realized by TOSHIBA in 1978, when it released the first machine dedicated for word processing. As the machine was heavy, disk sized, and very expensive, it was not sold in volume. However it was notable because it proved the practicality of Kana-to-Kanji conversion input method, in which Kana: Japanese phonetics would be converted to Kanji: Chino-Japanese letters with automatic reference to a built-in dictionary. By around 1985, these types of word processors were installed in many offices along with the OA (Office Automation) movement in Japanese companies.

Since around that time, smaller-sized machines were developed by companies including household electric appliance manufactures, and those for personal use have got popularity as they were far less expensive than PCs, and were actively sold through the distribution channel for usual electric appliances like TV sets. Now the Japanese word processors have become one of the common appliances in home, and there even exit ones for children sold at toy stores.

The wide acceptance of the word processors is considered to have worked for a long time as a barrier to the spread of PCs in Japan. In coping with the recent growth of PCs, word processor manufacturers have made them more and more versatile such that they are equipped with a built-in image scanner and color printer, and their editing functions are so enhanced that they can now be designated as the DTP (Desk Top Publishing) machine.

3.1.2 Word Processing Software

As prominent Japanese word processing software on PCs was developed in 1985, word processing on PCs became more or less popular in late 80s. But the high price of Japanese PCs and the incompatibilities between them, had made word processing on PCs

unpopular when compared to that on the word processors until recently. Introduction of Windows 3.1 in 1993 had considerable effect on the situation. The versions of Windows based English word processing software modified to handle Japanese language, made in USA, entered Japanese market. Now Japanese word processing software on Windows and Macintosh is getting larger market than ever, though the dedicated word processors appear to be still popular and multi-functioned.

3.1.3 Electronic Pocket Book or PDA

It is a famous historical episode that the first micro-processor, Intel 4004, was developed in 1971 according to the idea and order from a Japanese handy electronic calculator manufacturer. Handy calculators had a large market in Japan, and the manufacturers had been enhancing their functions. In 1987, SHARP released the "Electronic Pocket Book" as an expanded form of calculator. This included functions of calendar, diary and address book as well as that of calculator. It was 1992 that Apple announced the PDA (Personal Data Assistance) machine, Newton, with the quite same concept as the electronic pocket book.

The machines of electronic pocket book type have evolved so as to incorporate various functions such as hand written character recognition and electronic mailing with a built-in modem, and now have a secure position in mobile computing market. A new machine release by SHARP in 1996 is equipped with a digital camera for making a visual memo and a WWW browser for the internet. The electronic pocket books or PDA are now used by many people as a handy word processor which enable them to write manuscript anywhere.

3.2 Electronic Editing

3.2.1 Paper Media [7]

Professional environment -- In the past, printing was done by letterpress. Editors marked up manuscripts and type pickers formatted pages. Since around 1970, CTS (computer typesetters) were becoming popular among Japanese printers. In the latter half of 1980s, due to the spread of word processors and PCs among authors, type setting systems were enhanced to accept plain ASCII text files recorded on FDs. Thus the CTS operator can work effectively with minimum input errors. CTS systems are now used in conjunction with DTP systems of professional use, making editing and formatting quite effective.

Now, handing manuscript to editors / printers with FDs is most usual way of data transmission between authors and editors. Though there exits a variety of word processors and word processing software on PCs, that is, a variety of record format conventions, DTP systems are becoming to accept more and more formats from various machines. This makes more formatting information on the manuscript be directly conveyed, in addition to the simple character information on ASCII files.

Personal environment -- As the functions of word processing on PCs are enhanced, and high quality laser printers have become available at reasonable price, authors have now become to be able to enjoy high quality DTP in their office. In the dedicated word processors, this condition has been achieved several years earlier than in PCs. Thus many people in business and research can prepare high quality prints by themselves.

As far as the publishing with paper media concerned, the situation has been improved especially in recent years. Authors now can electronically prepare manuscripts on their machine, and get prints on their site or by professional printers. As this process goes very efficiently, the time required for publication has much reduced in terms of technical process.

3.2.2 Electronic Media

The problem still remain in the area of publishing on electronic media, that is, the electronic publishing in a narrow sense. As is described earlier, the word processing environment in Japan still has a great diversity, and this make direct exchange of word processed files quite limited, though the exchange is attained via formats of popular products like ICHITARO and Microsoft Word. Standardized formats now in use for exchange appears to be TeX, SGML and HTML.

TeX -- TeX is heavily used among researchers of computer, math and physics, but the number of people is limited in the entire researchers. Several Japanese academic societies in those areas accept paper submission in TeX format. But many of them are only accepting the TeX printouts as the high quality prints suitable for block copies or camera ready pages for offset printing. Thus, no editing is made on the TeX files at the society side.

SGML -- In 1990, NACSIS conducted an experiment of applying SGML to academic journal compilation.[8] This was an joint project with TOPPAN Printing, the other one of the two biggest

printing companies in Japan, where an experimental issue of a tentative journal with some 10 papers was compiled by using SGML. Then the issue was printed with TeX, and the CD-ROM version was also produced to show the capability of SGML.

NACSIS has been compiling its house journal with SGML since then. It is notable that based on this experiment, Japan Chemical Society began to produce the Bulletin (English version) with SGML in 1995 on a contract with the printing company. In 1992, NACSIS developed the NACSIS DTD (Document Type Definition) by analyzing tens of Japanese academic journals covering from humanities, social sciences to natural sciences. NACSIS has been promoting SGML application in Japanese academic journals through various opportunities of meetings with academic societies. Because NACSIS has been conducting database compilations on academic papers of the societies, it has close contact with them, having annual and occasional meetings.

CALS -- Though SGML appeared to be unpopular in Japan for years, the situation is changing rapidly together with the CALS (Commerce At Light Speed) movement in Japan. In 1995, MITI started CALS concerned projects in the light of the CALS development in USA, and many companies not only in computer fields but in the areas of manufacturing, power supply, etc., have become aware of the importance of SGML, as it is the standard format for exchanging electronic documents in CALS. The author expects that this movement would work favorably for our area, and more academic publications would efficiently be compiled and exchanged in SGML format.

HTML -- In April 1995, Netscape began to distribute its web browser capable of Japanese characters. In these 20 months since then, WWW has explosively spread in the country, and there have been released many software products of HTML editing and word processing with HTML functions. The functions of HTML are limited in terms of realizing the elaborate page layout as is seen in conventional journals. However, if people accept it as an official way of publishing academic papers, there would be a possibility of operating an academic society, where there would be no paper journal but the database of papers open for public access. In the internet environment, the business operation for an academic society could be processed with minimum cost and labor. Thus, a new type of society, or a virtual society on the network, might be realized.

3.3 Reproducing and Distribution

3.3.1 Paper Media

Publication with paper media should include reproduction to make copies for distribution. Though the printing can be done quite efficiently with the support of information technology, the problem still exists in the distribution cost, as it includes material handling. This seem to be more problematic for academic journals of limited number of circulations, as they depend on postal service, the cost of which will continuously increasing.

Some societies began to use BBS or the internet for communication purpose among members in stead of mailing the paper version of the newsletter. Communications via e-mail appear to become usual in small societies and in SIG activities of large societies.

Concerning large societies, the society journals seem to continue to be published in conventional paper media, and their replacement by some of the electronic media might not shortly be realized. However, some smaller or newer societies would be positive in this area, as they are capable of making decisions promptly.

3.3.2 CD-ROMs

Reproduction of CD-ROMs has become so inexpensive that publication in CD-ROM could be applied for copies as few as 100. CD-R should be applied for the smaller number of reproduction, including on-demand type reproduction. CD-R writing devices have also become inexpensive. Moreover, CD-ROMs can be mailed at low postage. Thus CD-ROM is considered as the suitable media for small sized publication like academic one as well as bulky commercial publication.

However, CD-ROM publishing in Japanese academia has very few applications. Some of the society have published CD-ROMs as the commemoration of their history, which store page images of all the issues of the journal. The author expects more academic CD-ROM publications would be realized in coming years.

3.3.3 Network, ISDN and OCN

Distribution of contents through network is becoming more feasible for various applications, as the larger band width will be available to users. In 1995, NT&T itself released a new type of ISDN TA (Terminal

Adapter) at about one fourth of the former price. At the same time, NT&T began a vigorous promotion toward personal users to replace existing ordinary phone to ISDN at a cost of only 800 JPY ($7). With ISDN, users can have access of 64k or 128kbps at the same cost as ordinary phone connection. As the results, a great increase in the number of ISDN users is being realized in 1996.

In 1997, NT&T is to enter the IP provider business under the name of OCN (Open Computer Network). It plans to establish internet access points at all of the phone areas in Japan, and to provide dial up and dedicated line service at reasonable costs.

On the other hand, the number of members of BBS services is recently going up dramatically, reaching 370 million in 1995, 1.4 times the number of 1994. Almost all the major BBS services are now providing the internet connection function, and they are now enhancing the function to be the seamless connection.

In around 1993, it was often pointed out that Japan was far behind USA in "Informatization," which could be seen in the low spread ratio of PCs and the low ratio of network connection of PCs in Japan. As is described above, the situation appears to be recently improved. Thus the information distribution via network will grow in various areas in coming years.

3.4 Reading Electronic Publications

Reading electronically supplied documents is a recent problem especially in conjunction with the electronic library system, as will be discussed later.

3.4.1 Paper and Display (Hardcopy vs. softcopy)

In many cases, people would like to read the electronic document once printed on papers, if it is based on the conventional paper document model with substantial text and elaborate page layout. For these types of electronic documents, browsing / viewing software should be equipped with print-out function, giving users high quality prints. So called multimedia applications generally put emphasis on movies and sound, and we do not see these systems adequately handle paper model documents. The systems suitable for electronic document are expected to be developed in conjunction with the electronic library applications.

3.4.2 Download and Print

It is possible to have the service where no softcopies of contents are provided. but users get contents only via downloading or file transfer, and play them back offline. A company opened the "Electronic Book Store" on a BBS service in 1995, where you can get famous or classic Japanese literatures and best sellers by downloading. The books are supplied in Voyager's Expanded Book format (Japanese version) which supports vertical writing style of Japanese literature. The prices are seem to be set as comparable to the paper versions. It is not clear whether the service would succeed, this indicate one of the directions towards the online trade of publications.

4. Electronic Library

4.1 Electronic Library Projects in Japan

Since around 1993, the electronic library has become the matter of attention for information / computer related people. In the year, The MITI got a budget for developing a pilot system for electronic library. This is to develop elementary techniques required for the future information service industry. The National Diet Library joined the project by providing its collections to be scanned as the testing material. The NDL is to build a new branch in KANSAI ares in 2003, and the systems and scanned materials in the pilot project would be applied in the new branch, as they would like to make the branch fully modernized by information technology.

In connection with universities, NAIST (NARA Institute of Science and Technology), a newly established national university, opened in 1996 the new library with a plan of digitizing its entire collection. They are now scanning several journals under the agreement with the publishers that they can be used inside the university. Our point of interest is that NAIST is encouraging the faculty and students to make their publications in a digitized format, which would be stored in the library system and be made accessible from outside. The attempt at NAIST appears to indicate a future direction of academic publication or academic information dissemination.

4.2 NACSIS Electronic Library Service [9][10]

4.2.1 Electronic Library Service

NACSIS, a national inter-university research institute, is responsible for the promotion of efficient creation and distribution of scholarly information. Its services are ranging from provision of the internet backbone for Japanese universities, an online cataloging system for university libraries, to scientific database

compilation and dissemination. (http://www.nacsis.ac.jp)

A new and big project for NACSIS is the Electronic Library Service, which is to start the operation in April 1997. The system works with a combination of two types of data on Japanese academic papers, that is, bibliographic information in coded format and scanned page images. Users will make search on bibliographic data and get page images on display terminals. The initial system utilizes the X-window environment and requires dedicated client software which is distributed through the network. In order to make the system accessible with commonly used WWW browsers, the HTML gateway is now being developed. The system is in experimental operation since December 1994, for the evaluation by monitors composed of the members of the societies and university librarians.

As NACSIS will put the system into a full service in April 1997, it is discussing with the societies on the license agreement of data utilization. There are different attitudes among societies on disseminating their materials on electronic media. On one side they welcome electronic compilation so long it reduces production cost of journals. But on the other side they worry about the competition between conventional paper media and new electronic media. At present, electronic compilation does not seem to reduce production cost as printing bureaus are not yet adapted to it. In addition, the electronic version could be more vulnerable to unauthorized reproduction than paper media. This thinking makes some of the societies inactive towards the new scheme of publication.

NACSIS is discussing the copyright charging system with the academic societies. The items to be investigated would have a variety of differentiated pricing between society members and non-members, pricing for current issues and back numbers, site licensing and fixed annual fees, etc. NACSIS is going to leave these items for the every society's decision, that is, each society is to set prices of hardcopy, softcopy, discount for members, discount for back numbers for its journals. In order to get feasible pricing level, in 1997, the first year of the official service, NACSIS will not charge users copyright fees and will collect usage statistics. Based on the statistics, the societies will decide the prices which would be applicable from 1998.

4.2.2 Full Text Database System

NACSIS has been conducting another project of forming full text databases of academic papers using SGML format. As the software products of effective full text search have become available on server machines of open system architecture, NACSIS databases are planed to be moved onto the new types of machines. In the new system, all databases including those of indexing and abstracting type as well as full text type are assumed to be in SGML format, and the system would accept versatile search requests such as proximity search and pattern matching. Toward 1997, some of the databases will be made to migrate to the new system.

The two approaches for full contents in the above, that is, the page image approach in the electronic library system and the coded data approach in the full text database system for SGML format are expected to be consolidated in a future system. This largely depends on the preparation of scholarly journals in some of the formatted data files such as SGML at the academic societies.

5. Concluding Remarks

Since around 1994, various types of movements towards the construction of national information infrastructure (NII) in Japan have become active in both the government and private sector, in response to the announcement of NII plan of the USA in 1993. The symbolic event in this context in the government was the formation of the Headquarters for the Promotion of Advanced Information and Telecommunication Society in August 1994, which was headed by the Prime Minister and included all the ministers as its members. The Headquarters gave a document titled "Fundamental policy towards the promotion of advanced information and telecommunication society" in February 1995. In this document, the government defines the advanced information and telecommunication society as a new social and economic system, which can result new societal revolution. As the Ministries are formulating each policies according to the idea, the information infrastructure in Japan will make progress in various aspects of the society.

In November 1995, the Science and Technology Basic Law was enacted at the Diet. By the law, the government is required to make the basic plan for the promotion of science and technology. In July 1996, the basic plan was approved by the cabinet, in which activities related to scientific information was included as a important area.

One of the topics near to the author is a

recommendation to the Minister of Education, Science, Sports and Culture (MONBUSHO) by the Science Council made in July 1996, with the title "Promotion of electronic library functions at university libraries." In the document, the university libraries are expected as a agent who would support digitization of materials in the university and make them accessible from outside, thus realizing more efficient dissemination of academic information.

To my view, the current multimedia boom in the industry are primarily aiming at entertainment applications, as it would encompass a big market. It is unlikely that commercial sector would actively enter the area of academic electronic publications. Electronic publication in academia should be promoted by the co-operation among researchers, societies, universities and libraries. Here governmental support should be noted as essential. The recent movements in the Japanese government depicted in the above are favorable and encouraging for us who would like to see scholarly information more efficiently disseminated.

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About the author

Masamitsu NEGISHI (Member)
He is a professor and the director of Division of Research Trend Research, National Center for Science Information Systems.
E-mail: negishi@rd.nacsis.ac.jp