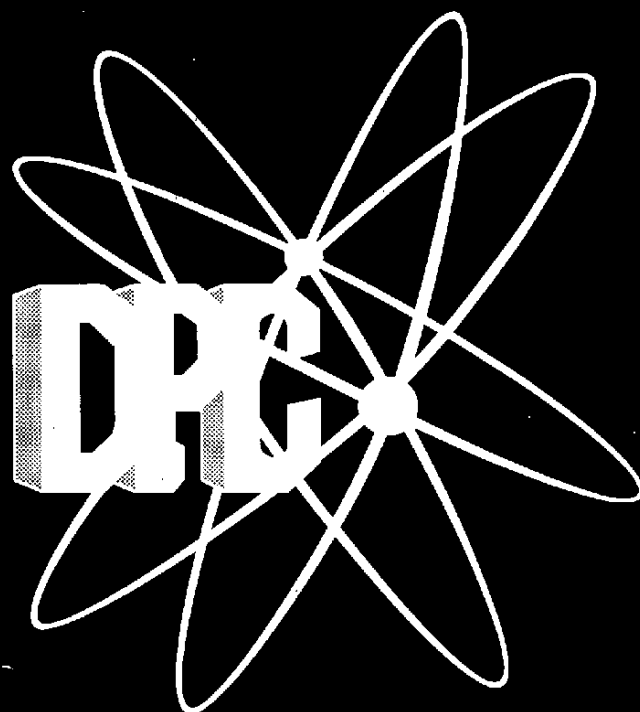
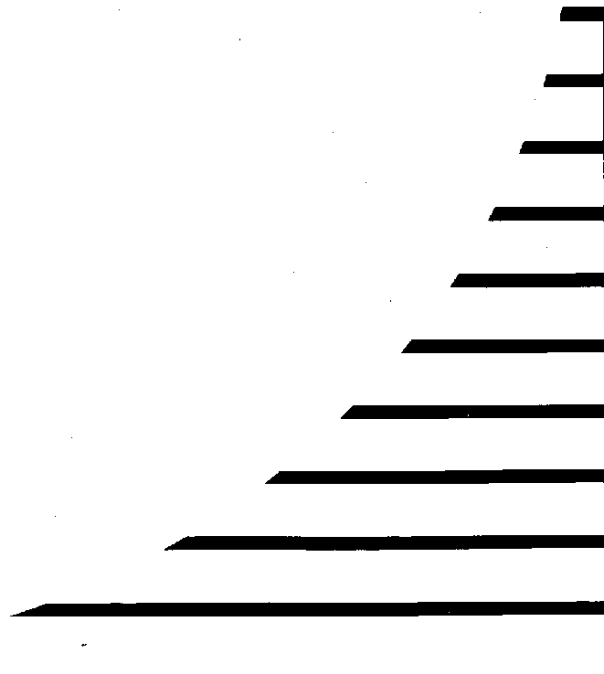
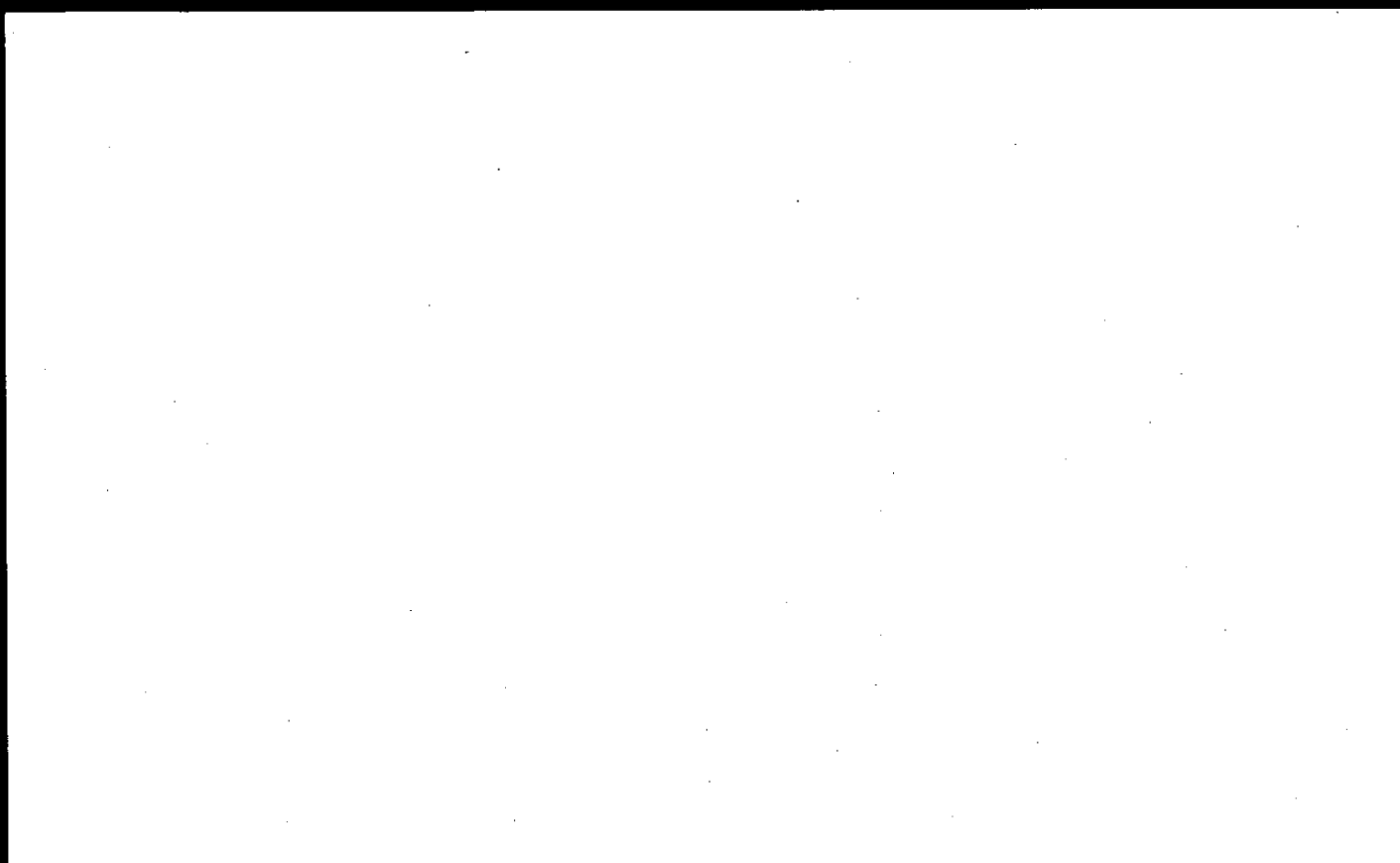


01-DPC-16

ISSN 0915-5686

DATABASE

in Japan 1989



Database Promotion Center, JAPAN

Database in Japan 1989

Published by

Database Promotion Center, Japan

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Database in Japan 1989 has been prepared with the assistance of the Japan Keirin Association through its Machine Industry Promotion Funds.

These funds are parts of the profits that the association earns via the sponsoring of bicycle races.

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I. INTRODUCTION

1. Beginning

Not many days remain before the end of the 1980's. During the 1980's our economy, society and international status have undergone a big change. Since early 1980's when the Industrial Structure Council submitted a report "An Outlook of the Information Industry for the 1980's," the actual progress towards an advanced information society has been made at an amazing speed. The databases which are the nucleus of the information industry have been developing remarkably during the 1980's, and the database services industry is consolidating its position among other industries.

"High Technology," "Internationalization" and "Information-Orientation," these three key words are said to be representative of the current situation in Japan. The technical innovation in the high technological fields such as "electronics," "fine chemicals," "super conductivity" is advancing rapidly, and is bringing about a revolution in our industrial structure and also is influencing our economy and society. Our high technology and products thereof affect other countries and also affect favorably our international status.

Our international status is changing. In the past, we exerted ourselves to participate in the international society. Now, people, commodities and money are flowing into Japan from all over the world. Tokyo is one of the important financial markets of the world, and a large number of laborers are rushing into our country from developing countries. Who could foresee these phenomena ten years ago? Of course, nobody could.

Under these circumstances, the demands for information have changed drastically not only in Japan but also in other countries of the world. Through the electronic media, which was brought about by the development of computers and communication technology, it is required to obtain the necessary information from a huge amount with the minimum time wherever one is. This is the so-called advanced information society. The progress of our high technology and the rise of our international status promote our information society and vice versa.

The databases are the nucleus of the advanced information society. This is because, although the improvement of hardware and software of computers, peripheral devices and communication technique, has to be made, information itself, its effective storage and supply systems are essential.

The databases have two categories of systems, one is called "in-house databases" which are used only inside the specific organizations such as enterprises, schools, government offices, etc., and the other is "commercial databases" which are offered for public use. Both of them started ten years behind the U.S. Our country is catching up with the U.S. in the fields of com-

puter hardware and software and communication technique, but as far as databases are concerned, we are far behind the U.S.

Our database service industry, in particular, is quite young and has many immature parts. Three fourths of the commercial databases available in Japan are produced overseas and only one fourth is made domestically. And many of the database service producers are not making sufficient profit.

However, these few years, environments around the database service market has been improving considerably. General understanding of the databases has been spreading widely and the word "database" itself is getting to be used more popularly. Personal computers are used more than expected as an information terminal and their prices are reduced. Word processors which have more users than personal computers, can now be used as database terminals and the successful digging up of potential users is expected to remarkably increase the number of the users of the database services. Apart from the on-line database services, CD-ROM databases are attracting public attention. Users different from existing users are expected to be scouted.

As our international status rises, our information and databases are attracting more attention from abroad, and the increased construction of domestic databases and their provision overseas are made energetically. These moves are most favorable for the development of our databases and database industry.

2. The Development of our Database Industry

Our database service industry started in about 1970 as a new independent industry and its start was ten years later than the U.S. On-line database services started much later. Its pioneers in the public organizations are JICST (Japan Information Center of Science and Technology, 1976), JAPIO (Japan Patent Information Organization, formerly, Japan Patent Information Center, 1978) and those in the private organizations are Nihon Keizai Shimbun (1973), QUICK (formally Quotation Information Center, 1974), Maruzen (1979), and Kinokuniya (1980). Database services before 1980, however, were only for the specialized fields of a limited number of specialists and enterprises. Both suppliers and users were compelled to be on a trial and error method. In December, 1979, the Database Services Industry Association of Japan (today's the Japan Database Industry Association; DINA) was organized. This association was a gathering of many enterprises related to databases. Since then, database service industry has become active. The start in the communication field of DDX net service (1979) by Nippon Telegraph and Telephone (today's NTT), ICAS (1980) and Venus-P (1982) by Kokusai Denshin Denwa (KDD), gave the strongest stimulus to the development of the database service industry.

On the other hand, with the extraordinary improvement of host computers, and with the improved technique of constructing and operating databases together with their extensive distribution, there was a growing tendency to construct both in-house and commercial databases.

The advent of personal computers made an epoch in database services. In 1979, Nippon Electric Corporation (NEC) started to sell PC8001 which created a personal computer boom. Their sales have been greater far beyond all expectations and the total consigned number exceeded 8 million as of 1988. Thanks to its excellent function as a communication terminal, the wide spread of personal computers contributed to the extraordinary expansion of the database service market.

Our economic and social conditions have favorably affected the development of our database services. Since the beginning of the 1980's, Japan has gained stronger economic power and higher international status, and technical innovation using the high level technology has been made vigorously. These factors increased the demands for information and changed the environment of the database service market for the better.

In 1981, the Information Industry Committee of the Industrial Structure Council of the government submitted a report "An Outlook of the Information Industry for the 1980's" and stressed the need to organize and promote database services. In 1983, the Committee stressed in its interim report "How to Develop New Media," the need to foster and improve the database services.

In 1984, Database Promotion Center, Japan (DPC) was established with the purpose of promoting our databases and database service industry, and since then the Center has been supporting the construction of databases and guiding and promoting the Japanese database industry.

In March, 1983, which was one year before the foundation of DPC, the MITI published "Database Directory" in which all databases available in Japan were listed, and has published it annually ever since.

In 1987, "Promotion Reserve Fund" was formed as a tax system to support the database service producers in their database construction. Although this tax system had a time limit of two years, the extension of the term of validity was approved in 1989. In 1987, the rules regarding the releasing and supplying by MT government owned data to the private section were framed. Both the establishment of "Promotion Reserve Fund" for database production and the releasing of government data were the fruits of discussions and proposals by the Congressional Federation for the Promotion of Information Industry (Chairman: Mr. Tadashi Kuranari, a Diet member).

Thanks to these efforts and the improving social and economic conditions, our database service industry has been developing steadily. The market is expanding at an annual rate of 20% and the number of commercial databases and of users is swelling. However, the market scale and the number of users are much smaller than those of the U.S., and only few database producers are able to run business on their own. Besides, many of the users are not satisfied with the quality and the fees of the databases.

3. Domestic Database Service Industry

Databases are defined as "the data files or collections of files which are organized and integrated so as to be processed by computer" and this definition is made in the Copyright Law. The database supplying business is called database service industry. MITI's "Survey on Designated Services Industries" shows that the sales in 1987 by "database service" amounts to 43.2 billion yen. "Database services" was included in the survey items for the first time in 1987 and "information supplying services" disappeared from the survey items in 1987. Thus, the exact amount of sales by database service industry could not be obtained. The 1988 total sales of information supplying services is estimated to be 155 billion yen from the data in the "information supplying services" included in "Current Survey on Designated Services Industries" which was started in December, 1987. This figure shows a steady increase over the sales in the amount of 114.3 billion yen which was listed in "Survey on Designated Services Industries" which was done two years before 1986. The sales by information supplying services and databases is much smaller than those of the other bigger industries and is only a negligible percentage of the total sales by entire information services and database services which amounted to 2 trillion 299.3 billion yen in 1987.

The actual number and the details of the database service suppliers can be found in the MITI's "Database Directory." In this directory, the commercial databases recorded to be available in our country in 1988 totaled 2,858, with the real number to be 1,964. In 1987, the recorded number was 2,440 with the real number of 1,975. These figures for 1988 show an increase of about 20%, or as much as four times or more compared to the figures for 1982, five years before. The real number of databases for 1988, totaling 1,964, is divided into two figures, i.e., 1,436 foreign made (73.1% of the total number) and only 528 domestic (26.9%). In 1986, more than 80% of the total databases were foreign made. Since then, a greater number of domestic databases have been produced but the number of foreign products still constitutes a large percentage. On the other hand, 71% of the total amount of money was paid for the use of domestic databases and 29% for foreign made (Survey of User Awareness of Database Services by DPC). The foreign products seem to give a language problem for our users.

The percentage of databases used in the field of "Business" has increased year after year and amounted to 1,306 in 1988, which is 45.7% of the total recorded databases. "Natural Science and Technology" follows with the number and percentage of 832 and 29.1% respectively, and "General" 594 and 20.8%. Before 1985, "Natural Science and Technology" ranked first and in 1986 "Business," won the first place and since then "Business" is leading by an increasing number and percentage. Within the field of "Business," enterprise finance, money, securities, market and commodities are increasing at an amazing speed. In the field of "General," newspapers, magazines and news have quadrupled over these four years.

4. New Trends Related to Databases

Database management system (DBMS) is being developed for distributed databases and for multi-media databases, and also efforts are being made to improve its reliability, security and performance. Hardware, software and networking systems of CD-ROM are being improved strikingly. The application of artificial intelligence is advancing. The expansion of personal computer networking is influencing the databases tremendously.

The development and widespread uses of electronic information are bringing into focus the relationship between the databases and intellectual property right, copyright and privacy.

4.1 Database Management System

A distributed database management system is what allows a distributed database to be used as if it were one independent database by integrating the databases distributed in the networking. In 1987, this kind of system began to come into practical use, but its condition of distribution, transparency and transaction are still limited. The hardware, software of the multi-media database management system are being developed speedily, and this system aims at the centralized managing and operating of databases by interrelating the data with their own features of expressing text, figures, image, voice, etc.

4.2 CD-ROM

CD-ROM was introduced quite recently, but new developments in its hardware and software utilization are being made one after another and are attracting attention from many fields. Because of its stand-alone access to information, it previously could not make multi-access, but it can now make multi-access by using a local area network (LAN). In its hardware area, personal computers with the standard utilization of CD-ROM drive have appeared. The kinds of databases to be recorded in CD-ROM are increasing rapidly, thus CD-ROM is steadily consolidating its position as a new media of the databases.

4.3 Personal Computer Network

Our personal computer network is rapidly expanding, and the number of its users is increasing. Its technical progress and the reduced cost are expected to accelerate both the commercial and the personal uses.

However, the increasing uses are bringing about new problems. Because of the immaturity in the hosts, terminals and communication software of the network, smooth communication is hard to be performed as the users increase. The problem of computer viruses which has appeared in the U.S., is another issue. In Japan it is not yet developing seriously, but it is feared to develop in the near future and some measures should be taken against it.

4.4 Kanji Code (Japanese Character)

Japanese databases are naturally constructed in Japanese and the overseas access to Japanese databases encounters the language problem. However, it's a principle to use the local language in the access to other country's database. The Kanji code of the Japanese language has no international standards. By JIS, Japan made an assembly of Kanji characters to be processed in computers and chose to use 2 bytes of character code.

The Republic of China chose 2 bytes of character code in their GB2312-80 (basis assembly) which was established in 1980. The republic of Korea also adopted 2 bytes for the Kanji and the Hangul alphabet as their national standard. On the contrary, in the U.S., LC (Library of Congress) and RLG (Research Library Group) are trying to computerize each character of Kanji in 3 bytes. The fact that the U.S. is constructing and using databases with Kanji code of a different standard from those of Japan and Republic of China may bring about a big problem in exchanging databases and making an international standard of the character code/set.

5. Problems for Database Industry

Our database industry is young in its history, but has been growing rapidly. This rapid growth is the result of not only the active import of the far advanced U.S. techniques of database construction, operation, distribution and utilization, but also of the numerous imports of their databases. Our entire database industry, including commercial databases and in-house databases such as those inside the enterprises and inside the industries, is going to enter a new phase, since the importing of basic technology is almost complete and most important foreign databases have been imported.

In the case of the database industry alone, there are many problems as to the reformation of the industry structure, its internationalization, copyright and privacy issues, etc. How to handle such new technologies as CD-ROM, multi-media databases and gateway and how to train the skilled workers also have to be studied.

The proposal made by MITI in 1987 in their Industrial Structure Council's "Outlook of the Information Industry for the Year 2000," foresees that the information industry's sales is going to swell to 144 trillion 500 billion yen in 2000 and is going to amount to 20% or more of our GNP. Out of all the information industry, the sales of information supplying services will be 3 trillion 385.5 billion yen and its percentage in the Japanese economy will rapidly increase (Figure 1-1).

The increase for the past few years has been at the rate of 20%, but this rate will not be able to achieve the expected sales. When the transaction databases or gateway services, which are developing rapidly in the U.S., come into wide use in our country and multi-media databases and communication technics are improved, the sales are expected to achieve the target figures. However, many problems have to be solved to accomplish this.

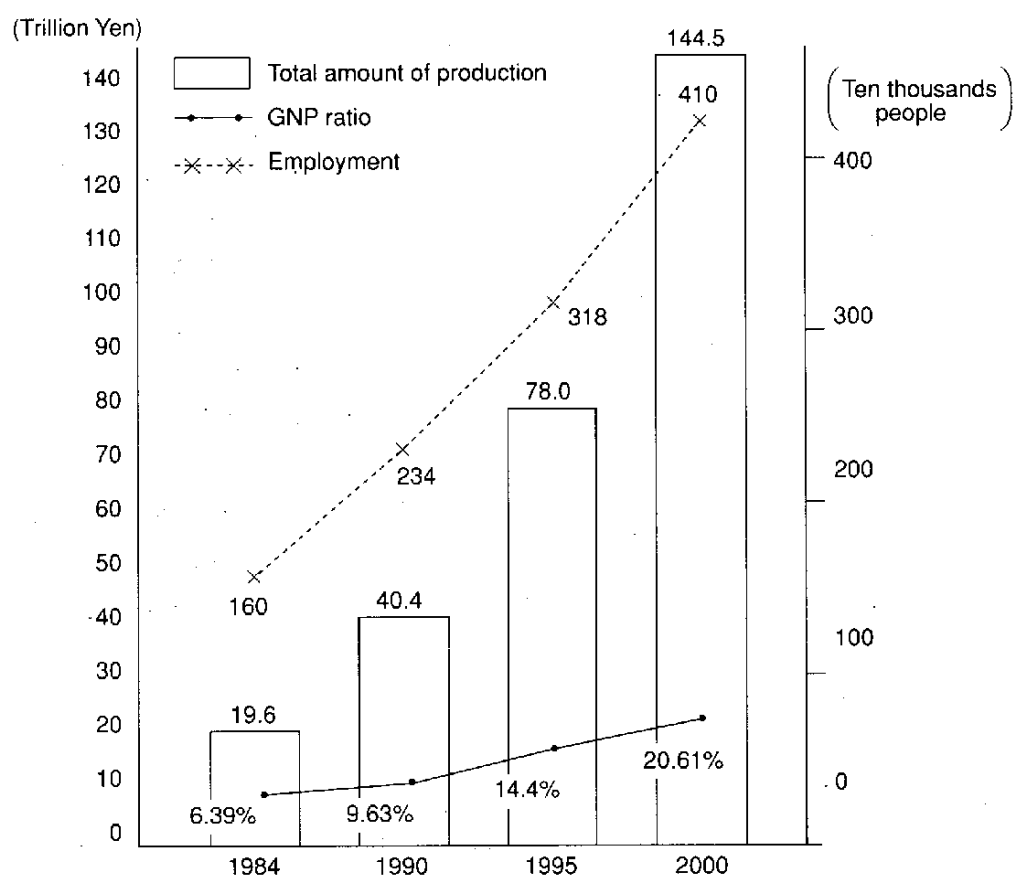


Figure 1-1 Long-Term View of Scale for Information Industry

Note: Figures for 1984 are actual, others have been estimated according to the input-output table with assumption of 5% increase per year in GNP.

Source: "Outlook of the Information Industry for the year 2000," Industrial Structure Council

Database dealers include database producers, distributors, and information brokers who search the required information from the distributors and provide it to the users. In the U.S., the producers, distributors and searchers are doing their respective business separately, but in Japan the producing and the distributing are not yet separated completely. For instance, our government's representative database service, JOIS, is produced and distributed directly to the users by Japan Information Center of Science and Technology. PATOLIS or Patent Information is also produced and distributed by Japan Patent Information Organization. Many private enterprises such as Nihon Keizai Shimbun also do both producing and distributing. Japanese Database industry seems to have adopted either the idea of integrated production which has been apparent in the manufacturing industry or the idea of doing both producing and selling similar to that which the smaller industries usually do. The method with these old ideas has its own advantage, but because of the remarkable increase of the number of users and the diversified user needs,

the business of the producers and of the distributors will be separated before long. The appearance of CD-ROM with an increase in electronic publishing is considered to have brought about structural reform of the current database industry which has consisted mainly of on-line services.

It was aforesaid that only 26.9% of the total databases are domestic and this fact shows that our country spared itself the effort of constructing the databases and depended heavily on the imported databases, as the construction requires much time and money. This fact tells that our database industry lacks the spirit of independence. Many of the database dealers are included as a side businesses in enterprises which are engaged mainly in news, communication, research, study, information processing, publishing, printing, book sales, etc. This is one of the reasons which prevents the industry from becoming independent. Only a few database dealers are making a profit and this shows one of the immature sides of the industry.

In the past year or two, many enterprises of other industries have been making active and long-range plans to begin the database business on their own as they foresee the huge sales. It is hoped that these moves will stimulate the existing database dealers and also many other industries.

6. Outlook for Internationalization

Database internationalization has three problems. The first one is the overseas supplying of our databases, which is being discussed earnestly, the second is the liberalization of service trade which made its first appearance in the Uruguay Round of GATT, and the third is the international criterion and standardization of database construction, implementation and utilization.

Japan is criticized more severely than ever for its reluctance to provide its information overseas, in spite of its eagerness to import information. Because of the rise of our international status which is the result of our swelling economic power and highly advanced technology, overseas demand for our information is increasing year after year. It is often heard that our information especially of science and technology is hard to obtain. However, in discussing the matter, the term "information" cannot be construed as "database." It is true that three fourths of our commercial databases are made overseas whereas only one fourth is made domestically and only one fifth of this little portion of domestic databases are provided overseas. However, it has to be noted again that "information" does not stand for "databases." Database as information media is sure to become much more important in the future, but databases are only one part of information media. This must be taken into account in providing our databases overseas.

Our databases have originally been constructed and provided for our domestic use and not for overseas provision. Besides, our databases are lower in quality and quantity than those of the U.S. and even the users in our own country are not fully satisfied with our databases. How can our information which can not be accessed on our own databases be provided overseas as a

database? Therefore, in the first place, our own databases are urgently required to be consolidated. There seems to be little difference between domestic needs and overseas needs in the fields of business, science, technology, personnel, and organization. It is of urgent necessity for us to prepare the system to provide information in Japanese. At the same time, effort must be made to study the overseas needs for our information, as we are liable to overlook the information needed overseas.

It is a consensus of opinion that the overseas provision of information has to be made in English. However, translation into English costs an enormous amount of money and in view of this, it is risky for the private enterprises to do the translation and the provision overseas on their own. Improvement in machine translation is urgently needed. On the other hand, at the international database meeting for mainly European countries, it is worth notice to have been discussed how to conduct Japanese language education in order to train workers with the skill of translating Japanese into their own languages.

We are encountering criticism from overseas that the overseas users are unable to know what kinds of Japanese databases are available and how they can be accessed. MITI's database directory has been published only in Japanese so far, but its English publication is under way and is expected to disarm the overseas criticism.

The other side of the internationalization of our information service is service trade. The interim ministerial review meeting of GATT's Uruguay Round which started in 1986 and aims at terminating in 1990, was held in Montreal, Canada in December, 1988. In the Uruguay Round, GNS (Group of Negotiation on Services) was set up apart from the GNG (Group of Negotiation on Goods) and it has engaged in formulating the international rules on service trade. In the interim review, it was agreed to include "transparency," "national treatment" and "nondiscrimination" as basic rules. More details were carried forward to the future negotiations which will attract world wide attention in the internationalization of the database industry.

The standardization of the databases is the third issue. The liberalization of service trade is scheduled to be realized, and this means we have to seriously discuss the adjustment of domestic and international standards of our databases and this adjustment may be one of the important factors to promote the internationalization of our databases.

7. Copyright and Protection of Privacy

As the construction and utilization of databases increases, the legal protection of information is becoming more important than before.

The Copyright Law enacted in January, 1987, stipulates the protection of the copyright of the databases and in this law, databases are treated as a separate literary work from the existing editorial work. This Copyright Law is widely accepted in the database industry, but on the side of enforcement, it is treated in a rather loose manner. The copyright problem becomes more

important than before with the advancement toward information orientation. Nationwide consciousness, especially of the users, of the copyright protection will have to be aroused.

Since 1985, privacy protection has been discussed actively and in March, 1988, Japan Information Processing Development Center (JIPDEC) issued "Guideline for Private Information Protection in Private Sectors." The debate on the private information protection in the administrative organizations began around 1974 and in December, 1988, "Law on the Protection of Private Information Concerning Electronic Computer Processing Owned by Administrative Organization" was issued officially. The database industry is closely related to privacy protection in the area of gathering, storing, utilizing and providing private information. The databases of private information are sure to increase in the future. Therefore, the private information will require far more discreet handling.

8. Training Professional Workers

MITI's Industrial Structure Council's "Software Engineer for the Year 2000" foresees the shortage of 970,000 software engineers in 2000. As a result of rapid increase both of commercial and of in-house databases, the securing of the professional workers (Database Engineer) in the construction and utilization of the databases has become an issue of vital importance. For this reason, it is urgent to create the proper environment to train the engineer for the database industry. Because of the upgrading of database technology and of the scaling up of the databases themselves, both sufficient number and efficiency of the engineer are urgently required for the construction and operation of databases. In the utilization of databases, not only the personnel to increase the end users but also sophisticated and highly technical database experts to deal with the advanced and diversified information needs, are required.

The current training of the engineer for database construction are given within enterprises, governmental offices and schools, and in some individual cases, a person receives the training at school by his own will, or on the side of utilization, the person receives the training by participating in a study course given by the database producers, vendors or information brokers. There is no official system of evaluating the skill of the engineer, except for the private examinations on the information retrieval. MITI is considering the possibility of giving examinations to the engineers after training them on a systematic curriculum as is currently done for the information technology engineer (Software Engineer). The national training system for the engineer of both database construction and information retrieval would be indispensable.

II. PRESENT SITUATION OF DATABASE SERVICES IN JAPAN

1. Positioning of Database Service Industry

1.1 Definition and Classification of Database

A database is defined as "a set of articles, numerical values, graphics, and other such data that are systematically arranged so that they can be easily accessed by computers" (the Copyright Law). Generally, a database can be thought of as files with a large amount of information in stock. However, flow type databases such as that of market information are becoming the center of public attention. In either case, it is prerequisite for a database to be able to provide users with necessary data at any time using computer technologies.

Databases are generally classified into reference databases and fact databases. The former contains data appearing in papers and books, offering data on the contents and abstracts of original literature. The latter offers original data themselves. Typical data offered by the latter are statistical data. Also, a reference database which covers complete works of literature is called a full text database and is categorized as a fact database. In recent years, fact databases are increasing as user demand rises and technological advances are made on storage media.

Further, databases may also be classified into commercial and in-house databases. The commercial service offers the database as a product by offering data to users for an appropriate fee. On the other hand, an in-house database is constructed and used within an enterprise for decision making and other such job processing. From the usage point of view, the former may be called an external database, while the latter is an internal database. This chapter introduces the trends seen in commercial database services.

1.2 Position of Database Industry

"An Outlook of the Information Industry for the Year 2000" by the Industrial Structure Council of the MITI (Ministry of International Trade and Industry) refers to the electronic industry, telecommunication, and information service as three main aspects of the information industry. Furthermore, it states that information service consists of three major structural elements; (1) information processing service, (2) software service, and (3) database service. In other words, when database service is regarded as an industry, it plays an important role as a part of the information industry.

In the process of data distribution from database construction to consumption of information, database service utilizes the techniques and services of all the sectors of the information industry. For example, apart from the host computer, various types of personal computers are used at terminals. Telecommunication service is indispensable as means of data distribution if

on-line service is to be offered. For more efficient construction and usage, various software, including a database management system (DBMS), are needed. Recently, new technologies, such as artificial intelligence (AI) and CD-ROM, are beginning to make contributions to improved database service.

Thus, database service occupies one corner of the information industry, and at the same time we should not overlook the fact that it gives incentives to the development of other information industries. The database industry serves as the nucleus of so-called "industrialization of information," and its importance is likely to increase in the near future with the advancement toward an information oriented society.

2. Market Size of Database Service Industry

The market size of database service can be seen in the "Survey on Designated Services Industries" annually issued by MITI since fiscal 1973. The 1987 Survey was revealed in September, 1988 as of November 1, 1987. The research into the information service industry revealed 3,692 sales branches (up 31.5% over the previous year), 241,187 employees (up 21.5% over the previous year), and annual sales of 2,299.3 billion yen (up 20.0% over the previous year). Within these figures, looking at the numbers of branches by type of service, the information vending service accounted for 1.7% of the total (6.0% last year), or 61 branches (196 last year).

From the standpoint of sales by type of business, the sales for on-line/off-line "database services" registered 43.2 billion yen. (On-line, approx. 63%; off-line, approx. 37%.)

Until 1986, the Survey was conducted for the "information vending service" which included database service. The sales in this sector showed an annual increase of about 20% from 1975 to 1985. In 1985, the sales exceeded 100 billion yen for the first time, and it reached 114.3 billion yen in 1986.

As for the sales of 1987, it is difficult to make simple comparisons because the Survey made changes to the classification of sectors of the information service. However, approximate movements can be conjectured from the results of the "Current Survey on Designated Services Industries" that began in fiscal 1987.

Current Survey is based on monthly surveys which sample the leading enterprises which account for 70% of the total sales in information vending service in the 1986 Statistical Survey, and make follow-up research on these.

By summing up the monthly sales reported by the Current Survey for one year starting December, 1987, the annual sales for the entire information vending service industry is estimated (by multiplying 10 / 7) at about 155 billion yen.

Compared with the sales of 114.3 billion yen as revealed in the Survey for fiscal 1986, it can be inferred that the sales was still on the increase in 1987.

"An Outlook of the Information Industry for the Year 2000" issued by the Industrial Structure Council of the MITI forecasts that the sales by the entire information industry will reach 145 trillion yen (20% of GNP), of which the information service accounts for 16 trillion yen (2.3% of GNP). Database service within the information service industry is expected to grow more steeply with the sales reaching 3 trillion yen.

Table 2-1 No. of Sales Branches by Sectors of Information Service

Sector	1985			1986			1987		
	No. of sales Branches	Component Ratio (%)	Comparison with Previous Year (%)	No. of Sales Branches	Component Ratio (%)	Comparison with Previous Year (%)	No. of Sales Branches	Component Ratio (%)	Comparison with Previous Year (%)
Total	2,556	100.0	100.3	2,808	100.0	109.9	3,692	100.0	131.5
Software Businesses	960	37.6	110.0	1,222	43.5	127.3	1,677	45.4	137.2
Information Processing Services	1,156	45.2	95.0	1,111	39.6	96.1	1,177	31.9	105.9
Information Vending Services	201	7.9	96.6	196	7.0	97.5	61	1.7	31.1
Other Information Services	239	9.4	95.2	279	9.9	116.7	777	21.0	278.5

Source: "Survey on Designated Services Industries," MITI, December, 1988

Table 2-2 Annual Sales by Various Sectors of Information Service

(Unit: Million yen)

Classification	1985			1986			1987		
	Annual Sales	Component Ratio (%)	Comparison with Previous Year (%)	Annual Sales	Component Ratio (%)	Comparison with Previous Year (%)	Annual Sales	Component Ratio (%)	Comparison with Previous Year (%)
Total	1,561,829	100.0	112.7	1,915,939	100.0	122.7	2,299,305	100.0	120.0
VAN	—	—	—	—	—	—	33,992	1.5	—
Trusted Computation	390,713	25.0	103.4	427,826	22.3	109.5	467,213	20.3	109.2
Software Development, Programming	658,030	42.1	128.4	912,747	47.6	138.7	1,104,504	48.0	121.0
Data Input such as Key Punching	109,650	7.0	101.4	120,324	6.3	109.7	118,740	5.2	98.7
Machine Time Sale	19,164	1.2	109.7	12,073	0.6	63.0	22,493	1.0	186.3
Trusted System Management and Operation	117,699	7.5	92.4	144,323	7.5	122.6	115,766	5.0	80.2
Information Vending Service	100,762	6.5	104.3	114,306	6.0	113.4	—	—	—
Database Service	—	—	—	—	—	—	43,237	1.9	—
Various Researches	56,980	3.6	90.3	72,989	3.8	128.1	99,313	4.3	136.1
Others	108,831	7.0	131.1	111,352	5.8	102.3	294,048	12.8	264.1

Source: "Survey on Designated Services Industries," MITI, December, 1988

3. Spread of Databases

Since 1982, the MITI has been issuing a "Database Directory" as a guidebook concerning databases commercially operating in Japan. It introduces the contents by field for any accessible database, domestic or foreign. The versions for 1986 and later are also offered in floppy disks, and they are available on-line through some vendors.

3.1 Sharp Increase in Number of Databases

According to the 1988 version of the Database Directory, the number of accessible commercial databases was 1,964. As compared with 456 databases in 1982, the number has increased by more than four times in the past six years. During this period, there was a trend of steady growth, with consistent increases of about 300 new databases starting operation each year. The number of enterprises (database service vendors) registered in Database Directory increased from 42 in 1982 to 194 in 1988, or by almost five times (see Figure 2-1).

3.2 Foreign Made Databases

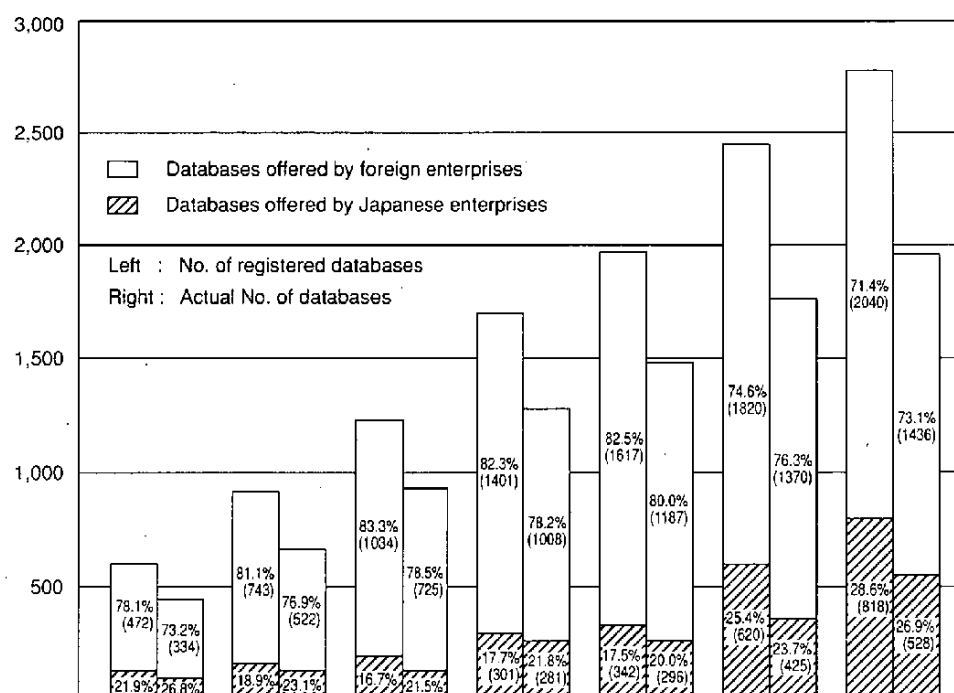
The majority of databases are of foreign made, mostly provided by the U.S. The 1988 version of the Database Directory shows that domestic databases account for only 27%, and no change has been seen in this trend since 1982.

There are more than 3,000 on-line databases in the U.S., and they can be accessed relatively easily through telecommunication lines. Some foreign database systems own 100 to 300 databases, so it is only natural that overseas databases have the upper-hand. On the other hand, because it takes a lot of time to construct a database, an increase in the number of domestic databases won't happen overnight. In Japan, however, the establishment of databases is attracting people's interest, and the ratio of domestic databases is expected to increase in the near future, now that the introduction of gigantic foreign systems has reached a plateau.

As for the number of databases, Japan continues to resort to those of foreign countries, but domestic databases account for the greater share in terms of actual fees paid by users. More precisely, 73.7% of the total fees paid by users is for domestic databases, and only 26.3% is paid to overseas databases. In other words, this is the inverse of the ratio in terms of the number of databases. This may be due in part to the fact that domestic databases center around the business sector which has a high access rate (see Table 2-3).

3.3 Main Stream is Business Sector

According to the subjects, databases can be classified into (1) general, (2) natural science and technology, (3) social and human sciences, and (4) business. Of these, the business sector is becoming the main stream of databases. Up to the 1985 version of the Database Directory, the natural science and technology and the business sectors each accounted for an even 37% of the



	Fiscal 1982	Fiscal 1983	Fiscal 1984	Fiscal 1985	Fiscal 1986	Fiscal 1987	Fiscal 1988
No. of Registered Databases	604	916	1,242	1,702	1,959	2,440	2,858
Actual No. of Databases	456	679	924	1,289	1,483	1,795	1,964
No. of Registered Enterprises	42	58	75	100	121	137	194

Figure 2-1 Databases Accessible in Japan

Source: "Database Directory," MITI

whole, but in the 1988 version, the former recorded 29.1% and the latter 45.7%, showing an apparent difference. On the whole, the ratio in terms of the number of databases, the general sector shows an increasing trend, while databases for natural science and technology, social and human sciences and the business sector remain stable (see Table 2-4).

By a more minute breakdown, the top three areas in the actual numbers of databases are (1) newspapers/magazines/news (153), (2) information on financial conditions and activities of foreign enterprises (139), and (3) data on money market/securities/exchange rates (138). "Medicine/pharmacy/life sciences/living things information" ranks fourth (134), followed by the fifth ranking "information on overseas economies" (111). The tendencies are for most databases in the business and general sectors to place their emphasis on fresh news, while those in the field of natural science and technology emphasize high tech. This distribution also reflects the demands of users.

Table 2-3 Distribution of Domestic and Foreign Databases by Subjects

No. of Registered Databases/Actual No. of Databases Subject		No. of Registered Databases			Actual No. of Databases		
		Overseas	Domestic	Total	Overseas	Domestic	Total
1. General	General	43	34	77	23	24	47
	Newspaper / magazine / news	145	73	218	109	44	153
	Information on persons and organizations	41	28	69	26	27	53
	Administration	26	8	34	9	4	13
	Laws	28	7	35	19	6	25
	Politics	23	1	24	18	1	19
	Health / sports	12	1	13	10	1	11
	Travel / schedule	14	2	16	3	2	5
	Amusement / leisure / facility guide	13	13	26	9	9	18
	Living Culture / home life	11	5	16	10	5	15
	Dictionaries / auxiliary files	6	18	24	5	18	23
	Place names / maps / addresses	2	9	11	2	9	11
	Others	23	8	31	18	8	26
	Total	387	207	594	261	158	419
2. Natural Science and Technologies	General	68	18	86	49	18	67
	Patent	67	16	83	48	16	64
	Medicine / pharmacy / life sciences / living things	171	26	197	101	22	123
	Chemistry	105	9	114	83	8	91
	Physics	5	1	6	3	1	4
	Mathematics	5	0	5	2	0	2
	Electricity / electronics / information	82	4	86	67	4	71
	Machinery	11	3	14	10	2	12
	Architecture (civil engineering / construction)	7	1	8	5	1	6
	Space / earth / oceans	28	0	28	20	0	20
	Nuclear power	3	0	3	3	0	3
	Environment / pollution	56	0	56	46	0	46
	Energy / resources	29	1	30	22	1	23
	Agriculture	20	0	20	11	0	11
	Meteorology	7	8	15	5	8	13
	Metal / material	26	3	29	14	3	17
	Foods	9	3	12	5	2	7
	Fiber / timber / pulp	8	0	8	5	0	5
	Others	30	2	32	24	2	26
	Total	737	95	832	523	88	611
3. Social and Human Sciences	General	17	0	17	10	0	10
	Pedagogy	25	0	25	17	0	17
	Sociology	14	0	14	6	0	6
	Demography	9	10	19	8	9	17
	Law	1	0	1	1	0	1
	History / politics	4	0	4	2	0	2
	Arts (movie / music)	12	0	12	7	0	7
	Psychology	10	0	10	5	0	5
	Linguistics	5	0	5	2	0	2
	Philosophy	2	0	2	1	0	1
	Religion	9	0	9	7	0	7
	Others	2	0	2	2	0	2
	Total	110	10	120	68	9	77

No. of Registered Databases/Actual No. of Databases Subject		No. of Registered Databases			Actual No. of Databases		
		Overseas	Domestic	Total	Overseas	Domestic	Total
4. Business	General	67	21	88	50	17	67
	Market / merchandise	89	40	129	63	30	93
	Economy (foreign)	134	26	160	98	13	111
	Economy (Japan)	1	118	119	1	61	62
	Financial conditions and activities of enterprises (foreign)	183	10	193	135	4	139
	Financial conditions and activities of enterprises (Japanese)	0	125	125	0	61	61
	Accounting / management	15	3	18	9	3	12
	Financing / securities / exchanges	133	111	244	96	42	138
	Energy industry	62	3	65	35	2	37
	Communication / broadcasting	32	0	32	31	0	31
	Agriculture / forestry / fishery	12	2	14	9	2	11
	Chemical industry	13	2	15	8	1	9
	Labor	10	2	12	7	2	9
	Education industry	0	0	0	0	0	0
	Construction	1	3	4	1	3	4
	Transportation	24	4	28	15	4	19
	Sales / service	7	3	10	6	3	9
	Circulation / immobile asset	2	5	7	2	4	6
	Others	19	24	43	16	17	33
	Total	804	502	1,306	582	269	851
	Others	2	4	6	2	4	6
	Others Total	2	4	6	2	4	6
Grand Total		2,040	818	2,858	1,436	528	1,964

Source: "Database Directory 1988," MITI

Table 2-4 Changes in Distribution Ratios by Sectors

Sectors	1984	1985	1986	1987	1988
General	16.1	17.5	18.8	18.8	20.8
Natural Science Technologies	37.0	37.3	32.2	27.4	29.1
Social and Human Sciences	9.4	8.2	5.2	4.1	4.2
Businesses	37.5	37.0	43.8	49.7	45.7
(Total Number of Databases)	(1,242)	(1,702)	(1,959)	(2,440)	(2,858)

Source: "Database Directory," MITI

3.4 Increase in Fact Databases

When databases are classified into reference type and fact type, most databases are now of the fact type. According to the 1982 version of the Database Directory, reference databases accounted for 56%, and fact databases 44%. However, in the 1988 version, the former was 35%, and the latter 61%, indicating an expansion in the number of fact databases. The reasons for this are that, in addition to a steep increase in full text databases, databases for the business sector offering mostly numerical data are expanding (see Table 2-5). The history of the development of European and U.S. databases tells that databases move from the scientific technology sector to the business sector, and from the reference type to the fact type. The same patterns are also seen in the development of Japan's databases.

Table 2-5 Database Distribution by Types

Types	Image of Data	1982	1983	1984	1985	1986	1987	1988
References	Document data	339	501	654	906	842	920	990
	Literatures	92	133	173	202	194	210	205
	Abstracts	10	11	47	112	211	236	230
	Magazines / summaries	188	286	353	421	380	404	470
	Others	49	71	81	171	57	70	85
Facts	Full text data	52	87	198	338	116	786	1,009
	Full texts	35	66	180	313	503	593	754
	Combination of full text and other documents	17	21	18	25	113	193	255
	Numerical data	130	229	207	239	389	616	689
	Graphic data	2	2	4	6	2	1	1
	Combination of document, numerical data, and graphics	81	97	179	213	19	25	43
Others		—	—	—	—	91	92	126
Total		604	916	1,242	1,702	1,959	2,440	2,858
Rate of References Databases		56.1%	54.7%	52.7%	53.2%	43.0%	37.7%	34.6%
Rate of Facts Databases		43.9%	45.3%	47.3%	46.8%	52.4%	58.5%	61.0%

NOTE: Number of Registered Databases

In the 1986 version and later, part of databases classified under "Others" for the reference type were made independent as "Others."

Source: "Database Directory," MITI

4. Comparison between Japanese and American Databases

4.1 Circumstances in the U.S.

For on-line databases alone, database services in the U.S. started about ten years earlier than in Japan. In the U.S., the Sputnik Shock in 1957 gave an impetus for the Federal Government to begin construction of large-capacity data processing systems and databases. DIALOG and ORBIT, which are among the oldest database systems, were born from national projects related to national defense and space development.

In the 1970's, many commercial database services appeared, and the distribution mechanism almost reached completion. In addition, through international networks, databases became accessible even from foreign countries.

In the 1980's, more and more private enterprises are entering the database market, and competition has become vehement. Accordingly, there is a recent movement toward reorganization of the industry through mergers and acquisitions.

4.2 Comparison between Japan and U.S.

It is difficult to compare database conditions in Japan with those in the U.S. because these two countries have different history and culture, and because no coordinated official statistical data is available. However, comparison with the advanced databases in the U.S. should provide an index in correctly positioning Japan's database service. For purposes of comparison here, data is based on the results of analysis of the Database Directory in the case of Japan, and for the U.S., data from Cuadra's directory, etc. are employed.

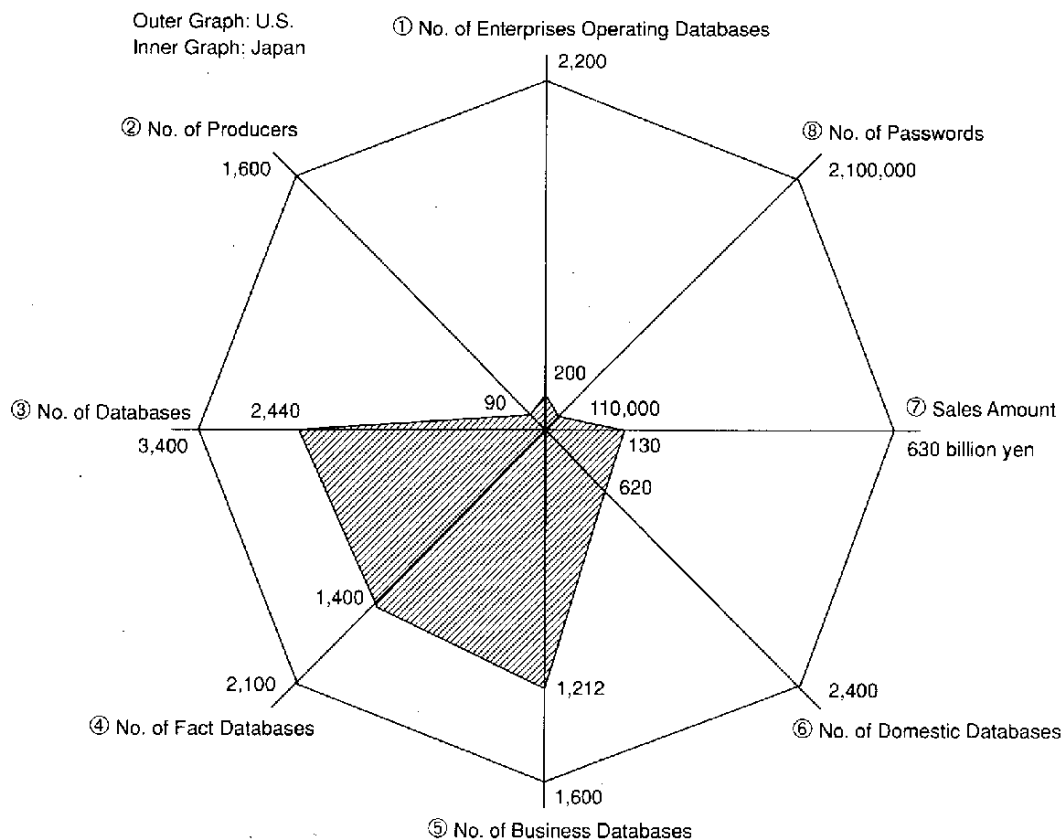


Figure 2-2 Comparison between Japanese and U.S. Databases (1987)

- Sources: ① ~ ⑥ Cuadra, On-Line DB Directory for the U.S.
 "Database Directory" by MITI for Japan
- ⑦ Estimated from data obtained from the Ministry of Commerce and LINK
 Resources for the U.S., and from Current Survey on Designated Services
 Industries for Japan. (1\$ = 125 yen)
- ⑧ Nikkei BP, "Nikkei New Media"

Figure 2-2 is a graph with various indices such as the number of enterprises engaged in database operation and the number of databases, on which the data for the U.S. is used to form the constant outside graph, while the conditions in Japan are expressed in relation to it as the inside graph. Figures are all approximate. There are fairly great differences between Japan and the U.S. in the number of enterprises operating databases, number of passwords (indicating the number of users), and the amounts of sales. The number of producers, which is most important in estimating database service conditions, is only 90 for Japan as opposed to 1,600 for the U.S. These findings show that database service in the U.S. is much greater than that of Japan in the size of the industry and in latent strength.

On the other hand, there is no conspicuous difference in attributes such as the number of accessible databases, subjects, and types. This is natural because most of U.S. databases are also accessible from Japan. In any case, the construction of a database requires much labor and

time. As the number of producers increases and an ample number of databases become available, the distribution mechanism for distributors and information brokers will also develop. Unlike technological development, it will be impossible to eliminate the differences in this field overnight, and a restructuring of the industry is likely to be required in the long run.

5. Structure of Database Service Industry

5.1 Data Distribution Mechanism

Database service is enabled by participation of enterprises (organizations) with various functions. Producers, distributors, sales agents, and information brokers are typical functions. In many cases, one company plays more than one role.

These enterprises divide up the various functions, and together constitute a distribution mechanism that distributes databases to end users. Among them, producers perform the most important function of constructing databases. Distributors have the role of distributing databases through a network. Agents, both domestic and foreign, try to acquire users and perform after-care for the sake of producers or distributors. Information brokers are searchers with highly advanced retrieval techniques who search databases for end users, and perform consulting.

In addition to these database enterprises, common carrier and VAN operators which take charge of telecommunication, and software firms which support the software also participate in the distribution of databases. Still more, there are public organizations that offer statistical data and other source data, which are the sources of databases.

For the spread of databases, it is preferable to establish a definite data distribution mechanism in which specific functions are assigned to particular enterprises. In the U.S., emphasis was placed from the very beginning on the separation of functions among various enterprises in the course of the formation of a distribution mechanism.

In the case of Japan, few enterprises specialize in one function. The distribution of database enterprises as classified by activities given in the Database Directory shows that only

Table 2-6 Transition of Numbers of Enterprises by Functions

	1982			1983			1984			1985			1986			1987			1988		
	Specialized	Non-Specialized	Total	Specialized	Non-Specialized	Total	Specialized	Non-Specialized	Total	Specialized	Non-Specialized	Total	Specialized	Non-Specialized	Total	Specialized	Non-Specialized	Total	Specialized	Non-Specialized	Total
Producers	6	24	30	8	29	37	13	42	55	21	52	73	18	55	73	19	70	89	23	87	110
Distributors	17	30	47	22	29	51	24	48	72	32	58	90	20	55	75	16	70	86	15	85	100
Information Brokers	3	10	13	3	10	13	4	20	24	9	19	28	18	17	35	20	21	41	44	27	71
Agents	—	—	—	—	—	—	—	—	—	—	—	—	3	11	14	4	13	17	9	18	27
Others	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	12	13
No. of Registered Enterprises	42			58			75			100			121			137			194		

Source: "Database Directory," MITI

23 producers act as sheer producers among 110 producers in 1988. The remaining 87 producers are also acting as distributors or information brokers. The same applies to distributors, where of 100 distributors, only 15 act as unadulterated distributors. Instead, there are 60 multi-function enterprises called producer-distributors, which is the highest in number among the types of database services activities (see Table 2-6).

5.2 Entry into the Market

No official data on the conditions of entry in the database market are available. However, from a number of materials and results of researches, it is possible to estimate regarding the entry into the market: (1) the types of enterprises entering (2) approximate time (3) the number of companies (4) the functions entered into.

First, the functions of enterprises participating in database service are estimated from the functional distribution of member enterprises of the Japan Database Industry Association (DINA), which is an association for the database industry. As of the end of December, 1988, from among 106 member companies, 23 companies (21.7%) are engaged in information vending service, of which many are small-sized information brokers.

The list of functions continues, in decreasing order of number of enterprises, with data processing and software development (17.0%); research, study, and think tank (16.0%); and printing, publishing, book sales (11.3%). There are also many enterprises which operate telecommunication and VAN business as well as newspaper, news, and services business. The primary business of most of these enterprises is closely associated with information itself.

When did these enterprises start information services? The database business in Japan showed signs of full-flagged development only after the early 1980's. There were only 19 member companies in 1979 when DINA was first started. The number gradually increased from 1980 to 1985, and an abrupt rise was seen since 1985 when the environment surrounding database business was improved. According to the Database Directory, the number of registered enterprises exceeded 100 for the first time in 1985.

According to the survey (Research into Users Awareness of Database Services, Vender Part) conducted by the Database Promotion Center (DPC), from among 104 respondents, 24 companies (23.1%) entered database services by 1979. A majority of them began to operate database services around 1985 (see Table 2-7). From the above, it is seen that some forerunner

Table 2-7 Time of Entering in Database Business

Year of Entering	Before 1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 (expecting)
No. of Enterprises Entering Database Business	24	4	6	4	6	11	14	18	9	5	3
Cumulative Rate	23.1%	26.9	32.7	36.5	42.3	52.9	66.3	83.7	92.3	97.1	100.0

NOTE: If the same enterprise began to perform two or more database service functions at different time, only the earlier one is counted.

Source: "Survey of User Awareness of Database Services," DPC, March, 1989

groups started database services before 1975, and that an increasing number of enterprises, including those handling overseas information, entered into the business in or around 1975. Thereafter, the number increased steeply.

There is no definite data on the number of companies entering database service to present. The Database Directory has 194 companies registered as of 1988. Because they develop database business in some form or other, it is certain that at least that number of companies are in the database business. On the other hand, DINA has 106 member companies. This figure includes enterprises that are planning to enter the database business, but are not in operation yet. The number of enterprises registered in the Database Directory and that of DINA members add up to 230 companies, excluding duplication. Since there are considered to be companies which entered the database business that are not registered in the Database Directory, the number of companies which have entered the business is estimated to be over 250.

As stated in the section "Data Distribution Mechanism," one of the features of Japan's database business is that few enterprises specialize in particular functions. Enterprises acting as both producers and distributors are the greatest in number, as shown by the distribution of enterprises registered in the Database Directory and that of members of DINA, with 30.9% and 31.1%, respectively. According to the Database Directory, those specializing in the producer business (enterprises engaged only in production as their database business) are as few as 11.9%.

6. Present Situation of Database Services

To know the present conditions of database services, the Database Promotion Center conducts a survey of vendors as part of their annual "Survey of User Awareness of Database Services." The following are the results of analysis concerning the survey conducted in September, 1988.

6.1 Outline of Respondent Enterprises

The survey was conducted by means of a questionnaire and 104 companies responded. Of the types of services of the respondent enterprises, the greatest number was the 25 enterprises acting as both producers and distributors (24.0%). This was followed by producers which accounted for 21.1%, information brokers 10.6%, and distributors 7.7%. The remaining were those performing a combination of functions in some form or other.

Do these enterprises regard database business as their primary business? 30% regarded it as such, and 60% answered in the negative. Because it is not always defined as the primary business even if the sales from database business accounts for more than 50% of the total sales, there is a possibility that these answers include wishful thinking and speculation. In any case, only about a third of those engaged in database service think of it as their primary business.

55% answered that it would be their major business in the future, indicating great expectations for the database business.

Looking at each service function separately, those greatly exceeding the overall average value (31.9%) for percentage of enterprises considering database services to be their major business are "producer/distributor/information broker" and "producer/distributor/agent." These were at 60% and 50% respectively, and they place their greatest emphasis on databases as a business. Agents and producers/distributors were each at 33.3%, or a little greater than the average value. 86% of the distributors think that database business will be their primary business in the future, thus having the highest expectation of the database business.

6.2 Sales of Database Services

The average sales of database services accounts for 17.7% of total sales as calculated from the responses by 69 companies. This means that database business is not yet the primary business for enterprises engaged in the database business. The results of the previous survey, which was very similar, gave the average percentage of 11%. On the whole, it can be seen that the level is on the increase.

Looking at each service function separately, the highest percentage was given by "producers/distributors/information brokers" with 32.4%, followed by "producers/distributors/agents" registering 28.8%. These two sectors constitute the top two groups which regard database business as their major business.

Besides these, only the sales by producers and information brokers exceed the average. The sales achieved by those specializing as distributors account for only 3.6% of their total. One of the reasons is that sales for major businesses such as information processing service are by far the greatest. However, distributors have the highest expectation of the database as their major business in the future.

Domestic databases account for a high overall average of 82.3% of the sales for databases. According to the 1988 version of the Database Directory, the number of databases accessible in Japan is 1,964 (in actual number). Among these, 528 (26.9%) are domestic ones. That is, overseas databases prevail domestic ones in quantity, but the size of business of domestic databases is overwhelmingly greater. The same results are induced from the amount of database fees paid by users (the amount of fees paid to domestic databases accounted for 74%).

The highest rate of sales of domestic databases are of course those of enterprises specializing as producers, with 100%. The rate for those multi-function enterprises related to producers all exceed the average. The enterprises specializing as information brokers and vendors recorded rates lower than the average, but this may be ascribed to the fact that they are intent on distributing overseas information. It is noteworthy that even for these, more than half of their sales comes from domestic databases.

The rate of on-line service to the database sales is 61.3% for domestic databases, and

78.1% for overseas databases, showing extravagant shares. In the future, there is a possibility that versatile database distribution media, including CD-ROM, will come into use, but under the present circumstances, on-line systems which meet the demands for quick acquisition of information are the main stream media.

6.3 Construction and Distribution of Databases

Producers are at the highest end of the database distribution mechanism, and play an important role. However, it requires labor, costs, and time to construct a database, and it is not easy to recover costs. Of the construction costs, data input requires the greatest component ratio of 22.8%, followed by 16.1% for data gathering, 15.6% for charges for computer use, and 15.4% for program development in that order. Seen from a higher level, they can be classified into (1) database construction, (2) software development, and (3) miscellaneous, which account for 53.0%, 26.6%, and 20.4%, respectively. The majority of costs are for infrastructures, such as data gathering, analysis, processing, and input (see Figure 2-3).

What problems do producers encounter when constructing a database? The most frequently encountered problem is "excessive cost and time for database construction jobs, such as data gathering and data input" as pointed out by 85% of the respondents. This is followed by "the burden of maintenance cost" (54%), and "too great initial investments to be recovered" (54%), revealing that much attention is given to cost related problems.

How do producers distribute data after the database has been constructed? Most of producers distribute them by themselves (66.2%), verifying the fact that there are many enterprises that act as both producers and distributors. It also indicates that the roles of producers and distributors are not yet demarcated.

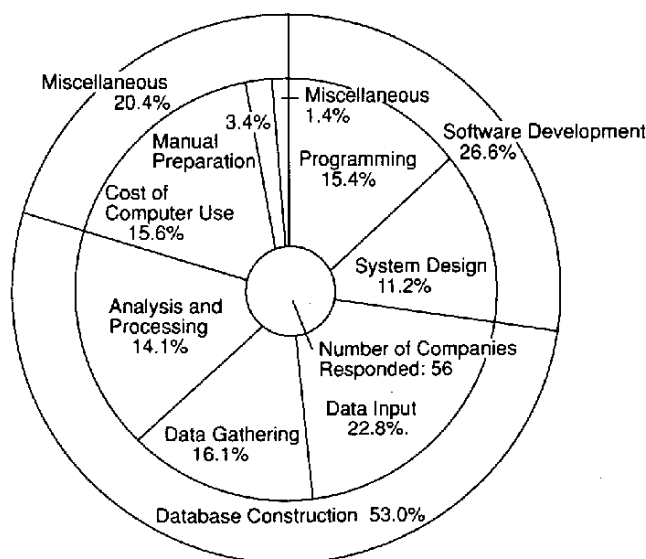


Figure 2-3. Component Ratio of Database Construction Cost

Source: "Survey of User Awareness of Database Services," DPC, March, 1989

There are 40 companies (58.8%) which offer their databases and assign the distribution to other companies. Sixteen companies offer their databases to one distributor, and 24 companies to two or more distributors. In the previous survey, the number of companies that offered their databases to one distributor was greater. Thus, the trend is for distributors to select two or more distributors.

Although there is little advancement in the separation of producers and distributors, the pattern in which each producer signs a contract with two or more distributors is drawing close to the example set by the U.S.

6.4 Future Problems

The future problems which the companies offering database services have to solve are (1) training of personnel (58%), (2) reduction of operating costs (57%), and (3) enhancement in the recognition of the value of information. As stated earlier, all of the greatest problems producers are encountering in database construction are related to costs. However, the greatest problem for the industry as a whole is the problem of personnel. That is, it is urgent to train and secure engineers for the construction and operation of databases.

III. TRENDS OF DATABASE IN FOREIGN COUNTRIES

1. Database Services in the U.S.

1.1 Size of the Database Services in the U.S.

The size of the industry can be looked at in several ways. It can be measured in terms of the numbers, or growth in the numbers, of vendors, producers, databases, database records, on-line searches, and of course, gross revenues. The gross revenues of the North American electronic information industry, including news and credit services, etc. has been estimated by LINK Resources to be \$6.3 billion for the year 1988 (See Table 3-1) and their estimate for 1979 was \$175 million. A much narrower cut of the industry is the information center/library market in the U.S. where the volume generated by the word-oriented database search services (MDC, DIALOG, ORBIT, NLM, BRS and similar services) more than doubled from 1982 to 1985 and nearly doubled again from 1985 to 1988 with approximately \$450 million estimated by LINK. If one were to include the numeric and transactional services that are directly accessible to the general public (excluding travel services, credit, etc. which are not used by the general public) the volume would be roughly five to six times that size.

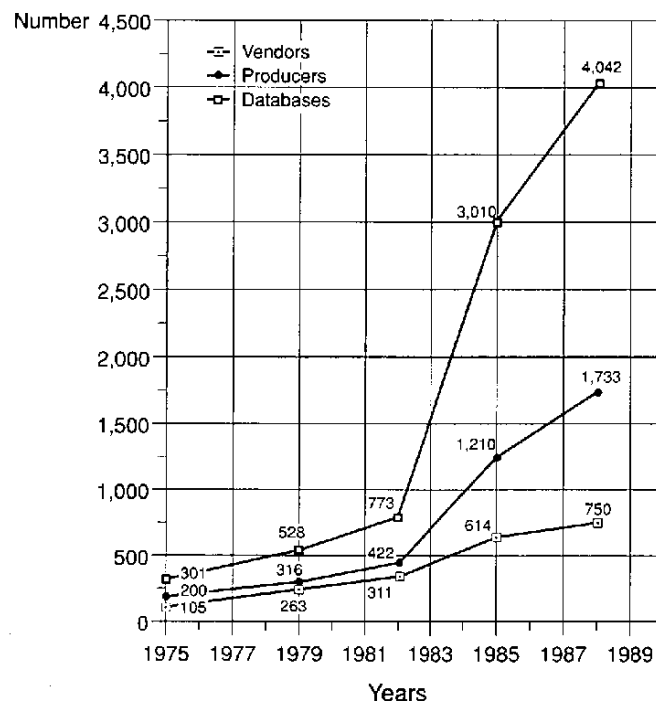
Over the ten year time period from 1979 to 1988, the number of vendors of database search services has grown by a factor of 2.85, going from 263 to 750. The number of database producers has grown by a factor of 5.48, from 316 to 1733, and the number of databases has grown by nearly a factor of eight. It went from 528 to 4,200 databases. The 4,200 databases contain the 4,042 database entries in the 1988 CRDB (See Figure 3-1). The most dramatic growth is the growth in machine readable records contained within the databases, which have grown in number from 149 million in 1979 to 2.25 billion in 1988 (See Figure3-2).

Throughout the 1970's users complained about the fact that they needed to learn too many command languages, and deal with too many passwords, protocols, system features etc. and that logging into one system was bad enough when there were telecommunications problems, but logging in and out of multiple systems was a terrible nuisance. For this reason the early research on gateways was undertaken by a variety of researchers in the late 1970's, and by the early 1980's several stand-alone commercial gateways existed and vendors began to gateway into each other's systems. The first record of gateway counting was in 1986 when there were 35; by 1989 they had just about doubled to 75 (See Figure3-3).

Table 3-1 Electronic Information Revenue by Information Type in the U.S.

Subject	1988 Revenue	
VMO/Transportation	\$1,038.0	Million
Consumer Credit	\$918.8	Million
Securities	\$593.0	Million
Business Credit	\$556.1	Million
Product Movement	\$395.97	Million
Forex & Money Market	\$364.67	Million
News	\$333.8	Million
Legal	\$259.4	Million
Corporate Information	\$257.4	Million
Audience Assessment	\$215.0	Million
VMO/Library	\$187.8	Million
Scientific	\$181.5	Million
Demographic	\$180.2	Million
VMO/Insurance	\$147.8	Million
Product Information	\$133.6	Million
Commodities	\$127.8	Million
VMO/Agriculture, Construction, Energy,	\$120.6	Million
Pharmacy Management & Weather		
Economic	\$102.5	Million
Real Estate	\$100.7	Million
Legislation & Government	\$83.5	Million
Patents & Trademarks	\$38.0	Million
Total	\$6,336.14	Million

Source : LINK Resources Corp.

**Figure 3-1 Growth in Processors, Producers and Databases (Ref. & Source)**

Source : Williams and Ref. 1)

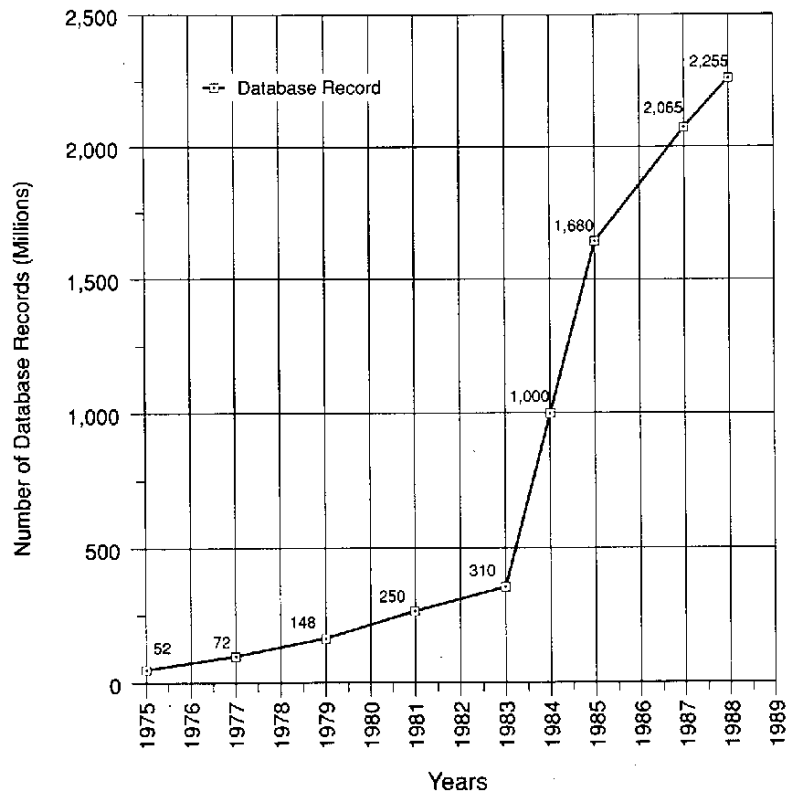


Figure 3-2 Growth in Database Records (Ref. & Source)

Source : Williams and Ref. 1)

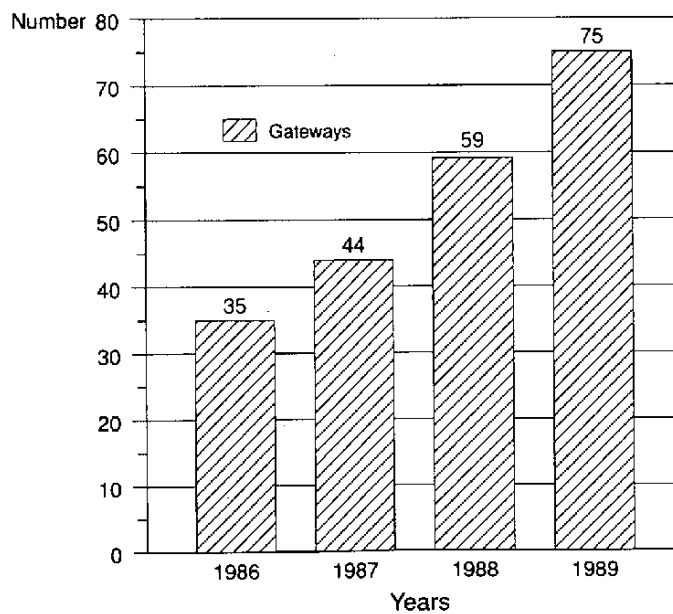


Figure 3-3 Growth in Gateways to On-Line Databases

Source : Ref. 2)

1.2 U.S. Government Policies on Database

Currently there are no enforced guidelines for government dissemination of information in electronic form. However, many government agencies sell, license and distribute data on magnetic tape. Among the agencies are:

- U.S. Government Printing Office (GPO)
- U.S. Library of Congress (LC)
- U.S. Congressional Research Service (CRS) of LC
- U.S. Geological Survey (USGS)
- U.S. National Oceanic and Atmospheric Administration (NOAA)
- U.S. National Institute of Science and Technology
(formerly the National Bureau of Standard)

The types of information that are available range from data that are arranged specifically for public dissemination, e.g., government produced bibliographic databases such as MEDLINE, to information that the government collects for its own use but routinely makes available to the public because of a known public demand for the information, e.g., population census data, and finally, information which an agency does not initially plan to release but finds public demand for it after it is created.

As far as the database world is concerned, the single agency of most concern is probably the National Technical Information Services (NTIS). NTIS distributes database tapes for itself and for other agencies, such as the National Library of Medicine (NLM) and the National Agricultural Library (NAL).

A large amount of information generated and/or collected by the government is publicly available in electronic form but there is no single set of policies guiding decisions about:

- What information should be made available,
- What format it should be in,
- How it should be publicized, and
- How prices for the information should be set, etc.

While there is currently no government-wide policy governing the distribution of data in electronic form, two proposed policies are under review. One is the Office of Management and Budget (OMB) "Proposed Policy on Electronic Dissemination of Information" and the other is the U.S. Department of Commerce's draft entitled "Electronic Information Dissemination Policy."

The Department of Commerce, one of the largest producers and distributors of information in the federal government, recently drafted a comprehensive set of policies on Electronic Information Dissemination. Commerce was the first agency to do so, but more recently, on December 28, 1988, the Office of Management and Budget (OMB) of the Executive Office of the President issued (via the Federal Register) a proposed policy on Electronic Information Dissemination. It is quite similar to the Department of Commerce proposal.

Many agencies have expressed interest in using the Commerce policies as guidelines for their own policies. The OMB policies provide broad guidelines; it is then up to each agency to determine how to implement them - the individual agencies flesh out the details for implementation within the specific agency. The agency policies and guidelines are issued in the form of department orders.

The Commerce proposal had as a goal to promote the fulfillment of their responsibilities with better service and at lower cost without harming the competitive free enterprise process. The Commerce proposed policies on the dissemination of information in electronic format can be summarized as follows:

- * Meet the OMB test of "required by law or necessary of the proper performance of agency functions."
- * Avoid unnecessary duplication in the market.
- * Solicit and consider opinions of affected information users.
- * Analyze potential for private sector involvement.
- * Avoid adding added-value features (e.g., sophisticated and unique retrieval and data manipulation capabilities) to the information.

It is worth noting that the Commerce policies would not apply to data sharing under international agreements.

The OMB proposed policy applies to all information dissemination products - printed as well as electronic - with the exception of audio-visual products. It applies to periodicals and non-recurring publications including machine readable data files, software files, CD-ROMs, bulletin boards, and on-line information services. It includes statistical materials (which were specifically excluded from the OMB Circular A-3).

It is likely that certain elements within the information industry will object to whatever aspects of government policy they consider to be competitive with private sector interests. The general feeling in the private sector has been that if something can be done by the private sector it should be done there rather than by the government. On the other hand, librarians and other interested parties will criticize, and have already criticized, the section of the policy that calls for agencies to avoid offering dissemination services they know to be available in the market place. Some librarians consider this to be an abdication on the part of the government to provide citizens with information. The ALA, for example, has already criticized the suggestion that the government should distribute databases without supporting software; the Census Bureau has disseminated agricultural statistics on CD-ROM with search software. ALA argues that without that supporting software the database would be virtually unusable.

Reference

- 1) K.Y. Marcaccio, J.A. De Maggio and M.E. Williams, *Computer-Readable Databases: A Directory and Data Source Book*, 5th edition; Gale Research, Inc. Detroit, MI. 1989.
- 2) Cuadra/Elsevier, *Directory of Online Database*. 9 (3); New York, N.Y. January, 1989.

2. Database Services in Europe

2.1 Size of the Database Services in Europe

According to the market research reports by Link Resources, Frost & Sullivan and INPUT, all reports anticipate steady growth (about 20%) of the on-line database markets in Europe. INPUT estimates are the most conservative, those from LINK are the most optimistic, Frost & Sullivan being half-way between. The market is expected to reach \$1.4 - 1.9 billion in 1989, growing about 20% a year. In view of expected trends the market could reach \$3-4 billion in 1992. These figures exclude videotex services.¹⁾

On-line access to databases represents only part of the professional information market. According the 1988 user panel surveys in Information Market Observatory by Commission of the European Communities, on-line represents only a quarter of European users' expenditure on information including manpower and material costs.²⁾

Of the 116 ASCII database hosts in Europe, only three are making significant revenue, overwhelmingly led by Reuters with global money market/financial information and news; followed by Data-Star with marketing efforts managed from London to build on its strength in the chemical industry, specialized news, and market intelligence databases; and Telekurs of Switzerland, which is owned by 350 Swiss banks and delivers broad-based, financial information services.

The United Kingdom, in general terms, has the strongest information industry in Europe and second only to the U.S. in international revenues with many world leaders of database services: Reuters, Inspec with physics, Derwent with patents, and so forth. Unlike France and West Germany, there has been no government intervention although there were significant indirect benefits from a liberal approach to telecommunications regulation and the deregulation of the London Stock Exchange in October, 1986. The market for real-time, financial information services is huge, accounting for the share of the U.K.'s \$996 million industry in 1988.³⁾

Switzerland, a bright and global market for scientific and medical information - particularly noted for its pharmaceutical data - is now a very significant market for real-time financial information including data on commodities, securities, fundamental corporate information, and especially foreign exchange (U.K. and Switzerland account for over 60% of these European market revenues), as well as news. Revenues in 1988 tallied some \$380 million.⁴⁾

France centers around its Teletel services whose success revolves around the Kiosque systems, where the costs are charged to a user's telephone bill and collected by the French PTT in the same manner. The charging rate, too low to attract the higher-cost, more successful vendor services, has been revised to enable high, value-added services bringing ASCII Minitels and adaptors for PC's. The ASCII on-line end of the business itself is already over \$275 million.⁵⁾

West Germany is moving away from a tress on scientific and technical information, long its industrial forte, to business. Genios, its business database host service, is gathering momen-

tum while FIZ Technik, traditionally an engineering science vendor, has begun to provide business databases. The country also has agreed with the French DGT to allow interconnection of Bildschirmtext and Teletel services. German hosts are heavily subsidized by the federal government.

Italy is Europe's fourth major population center and while ESA-IRS enjoys renown (most of its traffic falls to users originating outside Italy), on-line use is poorly developed. Because of the nation's appalling telecommunications, however, CD-ROM has been developed for the legal sector where the law is so convoluted that it requires many volumes, now on discs that are distributed to the legal market in a PC with a drive package meant to cover word processing as well as research. Resulting sales have accounted for 60 to 70% of the installed base of CD-ROM drives in all of Europe where there were a total of some 25,000 drives and some 170,000 disks manufactured by the end of 1988.⁶⁾

National markets in the rest of Europe are still very small, but growth rates may be 50% or more as countries start to cope with 1992, which ushers in the Single European Market.

2.2 New Community Program to Develop European Information Market

Professional electronic information services will be a decisive factor in achieving the Community's 1992 objective of a unified internal market. An action plan for a European information services market has therefore been given the go-ahead by the Council of Ministers, who agreed to allocate ECU 36 million to a development program covering an initial period of two years.

The community funds will be used to co-finance pilot demonstration projects to develop advanced information systems in collaboration with companies across Europe. The funds awarded by the Council decision will now allow the first projects to be launched in 1989.

The emergence of a "European information market" would contribute to speeding the integration and growth of the European economies. This program will create new vehicles for locating and using information in the workplace, to draw on the vast amounts of public information which are still inadequately exploited. It will benefit those who use - or can potentially use - computer-based information for their work: from managers to engineers and workers to the shopfloor.

The European electronic information service market industry today employs some 100,000 people, who generate ECU 1.26 billion of annual revenue. This figure is expected to increase to over ECU 10 billion within the next decade. This growth rate of 20 to 30% is very significant, especially when compared to world economic growth figures of 2-5%.

The Commission has received project ideas from both private and public sector organizations in all member States. First priority areas concerned are: image banks, standards information, road transport information, tourism information and intelligent interfaces to electronic information services.

Activities under the information services program also include setting up a European Information Market Observatory, which regularly tracks trends in the information market, improves the quality of market data and provides better decision-making tools.

Other areas highlighted for special attention by the program include better exploitation of publicly-held information by the private sector, overcoming legal, administrative and technical barriers, simplifying information access methods, and support for users of information services."

Reference

- 1) Commission of the European Communities, *Information Market Observatory*. IMO report 89/2; Luxembourg. March, 1989.
- 2) Commission of the European Communities, *Information Market Observatory*, IMO report 89/1; Luxembourg. February, 1989.
- 3) M. Fischer, *The Trend of Database Services in the U.S.A. and Europe*. Paper to be presented at the International Seminar on Database 1989. Tokyo, Japan; February 21, 1989.
- 4) Ibid.
- 5) Ibid.
- 6) Ibid.
- 7) Commission of the European Communities, *New Community Program to Develop European Information Market*. Brussels. July, 1988.

IV. INTERNATIONAL DEVELOPMENT OF DATABASES

1. Globalization of Japanese Database Services

With the growth of the presence of Japan in the World economy, there is an increasing need for information on Japan from overseas. However, up to the present, such information has tended to be considered difficult to obtain from outside her borders, which has created an environment where "information friction" is spreading along with the economic friction targeting Japan.

Reflecting on these global trends of information orientation and deregulation of trade and finance, database services in Western countries are aggressively-expanding their market on a global level. Under such circumstances, the availability of Japanese database services to the overseas market is a matter of concern, for those interested both in Japan and overseas.

1.1 State of Globalization

Japanese Database Industry Association (DINA) has conducted a survey of its members and other Japanese database services in order to establish the availability of Japanese database services in the overseas market, as well as to find out the problems encountered by those who are expanding their services abroad. The questionnaire was distributed to a total of 187 companies (105 members of DINA, and 82 others), and 121 valid responses were delivered (64.7% response ratio) by July 17, 1989.

Of the organizations which responded, currently 31 are offering database services abroad, while another 21 are planning such services.

The results show that a total of 104 (Table 4-1) databases are accessible by overseas users. (Note that where the same database is offered by two or more service companies, the databases are counted as one in the table.)

**Table 4-1 Number of Japanese Databases
Available from Overseas**

Subject	Number of Databases
Science and Technology	22
Economics, Business, Finance	65
General	23
Total	104*

(6 duplicates)

The following two tables show a description of Japanese databases offered for overseas use and a summary of Japanese databases being planned for overseas expansion as of July 17, 1989.

Table 4-2: Japanese Databases Accessible Overseas (as of July 17, 1989)

Subject: ① Science and Technology
 ② Economics, Business and Finance
 ③ General or Others

Language: J: Japanese
 E: Others
 N: Numeric

Vendor Status: P: Producer
 D: Distributor
 A: Agent

Format: O: On-Line
 M: MT, FD
 C: CD-ROM, CD-I

Company Name	Database	Description of Database	Subject	Language	Vendor Status	Format	Main Countries
The Asahi Shimbun	Asahi News Service	Collection of Asahi Shimbun articles translated into English with those originally written in English	③	E	P	O	U.S.
	Ditto		③	E	P	O	U.K.
	HIASK	Collection of all the Asahi Shimbun articles	③	J	P	O	U.S. Europe
Asia Data Research, Inc.	South East Asian Sales Trends Market Research	Research into retail sales of cameras and consumer electrics in South East Asia	②	J/E	P/D	M	Hong Kong Singapore Malaysia Thailand Taiwan
Kaiji Press Co., Ltd.	KEEP-SB	New shipbuilding information covers 40 Japanese companies, 4, Korean and CSBC of Taiwan	②	E	P/A	O	Korea Taiwan
	"Area and Trade News" back-number floppy	Back-number of "Area and Trade News" offered in MS-DOS text file	②	J	P/D	M	Korea Taiwan
Japan Association for International Chemical Information	NQR (Nuclear Quadrupole Resonance) database	Worldwide literature on NQRS and NQR	①	E	P/D	M	America Europe
	CHEM-J	Bibliographic information of chemical literature	①	E	P/D	M	America Europe
Kyodo News Service	JLS	Newsboard	②	J	P	O	Worldwide
	JED	Newsboard & retrospective	②	E	P	O	U.S.
	KEES	Retrospective	③	E	P	O	U.S.
	JAPINFO	Newsboard	②	E	P	O	France
Keizai Bunken Kenkyukai	JOINT (Journal of Industrial Titles)	A database of magazine articles on economics and industry	②	J	P	O	Worldwide
QUICK Corp.	QUICK Video-1	Stock prices and market news	②	J/E	P/D	O	16 countries of U.S., U.K., Hong Kong, Swiss, and others
	QUICK-10	Comprehensive financial information	②	J/E	P/D	O	5 countries of Hong Kong, U.K., and others
	QUICK Indicator Board	Securities, financial and macro economic indicators	②	N	P/D	O	Hong Kong, U.K.

Company Name	Database	Description of Database	Subject	Language	Vendor Status	Format	Main Countries
Kokusai Information Service Co., Ltd.	Automation Review	Trends in the development and use of robots, and industrial trends	①	J	P	O	U.S. and others
National Diet Library	JAPAN MARC (M)	Catalog of books published in Japan	③	J	P	M/C	Canada
	JAPAN MARC (S)	Catalog of serials published in Japan	③	J	P	M	Canada
Jiji Press Ltd.	MAIN	Comprehensive securities & financial information	②	J	P	O	Hong Kong, Singapore
	JSD	Lists prices for all issues on the TSE first section, Osaka first and second sections, and all issues on the NYSE and AMEX	②	E	P	O	U.S. and others
Tokyo Teleguide Corporation	TELEGUIDE IN ENGLISH	Town-guide of Tokyo	③	E	P/D	M	U.S. and Singapore
Daily Industrial News, Ltd.	NK-MEDIA	Articles and information mainly on new products and technology	③	J	P	O	Worldwide
The Japan Audit Bureau of Circulations	ABC Circulation Report	Circulation data of journals & newspapers	②	E	P	M	U.S.
The Japan Information Center of Science and Technology	JICST-E	Comprehensive Japanese literature relating to science, technology and medicine	①	E	P/D	O	U.S., Canada, Korea, Europe
	JICST	Literature relating to science, and technology	①	J	P/D	O	U.S., Canada, Korea, Europe
	JMED	Literature from Japanese journals in medical fields	①	J	P/D	O	U.S., Canada, Korea, Europe
	JCLEARING	Data on research being carried out at public-owned test and research institutes in Japan	①	J	P/D	O	U.S., Canada, Korea, Europe
	JPUBLIC	Covers occasional items published by public institutions in Japan	①	J	P/D	O	U.S., Canada, Korea, Europe
Nihon Keizai Shimbun, Inc.	NEEDS						
	Nikkei Basic Corporate File	Company outlines	②	J/E	P/D/A	O/M	U.S. and Europe
	Listing Annual Accounting Settlement Data	Data on the annual and interim settlements of listed companies, and frozen settlements	②	J/E	P/D/A	O/M	U.S. and Europe
	Flash Reports on Financial Data for Listed Companies	Flash report data on the financial affairs of listed companies	②	J/E	P/D/A	O/M	U.S. and Europe
	Corporate Earning Estimates for Listed Companies	Flash report data on corporate earnings estimates for listed companies	②	J/E	P/D/A	O/M	U.S. and Europe

Company Name	Database	Description of Database	Subject	Language	Vendor Status	Format	Main Countries
Nihon Keizai Shimbun, Inc.	NEEDS						
	Securities Reports on Non-Listed Companies	Data on major non-listed companies which issue securities	②	J/E	P/D/A	O/M	U.S. and Europe
	Reports to Shareholders on Major Non-Listed Companies	Business data on major non-listed companies	②	J/E	P/D/A	O/M	U.S. and Europe
	Data on Corporate Borrowing by Financial Institution	Data on borrowings from financial institutions and the Industrial Bank of Japan	②	J/E	P/D/A	O/M	U.S. and Europe
	Bank Financial, Data	Data on the annual settlements of banks	②	J/E	P/D/A	O/M	U.S. and Europe
	Stock and Bond Data	Stock and bond data	②	J/E	P/D/A	O/M	U.S. and Europe
	Bond Futures Data	Bond futures data	②	J/E	P/D/A	O/M	U.S. and Europe
	Capital Market Indicators	Data on capital market indicators	②	J/E	P/D/A	O/M	U.S. and Europe
	Securities Market Indicators	Daily data on securities market indicators	②	J/E	P/D/A	O/M	U.S. and Europe
	Corporate Activities in Financial Market	Data on company finances	②	J/E	P/D/A	O/M	U.S. and Europe
	NEEDS-PORTFOLIO	Portfolio analysis	②	J/E	P/D/A	O	U.S. and Europe
	Macro Economic Databank (NEEDS-ECONOMY)	Macro economic databank	②	J/E	P/D/A	O/M	U.S. and Europe
	Input-Output Analysis Databank (NEEDS-IO)	Input-output databank	②	E	P/D/A	O	U.S. and Europe
	Energy Databank (NEEDS-ENERGY)	Energy databank	②	J/E	P/D/A	O/M	U.S. and Europe
	IFS	IFS databank	②	E	P/D/A	O	U.S. and Europe
	Statistical Survey of Incorporated Enterprises	Statistical data on incorporated enterprises	②	J/E	P/D/A	O/M	U.S. and Europe
	Statistical Data on Consumption	Statistical data on consumption	②	J/E	P/D/A	O/M	U.S. and Europe
	Commodity Databank (NEEDS-COMMODITY)	Commodity databank	②	J/E	P/D/A	O/M	U.S. and Europe

Company Name	Database	Description of Database	Subject	Language	Vendor Status	Format	Main Countries
Nihon Keizai Shimbun, Inc.	NEEDS						
	Comprehensive Economic Data by Size	Comprehensive economic data by scale	②	J/E	P/D/A	O/M	U.S. and Europe
	Statistical Data on Wholesale/Export-Import Prices	Statistical data on wholesale and import/export prices of goods	②	J/E	P/D/A	O/M	U.S. and Europe
	Marketing Databank (NEEDS-MDB)	Marketing databank	②	J/E	P/D/A	O/M	U.S. and Europe
	Financial Databank (NEEDS-MONEY)	Financial databank	②	J/E	P/D/A	O/M	U.S. and Europe
	World Economic Forecast Databank	Databank of international economic forecasts	②	J/E	P/D/A	O/M	U.S. and Europe
	Nikkei Asian Corporate Profile	Basic Nikkei database on Asian companies	②	E	P/D/A	O/M	U.S. and Europe
	NEEDS-CHINA	A databank system on the Chinese economy.	②	E	P/D/A	O/M	U.S. and Europe
	CITIBASE	U.S. macro-economic and financial data	②	E	P/D/A	O/M	U.S. and Europe
	BLUE CHIP	Forecasts of business conditions and money-rate indicators by 50 U.S. forecasting firms	②	E	P/D/A	O/M	U.S. and Europe
	IMF Multilateral Trade Data	Trade data of 160 countries Worldwide	②	E	P/D/A	O/M	U.S. and Europe
	Nikkei Telecom (online database service available via personal computer) <Japanese Version>						
	Nikkei Telecom Japan Financial News & Data (Japanese Version)	Worldwide news and newsboard of financial and market data	②	J	P/D/A	O	North-America, Europe, Korea, Hong Kong, Singapore
	Nikkei News Telecom	News, newsletters, searches of articles, encyclopaedias, biographical registers and so forth	②	J	P/D/A	O	North-America, Europe, Korea, Hong Kong, Singapore
	Nikkei Telecom Management Information	News and management information	②	J	P/D/A	O	North-America, Europe, Korea, Hong Kong, Singapore
	Nikkei Telecom Industry & Technology	Trends of semi-conductor and IC industries, analytical data by individual industry	②	J	P/D/A	O	North-America, Korea

Company Name	Database	Description of Database	Subject	Language	Vendor Status	Format	Main Countries
Nihon Keizai Shimbun, Inc.	<English Version>						
	Nikkei Telecom Japan News & Retrieval	A comprehensive English language online service providing information on the Japanese economy, industry, market conditions, and companies	②	E	P/D/A	O	North-America, Europe, Korea, Hong Kong, Singapore
	Nikkei Telecom II Japan Financial News & Data	The same as the previous entry, but a new colour graphics capability has been added, and the news and market information has been expanded	②	E	P/D/A	O	North-America, Europe, Korea, Hong Kong, Singapore
The Industrial Bank of Japan, Limited	IBJ Financial Data	Financial data on companies listed on the first section of the TSE	②	E	P	M	U.S., Canada
							Europe
Marketing & Research Corporation	DCF	Directory of Japanese medical doctors and hospitals	③	J	P/D	M	
Nippon Statistic Center Ltd.	Area Dynamics A	Socio-economic indicator of municipal areas	②	J	P/D	M/C	
	Area Dynamics B & C	Socio-economic indicator of metropolitan areas	②	J	P/D	M/C	
Japan Patent Information Organization (JPIO)	Patent and Utility Model File	Published and public information of Japanese patents and utility models	①	J	P/D	O	Asia, U.S., Europe
	Design File	Registered information of Japanese design	①	J	P/D	O	Asia, U.S., Europe
	Trade mark File	Application and public information of Japanese trademarks	①	J	P/D	O	Asia, U.S., Europe
	Judgement File	Judgement information of Japanese patents, utility-models, design, and trademarks	①	J	P/D	O	Asia, U.S., Europe
	Application File	Registration information of Japanese patents, utility-models, design, and trademarks	①	J	P/D	O	Asia, U.S., Europe
	Code and Reference File	Code tables of applicants, free-keywords, and FI marks	①	J	P/D	O	Asia, U.S., Europe
	Newsboard of Patents and Utility Models	Published and public information of current (6 months) Japanese patents and utility models	①	J	P/D	O	Asia, U.S., Europe
	Patent File	Published information of Japanese patents	①	E	P	M	Worldwide
Nomura Research Institute	NRI/E	Japanese macro-economy data	②	E	P	O/M	U.S.
Personal Business Assist Inc.	PCOM-HOST	Databases of PCOM-3 communication software	③	J/E	P	O	Korea
Interactive Data Corporation Tokyo Branch	NRI/E	Japanese macro-economic, financial, and industrial data	②	E	D	O	U.K., U.S., West-Germany, others
INTEC Inc.	Investment Data System	Japanese security data for overseas Japanese security-firms and their customers	②	E	A	O	U.S., Europe, Hong Kong, and others

Company Name	Database	Description of Database	Subject	Language	Vendor Status	Format	Main Countries
N.I.F. Corporation	Asahi Shimbun Articles	Collection of Asahi-Shimbun articles	③	J	A	O	
	Yomiuri Shimbun Articles	Collection of Yomiuri-Shimbun articles	③	J	A	O	
	Nichigai ASSIST	Information on who's who, company, new products, newspaper articles, book contents, and management	②/③	J	A	O	
	Stock Price News-board	Stock market information of Tokyo Stock Market listed companies and foreign stocks	②	J	D	O	
	Used Car Information	Used car information by area	③	J	D	O	
	Mainichi Shimbun Online News	On-line newsboard	③	J	A	O	
	Asahi Shimbun News-board	On-line newsboard	③	J	A	O	
	Read-Show Information	Read-show information of Japanese and foreign films	③	J	D	O	
	Place to Eat in Tokyo	Eating place by type of foods and area	③	J	D	O	
	Advanced Sale of Concerts	Concert information of visiting and domestic artists	③	J	D	O	
	Weather Forecast	Weather information by area and purpose	③	J	D	O	
Japan Association for International Chemical Information	QCLDB (Quantum Chemistry Literature Database)	International literature on quantum chemistry abinitio calculation	①	E	D/A	M	Worldwide
Kinokuniya Company Ltd.	BOOK	Contents information of books published in Japan	①/②/③	J	D/A	O/C	U.S. and Europe
Kokusai Information Service Co., Ltd.	Nikkei Telecom	Domestic and international news, economic information	②/③	J/E	A	O	
Research Institute of International Trade and Industry	Input-Output Table	Tables on the whole country which are issued every five years are provided on magnetic tape	②	N	D	M	U.S.
Information Services International-Dentsu, Ltd.	ID-IR	A database of results of spectroscopical analysis of 4,300 substances	①	J	D	O	Worldwide
	COMLINE	Daily news and weekly reports from Japan for eight subject areas	②	E	D	O	Worldwide
	IBJ DATA	Financial data on one thousand companies listed on the first section of the TSE	②	E	D	O	Worldwide
	Jiji Securities Database (JSD)	Data on stocks and securities listed on the Tokyo and Osaka exchanges	②	E	D	O	Worldwide
Japan Weather Association (JWA)	Maritime Weather Reports	Weather reports on the North Pacific Region	③	N	D	M	U.K., China

Company Name	Database	Description of Database	Subject	Language	Vendor Status	Format	Main Countries
Japan Weather Association (JWA)	Weather Satellite Data	Analysis data from the NCAA and Himawari weather satellites	③	N	D	M	U.S., U.K., China, Korea, Canada
	Weather Satellite Imagery	Image data from the NCAA and Himawari weather satellites	③	N	D	M	U.S., U.K., China, Korea, Singapore
The Japan Information Center of Science and Technology	NK-MEDIA	Articles and information mainly on new products and technology	①	J	D	O	U.S., Canada, Korea, Europe, Australia
Heiwa Information Center Co., Ltd.	News Paper Databases	Newspaper articles	②/③	J	D	O	Worldwide
	Title Search	Table of contents of industrial and technological magazines issued in Japan	①	J	D	O	Worldwide
	Market Search	Marketing information of all the industry in Japan	②	J	D	O	Worldwide
	Jetro Ace	Information on regional economies, trade and investigation for countries Worldwide	②	J	D	O	Worldwide
	Chinese Newspaper Databases	Industrial and technical articles from newspapers published in China	②	J	D	O	Worldwide
	Intellectual Property Case Database	Full-text database of 6,000 cases	③	J	D	O	Worldwide
Maruzen Co., Ltd	J-BISC		①/②/③	J	D	C	U.S., U.K. and others
USACO Corporation	Actinomycetes Antibiotics Database	Data on antibiotics	①	E	A	M	U.S., U.K., West-Germany, Korea

Table 4-3 Japanese Databases Planned to be Accessible Overseas

Database	Description	Subject	Language	Format
C&C VAN Database Service	Information on newspaper articles, companies, and marketing provided online	② ③	J	O
COSMOS 1	Financial data of 250,000 companies with 1,000,000 annual reports	②	J	O/M
COSMOS 2	Description of 850,000 companies	②	J/E	O/M
COSMOS 3	Biographical information of 550,000 business executives and celebrities	②	J	O/M
CCR	Detailed information of 150,000 major companies	②	J	O
DIALONE	JAPAN / MARC (1981-present)	③	J	O
	JAPAN / MARC (1969-1980)	③	J	O
	Nippan MARC	③	J	O
	Nikkei File	③	J	O
	National-Report	②	J	O
	NHK News Manuscript File	③	J	O
	IROFA File	①	J	O
Pharmacast	Medical and pharmaceutical information	①	E	O/M
The Daily Yomiuri Database	Articles of daily newspaper published by Yomiuri Shimbun	③	E	O/M
ELDB	Retrospective and current information of newspapers and journals with full-text facsimile delivery	③	J	O
JETOC / KASHIN	Inventory of Japanese Chemical Substance Control Law	③	J/E	O
Regional Table	Address code table	③	J	M
Top Tax payers	List of tax payers reported by taxation office	② ③	J	M
DIAMOND Directory of Company personnel	List of employees of major listed and unlisted companies	②	J	M
Japan Technology	Detailed information of 400 Japanese scientific and technical publications	①	E	O
Patent File	Information on Japanese published patents	①	E	O
Area Dynamics A	Economic index of municipal area	②	E	
Area Dynamics B&C	Socio-economic index of metropolitan area	②	E	
ABC Circulation Report	Information on circulation of newspapers and journals	②	E	M
WHO	Who's who of those published in newspapers and journals	① ② ③	J	O/C
SCAN	New products and new technology published in newspapers and journals	①	J	O/C
KINODIAL	Order entry system of overseas books	① ②	J	O

NOTE: There are others in the process of planning.

1.2 Problems Encountered by Database Services in Globalization

Answers to the question on what sort of issues arise while providing database services for overseas use disclosed a variety of points, which are summarized as follows:

- 1) The agreement between producers and vendors,
- 2) Uncertainties of the needs for Japanese information,
- 3) Cost and quality of translation,
- 4) Unavailability of on-line terminals with Japanese language processing capability,
- 5) Uncertainties about network conditions in overseas countries, and
- 6) Others.

1.3 Globalization Process of Major Japanese Database Services

In response to the increasing interest being shown for Japanese information from overseas, several Japanese database services are expanding their services for the overseas market. The major events for this expansion are listed in Table 4-4.

Table 4-4 Chronology of Globalization

Date	Major Event
1976-10	QUICK starts offering VIDEO-I service overseas
1984-10	JICST starts offering JOIS service overseas
1984-11	Nikkei starts offering Japanese language version of its Nikkei Telecom
1985-11	JAPIO starts offering English version of its patent database through ORBIT
1986- 8	Nikkei starts offering English version of its Nikkei Telecom
1986-10	JICST starts offering its English language database service through JOIS
1987-10	QUICK opens its European office in London
1987-11	JICST opens STN International Tokyo Service Center
1989- 1	Heiwa Information Center starts offering HINET service in Europe

1.3.1 The Japan Information Center of Science and Technology (JICST)

1) Production and Distribution of Databases in English

An investigation of needs for Japanese scientific and technical information in the U.S. and Canada was conducted by JICST between 1984 and 1985. The results of the investigation disclosed that 85% of the respondents regarded information on Japan important. Special attention was focused on information in the area of high-technology, including electronics and its combined technologies, as well as biotechnology.

In order to respond to these overseas needs for Japanese information in the fields of science and technology, JICST established local agencies in Korea, West Germany, France, U.K., and U.S. to distribute its database service. At the same time, JICST started producing a part of its database in English from 1985, and this was then distributed overseas through the JOIS on-

line service starting from October, 1986.

The JICST-E File, the English language version of the JICST database, consists of 690,000 bibliographic items as of December, 1988, covering the fields of chemistry and the chemical industry, mechanical engineering, electrical engineering, metal engineering, mining, earth science, civil and architectural engineering, physics and applied physics, atomic energy, management and systems engineering, environment and pollution, life-science, and medicine.

The English language database consists of an English title, English key-words (descriptors), classification code (UDC), Romanized authors' name, and an English abstract. However, the abstract is included only when the original paper contains an abstract in English, which is some 20% of all the records covered as of December, 1988. The English key-words (descriptors) of the database, were prepared using a Japanese-English translation table consisting of 35,000 descriptors. The translated list of descriptors has been compiled as the English version of JICST Thesaurus.¹⁾

2) Participation in STN International

JICST arranged with Chemical Abstracts Service (CAS) of the U.S., and FIZ-Karlsruhe (FIZ-KA) of West Germany, to participate in the STN International in June, 1986. Then, an IBM main-frame computer for use with the STN International service was installed in the JICST office. It is with this machine that JICST English language database service has been distributed overseas from October, 1987.

The reasons for joining the STN International network in addition to offering an English language database service through JOIS, were described by a JICST representative as follows:

- (1) Improved service can be offered to domestic customers, because of the additional availability of databases provided by U.S. and German centers.
- (2) A variety of English language databases developed in Japan, including those produced by JICST, can be offered to the overseas market more effectively than using the JOIS on-line network.
- (3) More elaborate and sophisticated services can be developed through the sharing of original documents and by using cross-file retrieval capacity of multiple databases.
- (4) Cost reduction of software development can be achieved through cooperative software development with other centers.²⁾

3) Establishment of Liaison Offices in Overseas Countries

In order to support the overseas customers using JICST's English language database service through JOIS and STN International, liaison offices have been established in the U.S. (Washington D.C.) and in Europe (Paris, France), in addition to overseas service agents. JICST's service staff are stationed at the liaison offices to respond to inquiries. The addresses of the liaison offices are as follows:

- Europe: JICST Paris Office,
c/o CNRS/INIST

26 rue Boyer, 75971

Paris Cedex 20, FRANCE

- U.S.: JICST Washington Office

Suite 1050 M Street, N.W.

Washington D.C. 20005 U.S.

1.3.2 National Center for Science Information System (NACSIS)

NACSIS was established in April, 1986, as the reorganization of The Center for Bibliographic Information, University of Tokyo (CBI), in order to act as a comprehensive academic information center. It started offering NACSIS-IR the on-line information retrieval service for the Japanese academic community, including researchers and libraries of universities and related research organizations. So far, nineteen domestic and foreign databases are offered through NACSIS-IR as of December, 1988.

The report prepared by the Science Council of the Ministry of Education, Science and Culture (MESC) entitled "The Science Information System as it should be in the Future" directly motivated the establishment of NACSIS. The preface of the report states that "Japan is over-importing scientific information, which is a crucially weak point in Japan's academic research activities."³⁾ It then goes on to stress the importance of the role of NACSIS in opening up the routes by which international exchange of information can take place.

NACSIS, in response to these expectations, installed a leased line connected to the National Science Foundation (NSF) as of January, 1989, and started offering an overseas service. Through this line, the following six databases, originally developed by NACSIS, have been offered to U.S. researchers.

- (1) Grant-in-Aid Research Reports (GIAR) Database:

Reports submitted to MESC on research projects should be on Grant-in-Aid.

- (2) Index to Doctoral Dissertations Database:

Indicative data on doctorates conferred by Japanese universities.

- (3) Academic Conference Paper Database:

Abstract of papers presented by scientific academics.

- (4) Union Catalog of Japanese Periodicals Database:

Union List of Periodicals in Japanese Language, 1985 edition.

- (5) Union Catalog of Foreign Periodicals Database:

Union List of Periodicals in European Language, 1979, 1980, 1982.

- (6) Database Directory:

Directory of databases produced or distributed by Japanese universities and related research institutions.

In order to start the overseas service, two leased lines (9,600bps) were established between NACSIS and NSF and a packet switching machine and three personal computer terminals (IBM

PS55) were installed at the NSF by NACSIS. Electric mail services were also started up in April, 1989, using the same network. A workstation (SUN3-60) was also installed at the NSF for gateway facility. The same kind of overseas network will be established with the British Library by the end of 1989 fiscal year.

1.3.3 Japan Patent Information Organization (JAPIO)

JAPIO provides database service on patents, utility models, designs, trademarks, and their judgments and registration. Several databases produced or offered by JAPIO have been translated into English and are being offered to overseas users.

1) Overseas Services through INPADOC

International exchange, retrieval, and standardization of patent information has been one of the major projects promoted by the World Intellectual Property Organization (WIPO). The International Patent Documentation Center (INPADOC) was established based on the agreement between Austria and the WIPO in September, 1972. Since then, INPADOC has been gathering bibliographic information on patent registers from representative patent offices of member countries in machine readable form, which it has then developed into a comprehensive World patent database. The database has been provided to the patent office of each of the member countries, as well as to commercial database vendors to make it public. JAPIO has been acting as the agent for the Japan Patent Office in developing an Accumulated Standardized Data (ASD) Tape in order to exchange patent information between INPADOC and the Patent Office.

2) Dissemination of English Language Patent Information through ORBIT

The Japan Patent Office has been compiling and publishing an English language abstract journal of major Japanese patent information, other than utility models. The abstract journal covers some 75% of all the published, unexamined patent applications, which has officially been issued by the Japan Patent Office. The machine readable version of the abstract journal is produced by JAPIO with some additional information, and has been offered on-line through ORBIT to overseas users since 1986. The original agreement in distributing the database through ORBIT was made between JAPIO and SDC, the previous owner of the ORBIT service. ORBIT was since purchased by the Pergamon Group in U.K. in 1987.

3) International PATOLIS On-Line Service

With the increasing attention for Japanese technical information from overseas, several overseas customers have requested to use the PATOLIS on-line service in Japanese directly, in order to overcome the inevitable time-lag in using an ASD tape or the JAPIO database through ORBIT. INPADOC has installed PATOLIS terminals in its office and has been offering a Japanese patent retrieval service since 1985. In addition, JAPIO has been issuing PATOLIS passwords for several other end-users outside Japan. PATOLIS is accessible from 22 terminals located in the U.S., Korea, Taiwan, Finland, Sweden, U.K., West Germany and France as of December, 1988.

JAPIO plans to extend the PATOLIS service time in response to the requests from overseas users, as well as to translate titles into English in order to overcome the language barrier.

1.3.4 Japan External Trade Organization (JETRO)

JETRO has been concentrating on promoting an international industrial cooperation and technology exchange program, in addition to its original task of gathering overseas information on economics and industry. In order to fulfill its objectives, JETRO has been planning and developing Japanese information services for overseas users, including the production and provision of related databases.

1) Production and Provision of Databases

JETRO TOPS is a database service consisting of product information about those products overseas companies want to export to Japan, as well as profiles of the Japanese importers who are interested. Through the matching process of overseas exporters' products and Japanese importers' needs, the database provides lists of potential partners. The database is located at the JETRO Head Office in Tokyo and is updated all the time.

JETRO has also been developing the JETRO-ACE database, a comprehensive database of each country's economic and trade information, for Japanese users, and it offers this through domestic database vendors. The database is offered by the Heiwa Information Center to overseas users, and used to retrieve information on Asian countries.

2) Responding to Inquiries from Overseas

The Standards Information Service Point is located at the JETRO Head Office in Tokyo, to provide information regarding the Standards Code of the General Agreement on Tariffs and Trade (GATT), where inquiries by mail on government regulations, mandatory standards, certification standards and national standards, including the Japanese Industrial Standards (JIS), are handled. Also, many overseas business people visit, on a daily basis, the JETRO business libraries in Tokyo, which provide detailed trade and production statistics on Japan, as well as comprehensive lists of trading companies and importers.

3) Improving Japanese Information Service at Overseas Offices

Based on the discussions at the JETRO Long-Term Vision Round Table Conference, a long-term vision entitled "Aiming for Global Trade and an Industrial Promotion Body" was developed in 1988. The plan is to have some one hundred offices in overseas countries, expanding from the present seventy eight offices, where major reference tools on Japanese business information and on-line terminals to access Japanese database services are provided, with the professional intermediaries capable of handling Japanese business information. The idea is to provide reference services and information clearing services for those interested in Japanese business and industry in order to enhance overseas information service from JETRO.

1.3.5 QUICK Corp.

1) Responding to the Needs for Japanese Information in Europe

The deregulation and globalization of the financial market in the late 1980's removed the obstruction in the law of international financial information. Reflecting on such trends, overseas users and usage of the QUICK service have been increasing. As a financial information vendor, QUICK Corp. has concentrated on information gathering and providing functions in Tokyo.

However, with this procedure there still remains the problems of slow response time and high communication costs caused by the international telecommunication networks. In order to dissolve these problems, QUICK has been planning to establish a satellite center in Europe (City of London), the center of the international financial market. This is because the information is most effectively gathered at the place where users are concentrated.

QUICK Europe Limited was established in October, 1987, in London, and started business and systems development activities forthwith. In March, 1989, QUICK Europe started offering the QUICK-10E service, the European version of Japanese QUICK-10. The majority of the data in QUICK-10E is presently on Japanese subjects, but it is hoped that European contributors and users will increase in order to make the service more far-reaching. Also, direct installation of QUICK terminals, which has been coined out by local maintenance services, will make QUICK more accessible in Europe. Concerning the terminals, use of numerical information is fulfilled by ordinal terminals, whereas use of news information requires terminals with Japanese language processing capabilities. However, Japanese personal computer manufacturers provide, distribute and maintain personal computer terminals with Japanese language processing capabilities in Europe, which makes the installation of such a terminal more viable.

2) Overseas Markets other than Europe

Compared to the European market, the American one is not so far advanced in the distribution of investment, especially where needs for Japanese information are relatively small. The QUICK America Corporation was established in New York in June, 1988, as an information gathering point in America. QUICK America is also expected to work in the same way as QUICK Europe in the future. To begin with, QUICK-10E is to be offered to the American market. An office has also been opened in Hong Kong in October, 1988.

By far the greatest task of globalization for QUICK is the localization in all the aspects of the service. This means that hardware supply, software development, information gathering, personnel recruitment, and service maintenance should be fitted to suit the local conventions.

The location of QUICK overseas establishments are as follows:

- QUICK Europe Limited
QUICK House,
65 Clifton Street,
London EC 2A 4JE, U.K.

- QUICK America Corporation
33 Whitehall Street,
New York, N.Y. 10004 U.S.
- QUICK Corp. Hong Kong Representative
Suite 1504A, Two Exchange Square
8 Connaught Place, Central Hong Kong

1.3.6 Nihon Keizai Shimbun Inc.

The Databank Bureau of the Nihon Keizai Shimbun is actively distributing Japanese economic and financial information overseas by two means. One is to provide Nikkei original databases to overseas database distributors, and the other is to offer its own database services to overseas users through its own international telecommunications network.

1) Distribution of Foreign Produced Databases on the Japanese Market

Nikkei started, in 1970, to offer American and Canadian company financial and stock price databases on the Japanese market based on the agreement with Standard & Poor's. In 1972, Nikkei started the exchange of macro-economic data with Data Resources Inc. based on the joint agreement. Then, starting from 1975, the Japan Economy Forecasting service based on the Nikkei macro-model was offered through DRI. Presently, Nikkei provides European stock and bond price data and financial data by EXTEL, financial data of Knight-Ridder Unicom, TEXTLINE of the Finsbury Data Services (a Reuters' company), Info Globe of Canadian Globe & Mail, and Dow Jones News/Retrieval. Other than these are a comprehensive evaluation and ranking information service of 5,000 international companies based in 20 countries using their financial data, as well as the provision of a database of Asian companies, with basic financial information on 15,400 companies in six countries including Korea and Singapore.

2) Direct Service for Overseas Users

Reflecting on the globalization of the Tokyo stock exchange market and the increasing interest being shown toward Japanese financial, economic and company information, inquiries on NEEDS service, originally developed by Nikkei on Japanese financial information, have been increasing. Also, instances where overseas securities companies have installed the Nikkei News Telecom in Japanese language, a service which was first offered in 1984 in the U.S. and in 1985 in Europe, have been increasing.

In response to increasing requests from overseas users who want to access economic information on Japan in English, Nikkei has, from 1986, been offering the Nikkei News Telecom in English. To support their overseas service, Nikkei installed international leased lines from their Tokyo headquarters to eight overseas service points in New York, Washington D.C., Los Angeles, Toronto, London, Zurich, Hong Kong, and Singapore.

3) Establishment of Overseas Service Points

Sales of the databases on overseas markets has been conducted by Nikkei America in New York and Nikkei Europe in London, as well as by local sales representatives of Mitsui & Co. In Korea, Mainichi Keizai Shimbun is the local agent where Japanese and local staff are cooperating to conduct sales and user support activities. The most important task is to train and recruit more people who are knowledgeable of Japanese economic mechanisms and financial systems, capable of providing consultation at least in English for local clients. User manuals are written in English. The computer center was established in New York in September, 1987, thus making it possible to provide file transmission for the NEEDS-BULK Service. The inquiries and requirements from clients are becoming increasingly sophisticated which makes it necessary to provide support from the Tokyo central office using facsimile transmissions. By using this procedure, it is possible for development staff in the Tokyo office to grasp the overseas users' needs directly, in order to reflect on them and to gauge what kind of services will be needed in the future. Another overseas computer center is to be established in London in order to reinforce the user support in Europe.

4) Future Tasks

The provision of Japanese economic and financial information on-line for overseas customers has a distinct potential of becoming a profitable business in the future. Nikkei plans to increase its overseas service points by expanding its international network, while strengthening its sales activities by recruiting more personnel. Special focus will be on the development and improvement of the consulting services for users' data analysis support.

1.3.7 Heiwa Information Center

The Heiwa Information Center started offering its HINET on-line database retrieval service through a sales agent in London, in 1989. The company plans to expand its service area to a global level by using a reciprocal gateway with COMLINE International.

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- 2) JICST Planning Office, *JICST Participate in the STN International*. Vol.29. No.9. Joho Kanri. P.719 – 721. 1986.
- 3) Science Council, *The Science Information System as It Should Be in the Future*. 1980.

2 Overseas Movement on Japanese Information

2.1 Materialization of "Japanese Technical Literature Act" in the U.S.

The Office of Japanese Technical Literature was established within the Bureau of Economic Affairs of The Department of Commerce in June, 1987, staffed by two full-time Japanese speaking professionals. The office is publishing a bimonthly newsletter entitled "Japanese Technical Literature Bulletin." The following is based on some of the information from the newsletter and related publications.

2.1.1 Activities of the Office of Japanese Technical Literature

The following tasks have been assigned to the Office of Japanese Technical Literature in order to improve the availability of Japanese scientific and technical literature in the U.S.:

- 1) Publication of annual reports on Japanese scientific discoveries and technical innovations in key high technology areas,
- 2) Publication of an annual directory of resources in the U.S. for Japanese technology transfer information,
- 3) Submission of a report to Congress on all federal government activities to acquire, translate, and disseminate Japanese technical literature, and
- 4) Work with businesses and professional societies to meet their needs for Japanese technical literature and to coordinate Federal government activities in order to avoid duplication of effort.

Following the above objectives, the first "Report to Congress" for the fiscal year of 1987 and 1988 has been submitted to the congress which informs it of the activities of the office during the period.

The first annual "Directory of Japanese Technical Resources" was published by NTIS in cooperation with the Japanese Technical Information Research Service of the George Mason Institute. The directory lists public and private sector services which obtain, translate, abstract, and disseminate Japanese scientific and technical literature. A listing of all translations of Japanese language material performed by the Federal government in 1987 and case studies of successful U.S. company efforts to obtain and utilize Japanese technical literature are also included.¹⁾

Two reports summarizing the current status of Japanese research and development efforts in key high technology fields have been prepared. One is on advanced ceramics which was written by Dr. Robert Gottschall of the U.S. Department of Energy and is available through the National Technical Information Service. The other is on flexible manufacturing systems (FMS) written by Dr. Bruce Rubinger of the Global Competitiveness Council.²⁾

The Office of Japanese Technical Literature is a sponsor of Phase 3 of the Japan Technology Evaluation Program (JTECH) led by the National Science Foundation and its con-

tractor Science Applications International Corporation.

The Office held an inter-agency meeting on Federal government access, use, and distribution of Japanese technical literature on March 30, 1988, at the Department of Commerce as the first of a series of quarterly meetings intended to develop better coordination of Federal government activities. The following points were defined at this meeting and a previous meeting in April, 1987, prior to the formal establishment of the Office.

- (1) With the exception of the National Technical Information Service and Central Agency's Foreign Broadcast Information Service, most agencies acquire Japanese literature within a limited subject range, and the literature is usually obtained on an adhoc basis through scientific exchange agreements with counterpart government entities in Japan.
- (2) The volume of literature received under these agreements is sufficient, and in some cases too large to evaluate or utilize effectively. Few agencies have Japanese language proficient staff or other means of screening incoming material, and in most cases, government researchers are so overwhelmed with publications that Japanese information is assigned low priority.
- (3) Lack of screening and evaluating procedures, combined with an absence of long-term objectives for acquiring Japanese technical literature, created fragmentation, duplication of effort, and over-reliance on the Japanese to supply the appropriate information.
- (4) These factors can also inhibit inter-agency coordination, since with the exception of NASA, DOE, and NTIS, few agencies have established programs for acquiring Japanese technical literature which would provide a framework for consistent communication.
- (5) The Federal government and the country as a whole are at a relatively early stage in seeking information outside U.S. borders. As U.S. researchers increase their awareness of Japanese scientific and technical developments, internal demands for useful and timely information from Japan can be expected to grow.

Other than publishing and reporting to government, the following activities were informed to be conducted by the Office.

- Dr. Kusuda (a professional member of staff of the Office) traveled to Japan in July, 1987, and visited the U.S. Embassy and other Tokyo-based offices maintained by the Office of Naval Research, the National Science Foundation, the Department of Energy, NTIS, and the Commerce-Supported Electronics Industry Association. The results from this trip were offered to Congress as a report.
- Dr. Kusuda attended, on behalf of the Office of Japanese Technical Literature, the "Machine Translation Summit" in Hakone. This report was also included in the report to Congress.
- Ms. Sabina Javits (a professional member of staff of the Office) attended the "International Conference on Japanese Information" held at the University of Warwick, U.K.

- The Office co-sponsored the seminar on "High Tech Materials in Japan" held by the Office of Naval Research and the Department of Energy in April, 1988.
- In April, 1988, at the Hearing before the House of Representatives on "Sharing Foreign Technical Information: Should We Pick their Brains?" Associate Under-Secretary, Barry Beringer provided testimony on implementation of the Japanese Technical Literature Act in conjunction with the National Science Foundation and the Department of State.
- On September 30, 1988, the Office held a conference on Japanese-English machine translation in order to gauge current U.S. and Japanese machine translation efforts and determine future U.S. policy. A representative from the Systran Corp made a presentation on the Systran system and professor Jaime Carbonell of Carnegie Mellon University provided an overview of their "Universal Purser" system. Professor Makoto Nagao of Kyoto University, Japan, then gave a comprehensive status report on Japanese commercial systems.
- In August, 1988, the Office held a meeting to discuss the copyright problem which impedes the acquisition and dissemination of Japanese technical information in the U.S. Representatives from NTIS, the Patent and Trademark Office, the Library of Congress, T. Satoh & Co., Inc., and the U.S. Copyright Clearance Center attended. The discussion focused on the need to encourage Japan to establish a Reproduction Rights Organization (RRO) to facilitate copyright releases and collect royalty payments. Without an RRO, copyright releases must be negotiated with individual authors and publishers before a Japanese document can be legally duplicated or translated.³⁾

2.2 Research on the Needs of Japanese Information in Ceramics

Mr. Justin Bloom of Technology International Inc. conducted the survey of current needs for Japanese information in the field of advanced ceramics. Several professional societies participated in the survey.

The final report indicated that large companies and federal laboratories tend to be the most active in acquiring Japanese technical information. All of the organizations surveyed rely primarily on conventional sources such as professional journals, trade publications, patent literature and specialized abstract services. The majority of the respondents rely on NTIS publications. Translated abstracts of Japanese documents were assigned the greatest value overall.

Regarding the adequacy of the information systems currently in place, most respondents expressed a subtle dissatisfaction and indicated that to be most effective a number of systems including personal communication with Japanese colleagues should be employed simultaneously.

The indicated barriers include: (1) an insufficient number of Americans trained in the Japanese language; (2) the time lag in translation; (3) scattered and duplicative efforts to

acquire and assess Japanese information; (4) lack of access to information on Japanese corporate R&D; (5) U.S. industry's emphasis on short term goals and profitability; (6) the high cost of capital; (7) Japanese cultural barriers; (8) deficiencies in the American educational system; and (9) the need for production of more commercially applicable, innovative technologies.⁴⁾

2.3 Scientific Research Exchange Programs by the National Science Foundation

In 1988, the Japanese government started offering three new granted programs to support those American scientists and engineers who undertake long-term research stays in Japan. One of the programs was established when the former Japanese Prime Minister Takeshita visited the U.S. in January, 1988, where he proposed the Japan-U.S. Science Fellowship Program which would enable up to 100 U.S. investigators to conduct research at Japanese laboratories for 6 to 24 months. NSF is coordinating the program on the U.S. side. The Japan Society for the Promotion of Science (JSPS) provides the second program which annually offers 50 post-doctoral awards for U.S. scientists and engineers to conduct research at Japanese university laboratories or at other institutions affiliated with the Japanese Ministry of Education, Science and Culture. Twenty-five candidates are nominated by NSF, five by NIH, and 20 are directly invited by Japanese professors. The visitors are expected to stay for one year. The third program, sponsored by Japan's Science and Technology Agency (STA) supports 50 young U.S. researchers yearly at any Japanese national laboratory except those affiliated with universities, as well as at Japanese public corporations and certain non-profit research foundations.

2.4 The Japan-Info Project by European Communities

The European Communities started a Japan-Info Project in November, 1986, in order to collect and disseminate Japanese scientific and technical literature which is publicly available in Japan but difficult to obtain in Europe because of language barriers and other reasons. The initial plan for the project was fully documented in the paper presented by Dr. P. E. Roe at the First International Conference on Japanese Information in Science, Technology and Commerce.⁵⁾ Here, the later process of the project is described.

2.4.1 Outline of the Project

The project has been conducted by the Commission of the European Communities and the outline of the project is as follows:

- 1) A study of the information needs of end users (mainly private companies) in the European Communities was conducted at the beginning of the project and master profiles of the targeted areas of interest (Table 4-5) were developed.
- 2) The Information Science and Technology Association, Japan has undertaken to select articles from the Japanese literature uncovered by conventional databases with the information profiles of European companies, and to prepare abstracts of the articles in Japanese lan-

Table 4-5 Master Profile

01	ELECTRONICS COMPONENT TECHNOLOGY
02	ELECTRONIC EQUIPMENT AND COMPONENTS
03	COMMUNICATIONS INCLUDING PUBLISHING
04	INFORMATICS
05	ENERGY
06	MECHANICAL ENGINEERING, PRODUCTION INCLUDING ROBOTS
07	BIOLOGY AND BIOTECHNOLOGY
08	INFORMATION SYSTEMS INCLUDING LIBRARY INFORMATION
09	CHEMISTRY INCLUDING CHEMICAL ENGINEERING
10	MATERIALS
11	ENVIRONMENT AND PROTECTION
12	MEDICINE AND MEDICAL TECHNOLOGY INCLUDING PHARMACEUTICAL
13	FOOD AND AGRICULTURE
14	ELECTRICAL ENGINEERING
15	METAL PROCESSING
16	AVIATION AND SPACE TECHNOLOGY
17	TEXTILES AND FABRICS INCLUDING WOOD AND PAPER
18	MANAGEMENT AND MARKETING
19	CIVIL ENGINEERING
20	TRANSPORT AND URBAN PLANNING
21	INSTRUMENTS, CONTROL ENGINEERING AND COMPONENTS
22	REFRIGERATION INCLUDING HEAT EXCHANGERS
23	PHOTO AND PHOTOGRAPHIC TECHNIQUES
24	AUTOMOTIVE ENGINEERING
25	NATURAL SCIENCES

Source: Euroconsortium, Japan Information Service

guage.

- 3) Fujitsu (originally, Systran participated) has undertaken to translate Japanese abstracts into English using machine translation.
- 4) Euro Brokers and others have undertaken to provide the English abstracts to end-users and to offer original copies and translations on demand.⁵⁾

2.4.2 Structure of European Participants

Dr. P. E. Roe, who had long been a scientific attache in Japan, has been in charge of this project representing the European Communities. Based on the interview article on the "Information World Review," the project has already become fully operational, where the focus has shifted to the European agents and end users. Dr. Roe highly appreciated the capability of machine translation to remove man-power and time consumption in translation. He also indicated that the project was a good procedure to introduce the machine translation technology into

because of the low level in technology, or because they were already included in other English language abstracts journals.

Machine translation by Fujitsu is done using its originally developed NASTRAN system. The system directly translates the Japanese abstracts prepared by the Information Science and Technology Association, then post-edits them in English. The system eliminates 30 to 40 % of the process of human translators. The dictionary has been enriched through the project which consists of 60,000 originally contained words in NASTRAN and 250,000 words newly added by the project. During the final stage of the project, European Communities requested to increase literature on Energy, Robots, Biotechnology, Medical Technology and Food Related Technology, whereas to discard information on Civil Engineering and Photographic Technology.

2.5 Movement in West Germany

The second International Conference on Japanese Information in Science, Technology and Commerce is planned to be held at Berlin by Gesellschaft fur Mathematik and Detenverarbeitung (GMD), in cooperation with Japanisch-Deutsches Aentrum Berlin and Staatsbibliothek Preussischer Kulturbesitz. The purpose of the Conference is to exchange the experiences in accessing Japanese information based on the output at the First Conference held at the University of Warwick. The Berlin Conference is planned to provide an opportunity to access new information sources in and out of Japan, as well as to discuss the analysis, dissemination and use of Japanese information. A new technology and tools for dissolving language barriers are expected to be introduced. New Japanese Documentation Center is planned to be established at the Japanisch-Deutsches Aentrum Berlin where the Conference is held.

References

- 1) *Directory of Japanese Technical Resources in the United States*. 1988.
- 2) Dr. Robert Gottschall, Recent activities: *Ceramic and Semiconductor Science in Japan*. (PB88-210943)
- 3) *Report to Congress : Activities of the Federal Government to Collect, Abstract, Translate and Disseminate Declassified Japanese Scientific and Technical Information*.
- 4) Justin Bloom, *Survey of Supply/Demand Relationships for Japanese Technical Information in Ceramics Research and Development*. (PB88-210943)
- 5) P. E. Roe, "The Japan-Info Project" in *Preprint of International Conference on Japanese Information in Science, Technology and Commerce*. 1987.
- 6) "Information From Japan." *Information World Review*. P.20-21. October, 1988.

3. Assignments and Perspectives

3.1 Globalization of Database Services as a Solution to Information Frictions

Coupled with the fast growth of Japanese economic and technological strength in the area of high technology industries, there is a growing criticism of Japan's protectionism in keeping patent information unavailable from overseas. Japanese private and public database services are, however, trying hard to expand their services abroad in order to cope with this problem. Also, American and European public organizations have been trying to collect and utilize Japanese information. As a consequence, some of the problems seemed to have been solved by these efforts. However, these efforts have also exposed other problems which exist on both sides.

The greatest problem is, needless to say, the language barrier. That is, few people are capable of reading scientific and technical literature in the Japanese language in order to utilize the information obtained in overseas countries, and thus Japanese literature laboriously collected is greatly underutilized. As is obvious from the American experience, even if a large amount of Japanese scientific and technical literature is collected at government agencies and private companies, this is left unutilized because of the unavailability of people or the know-how to evaluate it. This is mainly because Americans have little experience in collecting foreign scientific and technical literature, which makes it difficult to develop mechanics to cope with the ever increasing needs for Japanese information in public and/or private organizations. This is also because Japanese has been a minor language in the global community up to now, and therefore, few foreigners were acquainted with the language.

Most of the problems inherent in the language barrier should be resolved by the overseas users of Japanese information. However, if the Japanese side leaves these problems as they are, overseas users might misinterpret the Japanese attitude as an intention to purposely conceal scientific and technical information. In fact, the existence of the criticism toward Japanese information protectionism is evident in these misinterpretations. If Japanese database services are to respond fully to overseas needs, there exist several issues to be considered.

3.2 Comprehension of Overseas Users' Needs

One of the points Japanese database service organizations listed as a problem in offering an overseas service was the uncertainty of the exact needs for Japanese information. These needs can be clarified by conducting a detailed market research and needs study of the potential users. However, the findings of the existing study have clearly indicated that most of the general users of Japanese information typically want to access Japanese information in English language through existing international database services. Considering these needs, the existing databases developed in the Japanese language should, in some way or the other, be translated into English. The most important issue to be considered at this point is whether or not the over-

seas needs for Japanese information are large enough to pay for the cost of translation.

The answers may be varied by the subject field to be considered. For example, in stock market and financial/economic fields, most of the information included in the databases is written in numerical data which is understood anywhere, and therefore, the cost of translation is minimal. Also, international interests in Japanese economic and financial information including stock market data are large enough to compromise an awareness toward profitability. This is already evident by the success of QUICK.

In the fields of science and technology, most of the bibliographic information of articles that are written by Japanese scientists and engineers in English or other European languages and published in the internationally recognized professional journals, are covered by the existing international databases in each respective field. Therefore, the focus is on the literature written in the Japanese language and published in domestic publications.

Most of this literature falls into the category of so called gray literature, which is not available through the general distribution channels such as book stores, possibly not covered by the domestic bibliographic databases, and hard even to obtain in Japan. JICST has been collecting some of this literature and is developing bibliographic information with abstracts in English, and is thus trying to make such information available through the STN-International network, as well as its own JOIS service. Is there enough need for this "gray literature" to persuade any Japanese database producer to develop bibliographic information in English? In U.S., the Office of Japanese Technical Literature has been trying to collect this kind of literature and translate it into English in order to make it accessible to American industries and research organizations. In Europe, European Communities has invested in the Japan-Info Project to collect and disseminate this kind of literature. The Japanese database industry should take these circumstances into account and provide overseas services to support these projects. If the Japanese side tries to originally develop databases of gray literature in the fields of science and technology without considering these overseas efforts, they may hinder the growth of these projects, and miss opportunities in this profitable market.

Japanese database producers will always inevitably guarantee the quality of information included in the database, as long as they are providing charged services. The word "quality" means not only the quality of information or data, but also the quality in the translated language. Once they start offering a database service in English, they will continue to assume a heavy responsibility with too large a risk, especially when there is little possibility of profitability. Also, they unconsciously deprive the opportunity of those organizations and people who have endeavored to develop mechanisms to collect and utilize Japanese information in the overseas community. In addition, if the Japanese start offering information services in English by translating literature originally written in Japanese without considering the profitability, then other countries adopting a language other than English will indirectly be forced to offer the same kind of service, which will strengthen the dominance of English, which is already the

most common and dominant language.

Also, when the costs of translation from Japanese to English are to be covered by public funds, it means that Japanese taxes are used to the profit of overseas users. This will raise the problem of the justification of using funds collected by Government. At the same time, the availability of all the information on Japan in English will make Japanese language education less important, thus lessening the number of employment opportunities for those foreigners who learn Japanese.

As long as private companies are concerned with offer database services overseas, profitability is the first issue to be considered. If there is no potential in profitability, they will not consider offering such services. In the case of the public sector on the other hand, they should provide reliable services continuously without oppressing the private services on both the domestic and overseas market.

In this respect, the first thing for the public sector to consider is to develop a comprehensive database of bibliographic information for all the publications available in Japan, including gray literature in the Japanese language for the convenience its own people. The database can then be translated into English for the convenience of overseas users.

3.3 Questionnaire Survey by Database Promotion Center

The Database Promotion Center (DPC) participated at the On-Line '88 Conference held in New York, 1988, in order to investigate the needs of U.S. database users for Japanese information. A questionnaire survey was conducted to analyze the needs of the audience, in addition to acquiring individual opinions and requests from those coming to the DPC booth located in the exhibition area. Among the 500 visitors to the booth, 149 responded to the questionnaire, most of whom were librarians and information brokers working in North America.

The respondents' needs for Japanese information were analyzed as follows:

- 1) Questioned on whether or not more information on Japan is needed, 129 (86%) answered "yes." It is reasonable to suppose that most of the respondents are concerned with databases and are more interested in information on Japan anyway.
- 2) Questioned on the field of interests of information on Japan with multiple answers, distribution of the responses are shown in Table 4-6. Among these fields, the largest number of respondents selected "Business & Industry" (44.5%), followed by "Science and Technology" (26.0%), and "General" (19.5%), but "Social and Human Sciences" were selected by fewer respondents (10%).

Within "Business and Industry," Markets/product, Economics, Finance, Information industry, as well as Management and Banks/stocks/foreign exchange received strong interest. Within "Science and Technology," Patents, Chemistry, Medicine and life Science, and Physics/electronics/computers were selected from a larger number of respondents. In the "General" field, News, People and organizations raised the most interest.

Table 4-6 Field of Interests of Information on Japan

Field	Number	
I GENERAL (19.5%)	159	100.0%
All areas	28	17.6
News	35	22.0
Information on people / organizations	36	22.6
Governmental administration	10	6.2
Laws	12	7.5
Politics	8	5.0
Sports	1	0.6
Travel / sightseeing	6	3.7
Entertainment / leisure guide	4	2.5
Living information	6	3.7
Maps, addresses, 'Yellow Pages'	13	8.1
II SCIENCE AND TECHNOLOGY (26.0%)	212	100.0%
All areas	39	18.3
Patents	34	16.0
Medical / pharmaceutical / life sciences / biology	21	9.9
Chemistry	24	11.3
Physics / electronics / computers	22	10.3
Engineering / mechanical engineering	16	7.5
Construction (civil engineering / architecture)	0	0.0
Space / earth / marine science	8	3.7
Environment / pollution	13	6.1
Natural resources / energy	8	3.7
Agriculture / food industry	14	6.6
Metals / materials	13	6.1
III SOCIAL AND HUMAN SCIENCES (10.0%)	81	100.0%
All areas	13	16.0
Library / information science	18	22.2
Sociology	4	4.9
Law	11	13.5
History / political science	5	6.1
Population statistics	9	11.1
Art	10	12.3
Linguistics	2	2.4
Philosophy / religion / psychology	8	9.8
Others	1	1.2
IV BUSINESS (INDUSTRY) (44.5%)	362	100.0%
Business in general	89	24.5
Markets / products	61	16.8
Economics	32	8.8
Finance	35	9.6
Management	28	7.7
Banks / stocks / foreign exchange	29	8.0
Communications / broadcasting	17	4.6
Agriculture / forestry / fisheries	11	3.0
Labor	9	2.4
Transportation	12	3.3
Information industries	34	9.3
Others	5	1.3

-
- 3) Questioned on experience in using Japanese on-line databases, only 25 (16%) responded that they had. The systems used were Nikkei Telecom, JOIS, and PATOLIS.
 - 4) Questioned on subject fields of Japanese databases used, answers were ordered "Business" (49.1%), "Science and Technology" (31.4%), "General" (14.8%), and "Social and Human Science" (4.5%).
 - 5) Questioned on the level of satisfaction with the information on Japan utilized, only 35 responded, among whom 10 selected "dissatisfied," whereas 7 selected "very satisfied."
 - 6) Among the reasons for dissatisfaction answered by ten respondents of the previous question, (1) language barrier (36.7%), (2) lack of knowledge in procedures (20.4%), (3) high cost of use (12.2%), were selected. Others were (4) too long a time lag (6.1%), and unavailability of on-line terminals (6.1%), both of which call for future consideration.
 - 7) On the question of whether or not information on Japan should be translated into English, 102 (68.4%) selected yes, which reflects how large the number of respondents without an understanding of Japanese is (141).

3.4 Establishment and Maintenance of the Service Points

There are several ways to provide Japanese database services to the overseas market. Major alternatives are (1) translate the database into English and offer it through international vendors, (2) locate the database (in Japanese or in English) in a Japanese vendors' host computer and offer it directly to the overseas users, or (3) develop databases (in Japanese or in English) in the off-line media like CD-ROM and distribute it to the overseas users.

In the case of the first alternative, Japanese database producers need not worry about the overseas user support, because local user-support services are fully provided by the vendors. However, it may be difficult to obtain the actual users' needs because the requests of local users are collected by the vendors.

In the second alternative, Japanese database services are able to grasp the overseas users' needs, because they should confront the users' inquiries and claims. However, they should establish local service points or agents, employ bilingual staff, operate host computers in accordance with the local time, and provide full user support. When the database is written in Japanese, they should provide terminals with Japanese language processing capabilities. IBM and other manufacturers are already producing personal computer terminals with Japanese language processing capabilities at overseas factories, so this problem will be partly resolved. The most important assignment is the recruitment of capable staff at the overseas service points.

3.5 Provision of Reference and Clearing Services

It is very important to provide a reference and clearing service for overseas potential users of Japanese databases on what databases are available and how to use them. This is important because it is only in this way that people outside Japan will recognize that the Japanese are

actually developing many kinds of databases, and that Japanese database services are making efforts to provide these databases for overseas users.

This recognition will support the view that Japan is not engaged in full scale protectionism. For this reason, it is necessary to establish a reference and clearing service window on a continuous bases in addition to the conventional activity of participating at overseas database fairs and seminars, and to introduce Japanese information products with demonstrations.

In general, information needs occur during the regular business and research process, which can usually not be anticipated. Therefore, it is more reliable for users to have permanent information services close to their working place. If such services are to be provided overseas, the Japanese information service can observe the overseas users' needs more closely.

What is expected from such overseas reference and clearing services is the introduction of methods and procedures in accessing Japanese information including databases. In order to provide this, a variety of reference tools on Japan, as well as database terminals are required, with the trained staff who are knowledgeable on Japanese special information resources, and which are supported by contacts in Japan. Several ways can be considered to provide these kinds of reference and clearing services overseas. Japanese government international public relations activities are expected to support these kinds of services.

The plan by JETRO to provide Japanese business information services at its overseas local offices is one possibility. Specialized reference and clearing services in the fields of science and technology and other areas should also be considered.

Concerning the private sector, it is up to each database service company to provide local service points themselves. One possibility to be considered is to cooperate with overseas information brokers specializing in information on Japan. With the increasing needs for Japanese information the number of information brokers specializing in it is also increasing. Among them are the public services at the British Library Japanese Information Service and Centre National de Recherche Scientifique in France, as well as those available from private and independent information brokers. These information brokers have professional staff with Japanese language proficiencies, and they can use Japanese databases in order to support their services.

V. CURRENT STATE OF IN-HOUSE DATABASES IN JAPAN

1. In-House Databases within Enterprises

1.1 Factors to Promote Information-Oriented Society

Information for today's enterprise is so essential that it can be said to be the fourth resource for their management. It is no exaggeration to say that the enterprises' skill to deal with information can affect their fate. The changes in the environment around the enterprises have brought about the increased needs for enterprises to develop their own in-house databases. There are two groups of factors to promote the development of in-house databases in each enterprise.

One is intensified competition, diversified needs, shortened life cycle of product, rapid technical reformation, etc. In order to cope with the rapidly changing environment, the enterprises choose to expend their energy to the building up of efficient and improved in-house databases from the strategical point of view as a powerful tool.

The other one is their countermeasure for sluggish demand and their effort to improve business efficiency, i.e., the enterprises' defensive against the slowly developing economy. By promoting the building up of in-house databases, they aim at reduced costs and improved rationalization.

These two groups of factors will affect vitally the planning, positioning, and deciding of the character and function of an in-house database. It is true, however, that there are several factors to prevent the information activities in enterprises at present.

First, there lies a problem in gathering information. The total amount of information which is produced and distributed has increased rapidly. The amount of really useful information, however, has not increased as much as expected. On the contrary, one is forced to select really useful information from a huge amount of information in a jumble of wheat and tares. Secondly, there lies a big obstacle in arranging and processing the information. Arranging and processing of information is the reproduction process of greater value-added new information. Because of an insufficient function in this reproduction process, the information gathered cannot be used most effectively.

Therefore, the most important factor for the smooth distribution of in-house information is the effective and efficient arrangement and processing of the information.

1.2 Present Condition

According to "The Users' Awareness on Database Services - March, 1989" by Database Promotion Center, Japan (DPC), 64.9% of the enterprises own their in-house databases and this

percentage is a definite increase over the previous figure of 57.0%.

As for the application of in-house databases, 42.1% are for personnel management, 33.2% for customers management, 29.1% for financial accounting, 27.9% for stock control, 24.3% for technical information, 22.0% for production and parts control, and 18.5% for patent information. The above figures show that numeric information like personnel, customers, finance, and stock information are the most highly ranked information.

On the other hand, 70% of information distributed in offices seems to be non-numeric information, whereas only balance 30% seems to be numeric information. These percentages do not agree with the above mentioned percentages. Nevertheless, the computerization has been done mainly for numeric information. Therefore, marked discrepancy is seen between the non-numeric information currently distributed in the enterprises and the numeric information which has mostly been computerized.

1.3 Problems in the Construction and the Implementation

According to the survey mentioned above, nearly one third of the databases are of 1 gigabyte capacity and 60% are of 100 megabyte or so. It can be said, therefore, that this figure shows fairly many of the in-house databases are on a large-scale. More than half of the in-house database controlling systems are developed by the enterprises themselves. This is probably due to the fact that each enterprise has their own purpose of development and utilization of the databases. These different purposes are making the construction cost higher.

The cost of data input which includes the costs of data gathering, purchasing and renewing is over 50% of total cost of production and maintenance of an in-house database. Especially, the high cost of data input in the operation stage of the production of in-house databases vitally affects the stabilized service of the in-house databases. The percentage of installation cost of computer is naturally lower during the operation of database service. Labor cost of the production of in-house databases is almost 11% of the total cost of production.

The training of the personnel, for which the success of the production of in-house databases depends is mostly done by on the job training. Although this method is very practical, it is liable to produce personnel who lack in systematic and basic knowledge. There are two key factors for the operation of in-house databases; one is to promote or give incentive to the person who is responsible for data input, and the other is to promote the utilization of the in-house database.

The promotion of data input for an in-house database depends greatly on the awareness of consciousness for information by the whole staff which makes up the enterprise. Information input by each individual may be fragmentary, but it could become a great power by accumulation. The activities of enlightenment and explanation which help the top executives and workers understand these points are important. Easy utilization of in-house data to be used for management strategy planning, product development guidance, materials of technical development

themes and inner communication improvement has a great influence upon utilization opportunity.

1.4 Combination with Networking

In-house databases promote the information development inside the individual enterprises and the combination with communication network enables them to exchange the data not only among their various offices such as head offices, branch offices, factories, and laboratories, but also with customers, clients, and financial institutions, and to add the data collected in these manners to the in-house database allows new possibilities.

In-house databases in Japan have begun operation in this manner and are expected to change from static databases to dynamic ones by the use of a network structure.

2. Databases in Various Industries

2.1 Positioning

Databases have been developed not only in the commercial fields but also in the industrial fields, and the databases which can traverse the industries have especially been acquiring an importance.

The change of the industrial structure from the mass production and mass sales to the small scale production of the goods which are needed requires the gathering of a huge amount of information to find out the goods with prospect for big sales. Since one company's information is not sufficient for an accurate sales strategy, the information of other companies or of the whole industry or even from overseas become necessary for this purpose.

Because of this change in environment, the industry-wide databases have been acquiring a greater importance.

In constructing the databases, commercial database services are supplied to unspecified fields and unspecified users, whereas databases within various industries can specify the fields and the users and consequently, needs of the users can be grasped easily and the type and contents of serving information can be clarified.

The features, implementation and future trend of the databases in various industries are mentioned below as these databases have been improving at a rapid pace.

2.2 Creating an Environment for Database Construction

It is needless to mention the necessity of databases. However, a long-term planning in the matters of construction cost, continuous effort to process information and to expand utilization has to be made by the whole industry. The consensus of the whole industry's opinions to this effect is essential to carry out the long-term plans.

The planning, designing, organizing, and popularization of some of the databases in vari-

ous industries which are currently operated have been discussed by the groups and associations within the industries or in the study meetings by the government and municipal offices, and in some cases have been discussed for several years. These discussions laid the foundation for establishing the organization which does the construction and implementation of the databases, and which aids the smooth utilization, maintenance, and implementation once the database services begin.

Another factor to make the database construction to be easier is the standardization. For instance, the installation of ISBN code in the printing and publishing industry has enabled the books (bibliography) to be processed in one systematic code, and it also contributes to the promotion of the construction of databases for the entire industry.

Moreover, bibliographic standardization for bibliographic information (standard MARC) for bibliographic database construction is allowing the databases constructed by individual enterprises to develop as unified (centralized) databases of the entire industry.

2.3 Operational Status and Utilizational Trend

The necessity and definition of industrial databases are fully recognized but their implementation is still in the initial stage.

At present, the bibliographic databases are utilized mainly with the former individual enterprise databases, and those of the entire industry are still in the preparatory stage.

It has already been 15 years since the construction of the steel industry databases, but the annual utilization is reported to amount to only 700 times which mainly consist of batch utilization.

The facts that this database consists mainly of statistics and that its network is small are considered the main reasons for the slow growth of its usage. Though the improvement of information and the expansion of the network are being discussed, the gathering of information to be used for daily business is also important.

In the construction industry, the database service features the information related to the construction works. This database service has begun recently, but its information with a quick report, which includes commodity prices and other information closely related to the daily business, has been contributing to increased utilization. Moreover, its network which can be accessed nationwide and its simple terminal operation are also contributing to its increased usage.

3. Databases of Administrative Organizations

Electronic computers began to be used within the administrative organizations around 1960, mainly to computerize their administrative work. Though they are used mostly for this purpose even now, they are used increasingly in the fields which involve planning. In the information management of the administrative organizations, the databases are used for supporting office work management, research, information provision and policy planning.

3.1 Business Management Supporting Type Databases

Due to the computerized office work, a huge volume of data is processed by electronic computers. The data are controlled as files but their volume varies in different businesses and some of them have a stock of data exceeding one hundred million items. Examples of such large-scale databases are saving accounts for fixed amount and period (the Ministry of Post and Telecommunications), welfare pensions (the Ministry of Health and Welfare), automobile registrations (the Ministry of Transport), drivers' controlling (the National Police Agency), employment insurance (the Ministry of Labor), etc. To expedite the management work of these offices, many of those files are put in databases. The following two systems have been in the process of development.

- **The Patent Office Paperless System**

Paperless System is the computerization of all the works from patent application to judgement, in order to shorten the period of examination, to increase efficiency of office work, to improve patent information service, and to cope with our internationalization.

- **The Ministry of Labor Comprehensive Employment Information System**

This aims at united controlling of information for jobs offered and jobs wanted by using an on-line system among about 650 nationwide public employment security offices and prefectural offices.

3.2 Databases for Information Provision

As our information oriented society develops, the enforcement of a policy has been expedited by information provision by the databases listed below:

- (1) Distribution information system for perishable foods by the Ministry of Agriculture, Forestry and Fisheries
- (2) Information system for rivers and their basins
- (3) Management and Coordination Agency law searching system
- (4) Management and Coordination Agency statistical information database system

3.3 Policy Planning Supporting Type Databases

Private enterprises are increasingly using computers in deciding their business operation

and the administrative organizations have begun to make a similar effort. There are the following types in this category:

- (1) Economic policy information system by the Economic Planning Agency
- (2) Utilization and controlling system for national land numerical value information by National Land Agency
- (3) Policy planning information system by MITI

4. Databases of the Academic Organizations

4.1 Characteristics of the Databases of the Academic Organizations

Production: The index and abstracts (secondary information) databases, which constitute main sources in information retrieval services, are often produced by academic societies. This is because those databases are the derivatives of the abstract journals which have been compiled by the societies.

Distribution: Academic societies are not so active in operating on-line services as in the production area. This is due to the fact that on-line information retrieval services require large-sized equipment and expertise, and specialized system operators who cover various fields of sciences have advantage over the individual academic societies. This function could be included in the information disseminating function of academic libraries, but the development in libraries toward this direction is unlikely.

Utilization: In academic organizations, databases are utilized in accordance with the study topics of individual researchers. This lead them to do searches by themselves or request librarians the delegated searches. While the use of library is free of charge, on-line search costs a lot, and this puts researchers in financial difficulties.

Availability: Many of the academic databases are not commercially available. This is not because of their secrecy as seen for the corporate databases, but because of their unprofitability which can also be seen for the conventional academic publications.

Table 5-1 Present State of Database Service in Large-Scale Computer Centers and NACSIS

	Database Producer			Type of Data		Total
	Domestic		Imported	Reference	Fact/Full Text	
	Universities, etc.	Other than Universities				
7 Large-Scale Computer Centers	77	6	29	71	41	112
NACSIS	6	1	12	18	1	19
Total	83 (64%)	7 (5%)	41 (31%)	89 (68%)	42 (32%)	131

Source: Aggregated from "On-Line Database User's Guide, 8th edition," 1988, Database Forum of Large-Scale Computer Centers.

4.2 Science Information System

Science Information System was planned in the proposal which was made in 1980 by the Science Council, to the Minister of Education, Science and Culture, "A New Plan for a Science Information System." In it, the following objectives have been listed:

- (1) Systematic collection of books and journals at the university libraries
- (2) Effective utilization of material with a nationwide union catalog database
- (3) Spreading of the database utilization by promoting on-line retrieval services
- (4) Promoting the production of the scholarly databases

The above Item (1) is the role of the university libraries, Item (2), of the libraries and a science information center, Item (3), of each university's computing center and the science information center and Item (4), of each university or each researcher and the science information center. "The National Center for Science Information System (NACSIS)" has been established in 1986 as a "National Inter-University Research Institute" to realize the information center.

1) Science Information Network

Communication circuits are required to exchange information with databases. Telecommunication lines are available through the common carriers including NTT, but the necessary expenses proportional to the time used, to the volume of the data transmitted, and to the distance of call are too much for the researcher.

In order to promote the information flow, it is effective to reduce the communication expenses. NACSIS has rented major nationwide communication routes from the common carriers and has provided them to the university researchers and to the libraries for their common utilization. This is called "Science Information Network" and the network has been expanded every year since 1986, and at the end of 1988, network nodes have been established in 19 places in the country. This network is open to universities free of charge and is helping to level the regional differences of the communication expenses.

2) Nationwide Union Catalog Database

To maintain an on-line database concerning the books and journals which are acquired at all the universities every day throughout the country and to refer it, in lending services will bring about an effective utilization of the material. In order to construct and search the union catalog database, the system called NACSIS-CAT was developed by NACSIS and started to operate in 1985. As of the end of 1988, 78 university libraries have been connected to it and 1,230,000 volumes of books and 1,830,000 titles of journals have been registered in the database, and more than 70,000 books and journals are registered every month.

4.3 Promotion of the Scholarly Database Production

The Ministry of Education, Science and Culture is enforcing the following three policies:

- (1) Apportioning of the database construction funds to the national universities
- (2) Grant-in-Aid for Scientific Research to the researchers groups to compile databases
- (3) Developing of databases at NACSIS

In 1988, 14 databases were constructed in the projects supported by Item (1) above, and 45 databases by Item (2). NACSIS, which is in a position to produce the databases of common use in the academic community, is compiling the Union Catalog mentioned above, the Database Directory, the Grant-in-Aid for Scientific Research Reports and the Index to Dissertations. In order to promote the scholarly database construction, NACSIS also compiles the Conference Paper Database and the Full Text Database of the Chemical Journals in joint projects with the related academic societies.

VI. UTILIZATION OF DATABASE

1. Outline

The Database Promotion Center, Japan has been undertaking "the Survey of Users Awareness of Database Services" every year. The Survey was carried out in the fall of 1988 this time. The questionnaire was sent to 2,518 companies including users and venders, of which 723 companies responded (recovery ratio 28.7%). According to this Survey, the database utilization ratio for 1988 was 58.4% as an average of all industry groups. The chemical industry was ranked high at about 90%, followed by the research and study institutes at about 80%, and information processing and software related industry at about 40%. The result of the Survey is briefly described below.

2. Utilization

The database utilization cost for 1987 was 13.48 million yen per company as an average for all industry groups and 5.955 million yen when the insurance and securities industry were excluded. These costs are expected to be 14.39 million yen and 9.625 million yen per company respectively for 1988. Comparison of the utilization cost between domestic and foreign databases shows that the domestic occupies 73.7% as of 1987. As regards the number of databases, on the other hand, the domestic database occupies 23.7% and the domestic-foreign ratio here is quite contrary to the case of utilization cost.

The on-line utilization pattern shows that resorting to simplistic usage such as making hard copies of search results accounts for as much as 92.5% (Table 6-2). But the number of database users making complex usage such as by down loading is also increasing gradually. In the future, users may be divided into two extremes, that is, users being satisfied with simple utilization and users oriented toward complex utilization.

The percentage of on-line utilization of database has risen to 94 – 95% as an average of all industry groups. There are also large numbers of users utilizing database in other than the on-line mode. Particularly, "utilization of the SDI service" has increased from 38.4% of the previous survey to 40.8%, indicating increasing demands in this field. In the present survey, "the purchase of commercial database in the form of magnetic tape, FD, or CD-ROM" amounted to 39.7%, which is a 20% increase compared with the previous year. Such increases in the purchasing means not based on the on-line mode should be noted. In the future, it is expected that the means of database purchase will increase in view of the strategy of users themselves as the complex and multilateral utilization of data.

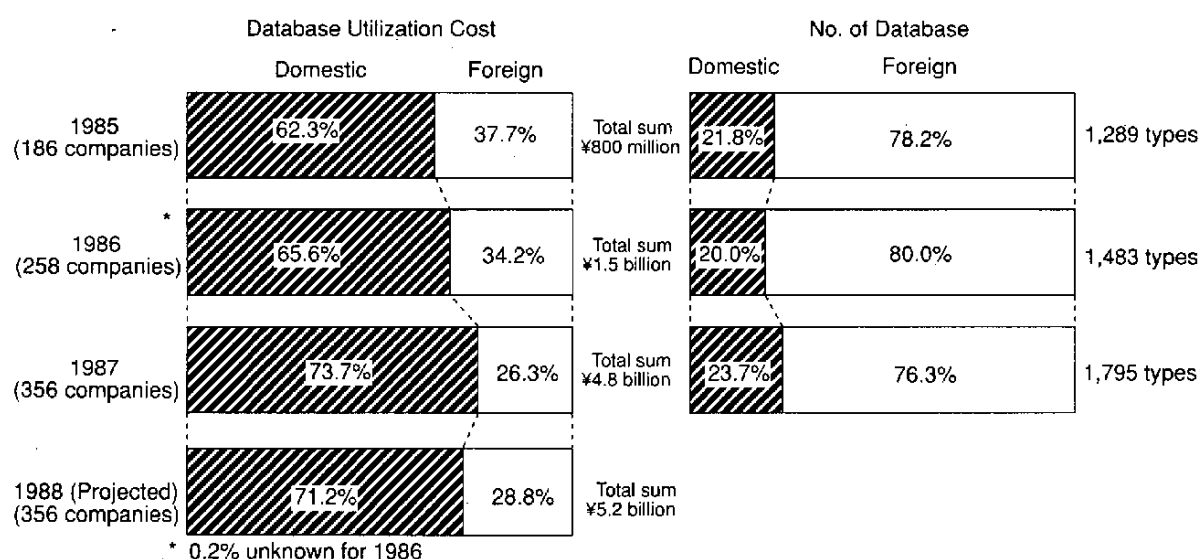


Figure 6-1 Ratio between Domestic and Foreign Databases

Source: "Survey of User Awareness of Database Services," DPC, March, 1989

Table 6-1 Database Utilization Cost per Company by Industry Group (Principal 5 groups)

(Sum unit : 10,000 yen)

Industry Group	1986		1987						1988 (projected)					
	Cases	Total	Cases	Total	Cases	Domestic	Cases	Foreign	Cases	Total	Cases	Domestic	Cases	Foreign
Chemical	52	1,266	37	607	36	281	29	399	37	680	36	326	29	432
Electric Equipment Manufacture	4	905	32	1,178	32	956	24	296	32	1,419	32	1,148	24	361
Finance	7	1,429	11	1,376	11	1,253	3	450	11	1,693	11	1,566	3	466
Information Processing Service, Software, Information Supply	28	458	33	486	33	149	17	654	35	627	34	237	19	730
Information and Research	22	124	26	244	25	191	16	88	25	292	25	216	18	104
Average of All Industry Groups	258	566	356	1,348	350	1,010	209	593	358	1,439	354	1,036	216	678
All industry Groups (Excluding Insurance and Securities)	—	—	349	595.5	343	429.6	203	287.0	354	962.5	347	501.7	210	320.0

Note: The numerical value of the chemical industry after 1986 excludes pharmaceutical and petroleum industries.

Source: "Survey of User Awareness of Database Services," DPC, March, 1989

Table 6-2 On-Line Utilization Means (Multiple Replies)

Utilization Means	1987	1988
Only printing-out search results displayed on the terminal	92.2 (%)	92.5 (%)
Processing (graph, etc.) by terminal function after downloading	11.0	16.8
Storage in the in-house database or private file	9.1	12.8
Others	3.8	3.0

(N = 373) (N = 400)

Source: "Survey of User Awareness of Database Services," DPC, March, 1989

**Table 6-3 Utilization Means Other Than On-Line Mode
(Multiple Replies)**

Utilization Means	1987	1988
Utilization of SDI service	38.4 (%)	40.8 (%)
Purchase of commercial database in the form of magnetic tape, FD or CD-ROM	33.3	39.7
Request of search and mailing of output result	36.4	25.9
Request to the agent	13.1	9.8
Utilization by visiting the service supplier	7.1	5.2
Others	4.0	5.2

(N = 99) (N = 174)

Source: "Survey of User Awareness of Database Services," DPC, March, 1989

**Table 6-4 Service System with Highest Utilization Fees Paid
(Multiple Replies)**

Rank in 1987	1988		Service System Name
	Rank	No. of Replies	
1	1	225	JOIS
2	2	212	DIALOG
3	3	151	PATOLIS
4	4	107	NIKKEI TELECOM
5	5	50	NEEDS-IR
6	6	40	STN
10	7	23	BRS
7	8	18	TSR
	9	17	COSMOS
9	10	16	DIALINE
	11	15	BRANDY
	12	13	DEMOS
	13	11	HINET
	14	10	QUICK VIDEO-I
	⋮	⋮	⋮
8	18	6	ORBIT
	⋮	⋮	⋮
Total		1,035	

Source: "Survey of User Awareness of Database Services," DPC, March, 1989

When database purchase is analyzed in terms of media, "the magnetic tape" occupies 70.2%, 19.8% for CD-ROM and 10% for FD, Specific databases purchased include "JICST Scientific and Technical Literature File," "NIKKEI File," "Enterprises Financial File" (Teikoku Data Bank), "Japan Patent and Utility Model File," etc.

Reasons for utilizing a commercial database were given as "rapid availability of informa-

tion," "comprehensiveness of information," and "easiness of filing, processing, and analyzing" in that order. Similar to the previous survey, not many users gave "the economy" as a reason.

Consequently, database users tend to put weight on "the rapid availability of information" and "comprehensiveness of information," rather than "being economical" or "substitution for a library." Furthermore, the degree of satisfaction for each reason can be ranked in the same order as the reasons. It may be said that the expectation of users for database is nearly fulfilled.

The information brokers were once utilized at high percentage, but the percentage showed a downward tendency and was 8.5% in the present survey. The reasons include "the availability of in-house search," "expensiveness," and "concern about secrecy."

3. In-House Database

The companies having an in-house database (database within the company) account for 64.9% of the total, showing steady growth (7.4% increase) in spite of increased number of respondent companies from the previous survey (Table 6-5). More than half (54%) of the databases have been constructed before 1984. The greatest number of databases (15% of the total) were constructed in 1985.

As regards the content of the database, "personnel management" was highest at 42.1%, followed by "customer management" at 33.2%, "financial and accounting" at 29.1%, and "inventory control" at 27.9% in that order. The present survey did not include the question on the scale of database, but the reply ratio appears to indicate that a large number of companies create more than one database. When the average construction year is taken into account, "inventory control," "personnel," and "customer" are types of information introduced as a database from early on, while "reference material" and "personal/member information" are out into databases later.

Table 6-5 With / Without In-House Database

With / Without	1987	1988
	%	%
With In-House Database	57.0	64.9
Without In-House Database	43.0	35.1

(N = 577) (N = 690)

Source: "Survey of User Awareness of Database Services",
DPC, March, 1989

4. Utilization of Personal Computer Network

Figure 6-2 shows the summary of replies on utilization of personal computer network. According to this, 32.7% of users are "using" personal computer network while 67.3% are "not using." Among affirmative replies, 87.7% are using terminals installed within the company and 11.8% are using both terminals within the company and terminals at home. The menus frequently used in personal computer network include "electronic mail" (55.9%), "BBS (Bulletin Board System)" (50.2%) and "database" (35.5%).

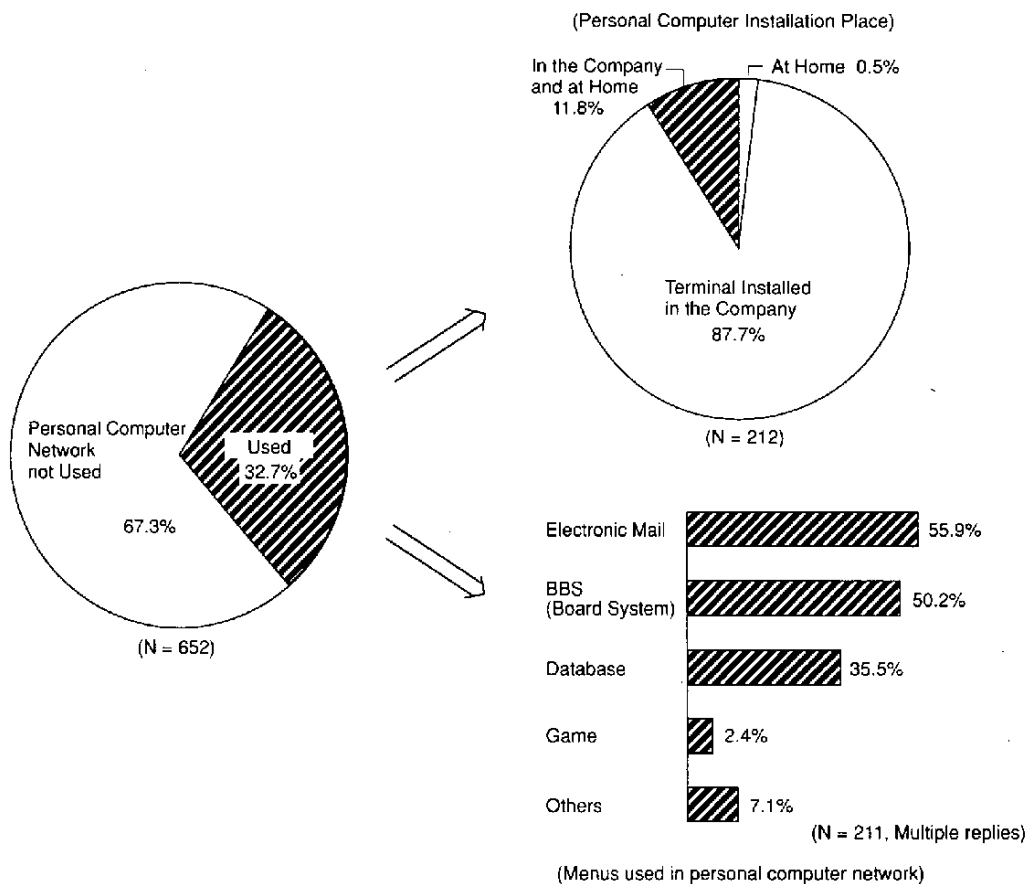


Figure 6-2 Outline of Utilization of Personal Computer Network

Source: "Survey of User Awareness of Database Services," DPC, March, 1989

5. Schedule of Utilization

Figure 6-3 shows the field of databases scheduled in the near future and the districts to be covered. The rough classifications are ordered as "business" (40.1%), "natural science and technology" (32.0%), "general" (22.2%), and "social and human sciences" (5.3%). The percentages and order are similar to that of the previous survey. The overall trend as viewed by the district to be covered shows the same sequence as in the previous survey (whole world, Japan, U.S., EC, Asia, etc.), except that the percentage of the U.S. decreased slightly while demands on information in the Asia district has grown.

When viewed by sector, data in the field of "general" and "business" are requested on Japan. In "natural science and technology" and "social and human sciences" fields, data tends to be requested on the whole world. Such difference may be due to difference in the nature and utilization purpose of information handled in each field.

As regards the district to be covered, Japan, whole world, and the U.S. occupy the largest percentage in most fields of more detailed break down. But needs tend to be more dispersed in

the field of "newspaper/magazine/news," "patent," "chemistry," "electric/electronic/information," "economy (foreign countries)," and "enterprise finances/enterprise information (foreign countries)." It may be said that information is difficult to obtain in districts other than Japan and the U.S. and that the demand is growing.

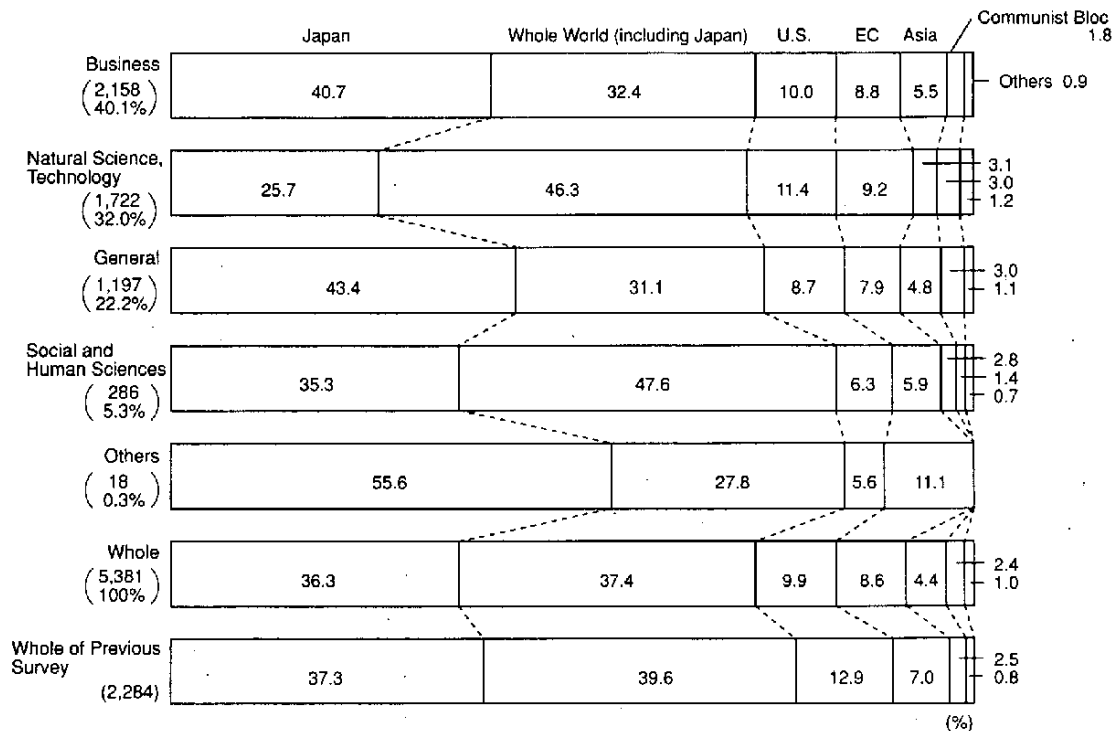


Figure 6-3 Database Field and District to be Covered in the Future
(N=5,381, Multiple Replies)

Source: "Survey of User Awareness of Database Services," DPC, March, 1989

VII. LOCAL DATABASES

1. Database Promotion Policy to Activate the Local Areas

Today's "Concentration to Tokyo" is typified by "information flooding to Tokyo." There exists a great difference in the information utilization between Tokyo and other areas as is the case of the databases. Almost all the database services and their vendors are located in Tokyo and in its neighboring area and this situation has not changed for years.

We should discuss the database producers and database distributors separately when we study their spread in the local areas. It is natural for the database producers to set themselves up in Tokyo where they can easily collect and process the original data. Not a few databases are constructed in Washington D.C. and New York where a big volume of information can be collected in the U.S. On the contrary, the distributors do not necessarily have to set themselves up in the central area. In fact, many big distributors like Mead Data Central (Ohio) and DIALOG (Calif.) have their bases of operation in the local areas. It's not strange if the same thing occurs in Japan. The problem is that most of our major distributors have their bases of operation in Tokyo. One of the reasons for this concentration is that our major database producers provide their own database on-line services to the public by their own efforts. They seem to think that the database services should be done from the upstream of production to the downstream on-line services. This idea seems to develop from the intense competition among the main frame computer producers.

In fact, the following database services of the government ministries and agencies have functions both as producers and as distributors; Japan Information Center of Science and Technology (JICST) for scientific and technological information; Japan Patent Information Organization (JAPIO) and Japan Techno Mart for patent information; Japan Small Business Corporation, Small and Medium Enterprise Information Research System (SMIRS); and National Center for Science Information System for bibliographic utilities of academic libraries. In the private sector, Nihon Keizai Shimbun's databases and Electronic Library not only produce but distribute the database services. This type of service in both the government and the private sectors has developed in this manner owing to the systematic characteristics and the circumstances under which the services started. However, the enterprises and organizations who are yet to start the database services are inclined to the same pattern. The local database services are no exceptions and many of them are having a hard time as they try to construct and distribute simultaneously in spite of the essential difference between the construction and the distribution. This is a fundamental problem for our whole database services and will affect the future development of our local databases.

Japanese government ministries and agencies are discussing the various fundamental policies to develop the local information oriented society. As one of MITI's policies in its "New Media Community Plan," nine local areas were newly designated as the practical development areas making a total of 64 areas designated.

Ministry of Post and Telecommunications' "Teletopia Plan" designated four local areas during 1988 raising the total of designated areas to 67.

Ministry of Construction's "Intelligent City Plan" designated 15 cities raising the total of designated cities to 51.

Ministry of Agriculture, Forestry and Fisheries' "Green Topia Plan" designated 17 areas, bringing the total of designated areas to 52.

The number of areas which are included in the Ministries' local information oriented society promotion plans, amounts to 234. However, in most of the areas, the plans have not yet been put into action but are still being discussed. Besides, some of the areas are designated by two or more plans and adjustments have not yet been made among the Ministries concerned. The local organizations concerned are short of the capable persons, and are asking for assistance in their planning from the governmental research organizations or consultants. The local areas with strong demand and intention to promote their information oriented society have more concrete plans. Originality and independence of the local areas are expected to develop strongly as the various plans become more concrete.

The local nodes of the public organization database services are being developed. For example, the small and medium enterprise information research system (SMIRS) of Japan Small Business Corporation is providing the information on the literature, corporations, groups and people, to the small and medium size business managers through the 45 Small and Medium Enterprise Regional Information Centers made for the small and medium size corporations all over the country. Twelve centers have their own host computers and firmly establish their own local information centers. In 1988, four more prefectures installed their own host computers.

The Database Promotion Center, Japan is inviting every year, from the public, projects of the promotion of database construction and of their technical development, and these few years projects related to the local information oriented society have appeared, though their number is still small and most of them are of fundamental nature.

The continuance of the researches are expected to bring about the construction and utilization of the local databases of their own originality. The widespread utilization of the local databases will serve to improve the regional differences in software provision and to facilitate in training the skilled workers. The future establishments of an "Advanced Information Center for Local Industries" in many local areas will be significant. Though the Center was originally established as a SIGMA system sub-center and was aimed at strengthening the local softwares provision, the establishment of the database showrooms and consulting will serve the wider utilization of the local databases.

2. Development of the Private and Local Database Industry

In 1989, Japan Database Industry Association (DINA), which is a voluntary trade group of database services providers in Japan, celebrated the 10th anniversary of its establishment. Most of the members are located in the Tokyo area. Of the few members located in Osaka, Nagoya and Kyushu, most are doing their activities through their Tokyo offices. This exemplifies the concentration of the databases in Tokyo, but in order to promote the local database services, it has been expected to establish separate local promoting organizations.

In 1985, Kansai Database Association was established as a liaison conference group of the organizations and enterprises related to database services in the Kansai area covering seven prefectures. This association has 156 members who are in the fields of industry, local public organizations and universities, and has its secretariat in the Kansai Institute of Information Systems, Osaka, and is actively promoting its project. As a first step, the institute has sketched out a "Vision" for the database construction and utilization in the Kansai area (1987), in which, following four themes are shown in the "Vision":

- (1) Construction of the diversified database
- (2) Publication and distribution promotion of the databases
- (3) Promoting the database utilization
- (4) Promoting the development of the database industry

Kansai Database Association made an investigation of the databases which had already existed in the area within enterprises, universities, local municipalities and laboratory research corporations, and as a result of several years of investigation has published the locations of those databases. Many of those are used privately in house. This investigation provides important data on the development of the databases and the accumulation of data which is the original source of the databases in the huge industrial area of Kansai. For the purpose of information promotion in the local industries, the digging up, introducing and awarding of excellent in-house databases are performed.

A symposium is held every year to publish the actual utilization of in-house and commercial databases and to exchange the information on their respective experiences. Once a year, Kansai Database Fair is held in Osaka and not only local database service dealers but also many of those from Tokyo participate in the Fair in which they exhibit and demonstrate the commercial databases. An organ bulletin "Database" is published quarterly.

In the Tokai and Hokuriku areas, the Tokai Hokuriku Database Promotion Association was formed in Nagoya in November, 1987. This association consists of 134 companies and organizations in the fields of industry, non-profit organizations, universities, and database service dealers all of which are located in the seven prefectures of this area. In 1988, lectures, meetings, study and training were held to exchange information of the experience on the database

utilization, and a bulletin "Data Pro" is edited and distributed. Lecture meetings are held not only in Nagoya but in Toyama. The lecture meeting is planning to construct a database booth in the Business Machine Show to be held in Nagoya in June, 1989 and also to dispatch a study group overseas.

In the Kyushu area, the Kyushu Database Promotion Association was formed in February, 1988. This association consists of 17 leading organizations in both the private and the public sectors under the guidance of Kyushu Bureau of International Trade and Industry for the purpose of promoting database utilization in the Kyushu area. The association is trying to find a means to construct and spread their own databases. In Fukuoka, Kumamoto, Oita and Kagoshima, systematic efforts to construct and utilize their own local databases are being made.

In Hokkaido, the Sapporo Chamber of Commerce and Industry has been studying the database utilization since 1985, and in May, 1988, Hokkaido Database Study Group was formed. The current members are 22 companies. In Sapporo, the demonstration and exhibition of databases were made several times as a part of the exhibitions of the computers and electronic machines fair, and more future activities of this kind are expected.

There is an initiative aiming at inter-connections among the local databases all over the country and the three organizations of DINA, Kansai area and Tokai-Hokuriku area are exchanging bulletins among their members. In May, 1989, Society of Database Promotion Organization was formed.

VIII. NEW TRENDS RELATED TO DATABASE

1. Database-Related Fundamental Technologies

1.1 Production Technology

Data production technology is a technology to collect and input data into a database system. Data production, which is executed manually at present, is expected to evolve in the future into a process based on automation and information processing technologies.

(1) Data Collection and Input

Data collection and input covers a scope from the occurrence of a certain event up to the input of such event as data into a computer.

For the bibliographic database, for example, the collection of bibliographic data is newly made from data provided in the form of books, magazines, and newspapers. In the publishing industry (newspapers, etc.), however, data entered into a computer system at the time of publishing a newspaper are utilized for building up a commercial database.

Manual data collection is inefficient and may possibly cause delay or error. A support technology to solve problems associated with manual operation is on-line data collection using a computer network. The hardware or software environment is important in order to facilitate data exchange. On-line data collection is becoming popular now along with the propagation of the POS (Point of Sales) system in the distribution industry and improvement of the data communication function of personal computers and workstations.

The methods of entering data into a computer are classified into the manual input system and the pattern recognition system. The manual input system uses a keyboard to input data, and in the present situation a kana-kanji conversion type input is used which converts the key-in data into kanji by using a conversion dictionary.

The pattern recognition system is a means to speed up and reduce labor of the input operation of not only numerical and character data, but also of image data. There are two types of methods available for entering data; as image data the way it is, or as data converted to the coded information through recognition. In the present situation, a method of using an image scanner to input data including characters as a whole as image data is often used. Recently, a device enabling recognition of characters printed in any place and conversion of such characters into character data has been introduced. As a result, the required storage capacity will decrease and reprocessing on the search side will be easier when compared with the conventional case of storing characters as image data.

As compared with the direct input methods above, the indirect input methods using transmission devices (facsimile, etc.) have also been brought into use gradually.

(2) Data Editing

Data editing is a technical method to edit input data by various means into a proper form for processing in the database.

In the case of searching bibliographies, keyword search and extraction functions are required. These functions are mostly handled manually and thus require time and money while unnegligible errors in accuracy are found. One of promising means to solve these problems is automation. Automation in a field of bibliography search includes word isolation, automatic extraction and classification of keywords, automatic editing of thesaurus, and extraction of important numerical values. Data will be edited and stored in the database on the basis of these information. Moreover, practical application of auto-abstract and machine translation can also be considered as long-term subjects.

At present, automatic extraction of keywords through analysis of the Japanese structure by AI (Artificial Intelligence) is being put into practical application. Also, a system enabling new automatic registration of a control word (described later) by request is in the process of development. This approach is applicable not only for the bibliographic database, but also for creation of the numerical database and statistical database as well, and its application field is expected to be further expanded.

Various dictionaries are used in the operations above in order to enhance the qualitative accuracy of the database, speed-up and reduce labor for database creation, and reduce its cost. Among those dictionaries used for data editing, the thesaurus plays an extremely important role. The present thesaurus utilization still remains on a stage in which a word (control word) equivalent to one concept is manually selected from the thesaurus and entered as a search key. A study on automatic conversion from natural word to control word has been done for further utilization of the thesaurus. Such a study involves creation of a dictionary and incorporation of the additive information (e.g., classification code).

1.2. Distribution Technology

Data distribution technology is a technology concerning the way of sending the accumulated data to a counterpart. Developments of diverse and highly sophisticated communication networks and data utilization technology have contributed greatly to development of data distribution technology.

(1) Data Distribution

Data distribution is classified into two types; on-line and off-line.

The off-line distribution is suitable for mass data utilization, in which data are stored into magnetic tape, distributed via means such as mail, and processed by computers of uses. Recently, CD-ROM has also started being used as a medium of data distribution.

However, on-line search of database is generally employed for extraction of necessary data from among a large amount of data. Even in the case of on-line search, distribution by mail or

by facsimile in the form of printed matter is additionally used when the result of the search is in large quantity.

As the personal computer and workstation are disseminated, it becomes possible to store the search result tentatively on the terminal side in order to print a series of integral information, or to receive and store the search results of a numerical database onto disk on the terminal side and to analyze and process the data by a personal computer program.

With dissemination of CD-ROM, the usage is expected to evolve to the form of using CD-ROM for search of a large quantity of data and using on-line search for the newest data .

(2) Networking

Generally, the commercial databases maintain a low search frequency per user, and most use the telephone network. The users can access via a telephone network to the database center from any place in the nation. Variations of the database search network include a videotex network, facsimile communication network, and various VANs. In addition, ISDN allows utilization of a communication network that enables easy transmission of multi-media data at high-speed and at low cost. This will expedite multiplication of media of the database further.

It is now necessary for the convenience of users to provide the service extending over the database on multiple computers. In this case, interconnection of networks is also necessary. However, the protocol of data communication is set independently by each maker, and it is essential for connection of dissimilar systems to match protocols. International standard protocols are being standardized while being coordinated by ISO and CCITT.

1.3 Utilization Technology

The most important issue of the commercial database service is to improve the service quality to users. Complaints concerning the existing database service include "difference in the operation method from terminal to terminal," "difficulty of understanding the search language," "difficulty of remembering the search language because it differs from database to database," and what is required now is how to solve these complaints.

Also importance is how to utilize the search result. Techniques in terms of utilization are summarized as the utilization technology.

(1) Equipment

The principal equipment currently used as an on-line terminal is the personal computer. Since the 8-bit personal computers have been in the market for about 10 years in Japan, the function and performance have been improving year by year to this age of the 32-bit personal computer. Along with the use of personal computer and workstation terminals, there is a change from a conventional terminal handling codes to the multi-media terminal handling graphics, image, and voice. The terminal which has conventionally performed only display/output of the search result can now process/edit the search result as its own material after down loading.

The use of facsimile as an image data output device is frequent and will be more frequent

with dissemination of the G IV facsimile with improved output quality.

(2) Man-Machine Interface (MMI)

The user interface of on-line search in the commercial databases is a system in which, based on key input by the keyboard, the secondary information, abstract, and location of the target data are output in the form of characters. Certain databases allow the users to know the desired primary information directly, but even in this case the content is simple with information of mainly codes or characters. The key input content generally contains designation of the keyword/search conditions by alphanumeric, menu number input method, etc. Recently, a product offering a display/input method more convenient for users by means of a search software on the personal computer/workstation side are on the market.

In the future, the man-machine interface will undergo substantial change in line with the increasing number of available databases and expansion of the available types of information, that is, development from the coded information into multi-media including image and voice. There is also demand to offer the operability corresponding to the familiarity of terminal users in order to cover all users from beginners to the experienced.

(3) Search Language

The general database utilization involves searching of bibliographic information, etc., by entering simple commands from the on-line terminal. Providing the search keywords or designating the composite conditions are ways to focus on the target data. Moreover, registration of the questionnaires or use of a thesaurus enable multilateral and efficient search.

At present, standardization of the database language for access to the database is in progress. In November, 1987, the database language "SQL" established by ANSI and ISO was authorized as JIS standard and the unification of the interface between the database and users/business applications being attempted.

Research and development on the input of natural language is also flourishing, with trials already made on limited databases. In the future, search will be done just by entering the conditions of required data in Japanese.

(4) Data Processing and Editing

Development of the personal computer and workstation has enabled tabling/graphing of searched data and bibliography during insertion of the created text by the user. This kind of utilization is conspicuous in database use within the enterprises/enterprise groups. The result searched in one screen using multi-windows can now be readily transferred to the material being created in another screen and the search data can automatically be graphed. Note that due attention needs to be paid to the copyright during data processing/editing of data in a commercial database.

1.4. Other Technologies

(1) Distributed Database System

Needs for distribution of databases include two kinds; one is to interconnect databases already constructed and the other is to distribute processing/control along with increases in the data amount.

The database is produced in each section in most enterprises. For integrated utilization of such database over the entire company, mutual utilization of databases by interconnecting them via network is essential.

On the other hand, it is becoming more and more difficult to handle all data by one main frame computer as the data volume to be handled by an information processing system is increasing. It is therefore necessary to separate data required by the section/region from those required over the entire company/country and thus to distribute processing and control.

It is essential for the distributed database system that the users can utilize the database without considering its location. Currently, various companies are offering or developing the above system in various approaches. The horizontal distribution system, for example, can realize the reference function with relative ease, but is rather difficult in realization of the exclusive processing.

(2) Machine Translation

Various machine translation systems from main frame computers to personal computers are provided. Though the translation accuracy has been enhanced by limiting the subject to specific commercial or technical information, pre- and post-processing by people are still necessary. Therefore, the machine translation system is used partially for word translation, such as automatic translation of the extracted keyword into English on the commercial database. Since the level of translation accuracy has been improving gradually, it is expected in the future that the searched English bibliography is indicated in Japanese or that the database for overseas supply can be created in line with the creation of a Japanese database.

(3) Reliability and Safety

To ensure the reliability of the database system, the hardware has conventionally been provided with redundancy to enhance the fault resistance, so that partial fault of the circuit does not affect the system as a whole and repair/replacement of a faulty part can be made during system operation. The current system configurations ensure high reliability by employing a multi-processor construction.

This system guarantees reliability by assuming that the fault is occurring in some specific section. In the future, it may be necessary to ensure reliability including complete duplex system to be prepared for multiple faults.

Information is an important resource for enterprises and the society which has been accumulated with gigantic investment of both enterprises and the society. Due consideration is therefore necessary on the safety to protect it from illegal leakage or data appropriation.

The internal security of the computer system has been ensured in both hardware and software, and so the security external to the computer such as the control of admission into the computer room, training of operators, and legal measures are also necessary.

(4) Multi-Media

Data currently used for the database are mainly numerical and character data. Along with the development of the information oriented society, there is more demand for use of multi-media data to be integrated organically and to be more efficient with image and voice, besides numerical and character data. In order to meet such demand, proper processing must be done at all stages from the database input to control/transmission and utilization.

The systems available can process and store individual media in the personal computer/workstation and database system. But the system that is entirely compatible with media is still in the process of research and development by manufacturers.

2. Present Condition of ISDN Services

The telecommunication market is undergoing substantial changes recently along with expansion and sophistication of social and economic activities. Needs for the network services of transmitting various information such as facsimile data, image data and so on, in large quantity and at high-speed has been growing day by day in addition to conventional communication (telephone).

Each country in the world has developed the "Integrated Services Digital Network" (ISDN) as a network service to meet the demand of the high-level information oriented society, and at the CCITT a framework of its standardization was counseled as the I series in 1984. In Japan, standardization of domestic ISDN has been proceeding with Telegraph and Telephone Committee (TTC). The ISDN service is a digital network which transmits degitalized information such as voice as well as image, animation, and various data information and is expected to become the communication network for the next generations. The on-line database is positioned as one of principal utilization patterns of ISDN service.

In April, 1988, "the INS net 64" which is an NTT version of ISDN service has started offering services in Tokyo, Nagoya, and Osaka.

There are two types of INS net services offered by NTT:

One is a basic interface service using the existing telephone circuit and the other is a primary group speed interface service of an optical transmission type. Both services are given via the interface complying with international and national standards.

The INS net service allows communication with anyone at any time, simply by dialing. Other features are described below:

- (1) The charge for the INS net service is based on the rate according to the communication time, and thus the economical digital communication is possible.

-
- (2) The transmission speed thereby enables high-speed and high-quality communication (high-definition facsimile communication, image animated communication and high-speed data transmission).
 - (3) Multiple channels can be used via one telephone circuit.
 - (4) Multi-media communication, in which one circuit is enough for free selection of voice or data communication or circuit/packet exchange, will be available.
 - (5) The existing network transmits information and signal via the same channel, but since the INS net service has the information channel (B) and signal channel (D) separated, the signal channel can be used for free exchange of signals during communication via the information channel.

At the end of February, 1989, the number of users has grown to 208, the number of circuits exceeded 1,000 (1,025 circuits), and the contracting customers are also increasing steadily. Utilization is expected to grow further with the future development of terminal equipment and expansion of the coverage.

3. Intelligent Property Right and Copyright

Rights on database have been treated mainly by contract conventionally without definite recognition of the protection according to the Copyright Law. As development and utilization of the database proceeds further, the problems beyond the contract have begun to occur. For example, one problem concerns the scope of protection with the situation of reproduction of database stored on a magnetic medium. With this, it is now necessary to define the management based on the copyright system more clearly.

The Agency for Cultural Affairs has started to discuss the problem in 1984 and presented the Bill for amendment to the Copyright Law before the diet in March, 1986. The Bill was approved in May of the same year, and enacted in January, 1987.

The copyright of databases was reviewed from the viewpoint of conventional editorial products. However, in view of creativity of each stage of (1) collection and selection of information to be used as material, (2) set-up of a system that can be retrieved by a computer, and (3) analysis/processing of information according to the above system as well as selection of a key word, the database was defined as being different from the other editorial products. The database is therefore "protected as a product when it has creativity by selection of information or its systematic composition." However, only a fundamental framework for protection of the database was completed within the Copyright Law, and there are problems to be solved concerning the scope of protection.

WIPO affirms the properties of database as a literary work from the viewpoint of collection and editing of information. In 1988, the EC committee presented the green paper on copyright which deals with the copyright. It defines the database as an "aggregate of information

stored and accessed by electronic means," when dealing with the issues of database and copyrights.

In the U.S., the database is interpreted as a literary work and its registration is required by the Bureau of Registration. With the development of telecommunication and computer technologies, much information on enterprises and private matters has been distributed beyond the border freely. Due to differences in information resources, the amount of information distribution, and legal systems among various countries, the TDF (Transborder Data Flows) problem has been discussed. The problem of TDF has been discussed mainly from the following two aspects:

In response to the 1980 recommendation of OECD, the allied countries enacted the Privacy Protection Act. In Japan, this act was also enacted in December, 1988. However, there have been differences in the content of protection, so that coordination of details of protection will be necessary among countries concerned in the near future.

Also, the domestic industry fostering policy and various policies in liberalization of TDF are closely related. Various regulations to protect and foster the domestic industries may be regarded as a non-tariff barrier and could become a trade problem. These issues should be discussed between countries or in international agencies in the future.

4. Electronic Information and Privacy

Privacy is one of the important rights of the dignity of one person and has been considered as an aggregate of the individual items of thoughts, creeds, religion, and medical history. However, as computerization proceeds, and personal information including private information is handled independently, privacy is now interpreted as "a right to control the flow of one's own information." The personal information which cannot be considered as private information in a general sense may turn into private information by application of computerized data accumulation, classification, recollection, or transmission technologies or through a combination of these technologies. It is also difficult to define which items of personal information are included in the scope of private information. It is considered that the boundary area may also shift depending on the change of an age.

Protection of privacy through the national legal system in foreign countries has begun with the Data Act of Sweden in 1974. In September, 1980, OECD has adopted "The Recommendation of the Board Concerning Guideline in Protection of Privacy and International Distribution of Personal Data."

In Japan, the Administrative Management Committee presented "The Interim Report on How the Privacy Protective System Should Be Associated with Utilization of the Computer by the Administrative Agency," in 1975, in response to consultation of the Minister of Administrative Management. "The Applicable Regulation on Protection of Computer Processed

Data" was enacted in 1986 and "The Law for Protection of Personal Information Associated with Computer Processing in the Administrative Agency" was proclaimed in December, 1988.

Protection of personal information becomes a specific problem in the administrative agency because the personal information is often being collected semi-forcedly on the basis of administrative need. The Japan Information Processing Development Center organized "The Privacy Protection Research Committee in the Private Sector" with experienced scholars and experts of computer processing of personal information. After a two-year discussion, the committee made public "The Guideline for Protection of Personal Information in the Private Sector" in March, 1988. This guideline is based on eight principles presented by OECD.

IX. ACTIVITIES FOR PROMOTION OF DATABASE

1. Database-Related Policies in Japan

Databases, as well as hardware, software, and human-ware are indispensable for the smooth realization of the information oriented society, so various ministries have been performing various measures to promote the database.

"New Media Community Plan" of MITI, "Teletopia Plan" of Ministry of Posts and Telecommunications, "Greentopia Plan" of Ministry of Agriculture, Forestry, and Fisheries, "Intelligent City Plan" of Ministry of Construction, and other regional information projects involve the databasing of regional information and introduction of the database system.

Furthermore, other database-related activities include promulgation of "The Law Concerning Protection of Personal Information Associated with Computer Processing in Administrative Agency." This law is to protect the rights and interests of personal information held by the government.

Providing various statistical data held by the government in a form of magnetic tape is actively promoted to expand utilization of governmental statistical data in the private sector.

2. Ministry of International Trade and Industry

2.1 Present State of Databases in Japan

Information is widely disseminated industrially and socially and the database industry of Japan is currently achieving steady growth. According to the "1987 Survey on Designated Services Industries" of MITI, the sales of the database industry totaled 43.2 billion yen.

The 1988 "Database Directory" (issued in July, 1989) summarized by MITI shows that the number of databases distributed in Japan is 1,964 (9% increase from the previous year) of which only about one fourth (528; 20% increase from the previous year) of the total are domestic databases. This shows substantial dependence on foreign countries.

2.2 Overall Policies for Database Maintenance

Each year, several subjects are selected concerning the databases which are critical for the development of the Japanese economy, and development, planning, and research of critical databases are performed, geared toward the construction of these.

In spite of recent growth in needs from overseas for databases in Japan, the import of database exceeds the export. To control such unbalance and to meet the demands from foreign countries, domestic databases are being internationalized by undertaking research on the main-

tenance and promotion of database for overseas and the improvement of the overseas supply system. This research has been started from 1989 and involves, research on needs and seeds in foreign countries.

The database construction requires gigantic initial investment, and a considerable time is required for recollection of investment. To alleviate the burden associated with the cost, the database reserve system was started in 1988.

In September, 1982, "the database directory system" has been adopted to promote dissemination of the database services. Database directory is published in print and is offered on floppy disk to improve the database clearing service in Japan.

3. Management and Coordination Agency

3.1 Database Construction State Within each Ministry

Since 1975, the database began to be constructed using various accumulated data in line with accelerated utilization of computer in various ministerial agencies. The number of operating databases increased by four to five times for seven years after 1980 and the number of databases under development shows the same tendency. The present trends include promotion of development of small and diversified databases and the number of databases in agencies will further increase in the future.

3.2 Basic Policy Concerning Database Maintenance

"The basic policy of the database maintenance in administrative agencies" was approved in the liaison conference of ministries on the administrative information system. Each ministry is to promote improvement of the database according to this basic policy as determined in the cabinet conference on the innovation of administration in 1988. Specifically, these policies include; (1) improvement of the planning coordination function within the ministry, (2) planned promotion of database maintenance within the ministry, (3) improvement of the inter-ministry coordination function, (4) maintenance of the system for overall utilization of administrative information, and (5) promotion of supply of magnetic data to the private sector.

3.3 Determination of the Cabinet Conference in 1989

The cabinet conference on innovation of administration in 1989 decided to incorporate two items of (1) official policy on OSI and (2) specific basic policy on improvement of the database within the improvement of the administrative information system.

4. Ministry of Education, Science and Culture

4.1 Promotion of Database Creation

The Ministry of Education, Science and Culture is positively promoting the project of creating the database of scientific life learning, and educational literature information on the basis of the report of the Council for Science and Technology, the report of the Provisional Council for the Promotion of Administrative Reform, and the report of the National Council on Education Reform.

The project of database creation of national universities and National Inter-University Research Institutes is supported by the National Schools Special Accounts Budget, while that of societies and research group is supported by the Grant-in-Aid for Publication of Scientific Research Result.

To promote independent learning activities for the society of life-long learning, the prefectures and cities have been cooperating to establish the learning information network since 1988. An auxiliary project to improve the learning information supply and consultant system for community people has been created.

4.2 Maintenance of the Infrastructure of Database Distribution

National Center for Science Information System (NACSIS) is taking leadership in improvement of the scientific information network connecting principal points all over the country via a high-speed digital circuit.

In January, 1989, NACSIS was connected with the National Science Foundation (NSF) of the U.S. via the international dedicated network. Connection with British Library (BL) is also planned in 1989.

As the information oriented society proceeds, fostering talents to support the advanced information oriented society has become an important issue. The Ministry of Education, Science and Culture reviewed how the information engineers should be fostered and released the interim report in June, 1988.

The National Institute for Education Research, National Education Center, and National Women's Education Center are also undertaking construction and operation of various databases.

5. Agency of Science and Technology

5.1 Science and Technology Information Policies of Japan

The science and technology information policies of Japan are based on "The National Information System for Science and Technology" (NIST), a concept proposed in response to No.4 Consultation of Science and Technology Meeting in 1969. The concept intends to establish and improve the nationwide distribution system through organic integration of various

information agencies (the general center, etc.) under governmental coordination to ensure smooth information distribution. Various policies have been promoted up to now according to this concept.

5.2 Science and Technology Information Activities

Japan Information Center of Science and Technology (JICST) was established in 1957 as a spinal agency of scientific technology information distribution in Japan and has been supplying literary databases created based on scientific and technical documents collected inside and outside Japan, as well as fact database with compound dictionary. The Scientific and Technical Information Promotion Funds was offered for the Agency of Science and Technology as the cost for overall promotion and coordination of important researches, and various studies have been executed. For standardization necessary for promotion of distribution of scientific information the Agency of Science and Technology enacted the Standards for Information of Science and Technology (SIST).

To promote mutual and international distribution of scientific information, STN International, which is an international on-line network, is operated with Chemical Abstracts Service (CAS) of the U.S. and FIZ Karlsruhe of West Germany.

X. CHRONOLOGICAL TABLE OF DATABASE

Calendar year	Background	Principal Events
1957	Establishment of Japan Information Center of Science and Technology (JICST)	
1967	Establishment of the Japan Information Processing Development Center (JIPDEC)	
1969	Presentation of the NIST concept	
1970		Sales of MT of Nikkei NEEDS, Finance, and Stock Price start
1971	Establishment of the Japan Patent Information Center (JAPATIC) Opening of the public communication circuit of NTT	NTT starts DEMOS-E
1972		JICST starts batch service, Kinokuniya starts ASK JAPATIC starts batch service Nikkei starts NEEDS-TS/I (finance)
1973		Nikkei starts NEEDS-TS/II (macro economics) Dentsu starts MARK-II
1974		Quotation information center starts QUICK/Video I (stock price) Dentsu starts MARK-III
1976		JICST starts JOIS-I
1978		JAPATIC starts PATOLIS Nikkei starts NEEDS-IR batch service Tokyo Shoko Research starts TSR-COMPASS service via MARK-III
1979	DDX network service started Organization of the Database Services Industry Association of Japan (DB SIA)	Japan SDC starts Search J Maruzen starts DIALOG via dedicated circuit
1980	KDD starts ICAS Presentation of Standard Specification for Public Kanji Terminal by five information service agencies	Kinokuniya starts DIALOG via dedicated circuit
1981	Report of the Information Industry Committee of the Industrial Structure Council (An Outlook for 1980s)	Nikkei starts NEEDS-IR on-line service Tokyo Shoko Research starts TSR-BIGS JICST upgrades JOIS-II
1982	KDD starts Venus-P Nippon Documentation Center (NIPDOC) sponsors First Database Fair	INTEC starts IP SHARP
1983	MITI issues the Database Directory KDD intergrates ICAS into Venus-P	Teikoku Databank starts COSMOS-II on-line service JAPATIC starts PATOLIS service in Kanji via the public circuit Mitsubishi Research Institute offers on-line experimental service of JAPAN-MARC
1984	Establishment of Database Promotion Center (DPC) Adopting the database corner in the business show	Nikkei starts TELECOM and NEXIS JUNET (Japan University/Unix Network) test is started NTT starts CAPTAIN service
1985. 4 5	Enactment of the Telecommunication Business Law Placement of NTT under private management Foundation of the Kansai Database Association	

Calendar year	Background	Principal Events
8	Reorganization of JAPATIC to Japan Patent Information Organization (JAPIO)	JAPIO starts English patent database supply to SDC/ORBIT
11	Execution of the qualification test of database retrieval engineers of NIPDOC Release of the Interim Report on Database Service from the Industrial Structure Council	
12	DB'SIA is re-named to the Japan Database Industry Association (DINA)	
1986. 4	Establishment of the National Center for Science Information System (NACSIS)	Approval of JICST for JOIS to perform substitute retrieval
5	Revision of the Copyright Law	
6	DPC, release of the White Paper of Database	
8	International Federation of Library Association and Institution held 52nd General Conference in Tokyo	
9		
10		Nikkei starts overseas service of News Telecom in English JICST starts overseas service of English file JAPIO approves substitute retrieval of PATOLIS
12	"Proposition for Promotion and Improvement of Japanese Database" of the Congressional Federation for the Promotion of Information Industry	
1987. 2	MITI announces private supply promotion of stored data via MT	
3	Japan-USA agreement on international VAN	Opening of the Tokyo Service Center of STN International
9	Management and Coordination Agency announces private supply promotion of stored data via MT	
11	Foundation of the Tokai/Hokuriku Database Promotion Association	
12	Economic Planning Agency announces private supply promotion of stored data via MT	
1988. 2	Foundation of the Kyushu Database Service Conference	
7	NTT Data communications systems corporation separates as an independent company from NTT	
10	The first participation of DPC in the On-line '88 held in New York (October 10 - 12)	
11	First participation of DPC in the 7th Southeast Asia Computer Conference/Exhibition held in New Delhi (November 28 - December 1)	
12	Promulgation of the Law Concerning Protection of Personal Information associated with computer Processing in the Administrative Agencies	
1989. 1	First participation of DPC in the Information On-line '89 held in Sydney (January 17 - 19)	Installation and start of operation of NACSIS in NSF, America.

XI. CONSIGNED SUBJECT AND OUTLINE OF DATABASE PRODUCTION AND TECHNICAL DEVELOPMENT PROMOTION PROJECT OF THE DATABASE PROMOTION CENTER, JAPAN

The Database Promotion Center, Japan has been providing financial support to private enterprises and industrial organizations for database production and technical development. This support has been given every year since 1984 and is to promote production of databases which are important socially, economically, and internationally or databases necessary for prosperity and promotion of regions and industries, and research and development of database related technologies in view of production and distribution of databases, and improvement of utilization efficiency.

Consigned project has been performed for 5 subjects in 1984, 18 subjects in 1985, 24 subjects in 1986, 29 subjects in 1987, and 24 subjects in 1988.

A total number of subjects from 1984 to 1988 has reached 100, ranging over a wide field. As a part of information events, the result presentation and dissemination meeting is held on consigned subjects of the previous year in October, every year.

Subjects Contracted for Database Production and Technical Development for 1988

Field	Title of Subject
Society	1 Research and investigation on mutual utilization of newspaper article database 2 The Research and Analysis on the most effective Utilization of the Databases on the Laws, Ordinances and Judicial Precedents in Japan. 3 Research and investigation for production of governmental/ministerial ordinance database 4 Production of the health care evaluation database and communication system with semantic information 5 Production of the life support database to meet information needs of handicapped person 6 Production of the accident and disaster information database 7 Research and investigation for production of the safety information database
Regional Activation and Promotion of Medium to Small Enterprises	8 Production of Osaka land price database 9 Production of database network on the public research and examination institutes 10 Development of an online database for technical consulting 11 Production of the regional industry map database
Materials	12 Production of the copper/base composite material patent database
Studies on Parts	13 Database production for programmable peripheral devices of microcomputer
Standardization	14 Production of Kanji database 15 Standardization for database facilities of computer graphics 16 Production of the CD-ROM standard database compatible with Japanese
Overseas	17 Development of the translation document edit program using the Japanese-English and English-Japanese technical term dictionary database as translation support tool 18 Research and investigation on the retrieval expert system of science and technical information in Japan for overseas users 19 Research on the technical term of dictionary database for a machine translation system 20 Production and research on database for overseas advancement of food industries and overseas procurement of food materials
Utilization Technologies	21 Research and investigation on the integrated technology for database comprising various types of data 22 Technical development for the full-text type technical information database test system 23 Research and investigation on the automatic word search system for small database 24 Development of the intelligent information retrieval system based on the set theory

**OUTLINE
OF
DATABASE
PROMOTION
CENTER,
JAPAN**

Introduction

The information industry is expected to play a vital role in enhancing Japan's overall industrial structure, and the development of this industry will depend on the balanced development of its various segments – the equipment and software used to generate, process and transmit data, and the information services made available through these. In order to contribute to the realization of an information oriented society and the establishment of free flows of information oriented between and among all nations of the world, Japan will be required to construct databases capable of being accessed by users around the globe.

Measures are required to improve and strengthen the database service industry and other information supply services, and to deal effectively with the problems that can be expected to arise as a result. The government, fully aware of the importance of such measures, has enacted a policy aimed at facilitating the promotion of database construction and services.

The private sector, including members of the information industry, computer users and other related parties, is also in agreement as to the need for a solid foundation to support the expansion of Japan's information supply services. This realization has led to the establishment of an organization charged with the task of creating such a foundation, the "Database Promotion Center."

DPC has as its goals the sound promotion of database construction efforts, research and development of basic technologies related to databases and the establishment of efficient clearing operations, activities which should also prove beneficial to the further development of the Japanese economy and to this country's contributions to the world economy.

DPC engages in the following activities:

1. Financial Assistance for Database Production

Since 1984 DPC has been offering financial assistance to help offset the high costs of production of, and the long period required to realize returns on investment in, databases deemed essential for the national economy. We selected five projects in 1984, 18 projects in 1985, 24 projects in 1986, 29 projects in 1987 and 24 projects in 1988.

2. Publication of Database White Papers and Database Directories

- a) DPC has been publishing Database White Papers on trends in Japanese and foreign database services, policies for promoting database development in Japan, domestic and foreign utilization of Japanese databases, and new trends relating to databases since 1986.
- b) DPC has been publishing database directories in book form since 1983 and in floppy disc versions since 1987, covering domestic and foreign databases available in Japan.

3. International Activities

- a) Holding of International Symposiums on Database

DPC has been holding international symposiums on databases since 1985, and guest speakers have included reputed lecturers like Professor Martha E. William of Illinois University, Ms. Laurie Leichman, Manager of Information Services of McKinsey & Co., Inc., New York Office, Mr. William L. Dunn, Executive Vice-President of Dow Jones & Co., Inc., Dr. Roger K. Summit, President of DIALOG Information Services, Inc., and Ms. Margaret T. Fischer, Vice President of Electronic Information Practice of LINK Resources Corp.

- b) Missions to Foreign Countries

DPC has sent missions to investigate new trends in database industries and services in the U.S., Europe, Australia, China, the NIES, and ASEAN nations since 1984.

- c) Participation in Conferences and Fairs in Foreign Countries

DPC participated in an international conference on Japanese science, technology and commerce information which was held at the University of Warwick in England in September, 1987. We participated in the On-Line Conference '88 which was held in New York in October, the SEARCC '88 in New Delhi in November 1988, On-Line Conference in Sydney in January, 1989, and On-Line Meeting in New York in May, 1989. In 1989, we are planning to participate in the 2nd International Conference on Japanese Information in Science, Technology and Commerce to be held in Berlin (West) in October, and On-Line Conference to be held in Chicago in November.

4. Survey, Investigation and Publication of Manuals

a) Conducting of "Survey of User Awareness of Database Services"

DPC has been conducting a survey under the title of "Survey of User Awareness of Database Services" since 1985.

b) Investigations of Reputed Consultancy Firms

DPC has been commissioned since 1985 to produce reports investigating new trends in database industries and services in the U.S. and Europe for reputed consultancy firms like INPUT, CSP International, LINK and IMI.

c) Organizing Committees for Investigation

DPC organized several committees for making recommendations and reports on "Training database engineers," "Opening of governmental data to the private sector," "Promotion of informatization of local areas," "Advanced utilization and the promotion of distribution of statistical data," "Establishment of synthetic networks for databases," "Charge system and regulations for the utilization of databases," and "Current situation of CD-ROM related industry in Japan."

d) Publication of Manuals

DPC has produced two manuals on the development of databases and the training of data-base engineers.

5. Other Promotional Activities

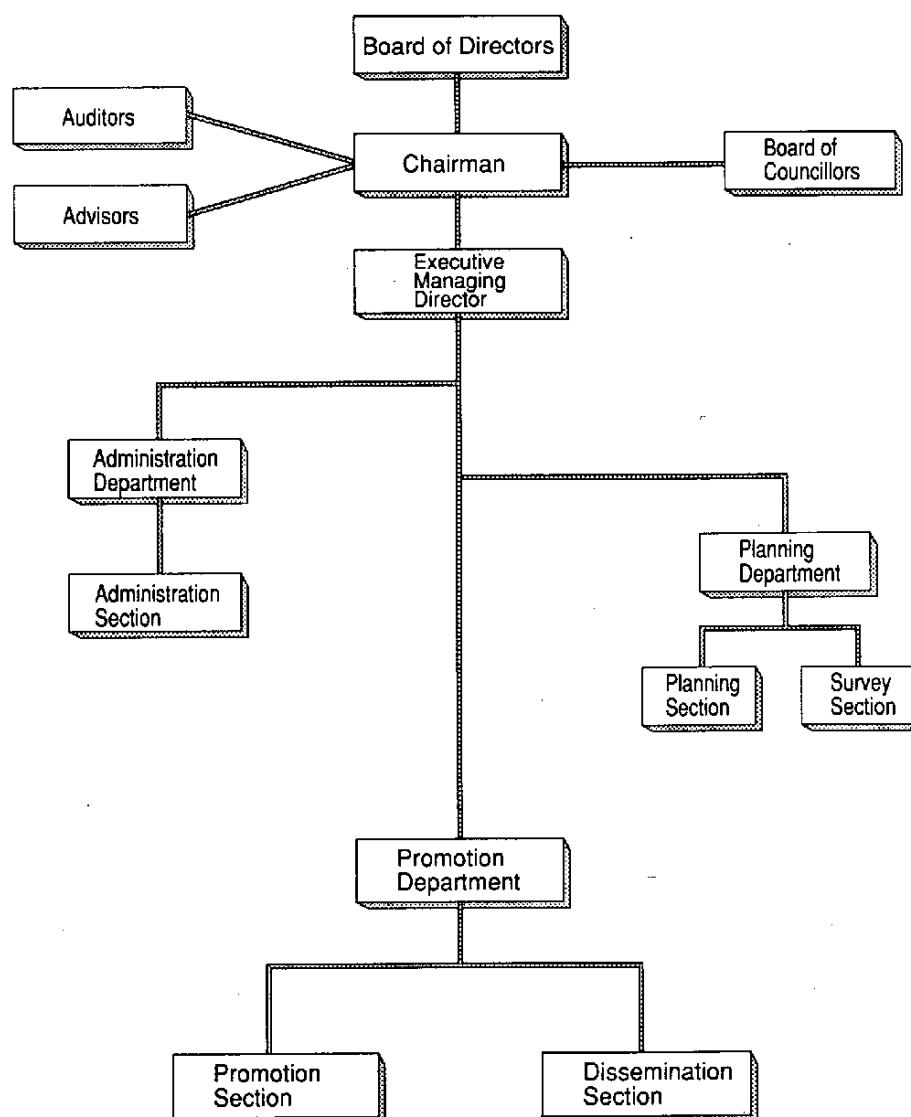
a) Participation in Events and Fairs in Japan

DPC has been participating in one of the biggest business fairs since 1984 and supports various events and fairs relating to databases in order to promote database services for businesses and ordinary people.

b) Production of Promotional Videos

DPC has been producing promotional videos since 1985. Last year DPC has produced videos under the title of "Database Services in Japan" in English. This year DPC is planning to produce video under the title of "Guidance of Database Production."

Organizational Set-Up



Basic Information on Database Promotion Center, Japan

Establishment: April, 1984
Fund: 200,000,000 Yen
Chairman: Jiro Enjoji
Executive Managing Director: Tatuo Watanabe

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